

ST200/250
CNC LATHE
AUTO-PROGRAMMING

66 Edition 1.01

AP-1782-1-0301-E-1-01



Hitachi Seiki Deutschland
Werkzeugmaschinen GmbH

CONTENTS

1. GENERAL	1 - 1
1. Outline	1 - 1
2. Programming	1 - 2
3. Before Reading This Programming Manual	1 - 2
2. OPERATION PANEL	2 - 1
1. Description of Operation Panel	2 - 1
2. Description of Keys	2 - 2
2-1 Keys Used for Automatic Programming	2 - 2
3. OPERATING ENVIRONMENTAL CONDITIONS.....	2 - 3
3. CONVERSATIONALLY AUTOMATIC PROGRAM OPERATION	3 - 1
1. What Is Conversationally Automatic Program ?	3 - 1
2. Starting the Conversationally Automatic Program	3 - 1
3. Executing the Conversationally Automatic Program	3 - 2
3-1 Executing the Conversationally Automatic Program	3 - 2
3-2 Selecting the Item	3 - 2
3-3 Material Shape Input	3 - 3
3-3-1 Shape Input	3 - 3
3-3-2 Material Shape Input	3 - 3
3-3-3 Selecting the Material	3 - 4
3-3-4 Selecting the Blank Shape	3 - 5
3-4 Inputting the Blank Shape (Formed Bar).....	3 - 8
3-4-1 Precautions for Inputting the Blank Shape	3 - 8
3-4-2 Setting the Element Start Point (Formed Bar)	3 - 9
3-4-3 Selecting the Inputting Method (Formed Bar)	3 - 9
3-4-4 Symbol Input (Formed Bar)	3 - 10
3-4-5 List Input (Formed Bar)	3 - 18
3-5 Input of Final shape	3 - 19
3-5-1 Shape Input	3 - 19
3-5-2 Setting the Element Start Point (Final Shape Input).....	3 - 20
3-5-3 Selecting the Inputting Method (Final Shape Input)	3 - 20
3-5-4 Symbol Input (Final Shape Input).....	3 - 21
3-5-5 List Input (Final Shape Input)	3 - 40
3-6 Correcting the Shape Input (Correcting the Blank Shape and Final Shape)	3 - 41
3-7 Turret Index Position	3 - 45
3-7-1 Input Shape	3 - 45
3-7-2 Setting the Turret Index Position	3 - 46
3-8 Selecting the Type of Machining	3 - 47
3-8-1 Input Shape	3 - 47
3-8-2 Selecting the Type of Machining	3 - 48

3-9	Automatic Program Creation	3 - 50
3-9-1	Programming	3 - 50
3-9-2	Automatic Programming (Selecting the Item)	3 - 51
3-9-3	Program Editing	3 - 59
3-9-4	View	3 - 61
3-9-5	Program Transfer	3 - 62
3-9-6	NC View	3 - 63
3-10	Displaying the Machining Time	3 - 65
3-10-1	Selecting the Function	3 - 65
3-10-2	Displaying the Machining Time	3 - 65
3-11	Inputting/Outputting the Shape Data	3 - 66
3-11-1	Programming (Selecting the Function)	3 - 66
3-11-2	Inputting/Outputting the Shape Data	3 - 66
3-12	Program Confirming Preparation (Turning)	3 - 67
3-12-1	Turning Confirmation Creation	3 - 68
3-12-2	Machining Contents	3 - 70
3-12-3	Machining Area	3 - 74
3-12-4	Enlarged Drawing of Machining Area	3 - 80
3-12-5	Special Function	3 - 81

4. MACHINING CONDITION FILE 4 - 1

1.	Selecting the Item	4 - 1
2.	Cutting Process File (Selecting the Item)	4 - 1
3.	Machining Sequence File	4 - 2
4.	Tool File	4 - 4
5.	Cutting Condition File (Material Selection)	4 - 21

5. PARAMETERS 5 - 1

1.	Selecting the Item	5 - 1
2.	Real Value Parameters	5 - 3
3.	Alphabet Parameters	5 - 12
4.	Bit Parameters	5 - 20
5.	Integer Value Parameters	5 - 21
6.	Details of Parameter Functions	5 - 23

REFERENCE MATERIAL R - 1

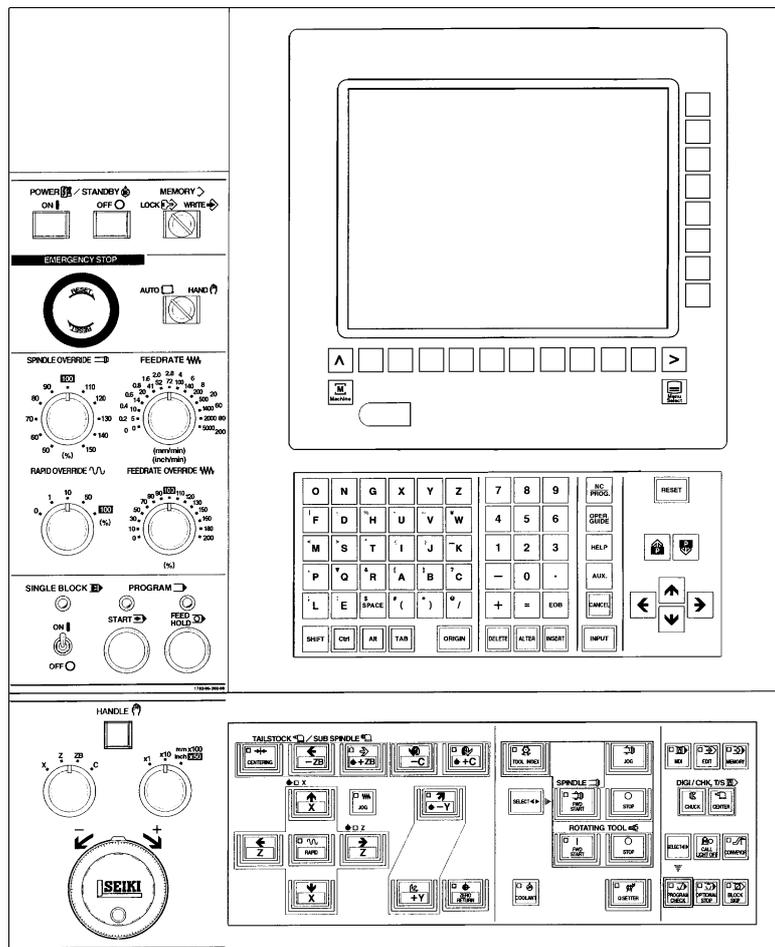
1.	When More Tools Are Automatically Selected Than the Number of Turret Faces (Tool Mounting Faces) Depending on Workpiece Shape	R - 1
2.	Input Example of Blank Shape and Final Shape	R - 2
3.	How to Always Output High-speed Steel Drill (Nose Angle 118°)	R - 18

1. GENERAL

1. Outline

We designed this CNC lathe, SEICOS-pcFLexi MULTI System, so that anyone can use it without difficulty. It has functions which enable various operations just by pressing the keys in accordance with the instructions shown on the 10.4-inch TFT color screen.

For programming, you only need to input a blank shape and a final shape. A program necessary for machining is automatically created.



Mechanical operation panel

CNC operation panel

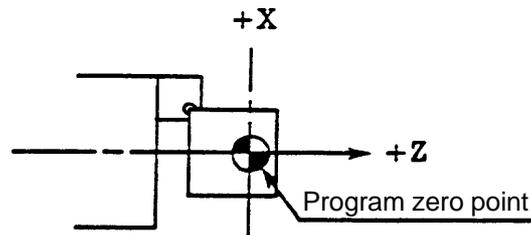
2. Programming

With the SEICOS-pcFLexi MULTI System, a program necessary for machining is created by only answering a blank shape and a final shape to inquiries shown on the screen.

3. Before Reading This Programming Manual

This programming manual is compiled to explain as many things as possible. However, since there are so many operations which are impossible with this machine, they are not included in this manual all. What are not described "possible" in this manual shall be assumed impossible".

- A program is created on the assumption that a workpiece is chucked at its left side and that a program zero point is set to the end face of the workpiece.

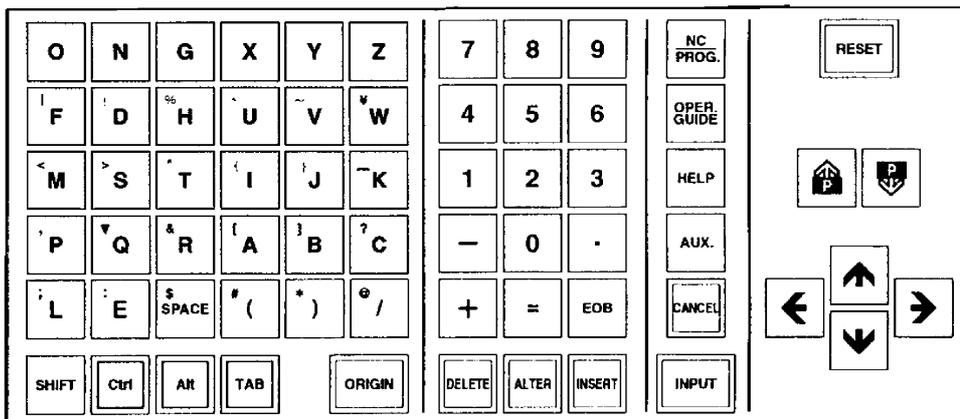
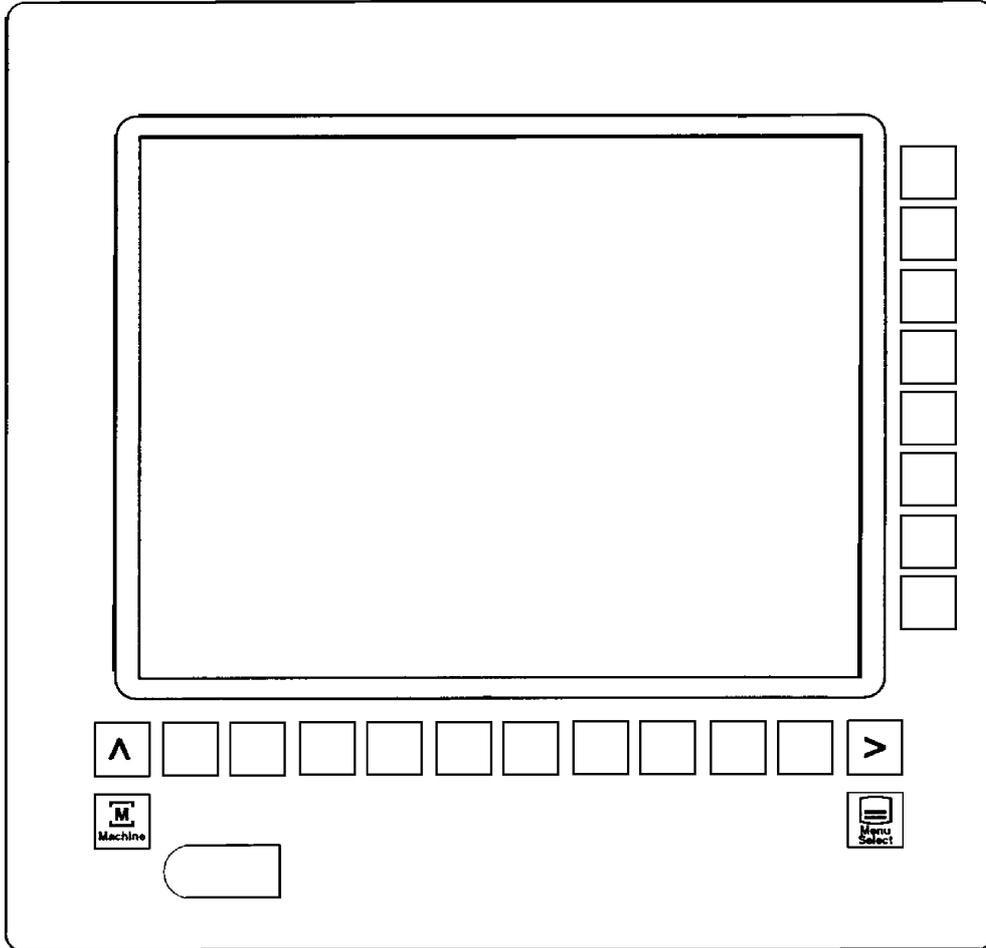


- A program for 2 axes (X, Z-axis) controlled NC lathe is created.
- The turret head assumes a turret indexing system.

2. OPERATION PANEL

1. Description of Operation Panel

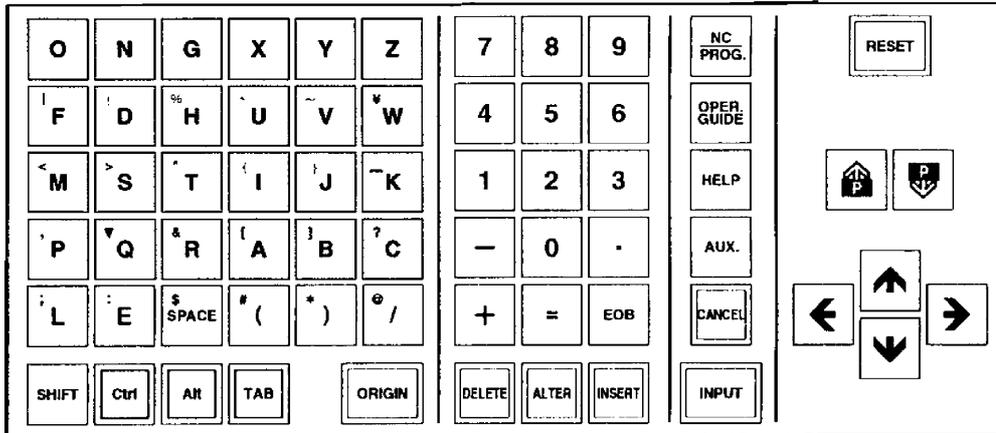
The operation panel consists of 10.4-inch TFT color screen, 18 function keys and other keys including Ten (10) keys, and so on. It has the following appearance.



Appearance

2. Description of Keys

2-1 Keys Used for Automatic Programming



FUNCTION Keys F1-F0

: Function names are displayed on the lower part of the screen for each screen.

ALPHABET Keys A-Z

: Inputs a alphabet.

SHIFT Key

: To be used to input the data indicated at the upper-left corner of each alphabet key and for other special operation.

ORIGIN Key

: No use key (during auto programming)

TEN (10) Keys 0 through 9 - +. =

: Inputs a numerical value.

EOB Key

: Changes lines after inputting one line (1 block).

INSERT Key

: Inserts data.

ALTER Key

: Alters data.

DELETE Key

: Deletes data.

NC/PROG. Key

: Switches over the PROGRAMMING screen and OPERATION screen.

OPER. GUIDE Key

: No use key (during auto programming)

HELP Key

: No use key (during auto programming)

AUX. Key

: No use key (during auto programming)

CANCEL Key

: Cancels input data.

INPUT Key

: Inputs data keyed in.

RESET Key

: No use key (during auto programming)

(Note) If pressed during operation, which is enabled for the operation side, the operation stops.

PAGE Keys  

: Each page goes forward  or backward 

CURSOR Keys    

: Moves the cursor.

: For maintenance.

3. OPERATING ENVIRONMENTAL CONDITIONS

To use SEICOS-pcFLexi MULTI, be sure to strictly obey the following conditions of operating environments:

Item	Specifications
Ambient	Temperature During operation 0° ~45° C (When using HDD, 5 ~ 40° C) Note 1)
Humidity	10 ~ 90%RH There shouldn't be dew condensation.
Vibration	Less than 4.9m/s ² Note 2)
Atmosphere	There shouldn't be flammable, corrosive gas.

Note 1) Ambient temperature in operation:

Conformity to the above ranges are monitored with the temperature sensor inside the heavy electric board.

(1) When temperature is out of the set range on supply of power:

The operating side alone is started with the indication displayed on the operating side status.

When temperature reaches inside the range, the interactive auto programming side, too, is automatically started.

Note 2) Vibration:

Under unspecified frequencies, the N/C control unit or the incorporated hard disk itself may be subject to resonance.

Even in the above-mentioned environments, contents stored in the hard disk can be destroyed on occurrence of an erroneous operation, unexpected failure, etc.. Especially, the risk is increased when power supply should be cut off while in auto programming computation. Therefore, never cut off power while in each processing.

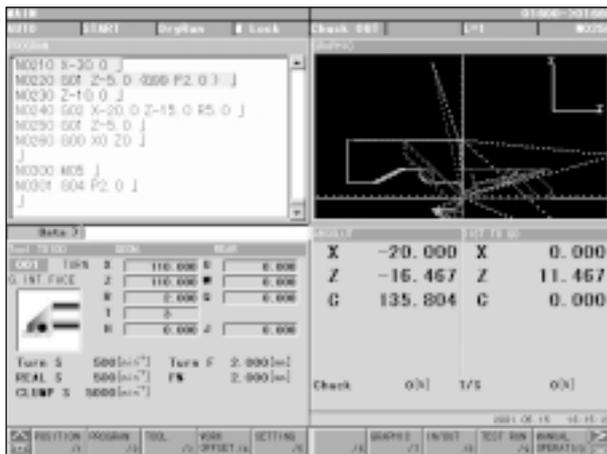
3. CONVERSATIONALLY AUTOMATIC PROGRAM OPERATION

1. What Is Conversationally Automatic Program ?

This is a function which creates a program by only inputting value to inquiries on the screen. With the SEICOS-pcFLexi MULTI, a program is automatically created by only inputting a blank shape and a final shape. There are 2 kinds of shape inputting methods; symbol input and list input.

2. Starting the Conversationally Automatic Program

Turn on the power control cabinet and press the POWER ON button on the operation panel.



The overall screen of the operating side is displayed.

Note) Refer to the Instruction Manual for operation.

Operation Screen



Press the NC /PROG. key on the operation panel.



An initial screen is displayed.

Initial Screen

3. Executing the Conversationally Automatic Program

3-1 Executing the Conversationally Automatic Program

3-2 Selecting the Item



Item Select Screen



Press the F1 (Shape) key.

Select a desired item.

- | | |
|-------------|---------------------------------------------------------------------|
| F1/Shape | To select material, final shape, index position, type of machining. |
| F2/Auto | To automatically create a program. |
| F3/L.Conf. | To confirm and create the turning process. |
| F5/Edit | To edit the NC program. |
| F6/View | To check the NC program. |
| F7/NC View | To check the program in the NC memory. |
| F8/Transfer | To transfer the program to the NC memory. |
| F0/Others | |

Note) Standard values have been set for the machining condition files and parameters. Proceed to "programming" after altering them as required. For the machining condition files and parameters, refer to "4. MACHINING CONDITION FILE" and "5. PARAMETERS".

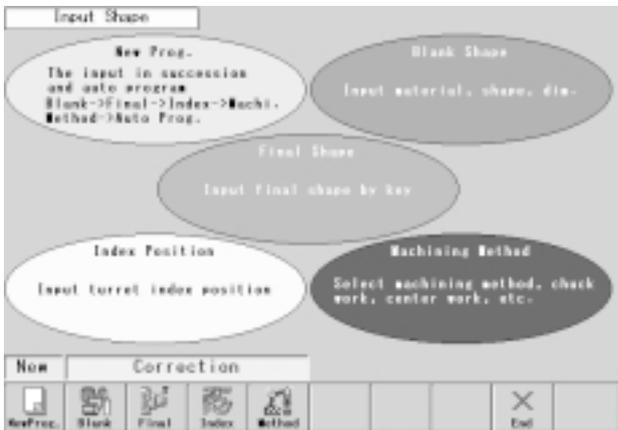
3-3 Material Shape Input

3-3-1 Shape Input



Press the F1 (Shape) key.

F1/Shape : Input of material, final shape.
Input of index position.
Selection of machining type.



Input Shape screen

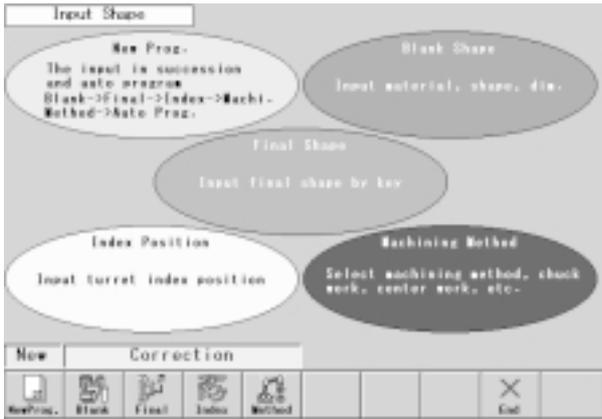
F1/New Prog. Creates a new program.
F2/Blank Modifies the shape input.
F3/Final Modifies the shape input.
F4/ Index Modifies the index position.
F5/Method Modifies the type of machining.
F9/End Returns to the precedent screen.

Outline of Inputting Procedure for Interactive Automatic Program

1. Blank shape input Input a material, shape, and so on.
2. Final shape input Input a final shape with symbol keys, and so on.
3. Turret index position Input respective index positions of OD and ID tools.
Output of the 2nd reference point (G30 U0 W0) can be specified.
4. Machining type selection Specify a chuck work, center work, and so on.
Set a limit of rotating speed of the turning spindle.
5. Automatic programming Automatically creates or checks to create an NC program with the 4 kinds of data mentioned above.
6. Checking program NC programs by means of a rotating tool are made out through conversation. (When C-axis is equipped.)
7. Transfer a program to the NC memory
After a transfer, you can create another program for the next work.

Note) For the same kind of work, you do not have to input data on No. 3 and No. 4 above.

3-3-2 Material Shape Input



Select a type:

F1/New Prog. Select when newly inputting a blank shape.

F2/Blank Select when correcting the shape already input.

- When New Prog. is selected, the data entered is displayed on the Material Select screen, and when Correction is selected, the data entered is displayed on the Material Select screen. When it is necessary to correct the material, correct it. If you don't modify, press F0 (Other), F9 (Set. End).

When the shape is of a formed material, the Element Start Point Setting screen appears with previously entered data displayed.

Correct the start point, if necessary. If you don't modify, press F0 (Other), F9 (Set. End).

When the modification is finished, press F0 (Other), F9 (Set. End).

Notes) ○ See 3-6 "Correcting the Shape Input".

- When a round bar, hollow round bar or hexagonal bar has been previously input and the shape is changed to a formed bar by selecting Correction, the element start point data and shape element data are not displayed. Input them by selecting New Prog..

3-3-3 Selecting the Material



Material Select Screen

Select the material name of work to be machined.

- F1/#1045 ST F2/#4140 ST
- F3/#6061 AL F4/#30 C.I.
- F5/#304 ST F6/C903 BR.
- F7/M2-TSSTL F8/ADD-1
- F9/ADD-2

- For ADD-1 and ADD-2, the user is kindly requested to input data such as cutting conditions, and so on.

For a data inputting method, refer to "4.

MACHINING CONDITION FILE". (Upon shipment, the same data as those for #1045 ST have been input.)

- The material name (up to 8 characters with alphabets and numerals) can be altered by changing the setting of the character parameter 1.
- When a wrong material is input, press the CURSOR key  and input a correct one again.

3-3-4 Selecting the Blank Shape



Blank Shape Select Screen

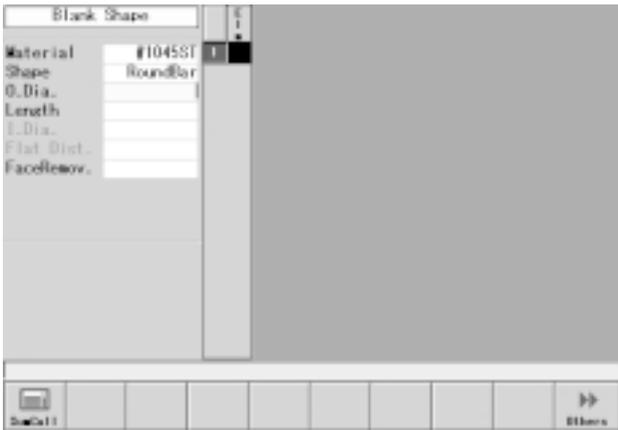
Select a desired blank shape.

- F1/Round Bar F2/Bar W/H.
- F3/Hex. Bar F4/Formed

- When a wrong shape is input, press the CURSOR key  and input blank shape again.

- Precautions when inputting blank shape dimensions:
Input dimensions so that a removal amount will become larger than a finish shape with a finish allowance added to.

1. Round Bar



Round Bar Setting Screen

Input the outer diameter, length and end face removal amount of the blank.

- Key in a numerical value for the item where a cursor is located, and press the **INPUT** key.
- After inputting all data, a blank picture is displayed. Press F7 (Next). The final shape screen is displayed.

2. Hollow Round Bar



Hollow Round Bar Setting Screen

Input the outer diameter, length, inner diameter and end face removal amount of the blank.

- Operate in the same manner as in case of round bar.

3. Hexagonal Bar



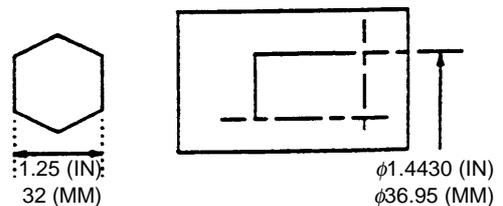
Hexagonal Bar Setting Screen

Input the flat distance, length and end face removal amount of the blank.

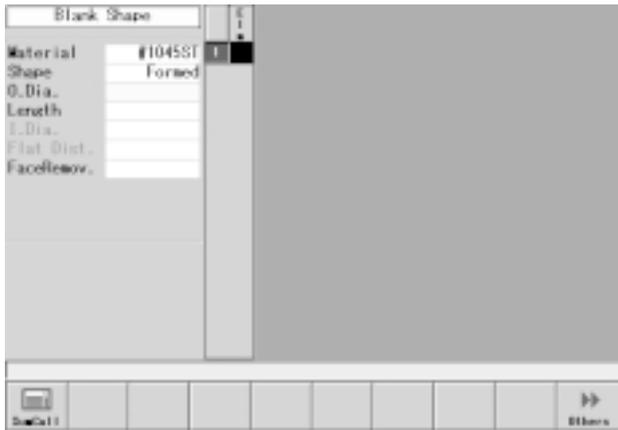
- Operate in the same manner as in case of round bar.

Note) If the flat distance is input, a blank picture is displayed in terms of opposite angle distance.

(Example)



4. Formed Bar



Formed Bar Setting Screen

Input the outer diameter, length and end face removal amount of the blank.

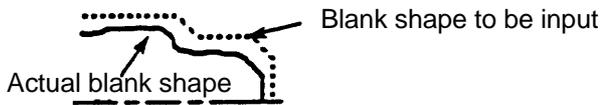
- Key in a numerical value for the item where the cursor is located and press the **INPUT** key.
- Press F7 (Next) after all of the data are entered.
- When you input wrong data to inquiries for outer diameter and length, press the CURSOR key  and input correct ones again.

Note) For blank shape dimensions, input maximum values when blanks are not uniform.

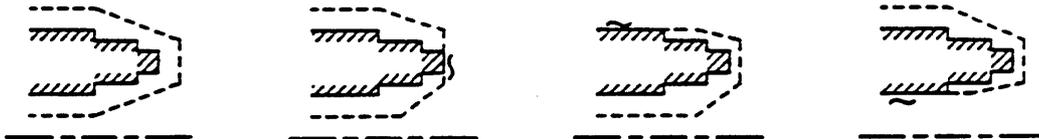
3-4 Inputting the Blank Shape (Formed Bar)

3-4-1 Precautions for Inputting the Blank Shape

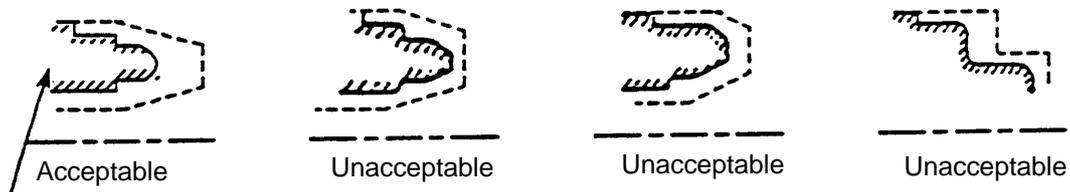
1. When the blank shape varies, input maximum values with some allowance.



2. When a finish shape line overlaps a blank shape line at all of end face, outer diameter and inner diameter, select a surface roughness symbol "~" upon inputting the finish shape.



3. Be sure to input the blank shape so that it will surround the finish shape entirely.



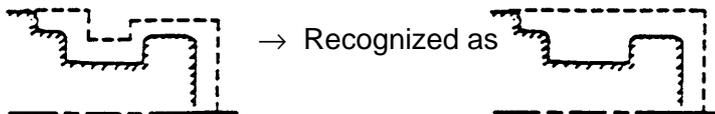
Note) Do not input the vertical line on the chuck side.

When inputting the finish shape as well, do not input the vertical line on the chuck side.

4. If only the blank shape is input as a dented shape, it will not be recognized.

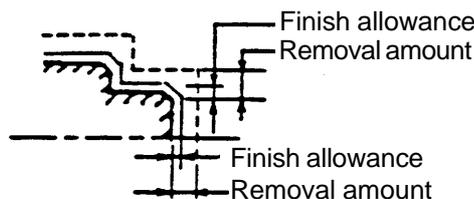


5. The blank shape input as a dented shape within the dent of the finish shape is not recognized.



6. Dimensions of the finish allowance and removal amount

Do not set the removal amount which is smaller than or equal to the finish allowance. Be sure to input the blank shape so that the removal amount will be added larger than the finish allowance.



3-4-2 Setting the Element Start Point (Formed Bar)



Element Start Point Setting Screen

Select the point from which you start to draw a blank shape.

- F1/Thru Hole
- F2/Blind H.
- F3/Solid

○ Input the diameter and length of the start point.

Notes) ○ For a length value, input a length from a finish end face.

○ When F3 (Solid) is selected, input a start length with a minus sign(-) attached. However, when no end face is to be cut, input 0 and set the roughness symbol of a final shape end face element to "~".

3-4-3 Selecting the Inputting Method (Formed Bar)



Input Method Select Screen

Select a desired inputting method.

F4/Symbol Inputs elements and dimensions, etc. per element with the symbol keys. Plots element by element.

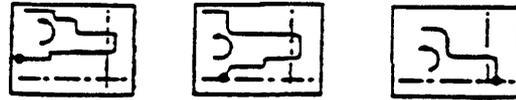
F5/List Inputs elements and dimensions, etc. into the list with the symbol keys. Plots a picture after inputting all data.

3-4-4 Symbol Input (Formed Bar)



Symbol Input Screen

- Press the element key ($\uparrow \leftrightarrow \swarrow \searrow \bigcirc \bigcirc \bigcap \bigcap$), and input the end point numerical value for that element, and others. Viewing a drawing, repeat this operation to plot a picture.
- Be sure to input sequentially in a counterclockwise direction as to the picture.



- A red point is displayed at the position of an entered start point.

1. If the element key \uparrow is pressed, the following items are inquired for :

END PT.X : Input a numerical value of the end point.
 END PT.Z : Input a numerical value of the end point. } When no numerical values are available from the drawing, press the **INPUT** key only.

INTERSECTION : When a previous element is either \bigcirc or \bigcap , an inquiry appears. Input a state of intersecting point.

Note) When the element is \uparrow , select among "Smooth", "Top" and "Bottom".

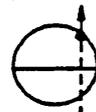
- State of the intersecting point (when a previous element is either \bigcap or \bigcap , this shows the state with an element preceding that one)

Smooth (TANGENT)



F1

Intersecting point top



F4

Intersecting point bottom



F5

- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
After pressing the **INPUT** key, return the cursor key pressing the CURSOR key \uparrow , key in a numerical value and press the **INPUT** key.
- When you made a mistake in element input, press the PAGE key P and input a correct one again.
- When a value of the end point length of a previous element has been determined, it is displayed at the end point length. Press the **INPUT** key only.

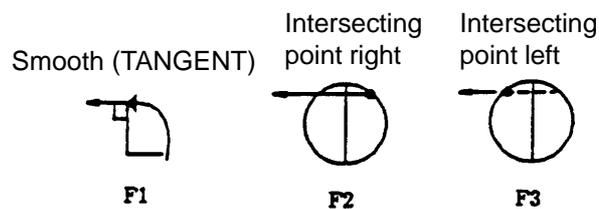
2. If the element key  is pressed, the following items are inquired for :

END PT.X : Input a numerical value of the end point.
 END PT.Z : Input a numerical value of the end point. } When no numerical values are available from the drawing, press the **INPUT** key only.

INTERSECTION: When a previous element is either  or  , an inquiry appears. Input a state of intersecting point.

Note) When the element is  , select among "Smooth", "right" and "left".

○ State of the intersecting point (when a previous element is either  or  , this shows the state with an element preceding that one)

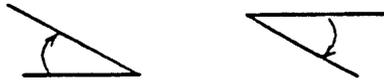


- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
 After pressing the **INPUT** key, return the cursor by pressing the CURSOR key  , key in a numerical value and press the **INPUT** key.
- When you made a mistake in element input, press the PAGE key  and input a correct one again.
- When a value of the end point diameter of a previous element has been determined, it is displayed at the end point diameter. Press the **INPUT** key only.

3. If the element key  is pressed, the following items are inquired for :

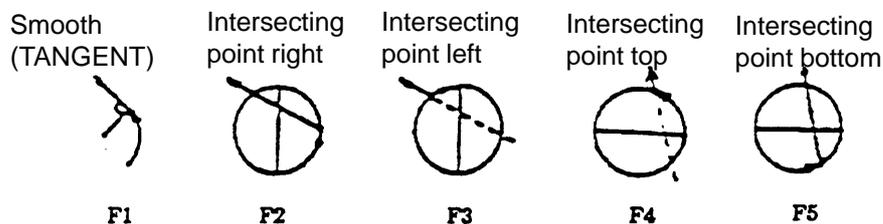
END PT.X	: Input a numerical value of the end point	} When no numerical values are available from the drawing, press the INPUT key only.
END PT.Z	: Input a numerical value of the end point	
ANGLE	: Input an angle to the Z axis. (0° ~ 90°)	

Angle



INTERSECTION: When a previous element is either  or , an inquiry appears. Input a state of intersecting point.

State of the intersecting point (when a previous element is either  or , this shows the state with an element preceding that one)

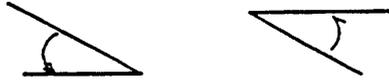


- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
After pressing the **INPUT** key, return the cursor by pressing the CURSOR key , key in a numerical value and press the **INPUT** key.
- When you made a mistake in element input, press the PAGE key  and input a correct one again.
- Upon inputting all data for END PT.X, END PT.Z and ANGLE, if an ANGLE value is not correct for END PT.X and END PT.Z values, it will be determined based on the END PT.X and END PT.Z values.

4. If the element key  is pressed, the following items are inquired for:

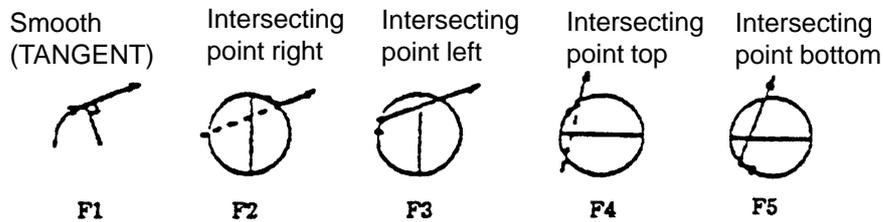
END PT.X	: Input a numerical value of the end point.	} When no numerical values are available from the drawing, press the INPUT key only.
END PT.Z	: Input a numerical value of the end point.	
ANGLE	: Input an angle to the Z axis. (0° ~ 90°)	

Angle



INTERSECTION: When a previous element is either  or , an inquiry appears. Input a state of intersecting point.

State of the intersecting point (when a previous element is either  or , this shows the state with an element preceding that one)



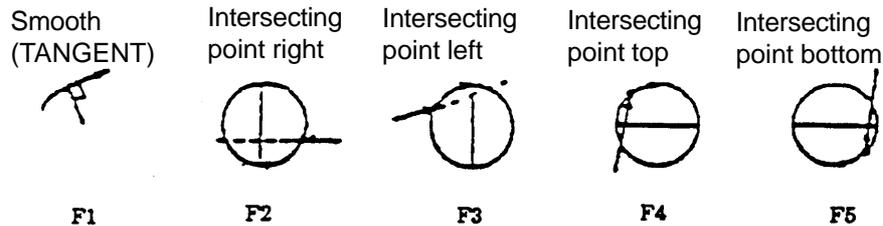
- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
After pressing the **INPUT** key, return the cursor by pressing the CURSOR key , key in a numerical value and press the **INPUT** key.
- When you made a mistake in element input, press the PAGE key  and input a correct one again.
- Upon inputting all data for END PT.X, END PT.Z and ANGLE, if an ANGLE value is not correct for END PT.X and END PT.Z values, it will be determined based on the END PT.X and END PT.Z values.

5. If the element key  is pressed, the following items are inquired for :

- END PT.X :Input a numerical value of the end point.
- END PT.Z :Input a numerical value of the end point.
- RADIUS :Input a circle radius.
- CENTER X-AX. :Input a diameter value of the circle center point.
- CENTER Z-AX. :Input a length value of the circle center point.
- INTERSECTION :Input a state of intersecting point with a previous element.

When no numerical values are available from the drawing, press the **INPUT** key only.

○ State of the intersecting point (when a previous element is either  or , this shows the state with an element preceding that one)

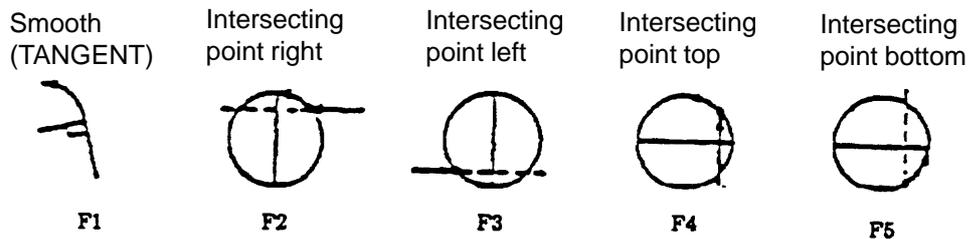


- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
After pressing the **INPUT** key, return the cursor by pressing the CURSOR key , key in a numerical value and press the **INPUT** key.
- When you made a mistake in element input, press the PAGE key  and input a correct one again.
- Upon inputting all data for END PT.X, END PT.Z and ANGLE, if an ANGLE value is not correct for END PT.X and END PT.Z values, it will be determined based on the END PT.X and END PT.Z values.

6. If the element key  is pressed, the following items are inquired for :

- | | | |
|--------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| END PT.X | :Input a numerical value of the end point. | } When no numerical values are available from the drawing, press the INPUT key only. |
| END PT.Z | :Input a numerical value of the end point. | |
| RADIUS | :Input a circle radius. | |
| CENTER X-AX. | :Input a diameter value of the circle center point | |
| CENTER Z-AX. | :Input a length value of the circle center point. | |
| INTERSECTION | :Input a state of intersecting point with a previous element. | |

○ State of the intersecting point (when a previous element is either  or , this shows the state with an element preceding that one)

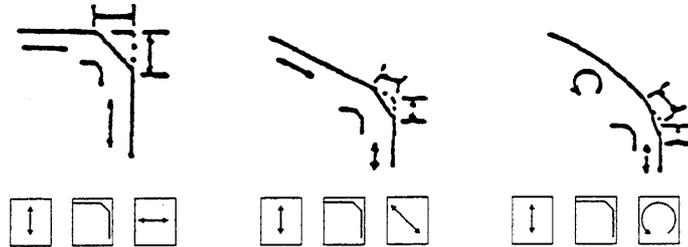


- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
After pressing the **INPUT** key, return the cursor by pressing the CURSOR key , key in a numerical value and press the **INPUT** key.
- When you made a mistake in element input, press the PAGE key  and input a correct one again.
- Upon inputting all data for END PT.X, END PT.Z and ANGLE, if an ANGLE value is not correct for END PT.X and END PT.Z values, it will be determined based on the END PT.X and END PT.Z values.

7. If the element key  is pressed, the following item is inquired for :

SIZE(C/R) : Input a C chamfering size.

○ This can be used when previous and next element intersect each other.



○ If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.

○ The value can be modified with **CANCEL** key.

○ When you made a mistake in element or numerical value input, press the PAGE key  and input a correct one again.

Notes) • You can neither start at nor terminate at this element.

• This element can be also used for corner C. 

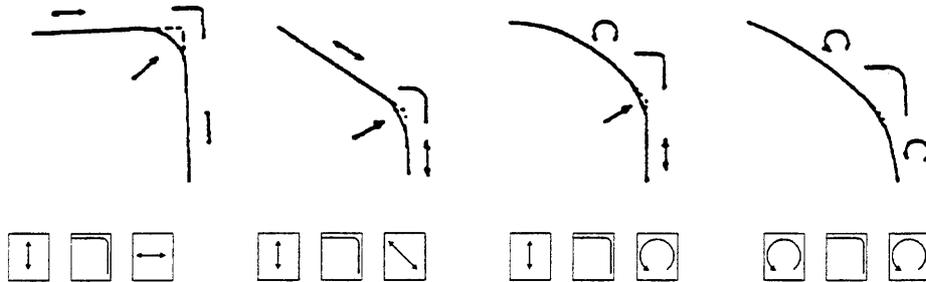
○ If the chamfering size is too large, a message “Element input error” appears. Then, press page key  and modify the value for the size.

8. If the element key  is pressed, the following item is inquired for :

SIZE(C/R) : Input a R chamfering size.

- This can be used when previous and next element intersect each other.

Note) Allowed only when the end point value of the element "  " has been determined.



- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
- When you made a mistake in element or numerical value input, press the PAGE key  and input a correct one again.

Notes) • You can neither start at nor terminate at this element.

- This element can be also used for corner R. 

- If the chamfering size is too large, a message "Element input error" appears. Then, press page key  and modify the value for the size.

3-5 Input of Final shape

3-5-1 Shape Input



Select the item.

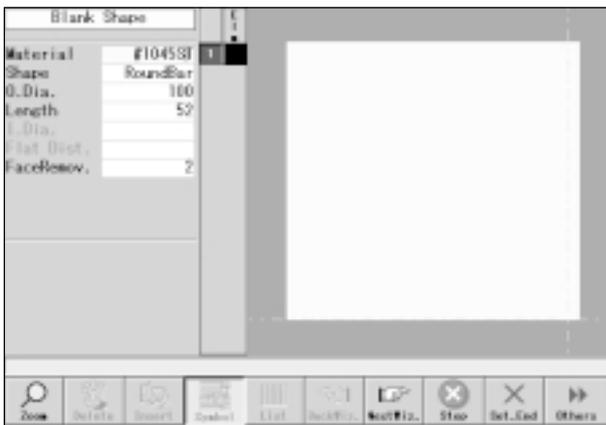
F1/Shape

Material, final shape.

Index position.

Selection of machining type.

Select F1 and input the final shape.



Press F0 (Others) then press F7 (Next).

The final shape input screen is displayed.

Material shape input screen

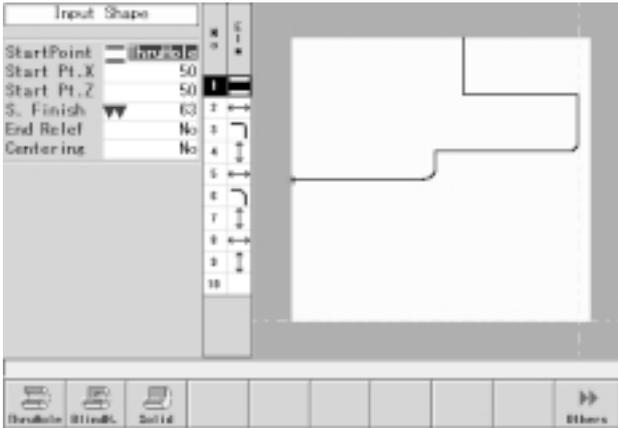


- If you select the New prog., the screen to set the element starting point appears, and if you select modification, the data you entered before are displayed so that you can modify them as necessary. When you have finished modifying, press F0 (Other) key. A drawing is drawn. Press F9 (Set. End) key if it is correct.

Final shape input screen

Note) See 3-6 “How to modify drawing input”.

3-5-2 Setting the Element Start Point (Final Shape Input)



Element Start Point Setting Screen

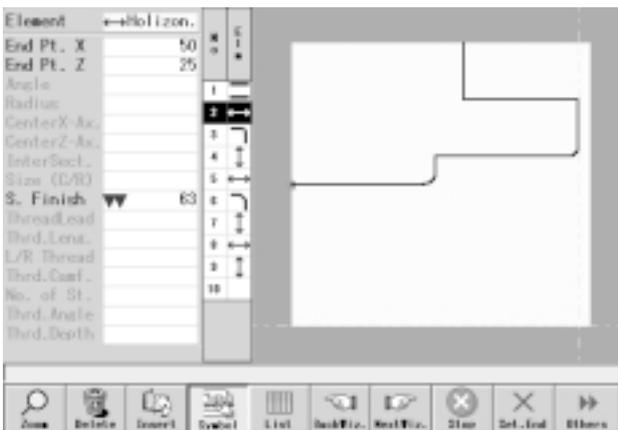
Select the point from which you start to draw a final shape.

- F1/Thru hole
- F2/Blind H.
- F3/Solid

○ Input the diameter and length of the start point.

- Note)**
- For a length value, input a length from a finish end face.
 - For S.FINISH, input the roughness which is most frequently found on the final shape to be input.
 - For an inquiry as to end point necking, specify "YES" when a picture has necking even at one point.
 - For the inquiry of "crumpling", specify "Yes" or "No" for the machining.

3-5-3 Selecting the Inputting Method (Final Shape Input)

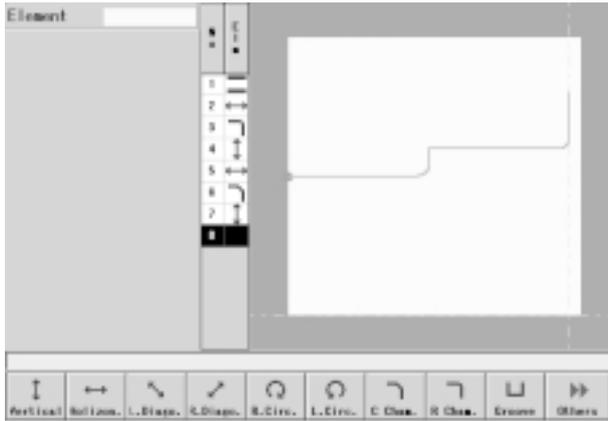


Input Method Select Screen

Select a desired inputting method.

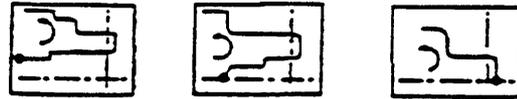
- F4/Symbol : Inputs elements and dimensions, etc. per element with the symbol keys. Plots element by element.
- F5/List : Inputs elements and dimensions, etc. into the list with the symbol keys. Plots a picture after inputting all data.

3-5-4 Symbol Input (Final Shape Input)



Symbol Input Screen

- Press the element key (↓ → \ / ○ ○ ◯ ◯), and input the end point numerical value, roughness and end point relief of that element, and others. Viewing a drawing, repeat this operation to plot a picture.
- Be sure to input sequentially in a counterclockwise direction as to the picture.



- A light red point is displayed at the position of an entered start point.

1. If the element key [↓] is pressed, the following items are inquired for:

END PT.X : Input a numerical value of the end point
 END PT.Z : Input a numerical value of the end point

} When no numerical values are available from the drawing, press the [INPUT] key only.

INTERSECTION : When a previous element is either ○ or ◯, an inquiry appears. Input a state of intersecting point.

Note) When the element is ↓, select among "Smooth", "Top" and "Bottom".

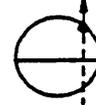
- State of the intersecting point (when a previous element is either ◯ or ◯, this shows the state with an element preceding that one)

Smooth (TANGENT)



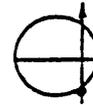
F1

Intersecting point top



F4

Intersecting point bottom



F5

S. FINISH : Input a finish symbol on the element. When same as overall roughness, press the [INPUT] key only.

- Roughness

	50	25	12	6	Thread
~	▽	▽▽	▽▽▽	▽▽▽▽	
F1	F2	F3	F4	F5	F6

END RELIEF : When there is necking between this and the next element, select a direction out of F1 through F8. Press the **INPUT** key when there is no necking.

RELIEF : Input a machining depth.

- When there is an end point relief

Direction	→	↗	↑	↖	←	↙	↓	↘	NO
	F1	F2	F3	F4	F5	F6	F7	F8	F9

- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
After pressing the **INPUT** key, return the cursor by pressing the CURSOR key , key in a numerical value and press the **INPUT** key.
- When you made a mistake in inputting the element, roughness or end point relief, press the CURSOR key  and input a correct one again.
- When a value of the end point length of a previous element has been determined, it is displayed at the end point length. Press the **INPUT** key only.

2. If the element key  is pressed, the following items are inquired for:

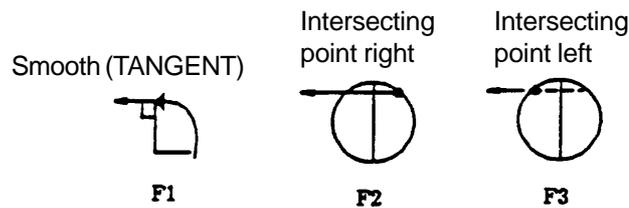
END PT.X : Input a numerical value of the end point
 END PT.Z : Input a numerical value of the end point

When no numerical values are available from the drawing, press the **INPUT** key only.

INTERSECTION : When a previous element is either  or , an inquiry appears. Input a state of intersecting point.

Note) When the element is , select among "Smooth", "Right" or "Left".

○ State of the intersecting point (when a previous element is either  or , this shows the state with an element preceding that one)



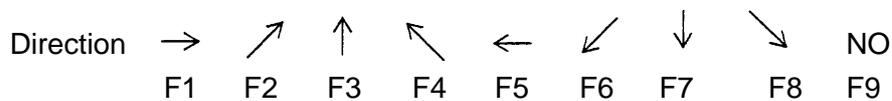
S. FINISH : Input a finish symbol on the element. When same as overall roughness, press the **INPUT** key only.

○ Roughness	50	25	12	6	Thread
	~	▽	▽▽	▽▽▽	
	F1	F2	F3	F4	F5 F6

END RELIEF : When there is necking between this and the next element, select a direction out of F1 through F8. Press the **INPUT** key when there is no necking.

RELIEF : Input a machining depth.

○ When there is an end point relief



○ If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.

○ The value can be modified with **CANCEL** key.

After pressing the **INPUT** key, return the cursor by pressing the CURSOR key , key in a numerical value and press the **INPUT** key.

○ When you made a mistake in inputting the element, roughness or end point relief, press the CURSOR key  and input a correct one again.

○ When a value of the end point length of a previous element has been determined, it is displayed at the end point length. Press the **INPUT** key only.

3. If the element key  is pressed, the following items are inquired for:

- END PT.X : Input a numerical value of the end point.
- END PT.Z : Input a numerical value of the end point.
- ANGLE : Input an angle to the Z axis. (0° ~ 90°).

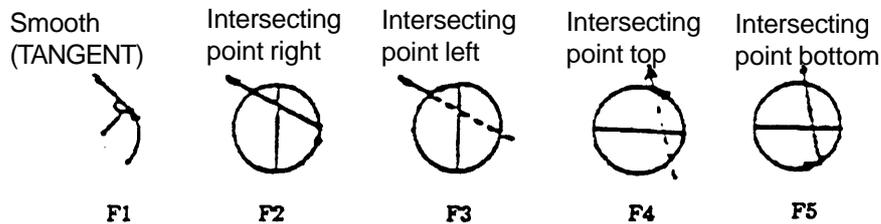
When no numerical values are available from the drawing, press the **INPUT** key only.

Angle



INTERSECTION: When a previous element is either  or , an inquiry appears. Input a state of intersecting point.

State of the intersecting point (when a previous element is either  or , this shows the state with an element preceding that one)



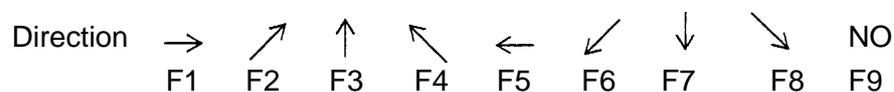
S. FINISH : Input a finish symbol on the element. When same as overall roughness, press the **INPUT** key only.

- Roughness 50 25 12 6 Thread
- ~ ∇ ∇∇ ∇∇ ∇∇∇
- F1 F2 F3 F4 F5 F6

END RELIEF : When there is necking between this and the next element, select a direction out of F1 through F8. Press the **INPUT** key when there is no necking.

RELIEF : Input a machining depth.

When there is an end point relief



- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
After pressing the **INPUT** key, return the cursor by pressing the CURSOR key , key in a numerical value and press the **INPUT** key.
- When you made a mistake in inputting the element, roughness or end point relief, press the CURSOR key  and input a correct one again.
- Upon inputting all data for END PT. X, END PT. Z and ANGLE, if an ANGLE value is not correct for END PT. X and END PT. Z values, it will be determined based on the END PT. X and END PT. Z values.

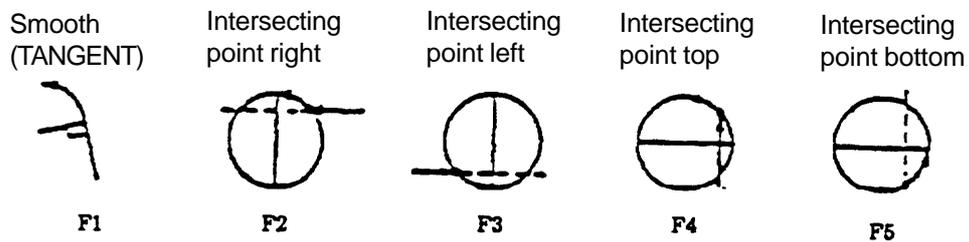
4. If the element key  is pressed, the following items are inquired for:

- END PT.X : Input a numerical value of the end point.
 - END PT.Z : Input a numerical value of the end point.
 - ANGLE : Input an angle to the Z axis. (0° ~ 90°).
 - Angle
- } When no numerical values are available from the drawing, press the **INPUT** key only.



INTERSECTION: When a previous element is either  or , an inquiry appears. Input a state of intersecting point.

- State of the intersecting point (when a previous element is either  or , this shows the state with an element preceding that one)



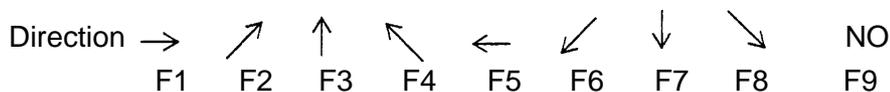
S. FINISH : Input a finish symbol on the element. When same as overall roughness, press the **INPUT** key only.

- Roughness 50 25 12 6 Thread
- ~ ▽ ▽▽ ▽▽ ▽▽▽
- F1 F2 F3 F4 F5 F6

END RELIEF : When there is necking between this and the next element, select a direction out of F1 through F8. Press the **INPUT** key when there is no necking.

RELIEF : Input a machining depth.

- When there is an end point relief

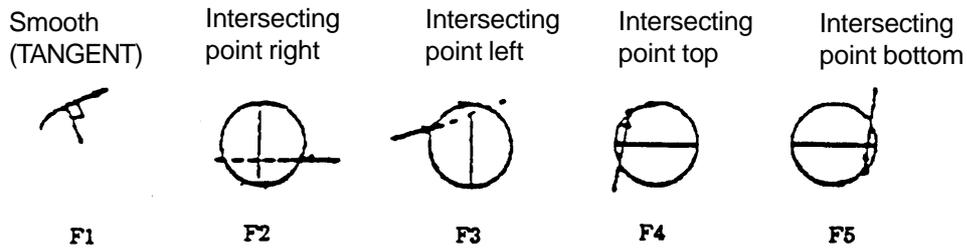


- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
After pressing the **INPUT** key, return the cursor by pressing the CURSOR key , key in a numerical value and press the **INPUT** key.
- When you made a mistake in inputting the element, roughness or end point relief, press the CURSOR key  and input a correct one again.
- Upon inputting all data for END PT. X, END PT. Z and ANGLE, if an ANGLE value is not correct for END PT. X and END PT. Z values, it will be determined based on the END PT. X and END PT. Z values.

5. If the element key  is pressed, the following items are inquired for:

- END PT.X : Input a numerical value of the end point.
 - END PT.Z : Input a numerical value of the end point.
 - RADIUS : Input a circle radius.
 - CENTER X-AX. : Input a diameter value of the circle center point.
 - CENTER Z-AX. : Input a length value of the circle center point.
 - INTERSECTION: Input a state of intersecting point with a previous element.
- } When no numerical values are available from the drawing, press the **INPUT** key only.

○ State of the intersecting point (when a previous element is either  or , this shows the state with an element preceding that one)



S. FINISH : Input a finish symbol on the element. When same as overall roughness, press the **INPUT** key only.

○ Roughness	50	25	12	6
	~	▽	▽▽	▽▽▽
	F1	F2	F3	F4

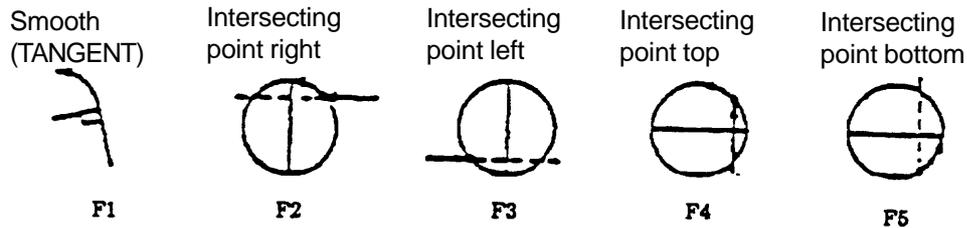
- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
After pressing the **INPUT** key, return the cursor by pressing the CURSOR key , key in a numerical value and press the **INPUT** key.
- When you made a mistake in inputting the element, roughness or end point relief, press the CURSOR key  and input a correct one again.
- Upon inputting all data for END PT. X, END PT. Z, RADIUS, CENTER X-AX. and CENTER Z-AX., if CENTER X-AX. and CENTER Z-AX. values are not correct for END PT. X, END PT. Z and RADIUS values, they will be determined based on the END PT. X, END PT. Z and RADIUS values.

6. If the element key  is pressed, the following items are inquired for:

- END PT.X : Input a numerical value of the end point.
- END PT.Z : Input a numerical value of the end point.
- RADIUS : Input a circle radius.
- CENTER X-AX. : Input a diameter value of the circle center point.
- CENTER Z-AX. : Input a length value of the circle center point.
- INTERSECTION: Input a state of intersecting point with a previous element.

When no numerical values are available from the drawing, press the **INPUT** key only.

○ State of the intersecting point (when a previous element is either  or , this shows the state with an element preceding that one)



S. FINISH : Input a finish symbol on the element. When same as overall roughness, press the **INPUT** key only.

○ Roughness	50	25	12	6	
	~	▽	▽▽	▽▽▽	
	F1	F2	F3	F4	F5

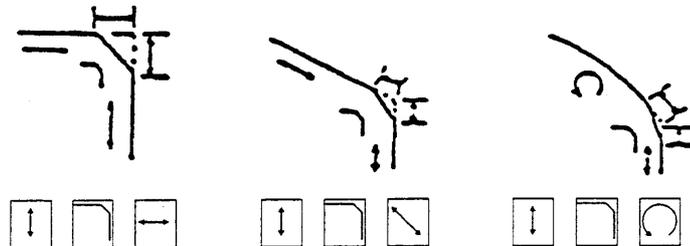
- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- The value can be modified with **CANCEL** key.
After pressing the **INPUT** key, return the cursor by pressing the CURSOR key , key in a numerical value and press the **INPUT** key.
- When you made a mistake in inputting the element, roughness or end point relief, press the CURSOR key  and input a correct one again.
- Upon inputting all data for END PT. X, END PT. Z, RADIUS, CENTER X-AX. and CENTER Z-AX., if CENTER X-AX. and CENTER Z-AX. values are not correct for END PT. X, END PT. Z and RADIUS values, they will be determined based on the END PT. X, END PT. Z and RADIUS values.

7. If the element key  is pressed, the following items are inquired for:

SIZE(C/R) : Input a C chamfering size.

S. FINISH : Input a finish symbol on the element. When same as overall roughness, press the  key only.

This can be used when previous and next elements intersect.



- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the  key.
- The value can be modified with  key.
After pressing the  key, return the cursor by pressing the CURSOR key , key in a numerical value and press the  key.
- When you made a mistake in inputting the element or roughness, press the CURSOR key  and input a correct one again.
- Notes)** • You can neither start at nor terminate at this element.
 - This element can be also used for corner C. 
- If the chamfering size is too large, a message “Element input error” appears. Then, press page key  and modify the value for the size.

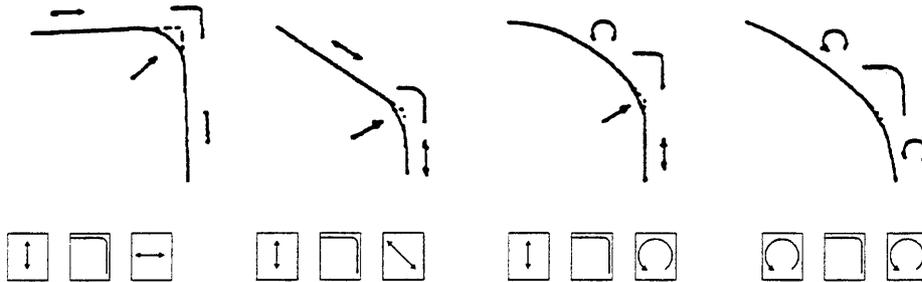
8. If the element key  is pressed, the following items are inquired for:

SIZE(C/R) : Input an R chamfering size.

S. FINISH : Input a finish symbol on the element. When same as overall roughness, press the  key only.

○ This can be used when previous and next elements intersect.

Note) Allowed only when the end point value of the element "  " has been determined.



○ If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the  key.

○ The value can be modified with  key.

After pressing the  key, return the cursor by pressing the CURSOR key , key in a numerical value and press the  key.

○ When you made a mistake in inputting the element or roughness, press the CURSOR key  and input a correct one again.

Notes) • You can neither start at nor terminate at this element.

• This element can be also used for corner R. 

○ If the chamfering size is too large, a message "Element input error" appears. Then, press page key  and modify the value for the size.

9. If the element key  is pressed, the following items are inquired for:

ELEMENT : Specify one of \uparrow , \leftrightarrow , \swarrow and \nearrow . **Note)**  In case of the final point of element just before the input of  shape is not known, input not accepted.

 Up to 8  shape elements.

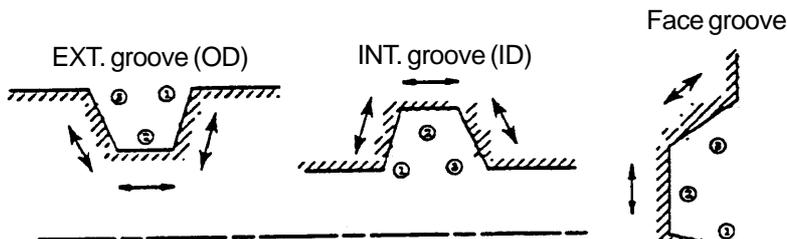
END PT.X : Input a numerical value of the end point.

END PT.Z : Input a numerical value of the end point.

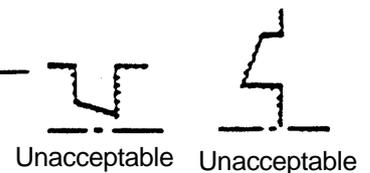
ANGLE : Input an angle to the Z axis. ($0^\circ \sim 90^\circ$)

When no numerical values are available from the drawing, press the  key only.

If a groove shape is specified, a similar inquiry is made 3 times in the following order:



However, the 2nd element (groove bottom) is limited to either \uparrow or \leftrightarrow .



 Next, four corner elements are inquired for.

1st corner: Specify ", " " or "none".

Size : Input a value.

2nd corner: Specify ", " " or "none".

Size : Input a value.

3rd corner: Specify ", " " or "none".

Size : Input a value.

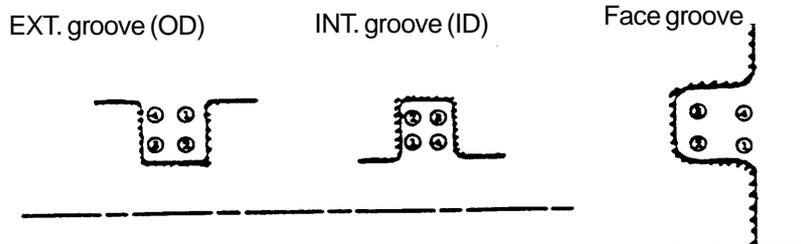
4th corner: Specify ", " " or "none".

Size : Input a value.

 When "none" is specified, press only the  key to an inquiry for size.

 When you made a mistake in input, return with the CURSOR key  and input correctly again.

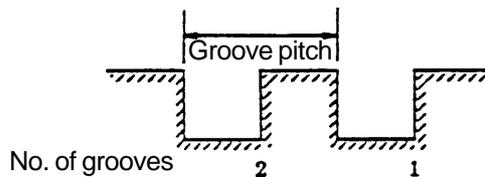
 When all four corners are "none", press the PAGE key .



 If the chamfering size is too large, a message "Element input error" appears. Then, press page key  and modify the value for the size.

Note) Input such as the intersection is overlapped by the figures of element before and behind is not accepted.

- Next, there appear inquiries for whether or not there are grooves repeated. (When entering programs containing steps such as , no inquiries are made.)
- NO. OF GRV : Input the number of grooves repeated. When the number of grooves is 1, press the **INPUT** key only.
- GRV. PITCH : Input a pitch of the grooves repeated. When the number of grooves is 1, press the **INPUT** key only.
- S. FINISH : Input a finish symbol for grooves. When same as overall roughness, press the **INPUT** key only.



○ Roughness

	50	25	12	6
~	▽	▽▽	▽▽▽	▽▽▽▽
F1	F2	F3	F4	F5

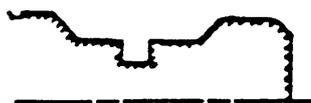
- If a numerical value is keyed in, it is displayed on the screen. After confirming it, press the **INPUT** key.
- When a numerical value is keyed in and while it is displayed on the lower left part of the screen, you can modify with the **CANCEL** key.
After pressing the **INPUT** key, return the cursor by pressing the CURSOR key , key in a numerical value and press the **INPUT** key.
- When you made a mistake in inputting the roughness, press the PAGE key  and input a correct one again.

Notes) ○ You can neither start at nor terminate at this element.

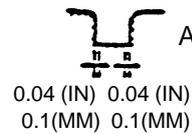
- A picture is not plotted like  in the course of inputting the final shape. It is plotted after inputting all elements.
- Grooves repeated are allowed to be input only on the element with the same diameter.



- A groove in a dent can be also input.

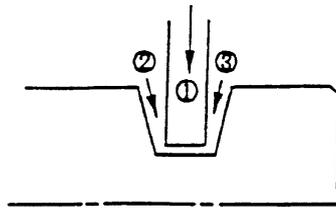


- When the groove bottom has neither C chamfer nor R chamfering, it is necessary to register a tool whose width is narrower than "groove width - finish allowance".



A standard set value for finish allowance is 0.04 (IN), 0.1 (MM).

- For grooving, rough finishing is performed with the same tool.
- If the groove sides are parallel, it is possible to set the dent with different levels such as , but in the case of a V-shaped groove like  with different levels of height, set the groove using not  element but ,  and  elements.
- When the groove bottom have no chamfering elements and both sides of the groove are parallelly shaped, if a roughness symbol $\sqrt{50}$ is specified, the both sides of the groove and the groove bottom are not finished. However, a dwell is applied at the groove bottom. A picture with this condition is machined in one time when a tool with the same width as the groove has been registered in the tool file (groove).
- Three passes cut for grooving can be done by a setting of a real value parameter 0021.



Refer to the paragraph 5 parameter 6 for a detail of parameter function for detail.

10. Thread Specification

If the element , ,  or  is input and F6 (THREAD) is specified in specification of roughness, the following items are inquired for:

THREAD LEAD : Input a lead. **Note)** For inch thread, input a value to the 4th decimal places. Output as E.x.xxxx in NC data.

THRD. LENGTH: Input a length.

R/L THREAD : Specify either left-handed thread or right-handed thread; F1 (LEFT), F2 (RIGHT). For the right-handed thread, press the key only.

(When left hand thread is required, a G32 command is outputted.)

THRD. CHAMFER :Specify whether or not chamfering is required; F1 (YES), F2 (NO). When not required, press the key only.

(When chamfering is required, a chamfering command is outputted.)

NO. OF TREADS : Input the number of threads. Press only the key in case of single thread.

THREAD ANGLE : Input a thread angle. When it is 60°, press the key only.

- If a numerical value is keyed in, it is displayed on the lower left part of the screen. After confirming it, press the key. The numerical value is input to the cursor located on the upper left part of the screen, and then, the cursor moves to the next inquiry.
- When a numerical value is keyed in and while it is displayed on the lower left part of the screen, you can modify with the key.
After pressing the key, return the cursor by pressing the CURSOR key,  key in a numerical value and press the key.
- Threads are displayed in red in a figure.
- The 1st depth of cut for thread is automatically determined by a coefficient set in a real value parameter 63 as follows:

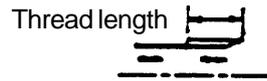
For inch unit

For thread PAR INCH "24"	0.0082 (IN) (Radius value)
For thread PAR INCH "20"	0.0089 (IN) (Radius value)
For thread PAR INCH "16"	0.0100(IN) (Radius value)
For thread PAR INCH "14"	0.0107 (IN) (Radius value)
For thread PAR INCH "12"	0.0115 (IN) (Radius value)

For millimeter unit

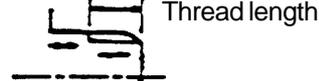
For thread pitch "1"	0.225 (MM) (Radius value)
For thread pitch "1.25"	0.252 (MM) (Radius value)
For thread pitch "1.5"	0.276 (MM) (Radius value)
For thread pitch "1.75"	0.298 (MM) (Radius value)
For thread pitch "2.0"	0.318 (MM) (Radius value)

For ID thread



Specify the thread by inputting the element "↔", and then, the same one again.

For OD thread



Specify the thread with the element "↔". Input the element "↔" again.

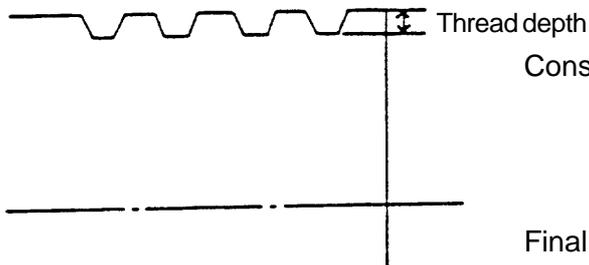
It is determined by the following formula:

Set value for 63 x $\sqrt{\text{Pitch entered}}$

Note) A standard set value for 63 is 0.04 (inch unit) 0.225 (millimeter unit)

Input zero for thread angle when machining by constant cutting depth system for square or acme thread.

Input the depth (radius value) at the following question of thread depth.



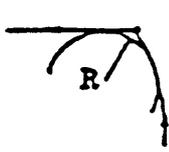
Constant cutting depth (radius value) =
Inputted thread pitch x Setting value of actual value parameter 35

Final cutting depth (radius value) =
Setting value of actual value parameter 36

Standard setting value	(MM)	(IN)
35	0.02	0.02
36	0.02	0.008

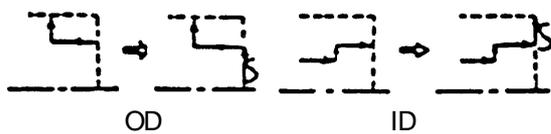
11. Overall Precautions

- For END PT.Z value, input a length from an end face.
- Inquiry for the state of the intersecting point.



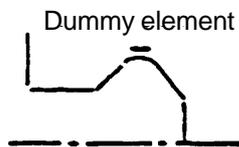
When elements are \odot , \sqcap and \leftrightarrow in that order, an intersecting point is on the right in case of inquiry for \leftrightarrow . It is not "Smooth". When a previous element is either \sqcap or \sqcup , it is assumed the state with an element before the previous one.

- Input "Contact" as to an inquiry "Previous State" when plotting begins with the element \odot or \odot .
- For a circle having a certain radius which contacts with circles, input a central element with either " \odot " or " \odot ". The element " \sqcap " is not available. (It is available when the end point value of the first circle has been determined.)
- Necking depth
For a depth in a direction " \swarrow ", " \searrow ", " \nearrow " or " \nwarrow ", input it by only a half the tool width used.
- A shape with OD or ID cutting only is not processed. Input an end face element.



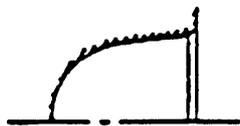
Note) When inputting a figure, be sure to input an end face element. When not finishing an end face, specify a surface roughness symbol "~". An area corresponding to "~" is displayed in green.

- Automatic generation of dummy element



A dummy element is automatically generated at the top of a circle, if input by \updownarrow , \swarrow , \odot , \nearrow , \leftrightarrow and \updownarrow in that order.

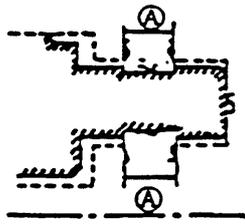
- The following shape is not processed.
(AUTO PROGRAM)



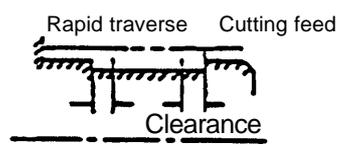
However, it is processed in CUSTOM PROGRAM.

- Roughness symbol

If a symbol "~" is specified for an unfinished part as a dent shape and a tool is fed over that part at a rapid traverse rate, NC data is output. When finishing of an end face is not to be done, specify the symbol "~" with a face removal amount set to 0 when inputting a final shape. It is displayed in blue on the figure.

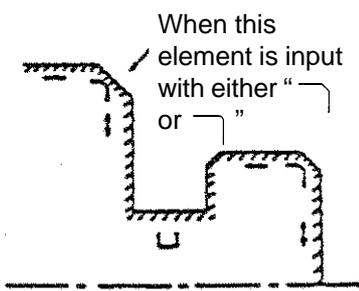


Output of NC Data

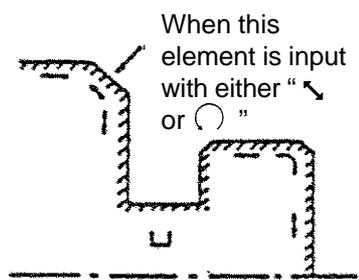
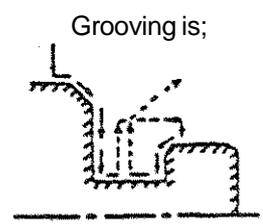
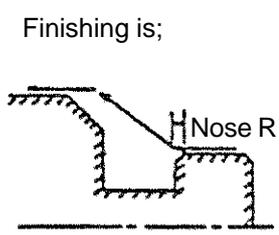


- Notes)**
- Giving some allowance to an actual shape, input the width (A) narrower.
 - Refer to "Example 8" and "Example 9" in REFERENCE MATERIAL "2. Input Examples of Blank Shape and Final Shape".

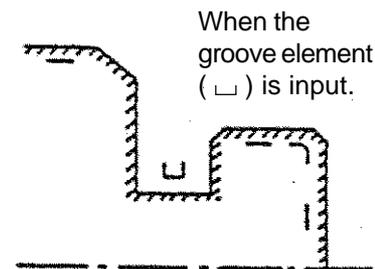
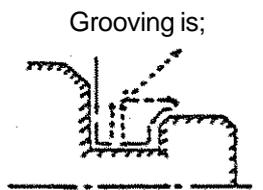
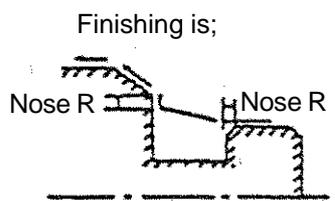
○ Groove shape by the wall (both OD and ID)



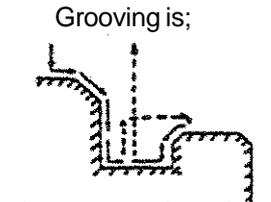
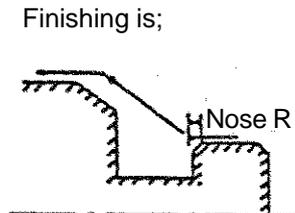
When you input as shown in the left figure;



When you input as shown in the left figure;

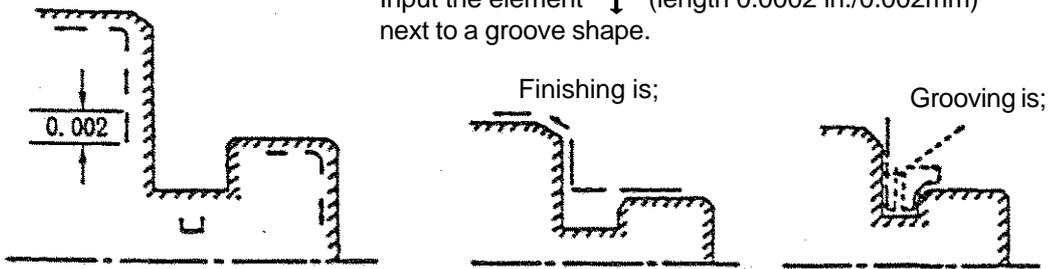


When you input as shown in the left figure;

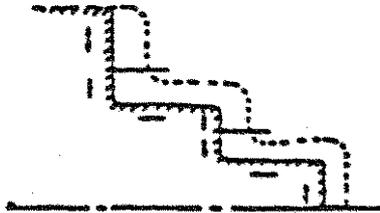


Input as follows when you want to machine a face by the wall with a finishing tool :

Input the element " ↓ " (length 0.0002 in./0.002mm) next to a groove shape.

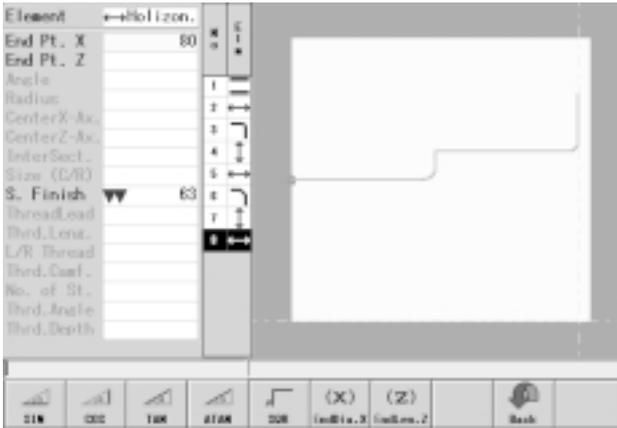


○ With a formed blank, if you want to execute facing first in program check and creation, input as follows when inputting a final shape :



Input the element " ↓ " separately at a diameter point which is several millimeters larger than a blank diameter, as shown in the left figure.

12. The Four Rules of Arithmetic, Operation of Function and Incremental Input



The four rules of arithmetic, operation of function

When asking the numeral input, following function key is displayed.

F6/EndDia. X

Display the end point diameter of the previous element.

F7/EndLen. Z

Display the end point length of the previous element.

When the value of the previous element is not determined, however, display the value of the end point determined formerly.

The four rules of arithmetic can be done by alphabet, 10key and operation of function.

+	<input type="text" value="+"/>	SIN	: F1
-	<input type="text" value="-"/>	COS	: F2
x	<input type="text" value="SHIFT"/> <input)"="" type="text" value="*"/>	TAN	: F3
/	<input type="text" value="@/"/>	ATAN	: F4
(<input)"="" type="text" value="#("/>	SQRT	: F5
)	<input)"="" type="text" value="*"/>		

(Example)

50 + 20 → 50 20 ⇒ 70

60 - (5x2) → 60 5 2 ⇒ 50

10 ÷ sin 30 → 10 F1 30 ⇒ 20

TAN⁻¹ (1÷1.732) → F4 1 1.732 ⇒ 30

$\sqrt{9}$ → F5 9 ⇒ 3

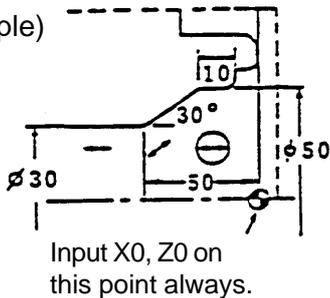
Note) When input miss is occurred, press cancel key and input again follow each display.

- 20.. -10 Duplicate use of decimal point
- 10 + -3 Duplicate use of mathematical point
- 20 + ((4*2) Illegal position of ()
- +50 -10 Illegal use of mathematical
- 20 (3*2) No specify of mathematical symbol
- 100/0 Division with "0" is impossible

Incremental input

If pressing the end point diameter (X) or length (Z), the value of the end point of the former element is displayed, then incremental input can be done by using the four rules of arithmetic keys.

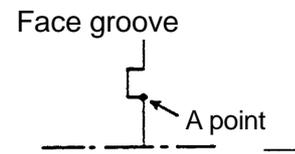
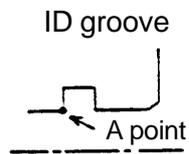
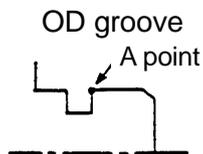
(Example)



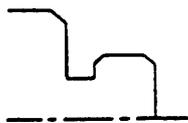
In case of left sketch, when input the value of the end point length of element \leftrightarrow or asking the end point length of element \leftrightarrow , 32.679 is displayed at the bottom left of the screen by pressing F7 **EndLen. Z** key then 22.679 is input by key in **- 10 INPUT**.

- Note)**
- Inputted numeral or sign can be deleted by **CANCEL** key one by one.
 - When performing by the groove type input, displayed value at the bottom left of the screen by pressing F6 (EndDia. X) or F7 (EndLen. Z) is always starting point.

Example)

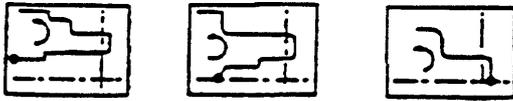


- When performing by the groove type input, displayed value by pressing F6 or F7 to ask each dimension of the 1st, 2nd and 3rd element is the value of the point A.
- When input the 3rd element of OD or ID groove, the value A is displayed at the end point diameter so press **INPUT** key only if no alteration. When the 3rd element it displayed at end point length so press **INPUT** key only if no alteration. (When symbolic input)
- When input the 3rd element, if shape has step, key in numeral and press **INPUT** key.



3-5-5 List Input (Final Shape Input)

- Press the element key ($\updownarrow \leftrightarrow \swarrow \nearrow \circlearrowleft \circlearrowright \lrcorner \llcorner \sqcup$), and input the end point numerical value for that element, and others. Viewing the drawing, input in a list order.
Be sure to input elements and other numerical values in a counterclockwise direction.



- If the element is input, the cursor moves to the position where a numerical value is required. Key in the numerical value and press the **INPUT** key. If no numerical values are available from the drawing, press the **INPUT** key only. Operation proceeds to the next step automatically.
- When you made a mistake in input operation, move the cursor with the CURSOR keys ($\leftarrow \uparrow \downarrow \rightarrow$), input a new numerical value and press the **ALTER** key. When deleting data other than the element, set the cursor there and press the **DELETE** key.
- When deleting, set the cursor to an element position and press the **DELETE** key. This will delete that one line.
- When inserting, set the cursor to the number where you want to insert, and press the **INSERT** key. As one line is spaced, input data there. Subsequent lines are shifted downward.
- For input of numerical values, etc., refer to “Symbol Input”.
- Since 8 lines such as \sqcup , \lrcorner , \updownarrow , \llcorner , \leftrightarrow , \lrcorner , \updownarrow and \lrcorner are output by inputting a groove element (\sqcup), input each data according to a cursor indication.

Input Example

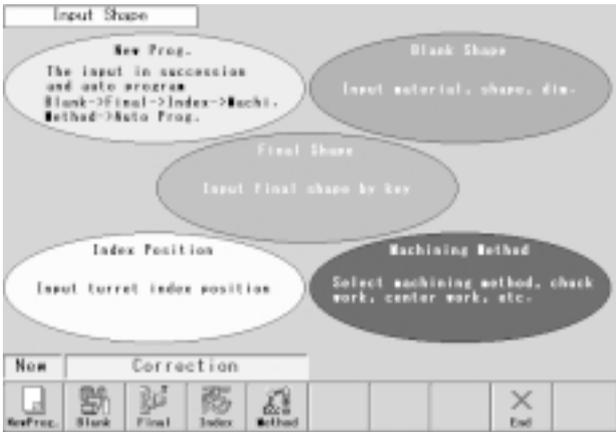
No	E I	End Pt.X	End Pt.Z	---	Inter Section	S. Finish	---	---	T. L/R	T. Ch of	No T.	Thr Aug	R. Dia.	Relief Depth
1	\updownarrow	50	50			12								
2	\leftrightarrow	50	25			12								
3	\lrcorner				2	12								
4	\leftrightarrow	60	25			12								
5	\leftrightarrow	60	0			12								
6	\lrcorner				1	12								
7	\updownarrow	80	0			12								
8	\sqcup	80				12								
9														

\updownarrow	\leftrightarrow	\swarrow	\nearrow	\circlearrowleft	\circlearrowright	\lrcorner	\llcorner	\sqcup	\rightarrow
Vertical	Horizon.	L.Diago.	R.Diago.	R.Circ.	L.Circ.	C Cham.	R Cham.	Groove	Others

- When you have finished inputting all the data, press F0(Others), F7(Next) keys. Drawing starts using the data input. Check the drawing and if it is correct, press F7(Next) key. If not, press F6(Back) key and select the modification again to modify it.

3-6 Correcting the Shape Input (Correcting the Blank Shape and Final Shape)

Note) Be explained on the Final Shape Input screen.



Input Shape Screen

For the Blank Shape

If you press F2 (Blank) key, the material shape screen is displayed, so modify the item you want to modify.

For the Final Shape

If you press F3 (Final) key, the screen to set the Final shape input is displayed.



Blank Shape Screen

Data previously input are displayed. Using the CURSOR key , move the cursor to the item which requires a correction, enter data and press the **INPUT** key.



Input Shape Screen

Select an input method.

F4/Symbol

F5/List

In the symbol input, a shape previously input is plotted with yellow lines when it is a Blank Shape (formed blank), or with black lines when it is a final shape, displaying elements on the center of the screen.

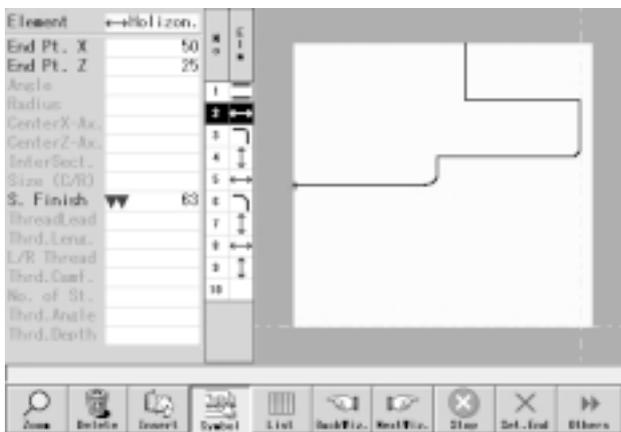
In the list input, elements previously input and other data are listed.



When the symbol input is selected, the shape previously input is plotted (with either yellow or black lines) and elements are displayed on the center of the screen, as shown in the left figure.

<Operation Method>

1. By using the PAGE key , the cursor moves on the elements when you are inquired for the element.
2. Data previously input is displayed.
3. When you have finished modifying, press F0 (Others) key, F9 (Set.End) key.

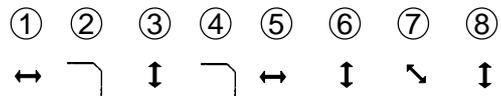


<Insertion>

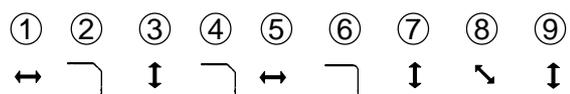
- To insert an element, put the cursor on the number you want to insert, then press F3 (Insert) key.

Pressing it shifts subsequent elements to make a room. Input the element you want to insert, and then, input data.

Example) Elements you previously input



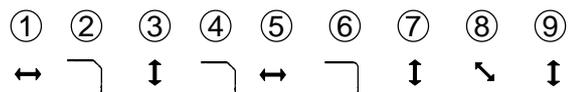
To insert “” element between ⑤ and ⑥, bring the cursor to ⑥, press F0 (Others), F3 (Insert) and enter the “” element.



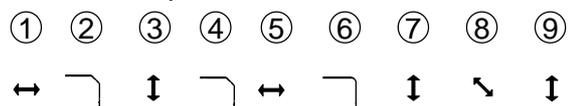
<Alteration>

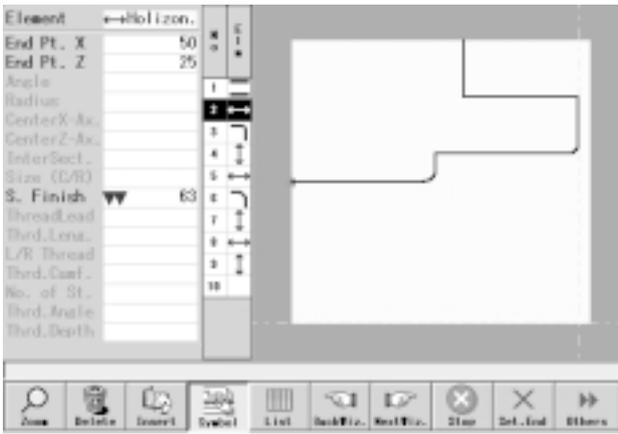
- When altering the element, set the cursor to the number which you want to alter, input a new element and input data.

Example) Elements you previously input



When altering the element ⑥ “” above to “”, set the cursor to ⑥, input the element “” and input data. It results in the following:





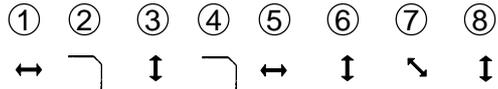
<Deletion>

- To delete an element, bring the cursor to the number you want to delete and press F0 (Others), F2 (Delete) keys.

Example) Elements you previously input



To delete ⑥, bring the cursor to ⑥ and press F0 (Others), F2 (Delete) key twice.



No.	C	End Pt. X	End Pt. Z	---	Intersect. Size	S. Finish	---	---	T. L/R	L. Dia.	No. of St.	Thrd. Ang.	R. Dia.	Thrd. Depth
1	↔	50	50			25								
2	↓	50	25			25								
3	↔			2		25								
4	↓	80	25			25								
5	↔	80	8			25								
6	↓			1		25								
7	↔	80	8			25								
8	↓	80	8			25								
9						25								

When the list input is selected, the elements and each data previously input are listed as shown in the left figure.

Operation Method

- By using the CURSOR keys , , , and , the cursor moves on the elements and data.
- When you have finished modifying, press F0 (Others), F9 (Set. End) keys.

<Insert>

- To insert the element, set the cursor on the number you want to insert and press F0 (Others), F2 (Insert) keys.

By pressing, following elements are shifted down by one line making a space, where you can enter the element and data you want to insert.

- To insert data other than elements, bring the cursor to the number to be inserted, input the data and press Input key.

No	C	End Pt. X	End Pt. Z	---	Sub-	S.	---	---	T.	L.	No	Str	R.	Serial
o	o				ser-	fi-			U	Ch		Ang	Di	Depth
					tion	on			o	ar		l	st	
1	→	50	50											
2	→	50	25											
3	↘			2										
4	↓	60	70											
5	→	60	0											
6	↘			1										
7	↓	80	0											
8	↘	80												
9														

↑	↔	↙	↘	↻	↻	↘	↙	↻	↻	↻	↻	↻	↻	↻
Vertical	Section	L. Diagon.	R. Diagon.	R. Circ.	L. Circ.	C. Class.	R. Class.	Circle						

<ALTER>

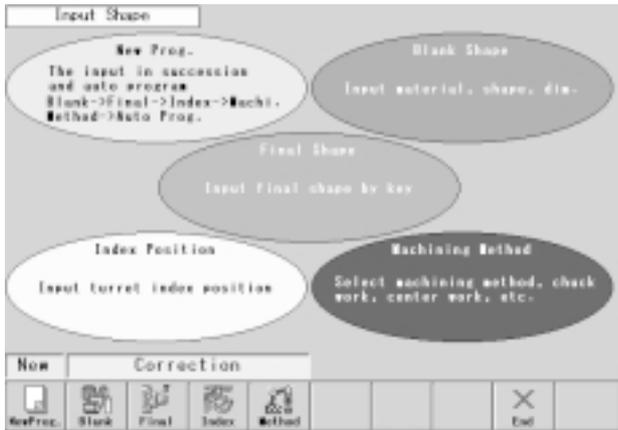
- To change an element, bring the cursor to the number to be alter, input the element to be alter and input the data.
- To alter data other than elements, bring the cursor to the data to be alter and input the data.

<Delete>

- To delete an element, bring the cursor to the place to be deleted and press F0 (Others), F2 (Delete) keys. All of the data including that element are deleted.
- To delete data other than elements, bring the cursor to the data to be deleted and press F2 (Delete) key.

3-7 Turret Index Position

3-7-1 Input Shape



Input Shape Screen

Select a desired item.

F1/New Prog.

F2/Blank : Inputs a blank shape.

F3/Final : Inputs a final shape.

F4/Index : Inputs the index positions of OD and ID tools.

Output of the 2nd reference point (G30U0W0) can be specified.

F5/Method : Select a type of machining or set a limit of rotating speed of the turning spindle.

F9/End : Returns you to the item select screen.

3-7-2 Setting the Turret Index Position



Set a turret index position.

Output with F1 (Tool Pos.) : (G00X...Z...J).

Move the cursor with the CURSOR key , key in numerical values and press the **INPUT** key.

Standard Set Values	ST200		ST250	
OD tool	(MM)	(IN)	(MM)	(IN)
Diameter position	250.0	10.0	250.0	10.0
Length position	150.0	6.0	200.0	8.0
ID tool	(MM)	(IN)	(MM)	(IN)
Diameter position	220.0	8.8	250.0	10.0
Length position	75.0	3.0	100.0	4.0



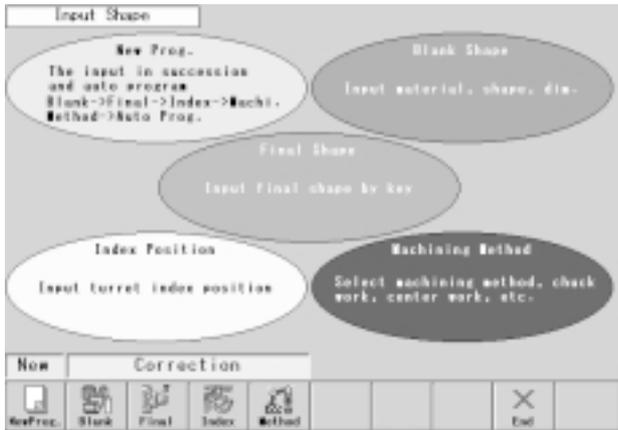
- When center work or bar work (center work) is selected for a machining type, alter LENGTH(Z) of OD TOOL to 100.0.
- Change an OD tool diameter position to a value which does not cause a tool, etc. not to interfere with the chuck.
- Make an OD tool length position larger than the maximum projection amount of an ID tool or the ID tool mounted to the turret.

Output with F2 (2nd Zero) : (G30 U0 W0J).

- When machining with a program made by 2nd zero point position output, machine the work after setting the 2nd zero position with Work Offset on the operating side.

3-8 Selecting the Type of Machining

3-8-1 Input Shape



Input Shape Screen

Select a desired item.

F1/New Prog.

F2/Blank : Inputs a blank shape.

F3/Final : Inputs a final shape.

F4/Index : Inputs the index positions of OD and ID tools.

Output of the 2nd reference point (G30U0W0) can be specified.

F5/Method : Select a type of machining or set a limit of rotating speed of the turning spindle.

F9/End : Returns you to the item select screen.

3-8-2 Selecting the Type of Machining



Machine type select screen

Select the type of machining.

- F1/Chuck Work
- F2/Center Work
- F3/Bar Work (Chuck Work)
- F4/Bar Work (Center Work)
- F9/Set. End

- F1/Robot (Unloader) Yes
- F2/Robot (Unloader) No

- The type currently selected is displayed on the screen and the function key. If the type which is the same as the displayed one is desired, it is not necessary to input here.
- End face machining is not output if F2(Center Work) is selected.
- When F2(Center Work) is selected and the counterboring is enabled, the counterboring process will be performed first regardless of the setting position of machining order file.
- When F3(Bar Work (Chuck Work)) is selected, the bar stopper and cut-off processes are output.
- When F4(Bar Work (Center Work)) is selected, the bar stopper, counterboring and cutoff processes are output.

Note) "Counterboring" follows the set order of the machining order file.

Set a limit of rotating speed of the turning spindle.

When each type of machining such as chuck, center or bar work is selected, set a limit of rotating speed of the turning spindle by key input. Outputting NC data is as follows;

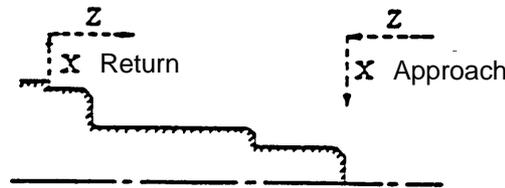
```
~ G50 S **** ~
      Setting value
```

- A setting value is stored in the real number parameter No.80 ~ 82.
A value is kept until alteration of parameter or setting value.
- A setting value is not available more than the integer value parameter No.7.

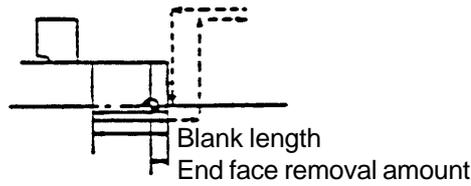
Note) ○ For outer diameter-related processes and bar stopper/spot drilling in case of center work and bar work (center work), a tool moves in the order of the Z axis and X axis when approaching, and it moves in the other order when returning to an index point.

<Outer Diameter-related Processes>

End face roughing, OD roughing, OD finishing, OD end face grooving, OD grooving, OD necking, OD threading, cutting-off.



- The bar stopper moves to a blank end face position at a rapid traverse rate, and then, to a blank rear end face. There, it outputs a chuck open command (M69) and a no-blank check command (M31). Then, it moves to blank end face. There, it outputs a chuck close command (M68). Then, it moves to a clearance position at a rapid traverse rate and outputs NC data to return to an index position (in case of automatic programming).

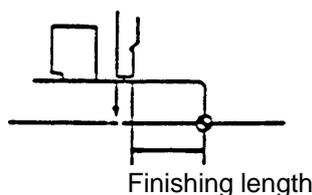


NC data corresponding to a super bar feeder (BS65) or a bar stock motion by feed per minute without the spindle rotation can be outputted by a setting of a real value parameter 94. (Standard setting correspond to a super bar feeder BS65.) In addition, the NC data for a forward draw-out system, can be also output by setting a real value parameter 103 and character parameters 2022 through 2026.

For details, see 6. Details of Parameter Functions in Section 5 PARAMETERS.

Note) When executing with the real value parameter 103 and character parameters 2022 through 2026 set, bar stopper process custom programming cannot be done.

- Cutting-off outputs NC data to cut at a position which is away from the blank rear end face by a cutting-off tool width (in case of automatic programming).



The NC data, which causes a cutting-off tool to perform chamfering (C chamfering, R chamfering) of the rear end face of the blank, can be also output by setting real value parameters 47 and 48.

For details, see 6. Details of Parameter Functions in Section 5 PARAMETERS.

3-9 Automatic Program Creation

3-9-1 Programming



Programming (Item Select) Screen



Press the F2 (Auto) key.

Select a desired item.

- | | |
|-------------|---------------------------------------------------------------------|
| F1/Shape | To select material, final shape, index position, type of machining. |
| F2/Auto | To automatically create a program. |
| F3/L.Conf. | To confirm and create the turning process. |
| F5/Edit | To edit the NC program. |
| F6/View | To check the NC program. |
| F7/NC View | To check the program in the NC memory. |
| F8/Transfer | To transfer the program to the NC memory. |
| F0/Others | |

Note) Standard values have been set for the machining condition files and parameters. Proceed to "programming" after altering them as required. For the machining condition files and parameters, refer to "4. MACHINING CONDITION FILE" and "5. PARAMETERS".

3-9-2 Automatic Programming (Selecting the Item)



Item Select Screen



Press the F2 (Auto) key.

Select a desired item.

- F1/Shape To select material, final shape, index position, type of machining.
- F2/Auto To automatically create a program.
- F3/L.Conf To confirm and create the turning process.
- F5/Edit To edit the NC program.
- F6/View To check the NC program.
- F7/NC View To check the program in the NC memory.
- F8/Transfer To transfer the program to the NC memory.
- F0/Others

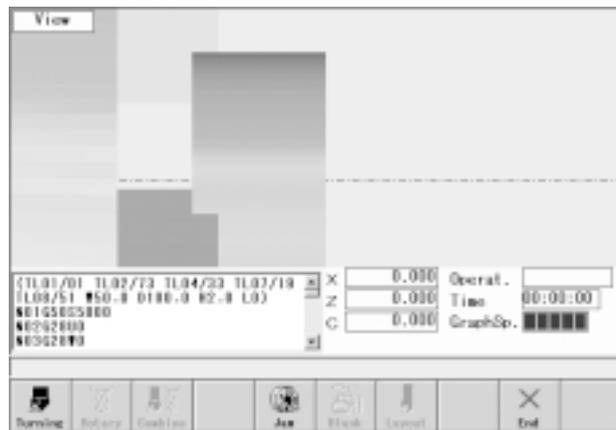
Note) Outline of Operational Procedure for Automatic Programming

1. Automatic ... Create a program with input data, and thereafter, check for interference with a picture.
2. Custom Prepare the program (New Prog.) or correct the program by automatic preparation or confirming preparation (Correction) through conversation after automatic selection of tool by finishing shape of turning data. Perform the preparation and correction of the machining program of the rotating tool through conversation. (With the C-axis is equipped.)
3. Edit Edit a created program as required.
4. View Check edited contents for interference with a picture again.
5. Transfer Transfer a created program to the NC memory.

1. Automatic Program Creation



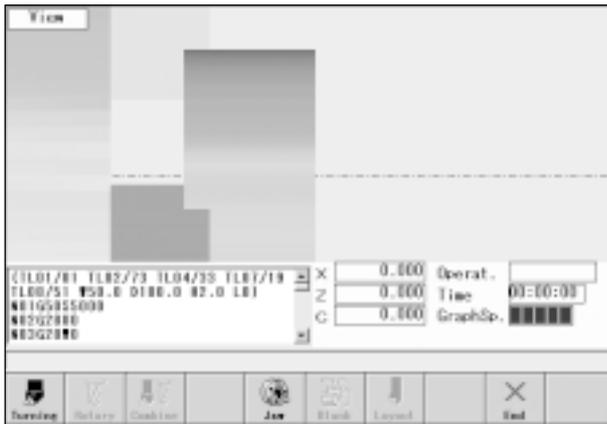
Tools Used Select Screen



Machining Contents Setting Screen

When automatic determination is completed, the screen changes to a View picture. Input a jaw shape and check for interference by the picture.

2. View



F1/Turning Shows the turning by View.

F2/

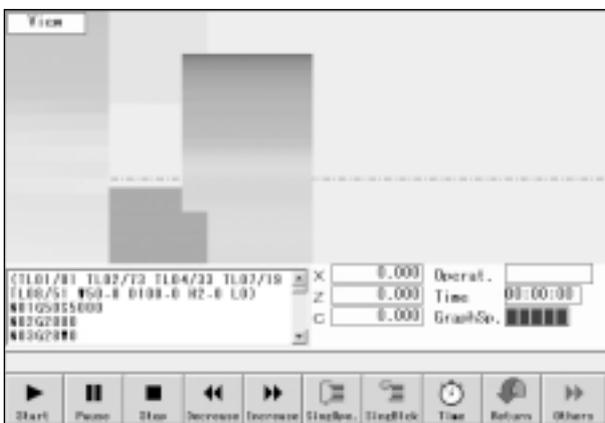
F3/

F5/Jaw

Sets the jaw shape.

F9/End

2-1 View of turning



F1/Start

Starts the View.

F2/Pause

Temporarily stops the View.

F3/Stop

Stops the View.

F4/Decrease

Slows down the speed of the View.

F5/Increase

Speeds up the View.

F6/Sing Ope.

Executes up to View M01.

F7/Sing Blck

Executes the View by line.

F8/Time

Displays the machining time after View.

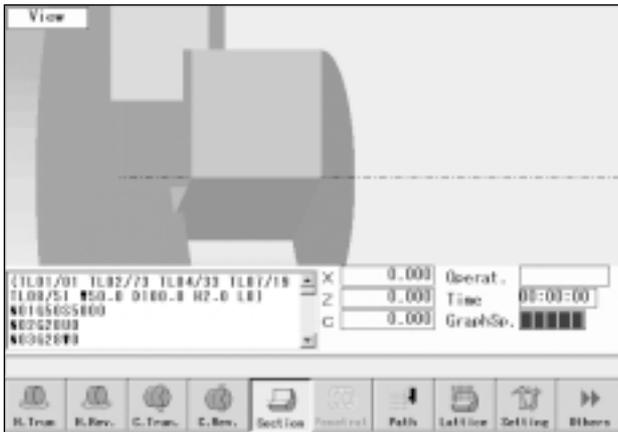
F9/Return

Returns to the precedent screen.

F0/Others

The screen under the present one is displayed.

2-2 View display



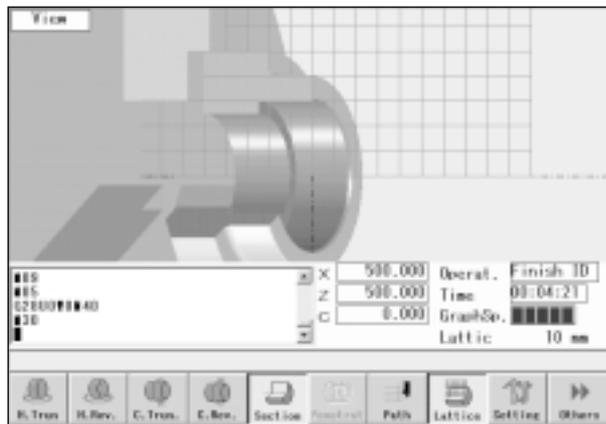
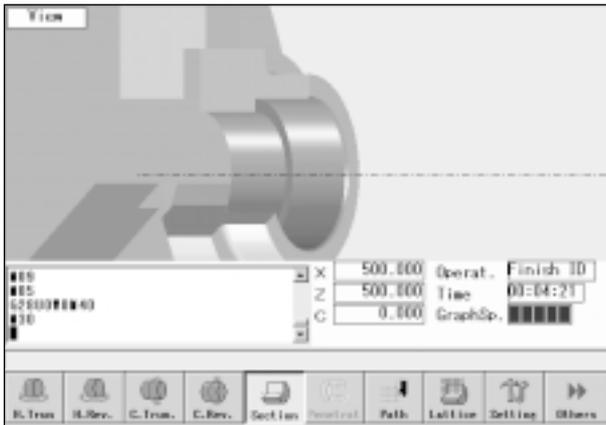
- F1/H.Trun Rotates forward horizontally.
- F2/H.Rev. Rotates backward horizontally.
- F3/C.Trun. Rotates forward to the circumference direction.
- F4/C.Rev. Rotates backward to the circumference direction.
- F5/Selection Cross section display Yes/No.
- F7/Path Orbit display Yes/No.
- F8/Lattice Grid display Yes/No.
- F9/Setting Setting of grid display/setting to display the center
- F0/Others Displays the screen above the current one.

2-3 Display setting



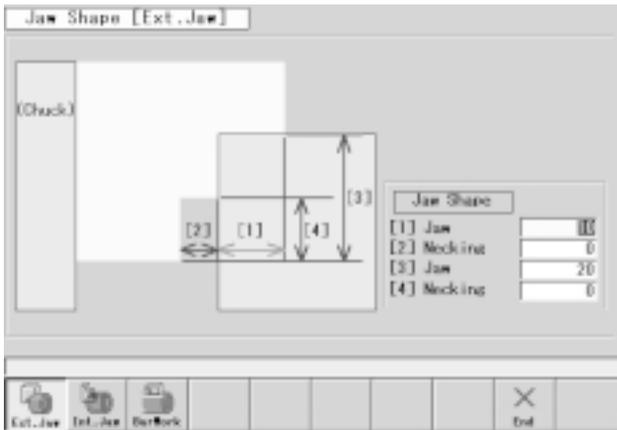
Set "On/Off" using cursor   .

2-4 View



Grid Display State

3. Jaw Shape Setting



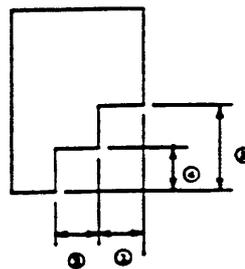
External Jaw Shape Setting Screen

Input the data of Jaw Shape.

<Setting Method>

1. Select F1 (Ext. Jaw), F2 (Int. Jaw) or F3 (Bar Work).
2. Input each dimension.
3. After inputting, press the F9 (End) key.

<Setting of Each Dimension of External Jaw>

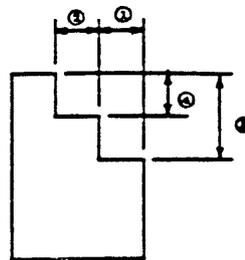


- ① Jaw depth in a longitudinal direction
- ② Necking in a longitudinal direction
- ③ Jaw depth in a diametrical direction
- ④ Necking in a diametrical direction

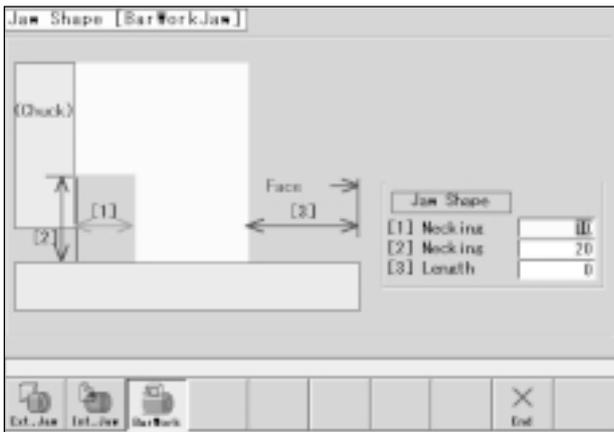
<Setting of Each Dimension of Internal Jaw>



Internal Jaw Shape Setting Screen

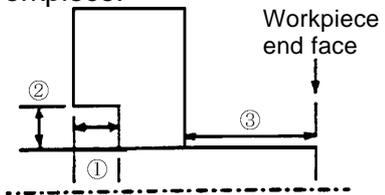


- ① Jaw depth in a longitudinal direction
- ② Necking in a longitudinal direction
- ③ Jaw depth in a diametrical direction
- ④ Necking in a diametrical direction



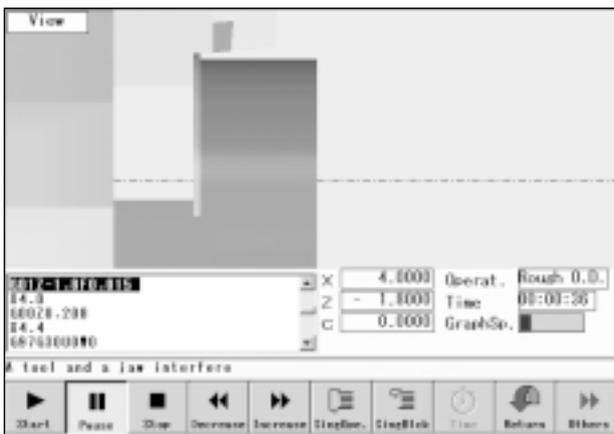
<Setting each dimension of bar work jaw>

- ① Escape in the longitudinal direction on the back of the jaw.
- ② Escape in the diametrical direction on the back of the jaw.
- ③ Protruding length of the workpiece.



Note) For the protruding length of the workpiece ③, the blank length input to Blank Shape Input Screen + 20mm will be displayed. If protruding length exceeds the above value, change it.

4. Interference Check with Picture



Interference Check Screen with Picture

Display a View and tool position (Diameter, longitudinal and angular), name of process, machining time, scale, View speed and NC data (5 line).

- F1/Start
- F2/Pause
- F3/Stop
- F4/Decrease
- F5/Increase
- F6/Single Operate
- F7/Single Block
- F8/Time
- F9/Return
- F0/Others

If the tool interferes with the jaw, an interference alarm is displayed. Modify a jaw shape.

- Pressing the F1 (Start) key starts the picture and pressing the F2 (Pause) key stops it. When the F6 (Sing Ope.) key is pressed, the picture screen will stop every operation. And when the F7 (Sing Block) key is pressed, the picture screen will stop every line.
- With a graphic display completed, and if F8 (Time) is pressed, the MACHINING TIME DISPLAY screen appears.
- After completing and confirming the picture, pressing the F9 (End) key returns you to the item select screen.

Notes)○ In parentheses, TLxx/△△ is output. However, when △△ is displayed as 203, 206, 211, or 212, it indicates that a special tool has been selected. It is output when the contents of the tool file, etc. do not match machining work.

Note) The special tool is displayed as a process No. (see Page 4-2) + 200.

(Example) A value “203” represents the special tool for the drilling process (03).

- For a grooving tool, no special tool is selected and no NC data is created.
- A special tool for boring bar is output with a tool diameter of 0.04 (IN) 1 (MM) and a tool nose radius of 0.03 (IN) 0.4 (MM).
- Use nose R (0.03 for IN. spec. and 0.4 for MM spec.) as to the tools used as well.
(An NC alarm may result depending on an entered figure, because the special tool is used.)

5. Machining Time List Display

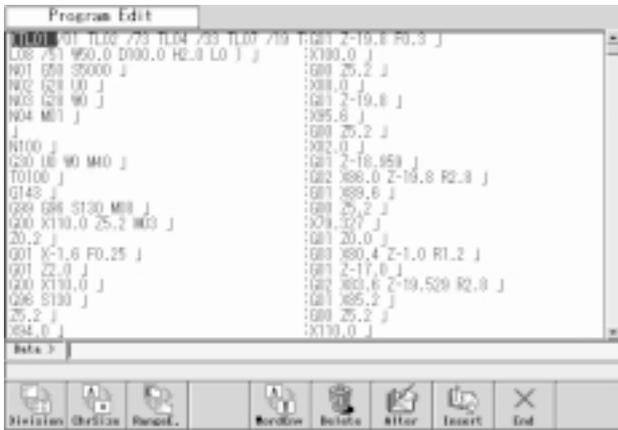
Machining Time										
T.No	T.File No	Tool Geometr	PI.Angle SA.Angle	TL.Width TL.Dia. Bar Dia.	Motor #	T-PS	Out Time Feed Time Mach. Time	Retl. Inp-15 Cut Speed (F/min) Feed Rate (In/rev)		
1	T 1	L 1 Rough G.D.	85 5		0.8	3	00:01:04 00:00:07 00:01:08	190 0.25		
2	T 2	L 20 Drill	100	32			00:00:28 00:00:01 00:00:31	1183 0.1		
3	T 4	L 10 Rough L.D.	-87 -27	20	0.8	2	00:02:04 00:00:07 00:02:08	190 0.198		
4	T 7	L 10 Finish G.D.	75 15		0.8	3	00:00:18 00:00:01 00:00:19	190 0.222		
Total Time							00:04:13	00:00:08	00:04:21	

3-9-3 Program Editing

- Press F5 (Edit) key on the item selection screen.
- Possible program to edit on this screen is the latest operated one.

After automatic preparation → Automatically prepared program for turning.

When turning confirmation is performed → Confirmation making-up program for turning.



F1/Division

F2/ChrSize Changes the size of characters.

F3/RangeE.

F5/WordCnv

F6/Delete

F7/Alter

F8/Insert

F9/End

Page key  : Previous screen

Page key  : Next screen

Cursor key  : Movement of cursor

  ... Every line

  ... Every address



In case of insertion :

Move the cursor to previous word and key in the address and numeral then press **Insert** key.

In case of alteration :

Move the cursor to the word to be altered and key in the address and numeral then press **Alter** key.

In case of deletion :

Move the cursor to the word to be deleted and press **Delete** key.

Word Editaddress search can be executed with character string + cursor key   .

Word Edit



Search and change of are executed.

Scope Edit



F3/Return

Returns to the precedent screen.

F4/Appoint.

Records the scope pecified.

F5/Housing

Inserts the scope specified.

F6/R.Insert

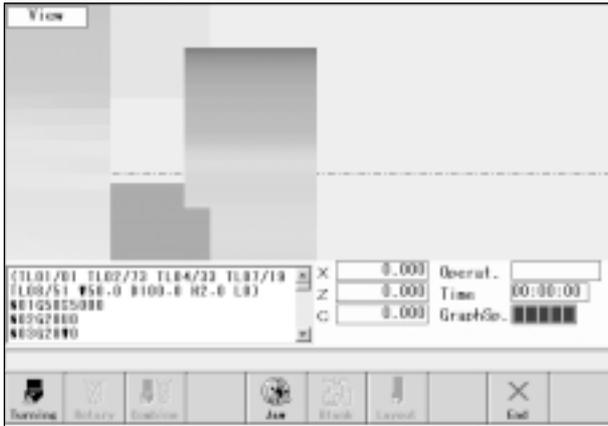
Deletes the scope specified.

F7/R.Delete

Restores the scope deleted.

F8/Del.Rev.

3-9-4 View



- Press F6 (View) key on the item selection screen.
- You can check the animation of the program.

After automatic preparation → Automatically prepared program for turning.

When turning confirmation is performed → Confirmation making-up program for turning.

3-9-5 Program Transfer



○ Press F8(Transfer) key on the item selection screen.

1. Shift the memory key to write.

2. Key in the program No.

3. Press F1(Transfer) , F5(Yes) keys.

Note) ○ The number which is already registered is not possible to input.

○ Program is deleted by pressing F3(Delete) key after key in the program number.

Return to the item selection screen by pressing F9(End) key.

○ Transferred program by this screen is the latest operated one.

After automatic preparation → Automatically prepared program for turning.

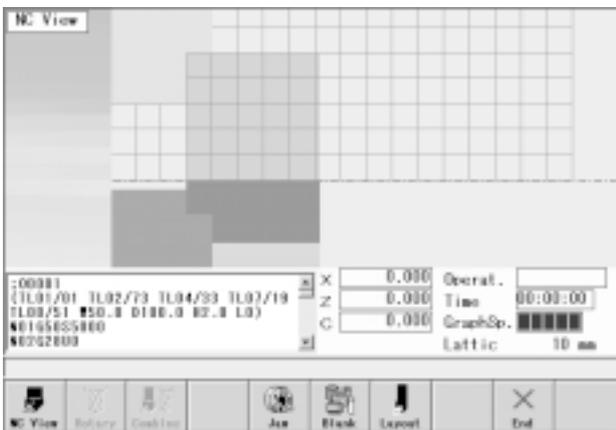
When turning confirmation is performed → Confirmation making-up program for turning.

3-9-6 NC View



Program call screen

- Check the program registered in the NC memory by animation.
- Press F7(NC view) key at item selection screen.
- Program list registered in the NC memory is displayed so key in the program number to be checked by animation then press input key.



Enlargement reduction setting screen

Press F6(Blank) and F7(Layout) key and set material and tool shape of the program to be checked by animation.

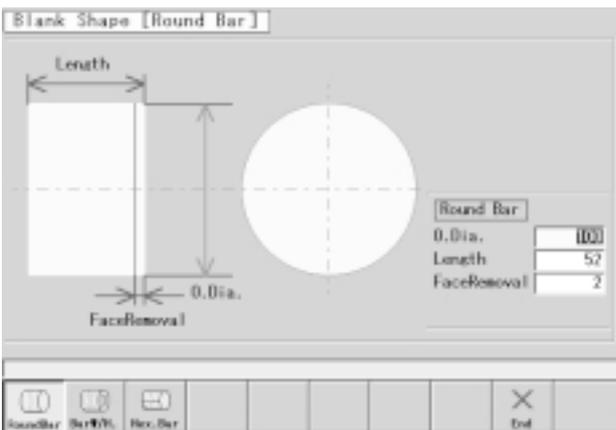
OD

Length

Cutting allowance of end surface

Key in the value of OD, length and cutting allowance of end surface then input by input key.

If pressing F9(End) key after completion of setting.



Material shape setting (Round bar) screen

Note) ○ When the program which is prepared by automatic programming, the value of W, D and H in the bracket of head of program is displayed automatically. W; Length, D; OD, H; Cutting allowance of end surface.

- When the program which is prepared manually, the value is displayed as OD; 100mm, Length; 100mm and cutting allowance of end surface; 2mm so alter them if required.

Actual value parameters
 64: Facing amount.
 65: Out diameter.
 66: Length

Tool Set									
Sta- tion No.	Tool File No.	Operation	Tool Geometry	CA Angle	SA Angle	---	---	Non-R	T- PT
1	1	Rough O.D.		85	5			0.0	2
2	73	Drill		100		32			
3	4	Rough I.D.		-37	-27		28	0.0	2
4	7	Finish OD		75	15			0.0	3
5	8	Finish ID		-37	-27		32	0.0	3

Tool shape setting screen

Tool Set									
Sta- tion No.	Tool File No.	Operation	Operation List						
1	1	Rough O.D.	1.Bar Stop	13. Necking OD	15. FaceSpotDrill				
2	2	Drill	2.Spot Drill	14. Necking ID	16. FaceDrilling				
3	4	Rough I.D.	3.Drill	15. Ext. Thread	17. FaceInt. Bore				
4	7	Finish OD	4.	16. Int. Thread	18. FaceTapping				
5	8	Finish ID	5. Rough O.D.	17.	19. FaceBore				
6			6. Rough I.D.	18. Tap	20. FaceIntDrill				
			7. Gro. Int.	19. Bore	21. E.D. SpotDrill				
			8. Gro. Int.	20. End Mill	22. E.D. Drilling				
			9. E. Ext. Face	21. Ext. Drill	23. E.D. Int. Bore				
			10. E. Int. Face	22. Face Form	24. E.D. Tapping				
			11. Finish OD	23. Ext. Form	25. E.D. Bore				
			12. Finish ID	24. Int. Form	26. E.D. EndMill				

Tool name insert screen

○ When the program which is prepared by automatic programming, the data correspond to tool file No. by the data such as TL01/02 in the bracket of head of program is displayed. About a drill (Shape 2), however, the minimum diameter in tool file registered is displayed so input the actual dimension to be used.

○ When the program which is prepared manually, nothing is displayed so input actual tool data to be used.

Note) ○ Confirm the input value of machining turret surface to the T number of program.

Example) Input 1 when T0100.

○ If set the cursor to process description and input the F5(Ope.Name) key process description is displayed. Also shape can be changed by pressing F6(NextData) at this time.

○ Input of tool file No. is not necessary.
○ Main cutting edge angle can not be inputted.

3-10 Displaying the Machining Time

3-10-1 Selecting the Function



Select a desired item.

F1/Cond. : Display and setting of various machining condition files.

F2/Data I/O : Stores and calls shape data conversationally input.

F3/Time : Displays a tools automatically selected and machining time.

F7/Initial : Initialize each multi file.

F0/Others



Press the F3 (Time) key.

3-10-2 Displaying the Machining Time

Machining Time										
T.No	T.File No Doc.	Tool Code/Gr	Fl.Angle FA.Angle SA.Angle	Cl.Width TW.Dia. SR Dia.	Wore-R	Z- FF	Cut Time Rapid Time Wch. Time	Spd.(min-1) Cut Speed/Spd FeedRate/Feed		
1	1	L 1 Rough D.O.	85 5		0.8	3	00:00:51 00:00:07 00:00:58	100 0.25		
2	4	L 33 Drill	180	32			00:00:00 00:00:07 00:00:00	1183 0.1		
3	4	L 33 Rough T.O.	-07 -27	20	0.8	2	00:01:56 00:00:07 00:02:04	100 0.199		
4	8	L 18 Finish D.O.	75 15		0.8	3	00:00:24 00:00:07 00:00:31	180 0.222		
Total Time							00:05:02	00:00:52	00:05:54	

Machining Time Screen

- The following data of each operation of programs checked in the moving screen are displayed; machining order, machining turret face, tool file No., process name, tool shape, tool nose angle, main cutting edge angle, sub cutting edge angle, tool width, tool diameter, holder diameter, nose R, tool nose point, cutting time, operation time and machining time.

- The operations are displayed in every machining order.

- When there are 5 or more items, they are displayed by pressing the PAGE key .

- When there are less than 5 items, they are not changed even by pressing the PAGE key .

Notes) ○ When “203, 206, 211, 212” is displayed in the tool file No. Lxx, it indicates that a special tool has been selected. (when not registered in the tool file)

- When created by custom programming, data for specified tools are displayed. Viewing these data, alter respective data in Tool Layout on the operation side.

3-11 Inputting/Outputting the Shape Data

3-11-1 Programming (Selecting the Function)



Press the F2 (Data I/O) key.

3-11-2 Inputting/Outputting the Shape Data



Select a desired item.

F1/Cond. : Display and setting of various machining condition files.

F2/Data I/O : Stores and calls shape data conversationally input.

F3/Time : Displays a tools automatically selected and machining time.

F7/Initial : Initialize each multi file.

F0/Others

Display a saved shape data program.

- Shape data can be input and output.
- To call out the data, set the cursor on the program No., press F2(Load) key and press F5(Yes) in the confirmation message.
- To save the data, press F4(Ope. chg), enter the program No. and press the **Input** key. Then, enter the program name (up to 20 alpha-numeric characters) and press the Input key, then press F1(Save) key.
- Pressing the F9(End) key returns you to the “Select Function” screen.
- When deleting shape data, enter a program number and press the F3(Delete) key. With the confirmation message, push F3(Delete).

Output by external equipment

Using F7(Ext. Call), you can output the data to external equipment through and save them. (Carry out “I/O” by the operating side.)

Using F8(Ext. Sto.), you can call out the data stored through external equipment.(Carry out “I/O” by the operating side.)

Note) Ext.Call and Ext.Sto. is only one data under present input.

Notes) ○ When creating NC data by load the shape data, perform AUTO PROGRAMMING or CUSTOM PROGRAM.

○ You can store up to 100 shape data programs.

3-12 Program Confirming Preparation (Turning)

Selecting the Item



Item Select Screen

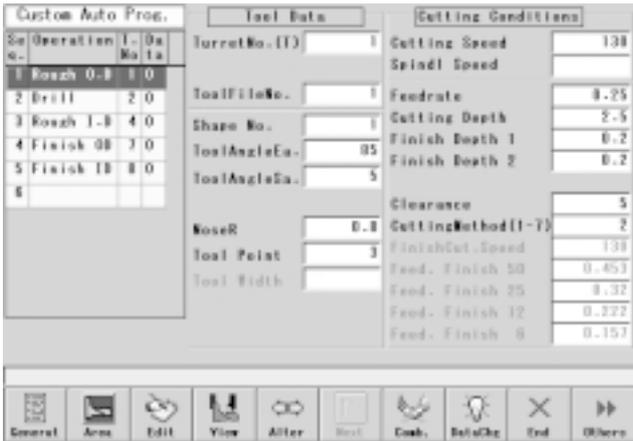


Press F3 (L. Conf.) key.

Select a desired item.

- | | |
|-------------|---------------------------------------------------------------------|
| F1/Shape | To select material, final shape, index position, type of machining. |
| F2/Auto | To automatically create a program. |
| F3/L.Conf. | To confirm and create the turning process. |
| F5/Edit | To edit the NC program. |
| F6/View | To check the NC program. |
| F7/NC View | To check the program in the NC memory. |
| F8/Transfer | To transfer the program to the NC memory. |
| F0/Others | |

3-12-1 Turning Confirmation Creation



F1/Generat

: Press this key after you have made the processing column of all processes "Completed".

F2/Area

: Create setting of the machining area.

F3/Edit

: Edit the NC data of the process where the cursor is located.

F4/View

: Execute the animation of the process specified.

F5/Ope.Chg.

: Change the input for columns of Process and Tool data/Cutting conditions.

F6/Next

: Call out the tool file No. or next data on the turret surface

F8/Data Chg

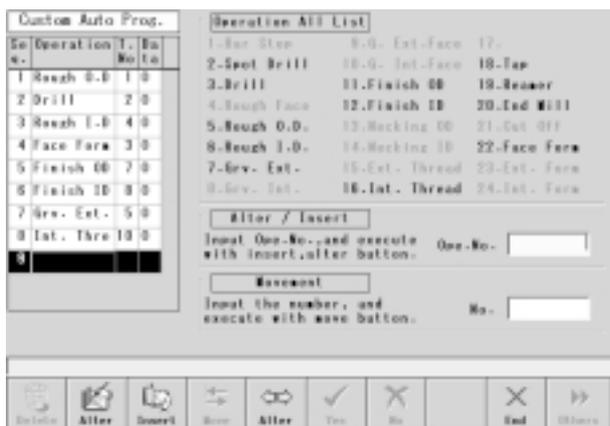
: Change the tool data changed or cutting condition data.

F9/End

: Returns to the multi boy screen.

1. By bringing the cursor on any process, you can set its tool data and cutting conditions.
2. If you want to change the NC data of each process directly, bring the cursor on the process you want to edit then press F3(Edit) key and you enter the screen to edit each process.
3. After you have finished work of each process and made all of the processes "Completed", press F1(Generat) key.

Insert, Change, Delete of Process



- F1/Delete Delete the process.
- F2/Alter Alter the process.
- F3/Insert Insert the process.
- F4/Move Replace the process.
- F5/Ope.Chg.
- F6/Yes
- F7/No
- F9/End
- F0/Others

- Using **Insert**, **Alter** or **Delete** key, you can insert, change or delete the process.

Insert

Bring the cursor on the number (the table left) you want to insert, press F0 (Others) key, F5 (Ope.Chg.) key, key-in the process No. (the table above) you want to insert and press **Insert** key. Then, the process specified is inserted.

Alter

Bring the cursor on the number (the table left) you want to change, press F0 (Others) key, F5 (Ope.Chg.) key, key-in the process No. (the table above) you want to change and press **Alter** key. Press F6 (Yes) key in the confirmation message. Then, the process is changed to the one specified.

Delete

Bring the cursor on the process you want to delete, press F0 (Others) key, **Delete** key and press again **Delete** key in the confirmation message. Then, the process is deleted.

- To move the process, bring the cursor on the number which is the destination of the movement and press F5 (Ope.Chg.) key. Then press the cursor key  to key-in the number (the table left) you want to move and press F4 (Move) key. Then the process specified is changed.

- Note)**
- The table left displays the process names only that are necessary for the final shape, so you cannot insert or change the process that is not displayed here.
 - In the case of insertion, the process is being “Not yet”, so you must set all of the processes to make them “Completed”, then press F1 (Generat) key without fail.
 - In the case of modification, there are processes which are “Not yet” and processes which are “Completed”, so set the processes which are “Not yet” to make them “Completed” and press F1 (Generat) key without fail.

3-12-2 Machining Contents

Operation Method

1. Since the system displays the screen which is for setting cool data for the processes specified in OPERATION LIST, make a confirmation.
2. Initially, tools automatically selected or tool data registered in the tool file are displayed. When not altering, press the PAGE key  and proceed to the next step.
3. When altering, set the cursor to where to alter by means of the CURSOR key . Enter data and press the **INPUT** key.

- Notes)**
- For the process inserted in OPERATION LIST, nothing is displayed at STATION NO. (T) field. Therefore, enter the turret position to mount the tool. Since initial values in the tool file are displayed for tool data, alter them.
 - The value of TOOL FILE NO. cannot be altered. The data registered in the tool file are sequentially displayed by pressing F6(Next) key.
Note) Since the data are displayed with 0 when a special tool is selected, display a number with the F6(Next) key and input data.
 - Although a program is created with the tool data specified on this screen, they may not be set in the tool layout on the operation side. So, after creating the program, check with a display of the tools used and alter the tool layout as well.
 - Even if you alter data on this screen, tool file data are not altered.
 - However the data of the No. of mounting faces are altered by the F6(Next) key in order, setting by key also available.

Custom Auto Prog.		Tool Data		Cutting Conditions	
Seq	Operation	TurretNo. (T)	18	Spindle Speed	180
1	Bar Stop	ToolFileNo.	71	Feedrate (rev)	6
2	Rough 0.3	Shape No.		Feedrate (min)	
3	Drill	Tool Angle	89	Approach Dist.	10
4	Rough 1.3	Diameter	3	De.atChckDeen.	3
5	Finish 08	De.atChckDias.	3		
6	Finish 13				
7	Cut Off				
8					

BAR STOPPER

Custom Auto Prog.		Tool Data		Cutting Conditions	
Seq	Operation	TurretNo. (T)	3	Cutting Speed	18
1	Rough 0.3	ToolFileNo.	88	Spindle Speed	816
2	Drill	Shape No.	1	Feedrate	0.38
3	Rough 1.3	Tool Angle	89	Approach Dist.	5
4	Finish 08	Diameter	3		
5	Finish 13	Depth	18		
6	Spot Drill				
7					

SPOT DRILLING

Custom Auto Prog.		Tool Data		Cutting Conditions	
Seq	Operation	TurretNo. (T)	2	Cutting Speed	120
1	Rough 0.3	ToolFileNo.	73	Spindle Speed	
2	Drill	Shape No.	1	Feedrate	0.1
3	Rough 1.3	Tool Angle	108	Approach Dist.	5
4	Finish 08	Diameter	32	Penetrated Dis.	8
5	Finish 13	Start Point	8	End Point	52
6		CuttingMethod(1-9)	1	Peck Length	
		Cut. Start Dis.		FeedrateAtAbove	

DRILL

Custom Auto Prog.		Tool Data		Cutting Conditions	
Seq	Operation	TurretNo. (T)	1	Cutting Speed	130
1	Rough 0.3	ToolFileNo.	1	Spindle Speed	
2	Drill	Shape No.	1	Feedrate	0.25
3	Rough 1.3	ToolAngleCa.	85	Cutting Depth	2.5
4	Finish 08	ToolAngleCa.	5	Finish Depth 1	0.2
5	Finish 13	ToolAngleCa.	5	Finish Depth 2	0.2
6		Clearance	5	CuttingMethod(1-7)	2
		Feed. Finish 58	0.453	FinishCut.Speed	130
		Feed. Finish 25	0.32	Feed. Finish 58	0.453
		Feed. Finish 12	0.222	Feed. Finish 25	0.32
		Feed. Finish 6	0.157	Feed. Finish 12	0.222
		Feed. Finish 6	0.157	Feed. Finish 6	0.157

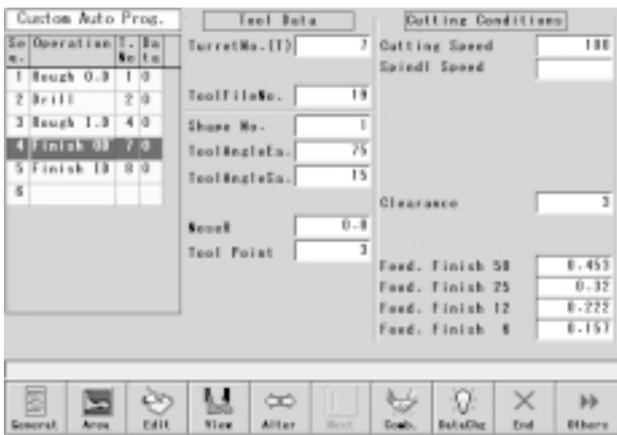
OD ROUGH/FORM

Custom Auto Prog.		Tool Data		Cutting Conditions	
Seq	Operation	TurretNo. (T)	4	Cutting Speed	130
1	Rough 0.3	ToolFileNo.	33	Spindle Speed	
2	Drill	Shape No.	1	Feedrate	0.186
3	Rough 1.3	ToolAngleCa.	-87	Cutting Depth	1.984
4	Finish 08	ToolAngleCa.	-27	Finish Depth 1	0.2
5	Finish 13	Radius Dia.	28	Finish Depth 2	0.2
6		Clearance	5	CuttingMethod(1-7)	2
		Feed. Finish 58	0.453	FinishCut.Speed	130
		Feed. Finish 25	0.32	Feed. Finish 58	0.453
		Feed. Finish 12	0.222	Feed. Finish 25	0.32
		Feed. Finish 6	0.157	Feed. Finish 12	0.222
		Feed. Finish 6	0.157	Feed. Finish 6	0.157

ID ROUGH/FORM

Custom Auto Prog.		Tool Data		Cutting Conditions	
Seq	Operation	TurretNo. (T)	5	Cutting Speed	180
1	Rough 0.3	ToolFileNo.	118	Spindle Speed	
2	Drill	Shape No.	1	Feedrate Rough	0.38
3	Rough 1.3	Finish Depth 1	0.1	Finish Depth 1	0.1
4	Face Form	Finish Depth 2	0.1	Finish Depth 2	0.1
5	Finish 08	DevlAtGrv-Bta.	0.3	Clearance	3
6	Finish 13	CuttingMethod(1-3)	1	FinishCut.Speed	180
7	Grv. End	Feed. Finish 58	0.32	Feed. Finish 58	0.32
8	Int. Thru	Feed. Finish 25	0.226	Feed. Finish 25	0.226
9		Feed. Finish 12	0.157	Feed. Finish 12	0.157
		Feed. Finish 6	0.111	Feed. Finish 6	0.111

GROOVE
(OD, ID, OD END FACE, ID END FACE)



OD FINISH



ID FINISH



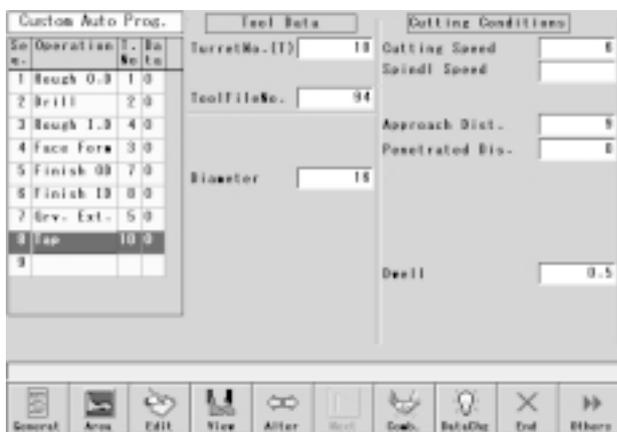
NECKING



THREADING (OD, ID)

Note) Using the (Next) key, tool data can be checked, but not altered. It is determined depending on the direction at figure input time.

Note) TOOL NO. (L) 100, 101 is for OD right-handed threads, 102, 103 for OD left-handed ones, 104, 105 for ID right-handed ones and 106, 107 for left-handed ones.



TAPPING (OD, ID)



REAMING

Note) TOOL NO. (L) 94 and 95 are for right-handed threads, and 96 and 97 for left-handed threads.

Custom Auto Prog.			Tool Data		Cutting Conditions	
Op. No.	Operation	T. No.	TurretNo. (T)	3	Cutting Speed	20
1	Rough 0.3	1			Spindl Speed	
2	Drill	2	ToolFileNo.	99	Feedrate	0.15
3	Rough 1.3	4			Approach Dist.	5
4	Finish 09	7			Penetrated Dis.	6
5	End Mill	3	Diameter	12		
6	Finish 19	8			Drill	0.5
7					Cut. Start Dis.	
					Feedrate at Above	

END MILLING

Custom Auto Prog.			Tool Data		Cutting Conditions	
Op. No.	Operation	T. No.	TurretNo. (T)	9	Cutting Speed	100
1	Bar Stop	10			Spindl Speed	
2	Rough 0.3	1	ToolFileNo.	221	Feedrate	0.38
3	Drill	2			Clearance	3
4	Rough 1.3	4			Length	50
5	Finish 09	7			Dis. of Cut.Off	100
6	Finish 19	8			F. Ret. at CutEnd	
7	Cut Off	9			Feed. at CutEnd	
8					Size of Chaffer	6
			Tool Width	5	Peck Length	

CUT OFF

Custom Auto Prog.			Tool Data		Cutting Conditions	
Op. No.	Operation	T. No.	TurretNo. (T)	3	Cutting Speed	100
1	Rough 0.3	1			Spindl Speed	
2	Drill	2	ToolFileNo.	154	Feedrate	0.16
3	Rough 1.3	4	Shape No.	3	Finish Depth 1	0.2
4	Face Form	3	ToolAngleCa.	8	Finish Depth 2	0.2
5	Finish 09	7	ToolAngleCa.	8	Clearance	5
6	Finish 19	8			CuttingMethod(1-7)	1
7	Rev. Ext.	5	Wedge	3	FinishCut.Speed	100
8	Ext. Thru	10	Tool Point	7	Feed. Finish 50	0.876
9			Tool Width		Feed. Finish 25	0.82
					Feed. Finish 12	0.426
					Feed. Finish 6	0.384

FACE FORM

3-12-3 Machining Area

Operation Method

- Specify cutting directions for the processes specified in OPERATION LIST, using the keys F1 through F4.

F1	F2	F3	F4
↑	↓	←	→

Notes) ○ The cutting directions for the following processes cannot be altered :

Process	Cutting direction
Bar stopper	←
Spot drilling	←
Drilling	←
OD grooving	↓
ID grooving	↑
End face grooving	←

Process	Cutting direction
OD necking	No display
ID necking	No display
Trapping	←
Reaming	←
End milling	←
Cutting-off	↓

Note) OD/ID necking assumes a direction specified when inputting a shape.

- The cutting directions below cannot specified for the following processes :

Process	Cutting direction
OD roughing	↑
ID roughing	↑
Face form	→ ←
OD threading	↑ ↓
ID threading	↑ ↓

- When machining the OD or ID indentation with the tool shape No.3 (button tool), the cutting direction → is not available.

- Specify a machining area. Specify its start point (red arrow) and end point (white arrow) by moving them with the CURSOR keys. First, move the start point (red arrow) to the start point of the machining area with the CURSOR keys and press the **INPUT** key. When this is done, diameter and length values are also displayed. Confirm the position and values of a picture.

Next, move the end point (white arrow) to the end point of the machining area with the CURSOR keys and press the **INPUT** key. When this is done, diameter and length values are also displayed. Confirm the position and values of the picture. After inputting the end point. Set the machining area.

Next, you are inquired whether you want to cut another area with the same tool. If “yes”, press the F5 (Yes) key and specify the cutting direction and machining area in a similar way.

If “no”, press the F6 (No) key.

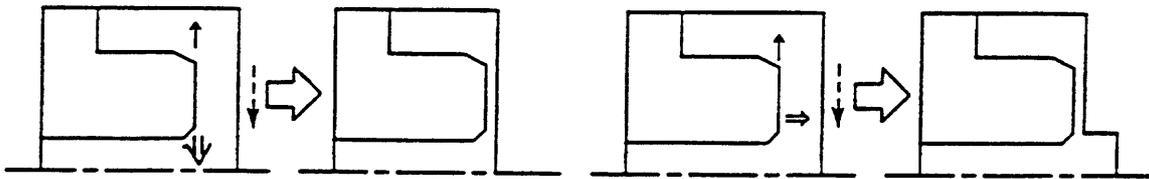
Pressing the F4 (View) key enables you to check per process with the graphic display.

- Notes) ○ The machining area start point does not refer to a cutting start point, but to the start point of the range to be machined (since a machining profile is input counterclockwise, the machining area start point is located on the side closer to an element start point in that order).
- When moving the start point (red arrow) before the end point (white arrow), press the **INPUT** key, assuming the start point (red arrow) as a temporary position. Next, move the end point (white arrow) to a regular position and press the PAGE key  . Next, move the start point (red arrow) to the regular position again and press the **INPUT** key. Finally, confirm an end point (white arrow) position and press the **INPUT** key.

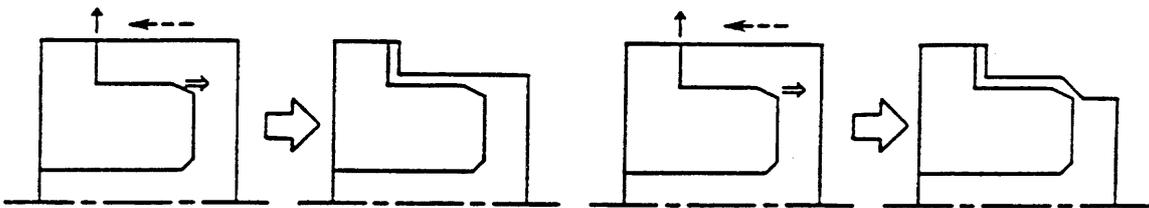
- The machining areas for the following processes are not required to be specified :
 1. Bar stopper
 2. Spot drilling
 3. Drilling
 4. OD/ID necking
 5. Cutting-off

Examples for Specifying Machining Areas (Machining area start point and end point are indicated with ↓ and ↑, respectively. A cutting direction is indicated with “- - - →.”)

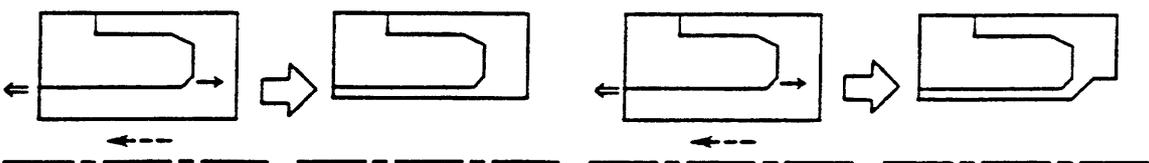
1. End face roughing



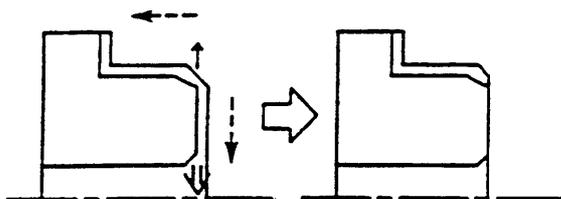
2. OD roughing



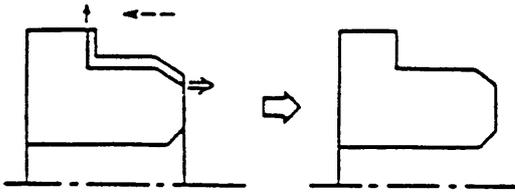
3. ID roughing



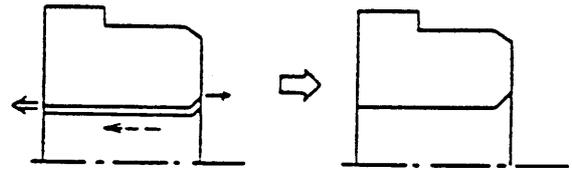
4. End face finishing



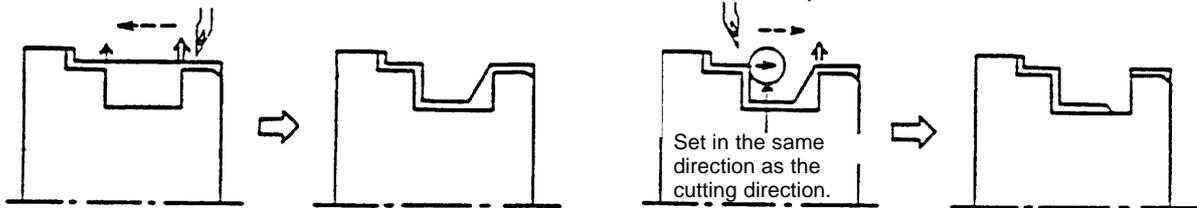
5. OD finishing



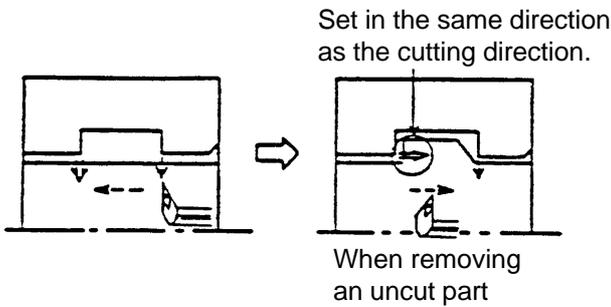
6. ID finishing



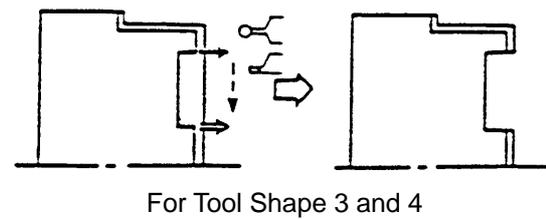
7. OD denting



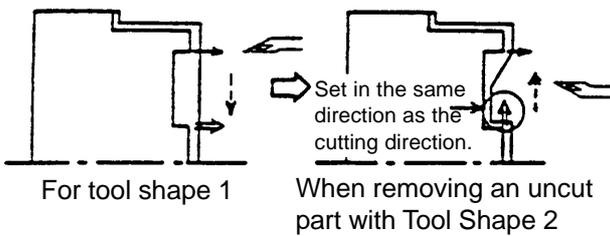
8. ID denting



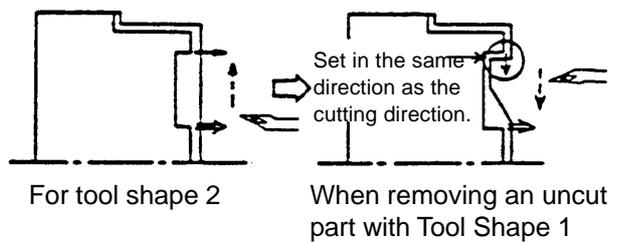
9. Face form



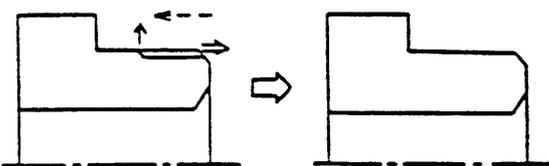
End face indenting



End face indenting

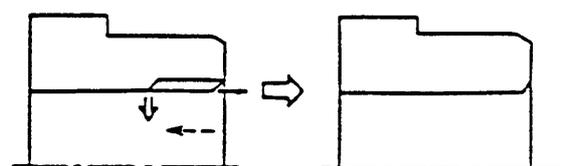


10. OD threading



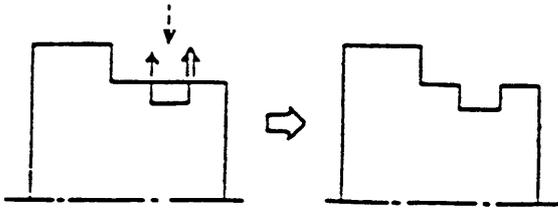
Note) Threads are displayed in purple after execution.

11. ID threading

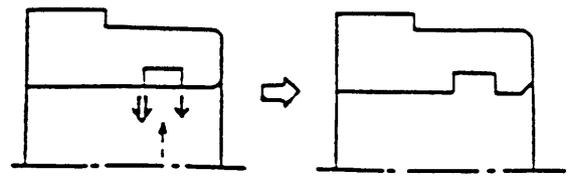


Note) Threads are displayed in purple after execution.

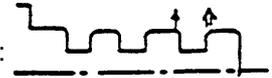
12. OD grooving



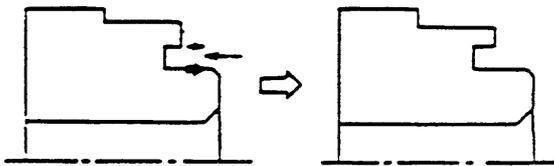
13. ID grooving



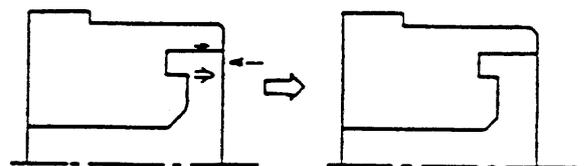
Note) When the groove is input repeatedly, specify with one groove as follows :



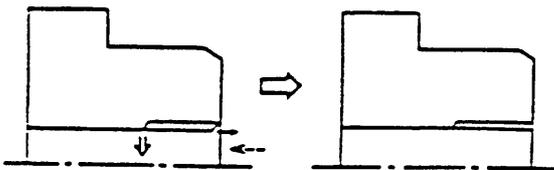
14. OD end face grooving



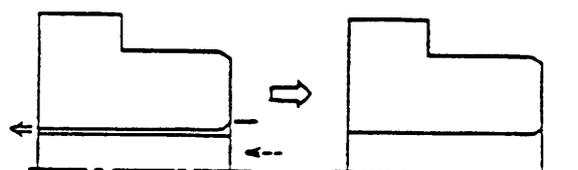
15. ID end face grooving



16. Tapping

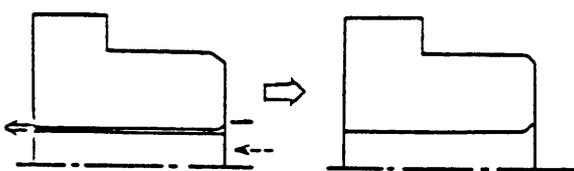


17. Reaming

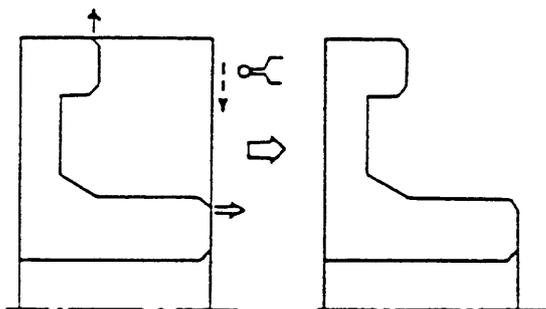


Note) Threads are displayed in purple after execution.

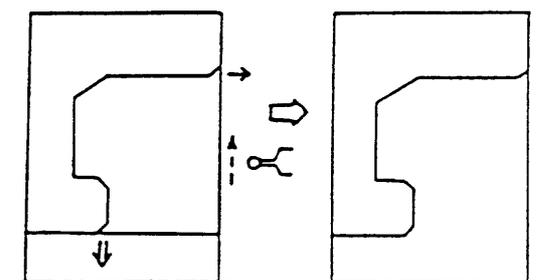
18. End milling



19. Processing OD and OD indent using one tool (shape 3 only).

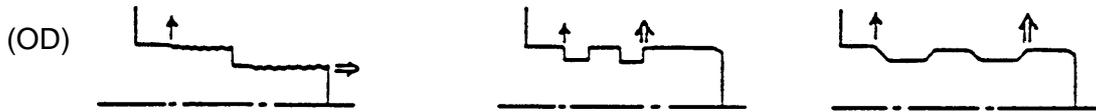


20. Processing ID and ID indent using one tool (shape 3 only).

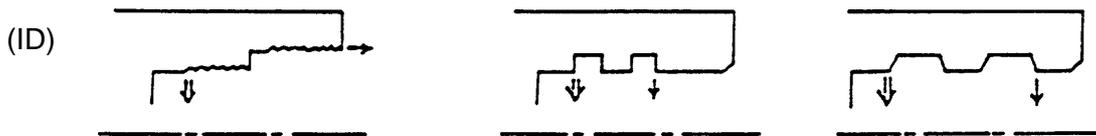


Note) Caution of machining range designation

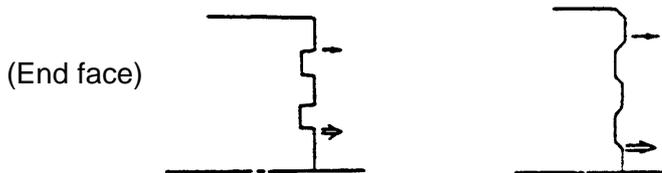
1. When designate a range including two or more thread, groove or cavity, start machining from the end face side.



When designate a range including two or more thread, groove or cavity, start machining from the chuck side.



When designate a range including two or more groove or cavity, start machining from inner side.

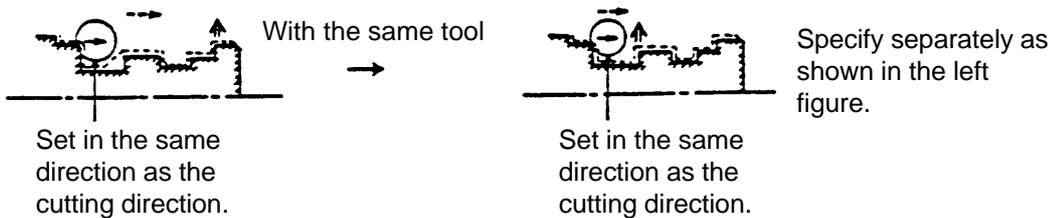


Note) Set the arrow to designate the range two or more correctly.

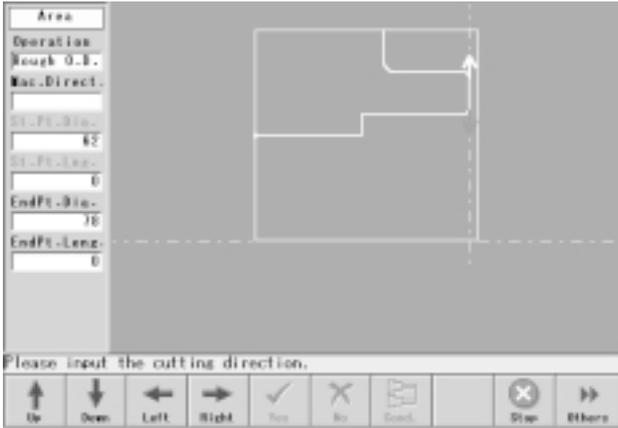
2. Specifying an indenting area in an indentation



Uncut part



3-12-4 Enlarged Drawing of Machining Area

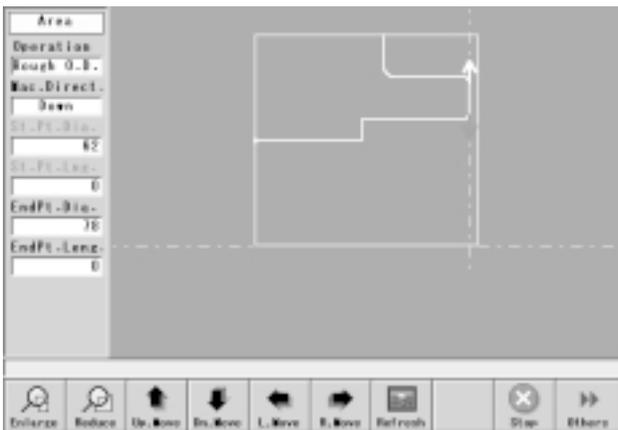


- F1/Up
- F2/Down
- F3/Left
- F4/Right
- F5/Yes
- F6/No
- F7/Cond.
- F9/Stop
- F0/Others

Machining details
(machining area) setting screen



Press the F0 (Others) key.



- F1/Enlarge
- F2/Reduce
- F3/Up. Move
- F4/Dn. Move
- F5/L. Move
- F6/R. Move
- F7/Ref resh
- F9/Stop
- F0/Others

Drawing area setting screen

3-12-5 Special Function

Creation of the following special programs is enabled through editing in confirming creation.

1. Direct Point Program

Characteristics of Functions

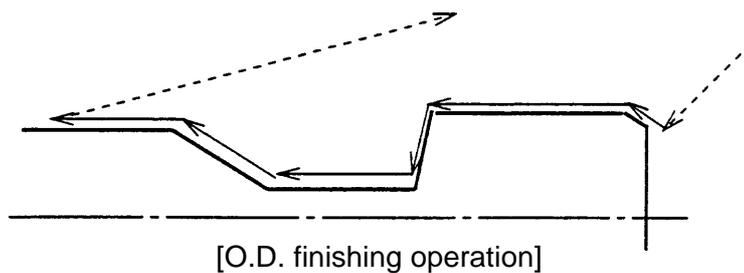
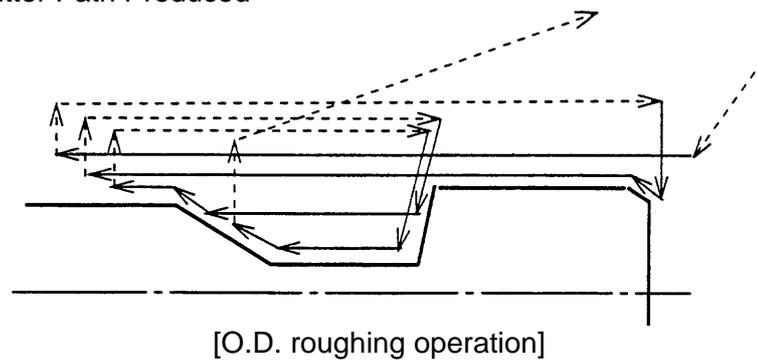
- Regardless of a tool nose R (tool nose R) and a cutting edge angle, a program is output for which points are taken along the finish shape.

Note) When a created program is transferred to NC for actual machining, it is necessary that a tool nose R, tool nose point, and knife-edge width within tool offset/tool layout be edited.

- A program which does not concern tool approach enabled/not can be obtained.
- Setting is enabled in five kinds of operations including "Rough O.D.", "Rough I.D.", "Finish O.D.", "Finish I.D.", and "Face Form".

Note) For roughing operation, a program is created in which cutting is performed according to stock allowance/finishing allowance.

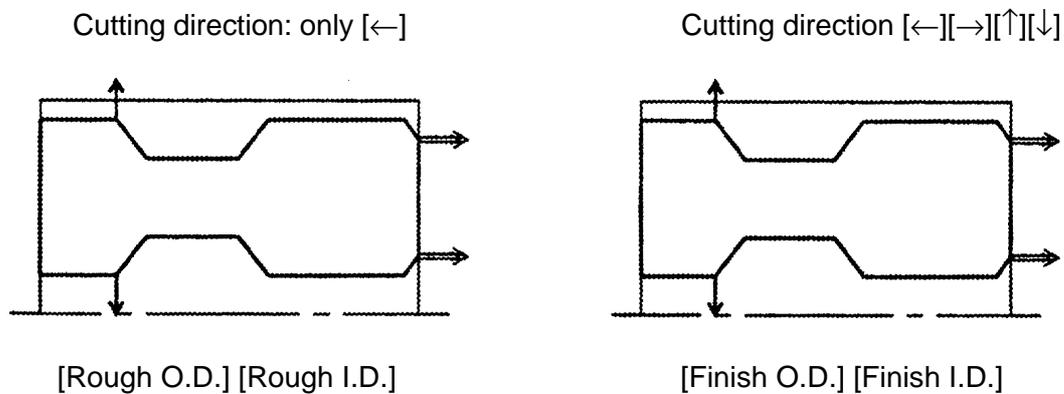
Example of Cutter Path Produced



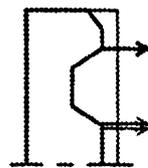
How to Create Direct Point Program

1. In the process list screen, bring the cursor on the process for which you want to have a direct point.
2. Press F5(Ope.Chg.) key and enter "9" into the item of "Shape No." in the tool data screen.
 - * The nose R/knife-edge width are made equal to "0" and the tool nose angle to "none" both in Auto.
3. Set Cutting Conditions and Machining Area.
 - * For setting of arrows for the machining area, see the following example drawings :
(↑ : Area start point, ↓ : Area end point)

(Example)

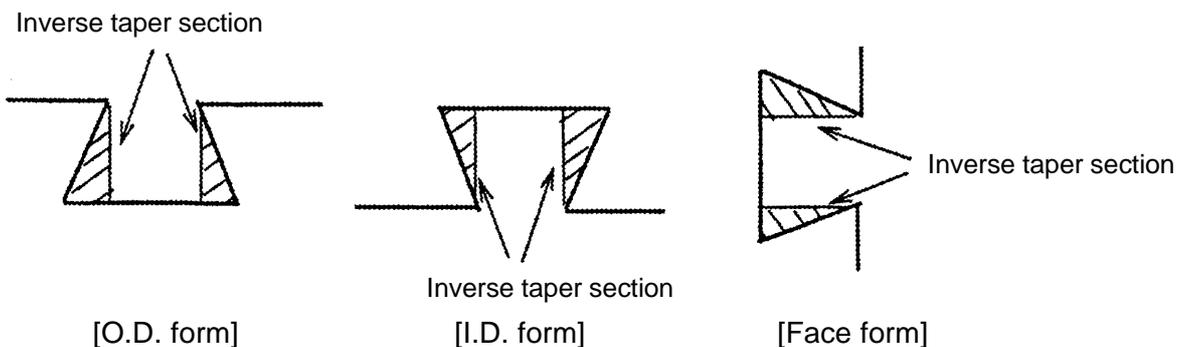


Cutting direction: only [↑][↓]



[Face form]

Note) No program is created for a shape whose form side is made into inverse taper.



4. MACHINING CONDITION FILE

1. Selecting the Item

Note) Various machining condition files for automatic program creation. Before creation a program, alter the set values of these files as required. Note that automatic determination is not made when the conditions in the files are not met.



Item Select Screen



Press the F1 (Cond.) Key.

Select a desired item.

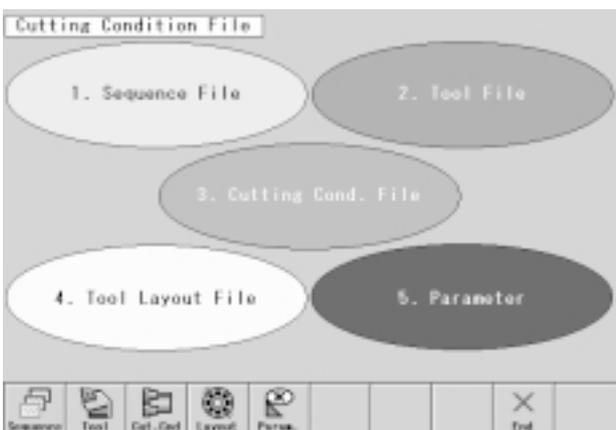
F1/Cond. : Displays and sets machining conditions.

F2/Data I/O : Displays and sets various parameters.

F3/Time

F0/Others

2. Cutting Process File (Selecting the Item)



Select various files used for automatic determination.

F1/Sequence : Displays and sets a process order and tool mounting positions.

F2/Tool : Displays and sets the shape of each tool, and so on.

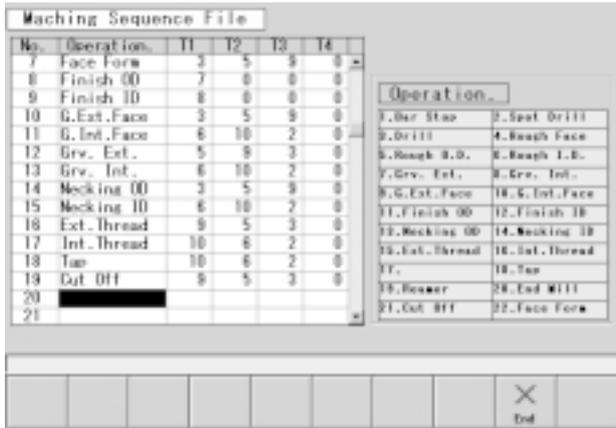
F3/Cut. Cnd : Displays and sets cutting conditions.

F4/Layout : A turret face used for checking and making-out is set.

F5/Param. : Displays and sets various parameters.

F9/End : Returns you to the above-mentioned item select screen.

3. Machining Sequence File



Machining Sequence File Screen

Set a process order and tool mounting positions.

Input process manes with numerical values.

- | | |
|--------------------------|------------------|
| 1. Bar stopper | 11. OD finishing |
| 2. Spot drilling | 12. ID finishing |
| 3. Drilling | 13. OD necking |
| 4. End face roughing | 14. ID necking |
| 5. OD roughing | 15. OD threading |
| 6. ID roughing | 16. ID threading |
| 7. OD grooving | 18. Tapping |
| 8. ID grooving | 19. Reamer |
| 9. OD end face grooving | 20. End mill |
| 10. ID end face grooving | 21. Cutting-off |
| | 22. Face form |

4. Tool File

Turning tool



Tool File Select Screen 1

Select a desired tool.

F1/Facing

F2/Rough O.D.

F3/Finish O.D.

F4/Rough I.D.

F5/Finish I.D.

F6/Bar Stopper

F9/Set. End : Returns you to the item select screen for the machining condition file.

F0: Others : Proceeds to the next screen.

Page key  : Moves to the first line.

Page key  : Moves to the last line.



Tool File Select Screen 2

Select a desired tool.

F1/Drill

F2/Spot Drill

F4/Reamer

F5/Tap

F6/End Mill

F9/Set. End : Returns you to the item select screen for the machining condition file.

F0: Others : Proceeds to the next screen.

Page key  : Moves to the first line.

Page key  : Moves to the last line.



Tool File Select Screen 3

Select a desired tool.

F1/Thread

F2/Groove

F3/Necking

F4/Face Form

F5/Cut Off

F9/Set. End : Returns you to the item select screen for the machining condition file.

F0/Others : Move the next screen.

Moves to the original tool selection screen.

Page key  : Moves to the first line.

Page key  : Moves to the last line.

<Lathe Turning Tools>

End Facing Tools (Number of tools registered : 6) <INCH>

Tool File(Face)

Group	File No.	Shape	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl
1	1	1	85	5					0.0312	3	4
1	2	1	85	5					0.0156	3	4
	3										
	4										
	5										
	6										

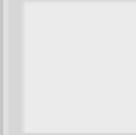
Shape 1



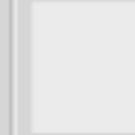
Shape 2



Shape 3



Shape 4



Tool PT.



Material

1. Carbide

2. TIN

3. Ceramic

4. Coated

5. HSS

6. CBN

Facing
Rough O.D.
Finish O.D.
Rough I.D.
Finish I.D.
Bar Stop.
End
Others

OD Roughing Tools (Number of tools registered : 12) <INCH>

Tool File(Rough O.D.)

Group	File No.	Shape	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl
1	7	1	87	32	0				0.0312	3	4
1	8	1	87	32	0				0.0156	3	4
1	9	1	87	52	0				0.0312	3	4
1	10	1	87	52	0				0.0156	3	4
2	11	2	93	148	0				0.0312	4	4
2	12	2	93	148	0				0.0156	4	4
2	13	2	93	128	0				0.0312	4	4
2	14	2	93	128	0				0.0156	4	4
3	15	3	90	90	0				0.1875	3	4

Shape 1



Shape 2



Shape 3



Shape 4



Tool PT.



Material

1. Carbide

2. TIN

Facing
Rough O.D.
Finish O.D.
Rough I.D.
Finish I.D.
Bar Stop.
End
Others

Tool File(Rough O.D.)

Group	File No.	Shape	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl
1	10	1	87	52	0				0.0156	3	4
2	11	2	93	148	0				0.0312	4	4
2	12	2	93	148	0				0.0156	4	4
2	13	2	93	128	0				0.0312	4	4
2	14	2	93	128	0				0.0156	4	4
3	15	3	90	90	0				0.1875	3	4
3	16	3	90	90	0				0.1	3	4
4	17	4	90	90	0.15				0.0075	3	4
4	18	4	90	90	0.125				0.0075	3	4

Shape 1



Shape 2



Shape 3



Shape 4



Tool PT.



Material

1. Carbide

2. TIN

3. Ceramic

4. Coated

5. HSS

6. CBN

Facing
Rough O.D.
Finish O.D.
Rough I.D.
Finish I.D.
Bar Stop.
End
Others

OD Finishing Tools (Number of tools registered : 12) <INCH>

Tool File(Finish O.D.)											
Group	File No.	Shape	EA Angl	SA Angl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl
1	19	1	75	15					0.0312	3	4
1	20	1	87	32					0.0312	3	4
1	21	1	87	52					0.0156	3	4
1	22	1	87	52					0.0075	3	4
2	23	2	105	165					0.0312	4	4
2	24	2	93	148					0.0312	4	4
2	25	2	93	128					0.0156	4	4
2	26	2	93	128					0.0075	4	4
	27										

Shape 1



Shape 2



Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

 Facing
  Rough O.D.
  Finish O.D.
  Rough I.D.
  Finish I.D.
  Bar Stop.

 End
  Others

ID Roughing Tools (Number of tools registered : 20) <INCH>

Tool File(Rough I.D.)											
Group	File No.	Shape	EA Angl	SA Angl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl
1	31	1	-85	-5	0		1.25	1.53	0.0312	2	4
1	32	1	-85	-5	0		1	1.25	0.0312	2	4
1	33	1	-87	-27	0		0.75	1	0.0312	2	4
1	34	1	-87	-27	0		0.625	0.812	0.0156	2	4
1	35	1	-87	-27	0		0.5	0.824	0.0156	2	4
1	36	1	-87	-27	0		0.375	0.5	0.0156	2	4
1	37	1	-87	-27	0		0.25	0.375	0.0075	2	4
1	38	1	-87	-52	0		1.25	2.25	0.0156	2	4
2	39	2	-95	-175	0		1.25	2.25	0.0312	1	4

Shape 1



Shape 2



Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

 Facing
  Rough O.D.
  Finish O.D.
  Rough I.D.
  Finish I.D.
  Bar Stop.

 End
  Others

ID Finishing Tools (Number of tools registered : 20) <INCH>

Tool File(Finish I.D.)

Gr-up	File No.	Sha-pe	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl
1	51	1	-87	-27			1.25	1.53	0.0312	2	4
1	52	1	-87	-27			1	1.25	0.0312	2	4
1	53	1	-87	-27			0.75	1	0.0312	2	4
1	54	1	-87	-27			0.625	0.812	0.0156	2	4
1	55	1	-87	-27			0.5	0.624	0.0156	2	4
1	56	1	-87	-27			0.375	0.5	0.0156	2	4
1	57	1	-87	-27			0.25	0.375	0.0075	2	4
1	58	1	-87	-32			1.25	1.75	0.0312	2	4
1	59	1	-87	-52			1.25	2.25	0.0156	2	4

Shape 1

Shape 2

Shape 3

Shape 4

Tool PT.

Material

1. Carbide

2. TiN

Tool File(Finish I.D.)

Gr-up	File No.	Sha-pe	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl
2	60	2	-93	-148			1.25	2.25	0.0312	1	4
2	61	2	-93	-128			1.25	1.53	0.0312	1	4
2	62	2	-93	-128			1	1.25	0.0312	1	4
2	63	2	-93	-128			0.75	1	0.0312	1	4
2	64	2	-93	-128			0.625	0.812	0.0156	1	4
2	65	2	-93	-128			0.5	0.624	0.0156	1	4
2	66	2	-93	-128			0.375	0.5	0.0156	1	4
	67										

Shape 1

Shape 2

Shape 3

Shape 4

Tool PT.

Material

1. Carbide

2. TiN

3. Ceramic

4. Coated

5. HSS

6. CBN

Facing

RughD.D.

FmshD.D.

RughI.D.

FmshI.D.

BarStop.

End

Others

Note) For the tools with the same edge angle, set in the descending order of the holder diameter.

Bar stoppers (Number of tools registered : 2) <INCH>

Tool File(Bar Stop)

Gr-up	File No.	Sha-pe	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl
1	71	1				2.5					
1	72	1				2.5					

Shape 1

Shape 2

Shape 3

Shape 4

Tool PT.

Material

1. Carbide

2. TiN

3. Ceramic

4. Coated

5. HSS

6. CBN

Facing

RughD.D.

FmshD.D.

RughI.D.

FmshI.D.

BarStop.

End

Others

Drills (Number of tool registered : 15) <INCH>

Tool File(Drill)

Group	File No.	Shape	PT. Ancl	Dia.	Depth	Min.D.	Max.D.	Intvl	Wall
1	73	1	180	1.25	3.75				4
1	74	1	180	1.187	3.56				4
1	75	1	180	1.125	3.38				4
1	76	1	180	1.062	3.18				4
1	77	1	180	0.937	2.93				4
2	78	2	118			1.187	1.25	0.062	5
2	79	2	118			1.062	1.125	0.062	5
2	80	2	118			0.938	1	0.015	5
2	81	2	118			0.828	0.922	0.015	5

Shape 1 Shape 2 Shape 3 Shape 4

Tool PT. Material

1 Carbide
2 TIN

Drill SpotDril. Reamer Tap Endmill

Note)

Group No.1 for carbide drills and group No.2 for high-speed steel drill.

Tool File(Drill)

Group	File No.	Shape	PT. Ancl	Dia.	Depth	Min.D.	Max.D.	Intvl	Wall
2	79	2	118			1.062	1.125	0.062	5
2	80	2	118			0.938	1	0.015	5
2	81	2	118			0.828	0.922	0.015	5
2	82	2	118			0.718	0.813	0.015	5
2	83	2	118			0.594	0.703	0.015	5
2	84	2	118			0.469	0.578	0.015	5
2	85	2	118			0.359	0.453	0.015	5
2	86	2	118			0.234	0.344	0.015	5
2	87	2	118			0.031	0.219	0.015	5

Shape 1 Shape 2 Shape 3 Shape 4

Tool PT. Material

1 Carbide
2 TIN
3 Ceramic
4 Coated
5 HSS
6 CBN

Drill SpotDril. Reamer Tap Endmill

End Others

Note) Set in the order of larger drill diameter.

Spot Drills (Number of tools registered : 4) <INCH>

These tools are used when spot drilling is specified as “Yes” (required) or when bar work (center work) is specified in selecting a machining kind.

Tool File(Spot Drill)

Group	File No.	Shape	PT. Ancl	Dia.	Depth	Min.D.	Max.D.	Intvl	Wall
1	88	1	60	0.29	0.292				5
1	89	1	60	0.23	0.24				5
1	90	1	60	0.18	0.196				5
1	91	1	60	0.13	0.153				5

Shape 1 Shape 2 Shape 3 Shape 4

Tool PT. Material

1 Carbide
2 TIN
3 Ceramic
4 Coated
5 HSS
6 CBN

Drill SpotDril. Reamer Tap Endmill

End Others

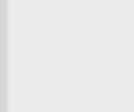
Reaming Tools (Number of tools registered : 2) <INCH>

Tool File(Reamer)										
Grp-up	File No.	Shape	PT. Angl	Dia.	Depth	Min.D.	Max.D.	Intvl	Matl	
1	92	1				0.472	0.787			5
1	93	1				0.236	0.472			5

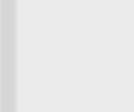
Shape 1



Shape 2



Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

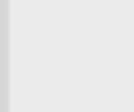
Tapping Tools (Number of tools registered : 4) <INCH>

Tool File(Tap)										
Grp-up	File No.	Shape	PT. Angl	Dia.	Depth	Min.D.	Max.D.	Intvl	Matl	
1	94	1				0.393	0.629			5
1	95	1				0.236	0.393			5
2	96	1				0.393	0.629			5
2	97	1				0.236	0.393			5

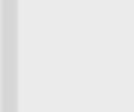
Shape 1



Shape 2



Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

Note) For a right-handed thread, a tool number of the group 1 is output.
 For a left-handed thread, that of the group 2 is output.

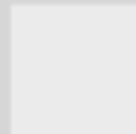
End Mill (Number of tools registered : 2) <INCH>

Tool File(End Mill)									
Group	File No.	Shape	PT. Angl	Dis.	Depth	Min.D.	Max.D.	Intvl	Matl
1	98	1				0.472	0.787		5
1	99	1				0.236	0.472		5

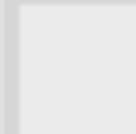
Shape 1



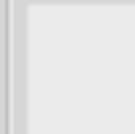
Shape 2



Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

 Drill
  SpotDrl.
  Reamer
  Tap
  Endmill

 End
  Others

Note) For a right-handed thread, a tool number of the group 1 is output.
 For a left-handed thread, that of the group 2 is output.

Threading tools (Number of tools registered : 4 OD tools and 4 ID tools) <INCH>

Tool File(Thread)											
Group	File No.	Shape	EA Angl	SA Angl	Angle	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	ToolMatl
1	100	1									1
1	101	1									1
2	102	1									1
2	103	1									1
1	104	2									1
1	105	2									1
2	106	2									1
2	107	2									1

Shape 1



Shape 2



Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

 Thread
  Groove
  Necking
  Face Fr
  Cut Off

 End
  Others

Grooving Tools (Number of tools registered : 8 OD tools, 8 ID tools, 7 OD end facing tools and 7 ID end facing tools) <INCH>

Tool File(Groove)												
Grp-up	File No.	Shape	EA Angl	SA Angl	Ang-le	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl	PT.
1	100	1				5		10	0.4		3	1
1	108	1				5		10	0.2		3	1
1	110	1				4		10	0.4		3	1
1	111	1				4		10	0.2		3	1
1	112	1				3		10	0.4		3	1
1	113	1				3		10	0.2		3	1
1	114	1				2		10	0.2		3	1
1	115	1				1		10	0.2		3	1
1	116	2				5		10	0.4		2	1

Tool File(Groove)												
Grp-up	File No.	Shape	EA Angl	SA Angl	Ang-le	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl	PT.
1	117	2				5		10	0.2		2	1
1	118	2				4		10	0.4		2	1
1	119	2				4		10	0.2		2	1
1	120	2				3		10	0.4		2	1
1	121	2				3		10	0.2		2	1
1	122	2				2		10	0.2		2	1
1	123	2				1		10	0.2		2	1
1	124	3				5		10	0.4		3	1
1	125	3				4		10	0.4		3	1

Tool File(Groove)												
Grp-up	File No.	Shape	EA Angl	SA Angl	Ang-le	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl	PT.
1	126	3				2		10	0.2		3	1
1	130	3				1		10	0.2		3	1
1	131	4				5		10	0.4		2	1
1	132	4				4		10	0.4		2	1
1	133	4				4		10	0.2		2	1
1	134	4				3		10	0.4		2	1
1	135	4				3		10	0.2		2	1
1	136	4				2		10	0.2		2	1
1	137	4				1		10	0.2		2	1

Note) Of the same shape number, set in the order of wider tool width.

Necking Tools (Number of tools registered : 4 OD tools and 4 ID tools) <INCH>
 These tools are used when end point RELIEF is specified.

Tool File(Necking)												
Grp-up	File No.	Shape	EA Angl	SA Angl	Ang-le	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl	PT.
1	138	1			45			3			0	1
1	139	1			135			3			0	1
1	140	1			90			3			0	1
1	141	1			0			3			0	1
1	142	2			-45			3			0	1
1	143	2			-135			3			0	1
1	144	2			-90			3			0	1
1	145	2			0			3			0	1

Note) Cutting edge angles other than 45, 135, 90, 0, -45, -135 and -90 cannot be set.

Face Form Tools (Number of tools registered : 15) <INCH>

Tool File(Face Form)											
Gro-up	File No.	Shape	EA Ancl	SA Ancl	Ang-le	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl PT.
1	146	1	3	58		0			0.0312		3 4
1	147	1	3	58		0			0.0156		3 4
1	148	1	3	28		0			0.0156		3 4
1	149	1	3	28		0			0.0075		3 4
2	150	2	-3	-58		0			0.0312		2 4
2	151	2	-3	-58		0			0.0156		2 4
2	152	2	-3	-28		0			0.0156		2 4
2	153	2	-3	-28		0			0.0075		2 4
3	154	3	0	0		0			0.1875		7 4

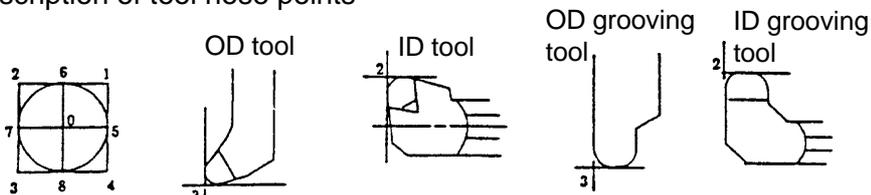
Note) The tools of Shape 1 and 2 are not selected in case of automatic program creation.

Tool File(Face Form)											
Gro-up	File No.	Shape	EA Ancl	SA Ancl	Ang-le	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl PT.
2	152	2	-3	-28		0			0.0156		2 4
2	153	2	-3	-28		0			0.0075		2 4
3	154	3	0	0		0			0.1875		7 4
3	155	3	0	0		0			0.1		7 4
4	156	4	0	0		0.189			0.0156		3 4
4	157	4	0	0		0.15			0.0075		3 4
4	158	4	0	0		0.15			0.0075		2 4
4	159	4	0	0		0.125			0.0075		3 4
4	160	4	0	0		0.125			0.0075		2 4

Cutting-off Tools (Number of tools registered : 4) <INCH>

Tool File(Cut Off)											
Gro-up	File No.	Shape	EA Ancl	SA Ancl	Ang-le	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl PT.
1	161	1				0.062				1	4
1	162	1				0.125				1.25	4
1	163	1				0.15				1.5	4
1	164	1				0.187				2	4

Note) Description of tool nose points



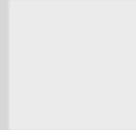
End Facing Tools (Number of tools registered : 6) <METRIC>

Tool File(Face)											
Group	File No.	Shape	EA Angl	SA Angl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Wall
1	1	1	85	5					0.8	3	4
1	2	1	85	5					0.4	3	4
	3										
	4										
	5										
	6										

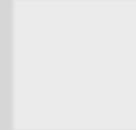
Shape 1



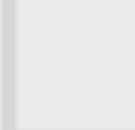
Shape 2



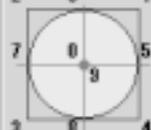
Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

 Facing

 RoughO.D.

 FnsH0.D.

 RughI.D.

 FnsH I.D.

 BarStop.

 End

 Others

OD Roughing Tools (Number of tools registered : 12) <METRIC>

Tool File(Rough O.D.)											
Group	File No.	Shape	EA Angl	SA Angl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Wall
1	7	1	87	32	0				0.8	3	4
1	8	1	87	32	0				0.4	3	4
1	9	1	87	52	0				0.8	3	4
1	10	1	87	52	0				0.4	3	4
2	11	2	93	148	0				0.8	4	4
2	12	2	93	148	0				0.4	4	4
2	13	2	93	128	0				0.8	4	4
2	14	2	93	128	0				0.4	4	4
3	15	3	90	90	0				3	3	4

Shape 1



Shape 2



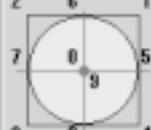
Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

 Facing

 RoughO.D.

 FnsH0.D.

 RughI.D.

 FnsH I.D.

 BarStop.

 End

 Others

Note) The tools of Shape 3 is not selected in case of automatic program creation.

OD Finishing Tools (Number of tools registered : 12) <METRIC>

Tool File(Rough O.D.)												
Group	File No.	Shape	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl	
1	10	1	87	52	0				0.4	3	4	▲
2	11	2	93	148	0				0.8	4	4	
2	12	2	93	148	0				0.4	4	4	
2	13	2	93	128	0				0.8	4	4	
2	14	2	93	128	0				0.4	4	4	
3	15	3	90	90	0				3	3	4	
3	16	3	90	90	0				2.5	3	4	
4	17	4	90	90	4				0.2	3	4	
4	18	4	90	90	3				0.2	3	4	▼

Shape 1



Shape 2



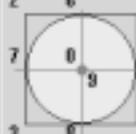
Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN


Facing


Rough O.D.


Fnish O.D.


Rough I.D.


Fnish I.D.


Bar Stop.


End


Others

ID Roughing Tools (Number of tools registered : 20) <METRIC>

Tool File(Rough I.D.)												
Group	File No.	Shape	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl	
1	31	1	-85	-5	0		32	40	0.8	2	4	▲
1	32	1	-85	-5	0		25	34	0.8	2	4	
1	33	1	-87	-27	0		20	26	0.8	2	4	
1	34	1	-87	-27	0		16	22	0.4	2	4	
1	35	1	-87	-27	0		12	16	0.4	2	4	
1	36	1	-87	-27	0		10	12	0.4	2	4	
1	37	1	-87	-27	0		8	10	0.2	2	4	
1	38	1	-87	-52	0		32	50	0.4	2	4	
2	39	2	-85	-175	0		32	50	0.8	1	4	▼

Shape 1



Shape 2



Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic


Facing


Rough O.D.


Frbsh O.D.


Rough I.D.


Frbsh I.D.


Bar Stop.


End


Others

Tool File(Rough I.D.)												
Group	File No.	Shape	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl	
2	41	2	-93	-128	0		32	40	0.8	1	4	▲
2	42	2	-93	-128	0		25	32	0.8	1	4	
2	43	2	-93	-128	0		20	25	0.8	1	4	
2	44	2	-93	-128	0		16	20	0.4	1	4	
2	45	2	-93	-128	0		12	16	0.4	1	4	
3	46	3	-90	-90	0		32	50	3	2	4	
3	47	3	-90	-90	0		32	50	2.5	2	4	
4	48	4	-90	-90	4		32	50	0.2	2	4	
4	49	4	-90	-90	3		32	50	0.2	2	4	▼

Shape 1



Shape 2



Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN


Facing


Rough O.D.


Frbsh O.D.


Rough I.D.


Frbsh I.D.


Bar Stop.


End


Others

Note) The tools of Shape 3 is not selected in case of automatic program creation.

ID Finishing Tools (Number of tools registered : 20) <METRIC>

Tool File(Finish I.O.)											
Grp	File No.	Shape	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl
1	51	1	-87	-27			32	40	0.8	2	4
1	52	1	-87	-27			25	32	0.8	2	4
1	53	1	-87	-27			20	26	0.8	2	4
1	54	1	-87	-27			18	22	0.4	2	4
1	55	1	-87	-27			12	16	0.4	2	4
1	56	1	-87	-27			10	12	0.4	2	4
1	57	1	-87	-27			8	10	0.2	2	4
1	58	1	-87	-32			32	44	0.8	2	4
1	59	1	-87	-52			32	50	0.4	2	4

Shape 1

Shape 2

Shape 3

Shape 4

Tool PT.

Material

1. Carbide
2. TiN
3. Ceramic

Tool File(Finish I.O.)											
Grp	File No.	Shape	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl
1	59	1	-87	-52			32	50	0.4	2	4
2	60	2	-93	-140			32	50	0.8	1	4
2	61	2	-93	-128			32	40	0.8	1	4
2	62	2	-93	-128			25	32	0.8	1	4
2	63	2	-93	-128			20	25	0.8	1	4
2	64	2	-93	-128			18	20	0.4	1	4
2	65	2	-93	-128			12	16	0.4	1	4
2	66	2	-93	-128			10	14	0.4	1	4
67											

Shape 1

Shape 2

Shape 3

Shape 4

Tool PT.

Material

1. Carbide
2. TiN
3. Ceramic
4. Coated
5. HSS
6. CBN

Facing
 Rough D.
 Finish D.
 Rough I. D.
 Finish I. D.
 Bar Stop.

End
Others

Note) For the tools with the same edge angle, set in the descending order of the holder diameter.

Bar stoppers (Number of tools registered : 2) <METRIC>

Tool File(Bar Stop)											
Grp	File No.	Shape	EA Ancl	SA Ancl	Tool Width	Tool Length	Bar Dia.	Min. Bore	Nose -R	Tool PT.	Matl
1	71	1				60					
1	72	1				60					

Shape 1

Shape 2

Shape 3

Shape 4

Tool PT.

Material

1. Carbide
2. TiN
3. Ceramic
4. Coated
5. HSS
6. CBN

Facing
 Rough D.
 Finish D.
 Rough I. D.
 Finish I. D.
 Bar Stop.

End
Others

Drills (Number of tool registered : 15) <METRIC>

Tool File(Drill)										
Group	File No.	Shape	PT. Angl	Dia.	Depth	Min.D.	Max.D.	Intvl	Matl	
1	73	1	180	32	80				4	
1	74	1	180	30	75				4	
1	75	1	180	28	70				4	
1	76	1	180	26	65				4	
1	77	1	180	24	60				4	
2	78	2	118			30	32	1	5	
2	79	2	118			27	29	1	5	
2	80	2	118			24	26	1	5	
2	81	2	118			21	23	1	5	

Note)

Group No.1 for carbide drills and group No.2 for high-speed steel drill.

Note) Set in the order of larger drill diameter.

Tool File(Drill)										
Group	File No.	Shape	PT. Angl	Dia.	Depth	Min.D.	Max.D.	Intvl	Matl	
2	79	2	118			27	29	1	5	
2	80	2	118			24	26	1	5	
2	81	2	118			21	23	1	5	
2	82	2	118			18	20	1	5	
2	83	2	118			15	17	1	5	
2	84	2	118			12	14	1	5	
2	85	2	118			9	11	1	5	
2	86	2	118			6	8	1	5	
2	87	2	118			1	5	1	5	

Spot Drills (Number of tools registered : 4) <METRIC>

These tools are used when spot drilling is specified as “Yes” (required) or when bar work (center work) is specified in selecting a machining kind.

Tool File(Spot Drill)										
Group	File No.	Shape	PT. Angl	Dia.	Depth	Min.D.	Max.D.	Intvl	Matl	
1	88	1	60	5	10				5	
1	89	1	60	4	10				5	
1	90	1	60	3	10				5	
1	91	1	60	2	10				5	

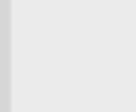
Reaming Tools (Number of tools registered : 2) <METRIC>

Tool File(Reamer)										
Gro-up	File No.	Shape	PT. Angl	Dia.	Depth	Min.D.	Max.D.	Intvl	Matl	
1	92	1				12	20			5
1	93	1				6	12			5

Shape 1



Shape 2



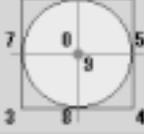
Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

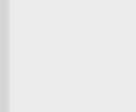
Tapping Tools (Number of tools registered : 4) <METRIC>

Tool File(Tap)										
Gro-up	File No.	Shape	PT. Angl	Dia.	Depth	Min.D.	Max.D.	Intvl	Matl	
1	94	1				10	16			5
1	95	1				6	10			5
2	96	1				10	16			5
2	97	1				6	10			5

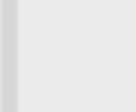
Shape 1



Shape 2



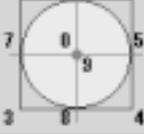
Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

Note) For a right-handed thread, a tool number of the group 1 is output.
 For a left-handed thread, that of the group 2 is output.

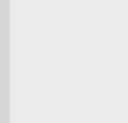
End Mill (Number of tools registered : 2) <METRIC>

Tool File(End Mill)									
Group	File No.	Shape	PT. Angl	Dis.	Depth	Min.D.	Max.D.	Intvl	Matl
1	98	1				12	20		5
1	99	1				6	12		5

Shape 1



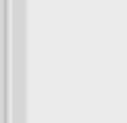
Shape 2



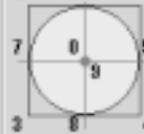
Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

 Drill
  SpotDrl.
  Reamer
  Tap
  Endmill

 End
  Others

Note) For a right-handed thread, a tool number of the group 1 is output.
 For a left-handed thread, that of the group 2 is output.

Threading tools (Number of tools registered : 4 OD tools and 4 ID tools) <METRIC>

Tool File(Thread)												
Group	File No.	Shape	EA Angl	SA Angl	Angle	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool PT.	Matl
1	100	1										1
1	101	1										1
2	102	1										1
2	103	1										1
1	104	2										1
1	105	2										1
2	106	2										1
2	107	2										1

Shape 1



Shape 2



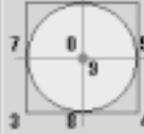
Shape 3



Shape 4



Tool PT.



Material

1.	Carbide
2.	TIN
3.	Ceramic
4.	Coated
5.	HSS
6.	CBN

 Thread
  Groove
  Necking
  Face Fr
  Cut Off

 End
  Others

Grooving Tools (Number of tools registered : 8 OD tools, 8 ID tools, 7 OD end facing tools and 7 ID end facing tools) <METRIC>

Tool File(Groove)											
Gro-up	File No.	Sha-shape	EA Angl	SA Angl	Ang-le	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl
1	100	1				5		10	0.4		3 1
1	109	1				5		10	0.2		3 1
1	110	1				4		10	0.4		3 1
1	111	1				4		10	0.2		3 1
1	112	1				3		10	0.4		3 1
1	113	1				3		10	0.2		3 1
1	114	1				2		10	0.2		3 1
1	115	1				1		10	0.2		3 1
1	116	2				5		10	0.4		2 1

Tool File(Groove)											
Gro-up	File No.	Sha-shape	EA Angl	SA Angl	Ang-le	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl
1	117	2				5		10	0.2		2 1
1	118	2				4		10	0.4		2 1
1	119	2				4		10	0.2		2 1
1	120	2				3		10	0.4		2 1
1	121	2				3		10	0.2		2 1
1	122	2				2		10	0.2		2 1
1	123	2				1		10	0.2		2 1
1	124	3				5		10	0.4		3 1
1	125	3				4		10	0.4		3 1

Tool File(Groove)											
Gro-up	File No.	Sha-shape	EA Angl	SA Angl	Ang-le	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl
1	129	3				2		10	0.2		3 1
1	130	3				1		10	0.2		3 1
1	131	4				5		10	0.4		2 1
1	132	4				4		10	0.4		2 1
1	133	4				4		10	0.2		2 1
1	134	4				3		10	0.4		2 1
1	135	4				3		10	0.2		2 1
1	136	4				2		10	0.2		2 1
1	137	4				1		10	0.2		2 1

Note) Of the same shape number, set in the order of wider tool width.

Necking Tools (Number of tools registered : 4 OD tools and 4 ID tools) <METRIC>

These tools are used when end point RELIEF is specified.

Tool File(Necking)											
Gro-up	File No.	Sha-pe	EA Angl	SA Angl	Ang-le	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl
1	138	1			45			3			0 1
1	139	1			135			3			0 1
1	140	1			90			3			0 1
1	141	1			0			3			0 1
1	142	2			-45			3			0 1
1	143	2			-135			3			0 1
1	144	2			-90			3			0 1
1	145	2			0			3			0 1

Note) Cutting edge angles other than 45, 135, 90, 0, -45, -135 and -90 cannot be set.

Face Form Tools (Number of tools registered : 15) <METRIC>

Gro-up	File No.	Shape	EA Anagl	SA Anagl	Angle	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl PT.
1	146	1	3	58		0			0.8		3 4
1	147	1	3	58		0			0.4		3 4
1	148	1	3	38		0			0.4		3 4
1	149	1	3	38		0			0.2		3 4
2	150	2	-3	-58		0			0.8		2 4
2	151	2	-3	-58		0			0.4		2 4
2	152	2	-3	-38		0			0.4		2 4
2	153	2	-3	-38		0			0.2		2 4
3	154	3	0	0		0			3		7 4

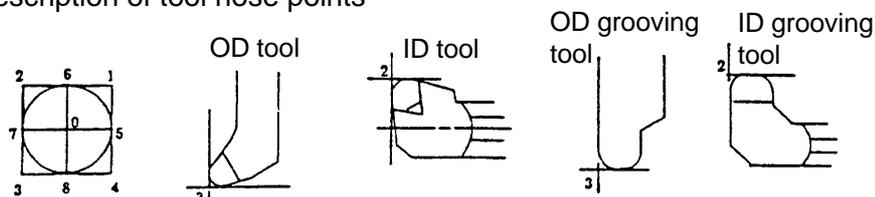
Note) The tools of Shape 1 and 2 are not selected in case of automatic program creation.

Gro-up	File No.	Shape	EA Anagl	SA Anagl	Angle	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl PT.
2	152	2	-3	-38		0			0.4		2 4
2	153	2	-3	-38		0			0.2		2 4
3	154	3	0	0		0			3		7 4
3	155	3	0	0		0			2.5		7 4
4	156	4	0	0		5			0.4		3 4
4	157	4	0	0		4			0.2		3 4
4	158	4	0	0		4			0.2		2 4
4	159	4	0	0		3			0.2		3 4
4	160	4	0	0		3			0.2		2 4

Cutting-off Tools (Number of tools registered : 4) <METRIC>

Gro-up	File No.	Shape	EA Anagl	SA Anagl	Angle	Tool Width	Tool Length	Depth	Nose -R	Max. Dia.	Tool Matl PT.
1	161	1				2				20	4
1	162	1				3				30	4
1	163	1				4				40	4
1	164	1				5				51	4

Note) Description of tool nose points



5. Cutting Condition File (Material Selection)

Cutting Condition File							Amount		
No	Operation	C.S. (ft/min)(in/rev)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facina	130	0.25	2.5			5	00/Face	0.2
2	Rough 00	130	0.3	3			5	00	0.2
3	Finish 00	180					3	00/Face	0.2
4	Rough ID	130	0.3	3			5	ID	0.2
5	Finish ID	180					3	Slot/Sid	0.1
6	Spot Drill	10	0.08				5	Slot/Bot	0.1
7	Carb.Drill	120	0.1		2.5		5		
8	Ext. Grv.	100	0.08				3		
9	Int. Grv.	100	0.08				3		
10	Face Grv.	100	0.08				3		
11	Face Form	100	0.2	2			3		
12	Ext. Thred	110					5		
13	Int. Thred	110					3		
14									

Cutting condition File
(Material Selection) Screen

Cutting condition file:

Display and setting of cutting conditions and finishing allowance in each process for each material.

Select a desired material.

F1/#1045 ST F1/C903 BR.

F2/#4140 ST F2/M2-TLSTL

F3/#6061 AL F3/ADD-1

F4/#30 C.I. F4/ADD-2

F5/#304 ST

- For ADD-1 and ADD-2, each user is kindly requested to specify them. (For Add-1 and ADD-2, the same data as #1045 ST has been set upon shipment.)

The material name (up to 8 characters with alphabets and numerals) can be altered by changing the setting of the character parameter 1.

Pressing the F9(Set. End) key returns you to the select screen for the cutting condition file.

- Note)**
- Input a rotation frequency into the field "CUT SPEED" of the No. 21 Bar Stopper in the cutting condition file.
 - Input a cutting speed, feed rate, depth of cut, clearance, diameter and finish allowance in units of
(METRIC unit) mm/min, mm/rev, mm, mm, mm and mm,
(INCH unit) FT/min, IN/rev, IN, IN, IN and IN,
respectively.

○ The set values of various coefficient files have been internally set.

This coefficient is used for the NC data of turning operations.

Set Values (Coefficient by tool nose angle)

Tool nose angle	Cutting speed	Feed rate	Cutting depth
120	1.00	1.00	1.00
90	1.00	1.00	1.00
80	1.00	1.00	1.00
60	1.00	0.95	0.95
55	1.00	0.90	0.90
35	1.00	0.80	0.80

Set Values (Coefficient by nose R)

INCH Nose R	Nose R (MM)	Cutting speed	Feed rate	Cutting depth
0.0780	2.000	1.0	1.0	1.0
0.0625	1.600	1.0	1.0	1.0
0.0463	1.200	1.0	1.0	1.0
0.0312	0.800	1.0	1.0	1.0
0.0156	0.400	1.0	0.8	0.8
0.0075	0.200	1.0	0.7	0.7

(degree)

Note) Only Rough OD & ID tools are effective.

Set Values (Coefficients by insert material)

[#1045 ST]

Coefficients by insert material

Material	Cutting speed	Feed rate	Cutting depth
CARBIDE	1.0	1.0	1.0
TIN	1.5	0.5	0.5
CERAMIC	2.5	0.2	0.2
COATED	1.0	1.0	1.0
HSS	0.3	0.7	1.0
CBN	3.0	0.1	0.1

Feeding is a coefficient in roughing.

[#4140 ST]

Coefficients by insert material

Material	Cutting speed	Feed rate	Cutting depth
CARBIDE	1.0	1.0	1.0
TIN	1.5	0.5	0.5
CERAMIC	2.5	0.2	0.2
COATED	1.0	1.0	1.0
HSS	0.3	0.7	1.0
CBN	3.0	0.1	0.1

Feeding is a coefficient in roughing.

[#6061 AL]

Coefficients by insert material

Material	Cutting speed	Feed rate	Cutting depth
CARBIDE	1.0	1.0	1.0
TIN	1.5	0.5	0.5
CERAMIC	2.5	0.2	0.2
COATED	1.0	1.0	1.0
HSS	0.3	0.7	1.0
CBN	3.0	0.1	0.1

Feeding is a coefficient in roughing.

[#30 C.I.]

Coefficients by insert material

Material	Cutting speed	Feed rate	Cutting depth
CARBIDE	1.0	1.0	1.0
TIN	1.5	0.5	0.5
CERAMIC	2.5	0.2	0.2
COATED	1.0	1.0	1.0
HSS	0.3	0.7	1.0
CBN	3.0	0.1	0.1

Feeding is a coefficient in roughing.

[#304 ST]

Coefficients by insert material

Material	Cutting speed	Feed rate	Cutting depth
CARBIDE	1.0	1.0	1.0
TIN	1.5	0.5	0.5
CERAMIC	2.0	0.2	0.2
COATED	1.0	1.0	1.0
HSS	0.3	0.7	1.0
CBN	3.0	0.1	0.1

Feeding is a coefficient in roughing.

[C903 BR.]

Coefficients by insert material

Material	Cutting speed	Feed rate	Cutting depth
CARBIDE	1.0	1.0	1.0
TIN	1.5	0.5	0.5
CERAMIC	2.5	0.2	0.2
COATED	1.0	1.0	1.0
HSS	0.3	0.7	1.0
CBN	2.5	0.1	0.1

Feeding is a coefficient in roughing.

[M2-TLSTL]

Coefficients by insert material

Material	Cutting speed	Feed rate	Cutting depth
CARBIDE	1.0	1.0	1.0
TIN	1.5	0.5	0.5
CERAMIC	2.5	0.2	0.2
COATED	1.0	1.0	1.0
HSS	0.3	0.7	1.0
CBN	3.0	0.1	0.1

Feeding is a coefficient in roughing.

[ADD-1]

Coefficients by insert material

Material	Cutting speed	Feed rate	Cutting depth
CARBIDE	1.0	1.0	1.0
TIN	1.5	0.5	0.5
CERAMIC	2.5	0.2	0.2
COATED	1.0	1.0	1.0
HSS	0.3	0.7	1.0
CBN	3.0	0.1	0.1

Feeding is a coefficient in roughing.

[ADD-2]

Coefficients by insert material

Material	Cutting speed	Feed rate	Cutting depth
CARBIDE	1.0	1.0	1.0
TIN	1.5	0.5	0.5
CERAMIC	2.5	0.2	0.2
COATED	1.0	1.0	1.0
HSS	0.3	0.7	1.0
CBN	3.0	0.1	0.1

Feeding is a coefficient in roughing.

ST200

Cutting Condition File (#1045 ST) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	500	0.012	0.1			0.2	OD/Face	0.008
2	Rough OD	500	0.015	0.125			0.2	OD	0.008
3	Finish OD	700					0.1	OD/Face	0.008
4	Rough ID	500	0.012	0.125			0.2	ID	0.008
5	Finish ID	700					0.1	Slot/Sid	0.004
6	Spot Drill	50	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	450	0.005		2.5		0.2		
8	Ext. Grv.	330	0.004				0.15		
9	Int. Grv.	330	0.004				0.15		
10	Face Grv.	330	0.004				0.15		
11	Face Form	330	0.008	0.08			0.2		
12	Ext.Thred	200					0.2		
13	Int.Thred	200					0.2		
14									

							
#1045ST	#4140ST	#6061AL	#30C.1.	#304 ST	Ope. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	330	0.004				0.15	OD	0.008
16	NeckingID	330	0.004				0.15	OD/Face	0.008
17	Cut Off	330	0.004				0.15	ID	0.008
18	Reamer	50	0.006				0.2	Slot/Sid	0.004
19	Tap	20					0.4	Slot/Bot	0.004
20	End Mill	70	0.006				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	60	0.003			0.125	0.2		
24	HSS Drill	60	0.004			0.25	0.2		
25	HSS Drill	80	0.006			0.5	0.2		
26	HSS Drill	80	0.01			1	0.2		
27	HSS Drill	80	0.012			1.5	0.2		

							
#1045ST	#4140ST	#6061AL	#30C.1.	#304 ST	Ope. Chg	End	Others

Cutting Condition File (#4140 ST) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	600	0.012	0.1			0.2	OD/Face	0.008
2	Rough OD	600	0.015	0.125			0.2	OD	0.008
3	Finish OD	750					0.1	ID/Face	0.008
4	Rough ID	600	0.012	0.125			0.2	ID	0.008
5	Finish ID	750					0.1	Slot/Sid	0.004
6	Spot Drill	50	0.003				0.2	Slot/Bot	0.004
7	Carb. Drill	400	0.005		2.5		0.2		
8	Ext. Grv.	300	0.004				0.15		
9	Int. Grv.	300	0.004				0.15		
10	Face Grv.	300	0.004				0.15		
11	Face Form	300	0.008	0.08			0.2		
12	Ext. Thred	180					0.2		
13	Int. Thred	180					0.2		
14									



#1045ST
 #4140ST
 #6061AL
 #30C. I.
 #304 ST
 Ope. Chg
 End
 Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	300	0.004				0.15	OD	0.008
16	NeckingID	300	0.004				0.15	ID/Face	0.008
17	Cut Off	300	0.004				0.15	ID	0.008
18	Reamer	50	0.006				0.2	Slot/Sid	0.004
19	Tap	20					0.4	Slot/Bot	0.004
20	End Mill	70	0.006				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	60	0.003			0.125	0.2		
24	HSS Drill	60	0.004			0.25	0.2		
25	HSS Drill	80	0.006			0.5	0.2		
26	HSS Drill	80	0.01			1	0.2		
27	HSS Drill	80	0.012			1.5	0.2		



#1045ST
 #4140ST
 #6061AL
 #30C. I.
 #304 ST
 Ope. Chg
 End
 Others

Cutting Condition File (#6061 AL) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	1000	0.012	0.125			0.2	OD/Face	0.008
2	Rough OD	1000	0.015	0.15			0.2	OD	0.008
3	Finish OD	1500					0.1	ID/Face	0.008
4	Rough ID	1000	0.012	0.15			0.2	ID	0.008
5	Finish ID	1500					0.1	Slot/Sid	0.004
6	Spot Drill	190	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	800	0.008		2.5		0.2		
8	Ext. Grv.	900	0.004				0.15		
9	Int. Grv.	900	0.004				0.15		
10	Face Grv.	900	0.004				0.15		
11	Face Form	900	0.01	0.1			0.2		
12	Ext. Thred	450					0.2		
13	Int. Thred	450					0.2		
14									



1045ST	4140ST	6061AL	30C.1.	304 ST	Ope. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	900	0.004				0.15	OD	0.008
16	NeckingID	900	0.004				0.15	ID/Face	0.008
17	Cut Off	900	0.004				0.15	ID	0.008
18	Reamer	120	0.01				0.2	Slot/Sid	0.004
19	Tap	50					0.4	Slot/Bot	0.004
20	End Mill	190	0.006				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	190	0.006			0.125	0.2		
24	HSS Drill	190	0.008			0.25	0.2		
25	HSS Drill	220	0.01			0.5	0.2		
26	HSS Drill	220	0.012			1	0.2		
27	HSS Drill	220	0.015			1.5	0.2		



1045ST	4140ST	6061AL	30C.1.	304 ST	Ope. Chg	End	Others

Cutting Condition File (#30 C.I.) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	450	0.012	0.1			0.2	00/Face	0.008
2	Rough OD	450	0.015	0.125			0.2	OD	0.008
3	Finish OD	600					0.1	ID/Face	0.008
4	Rough ID	450	0.012	0.125			0.2	ID	0.008
5	Finish ID	600					0.1	Slot/Sid	0.004
6	Spot Drill	70	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	500	0.006		2.5		0.2		
8	Ext. Grv.	300	0.004				0.15		
9	Int. Grv.	300	0.004				0.15		
10	Face Grv.	300	0.004				0.15		
11	Face Form	300	0.008	0.08			0.2		
12	Ext. Thred	200					0.2		
13	Int. Thred	200					0.2		
14									



							
#1045ST	#4140ST	#6061AL	#30C. I.	#304 ST	Dpc. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								00/Face	0.008
15	NeckingOD	300	0.004				0.15	OD	0.008
16	NeckingID	300	0.004				0.15	ID/Face	0.008
17	Cut Off	300	0.004				0.15	ID	0.008
18	Reamer	40	0.008				0.2	Slot/Sid	0.004
19	Tap	25					0.4	Slot/Bot	0.004
20	End Mill	55	0.005				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	60	0.003			0.125	0.2		
24	HSS Drill	60	0.004			0.25	0.2		
25	HSS Drill	80	0.006			0.5	0.2		
26	HSS Drill	80	0.01			1	0.2		
27	HSS Drill	80	0.012			1.5	0.2		



							
#1045ST	#4140ST	#6061AL	#30C. I.	#304 ST	Dpc. Chg	End	Others

Cutting Condition File (#304 ST) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	300	0.01	0.1			0.2	OD/Face	0.008
2	Rough OD	300	0.012	0.1			0.2	OD	0.008
3	Finish OD	400					0.1	ID/Face	0.008
4	Rough ID	300	0.01	0.1			0.2	ID	0.008
5	Finish ID	400					0.1	Slot/Sid	0.004
6	Spot Drill	40	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	200	0.004		2.5		0.2		
8	Ext. Grv.	180	0.003				0.15		
9	Int. Grv.	180	0.003				0.15		
10	Face Grv.	180	0.003				0.15		
11	Face Form	180	0.006	0.06			0.2		
12	Ext.Thred	120					0.2		
13	Int.Thred	120					0.2		
14									




 1045ST


 4140ST


 6061AL


 30C.I.


 304 ST


 Ope. Chg


 End


 Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	180	0.003				0.15	OD	0.008
16	NeckingID	180	0.003				0.15	ID/Face	0.008
17	Cut Off	180	0.003				0.15	ID	0.008
18	Reamer	25	0.004				0.2	Slot/Sid	0.004
19	Tap	15					0.4	Slot/Bot	0.004
20	End Mill	40	0.004				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	26	0.002			0.125	0.2		
24	HSS Drill	29	0.003			0.25	0.2		
25	HSS Drill	32	0.005			0.5	0.2		
26	HSS Drill	36	0.007			1	0.2		
27	HSS Drill	39	0.009			1.5	0.2		




 1045ST


 4140ST


 6061AL


 30C.I.


 304 ST


 Ope. Chg


 End


 Others

Cutting Condition File (C903 BR.) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	650	0.015	0.15			0.2	OD/Face	0.008
2	Rough OD	650	0.017	0.15			0.2	OD	0.008
3	Finish OD	820					0.1	ID/Face	0.008
4	Rough ID	650	0.017	0.15			0.2	ID	0.008
5	Finish ID	820					0.1	Slot/Sid	0.004
6	Spot Drill	120	0.003				0.2	Slot/Bot	0.004
7	Carb. Drill	600	0.006		2.5		0.2		
8	Ext. Grv.	650	0.006				0.15		
9	Int. Grv.	650	0.006				0.15		
10	Face Grv.	650	0.006				0.15		
11	Face Form	650	0.01	0.1			0.2		
12	Ext. Thred	350					0.2		
13	Int. Thred	350					0.2		
14									



 C903BR.	 M2TLSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
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Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	650	0.006				0.15	OD	0.008
16	NeckingID	650	0.006				0.15	ID/Face	0.008
17	Cut Off	650	0.006				0.15	ID	0.008
18	Reamer	50	0.008				0.2	Slot/Sid	0.004
19	Tap	40					0.4	Slot/Bot	0.004
20	End Mill	100	0.005				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	130	0.003			0.125	0.2		
24	HSS Drill	130	0.004			0.25	0.2		
25	HSS Drill	150	0.005			0.5	0.2		
26	HSS Drill	150	0.008			1	0.2		
27	HSS Drill	150	0.01			1.5	0.2		



 C903BR.	 M2TLSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
---------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------	--	----------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------

Cutting Condition File (M2-TLSTL) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	300	0.01	0.1			0.2	OD/Face	0.008
2	Rough OD	300	0.012	0.125			0.2	OD	0.008
3	Finish OD	450					0.1	ID/Face	0.008
4	Rough ID	300	0.012	0.125			0.2	ID	0.008
5	Finish ID	450					0.1	Slot/Sid	0.004
6	Spot Drill	40	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	300	0.005		2.5		0.2		
8	Ext. Grv.	175	0.003				0.15		
9	Int. Grv.	175	0.003				0.15		
10	Face Grv.	175	0.003				0.15		
11	Face Form	175	0.006	0.08			0.2		
12	Ext.Thred	140					0.2		
13	Int.Thred	140					0.2		
14									



C303BR.
 M2TLSTL
 ADD-1
 ADD-2
 Ope. Chg
 End
 Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	175	0.003				0.15	OD	0.008
16	NeckingID	175	0.003				0.15	ID/Face	0.008
17	Cut Off	175	0.003				0.15	ID	0.008
18	Reamer	35	0.01				0.2	Slot/Sid	0.004
19	Tap	15					0.4	Slot/Bot	0.004
20	End Mill	50	0.003				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	40	0.002			0.125	0.2		
24	HSS Drill	40	0.003			0.25	0.2		
25	HSS Drill	45	0.005			0.5	0.2		
26	HSS Drill	45	0.008			1	0.2		
27	HSS Drill	45	0.011			1.5	0.2		



C303BR.
 M2TLSTL
 ADD-1
 ADD-2
 Ope. Chg
 End
 Others

Cutting Condition File (ADD-1) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	500	0.012	0.1			0.2	OD/Face	0.008
2	Rough OD	500	0.015	0.125			0.2	OD	0.008
3	Finish OD	700					0.1	ID/Face	0.008
4	Rough ID	500	0.012	0.125			0.2	ID	0.008
5	Finish ID	700					0.1	Slot/Sid	0.004
6	Spot Drill	50	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	450	0.005		2.5		0.2		
8	Ext. Grv.	330	0.004				0.15		
9	Int. Grv.	330	0.004				0.15		
10	Face Grv.	330	0.004				0.15		
11	Face Form	330	0.008	0.08			0.2		
12	Ext.Thred	200					0.2		
13	Int.Thred	200					0.2		
14									



 C903BR.	 W2TLSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
-------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------	--	--------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	330	0.004				0.15	OD	0.008
16	NeckingID	330	0.004				0.15	ID/Face	0.008
17	Cut Off	330	0.004				0.15	ID	0.008
18	Reamer	50	0.006				0.2	Slot/Sid	0.004
19	Tap	20					0.4	Slot/Bot	0.004
20	End Mill	70	0.006				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	60	0.003			0.125	0.2		
24	HSS Drill	60	0.004			0.25	0.2		
25	HSS Drill	80	0.006			0.5	0.2		
26	HSS Drill	80	0.01			1	0.2		
27	HSS Drill	80	0.012			1.5	0.2		



 C903BR.	 W2TLSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
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Cutting Condition File (ADD-2) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	500	0.012	0.1			0.2	OD/Face	0.008
2	Rough OD	500	0.015	0.125			0.2	OD	0.008
3	Finish OD	700					0.1	OD/Face	0.008
4	Rough ID	500	0.012	0.125			0.2	ID	0.008
5	Finish ID	700					0.1	Slot/Sid	0.004
6	Spot Drill	50	0.003				0.2	Slot/Bot	0.004
7	Carb. Drill	450	0.005		2.5		0.2		
8	Ext. Grv.	330	0.004				0.15		
9	Int. Grv.	330	0.004				0.15		
10	Face Grv.	330	0.004				0.15		
11	Face Form	330	0.008	0.08			0.2		
12	Ext. Thred	200					0.2		
13	Int. Thred	200					0.2		
14									



 C303BR.	 M2TLSTL	 ADD-1	 ADD-2	 Ope. Chg	 End	 Others
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Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	330	0.004				0.15	OD	0.008
16	NeckingID	330	0.004				0.15	OD/Face	0.008
17	Cut Off	330	0.004				0.15	ID	0.008
18	Reamer	50	0.006				0.2	Slot/Sid	0.004
19	Tap	20					0.4	Slot/Bot	0.004
20	End Mill	70	0.006				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	60	0.003			0.125	0.2		
24	HSS Drill	60	0.004			0.25	0.2		
25	HSS Drill	80	0.006			0.5	0.2		
26	HSS Drill	80	0.01			1	0.2		
27	HSS Drill	80	0.012			1.5	0.2		



 C303BR.	 M2TLSTL	 ADD-1	 ADD-2	 Ope. Chg	 End	 Others
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ST200

Cutting Condition File (#1045 ST) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	130	0.25	2.5			5	OD/Face	0.2
2	Rough OD	130	0.3	3			5	OD	0.2
3	Finish OD	180					3	OD/Face	0.2
4	Rough ID	130	0.3	3			5	ID	0.2
5	Finish ID	180					3	Slot/Sid	0.1
6	Spot Drill	10	0.08				5	Slot/Bot	0.1
7	Carb. Drill	120	0.1		2.5		5		
8	Ext. Grv.	100	0.08				3		
9	Int. Grv.	100	0.08				3		
10	Face Grv.	100	0.08				3		
11	Face Form	100	0.2	2			5		
12	Ext. Thred	110					5		
13	Int. Thred	110					3		
14									

#1045ST	#4140ST	#6061AL	#30C.1.	#304ST	Ope. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.2
15	NeckingOD	100	0.08				3	OD	0.2
16	NeckingID	100	0.08				3	OD/Face	0.2
17	Cut Off	100	0.08				3	ID	0.2
18	Reamer	8	0.15				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	20	0.07			5	5		
24	HSS Drill	20	0.1			10	5		
25	HSS Drill	25	0.15			20	5		
26	HSS Drill	25	0.2			30	5		
27	HSS Drill	25	0.23			35	5		

#1045ST	#4140ST	#6061AL	#30C.1.	#304ST	Ope. Chg	End	Others

Cutting Condition File (#4140 ST) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	120	0.25	2.5			5	OD/Face	0.2
2	Rough OD	120	0.3	3			5	OD	0.2
3	Finish OD	180					3	ID/Face	0.2
4	Rough ID	120	0.3	3			5	ID	0.2
5	Finish ID	180					3	Slot/Sid	0.1
6	Spot Drill	10	0.08				5	Slot/Bot	0.1
7	Carb.Dril	110	0.1		2.5		5		
8	Ext. Grv.	95	0.08				3		
9	Int. Grv.	95	0.08				3		
10	Face Grv.	95	0.08				3		
11	Face Form	95	0.2	2			5		
12	Ext. Thred	100					5		
13	Int. Thred	100					3		
14									



							
1045ST	4140ST	60S1AL	30C.1.	304ST	Ope. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.2
15	NeckingOD	95	0.08				3	OD	0.2
16	NeckingID	95	0.08				3	ID/Face	0.2
17	Cut Off	95	0.08				3	ID	0.2
18	Reamer	8	0.15				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	20	0.07			5	5		
24	HSS Drill	20	0.1			10	5		
25	HSS Drill	25	0.15			20	5		
26	HSS Drill	25	0.2			30	5		
27	HSS Drill	25	0.23			35	5		



							
1045ST	4140ST	60S1AL	30C.1.	304ST	Ope. Chg	End	Others

Cutting Condition File (#6061 AL) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	300	0.35	3.5			5	OD/Face	0.2
2	Rough OD	300	0.4	4			5	OD	0.2
3	Finish OD	600					3	ID/Face	0.2
4	Rough ID	300	0.4	4			5	ID	0.2
5	Finish ID	600					3	Slot/Sid	0.1
6	Spot Drill	12	0.1				5	Slot/Bot	0.1
7	Carb.Dril	250	0.15		2.5		5		
8	Ext. Grv.	300	0.12				3		
9	Int. Grv.	300	0.12				3		
10	Face Grv.	300	0.12				3		
11	Face Form	300	0.25	2.5			5		
12	Ext.Thred	350					5		
13	Int.Thred	350					3		
14									



 11045ST	 14140ST	 6061AL	 30C.1.	 304ST		 Ope. Chg		 End	 Others
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Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.2
15	NeckingOD	300	0.12				3	OD	0.2
16	NeckingID	300	0.12				3	ID/Face	0.2
17	Cut Off	300	0.12				3	ID	0.2
18	Reamer	20	0.3				5	Slot/Sid	0.1
19	Tap	10					9	Slot/Bot	0.1
20	End Mill	40	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	50	0.17			5	5		
24	HSS Drill	50	0.2			10	5		
25	HSS Drill	60	0.25			20	5		
26	HSS Drill	60	0.3			30	5		
27	HSS Drill	60	0.33			35	5		



 11045ST	 14140ST	 6061AL	 30C.1.	 304ST		 Ope. Chg		 End	 Others
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Cutting Condition File (#30 C.I.) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	110	0.25	2.5			5	OD/Face	0.2
2	Rough OD	110	0.3	3			5	OD	0.2
3	Finish OD	150					3	ID/Face	0.2
4	Rough ID	110	0.3	3			5	ID	0.2
5	Finish ID	150					3	Slot/Sid	0.1
6	Spot Drill	9	0.07				5	Slot/Bot	0.1
7	Carb.Dril	110	0.12		2.5		5		
8	Ext. Grv.	95	0.1				3		
9	Int. Grv.	95	0.1				3		
10	Face Grv.	95	0.1				3		
11	Face Form	95	0.2	2			5		
12	Ext.Thred	100					5		
13	Int.Thred	100					3		
14									



1045ST
 4140ST
 6061AL
 30C.I.
 304ST
 Ope. Chg
 End
 Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.2
15	NeckingOD	95	0.1				3	OD	0.2
16	NeckingID	95	0.1				3	ID/Face	0.2
17	Cut Off	95	0.1				3	ID	0.2
18	Reamer	10	0.2				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	15	0.07			5	5		
24	HSS Drill	15	0.1			10	5		
25	HSS Drill	20	0.15			20	5		
26	HSS Drill	20	0.2			30	5		
27	HSS Drill	20	0.23			35	5		



1045ST
 4140ST
 6061AL
 30C.I.
 304ST
 Ope. Chg
 End
 Others

Cutting Condition File (#304 ST) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	80	0.2	2			5	OD/Face	0.2
2	Rough OD	80	0.25	2.5			5	OD	0.2
3	Finish OD	120					3	ID/Face	0.2
4	Rough ID	80	0.25	2.5			5	ID	0.2
5	Finish ID	120					3	Slot/Sid	0.1
6	Spot Drill	8	0.06				5	Slot/Bot	0.1
7	Carb. Drill	70	0.07		2.5		5		
8	Ext. Grv.	60	0.06				3		
9	Int. Grv.	60	0.06				3		
10	Face Grv.	60	0.06				3		
11	Face Form	60	0.15	1.5			5		
12	Ext. Thred	70					5		
13	Int. Thred	70					3		
14									

#1045ST	#4140ST	#6061AL	#30C.1.	#304ST	Ope. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.2
15	NeckingOD	60	0.06				3	OD	0.2
16	NeckingID	60	0.06				3	ID/Face	0.2
17	Cut Off	60	0.06				3	ID	0.2
18	Reamer	6	0.1				5	Slot/Sid	0.1
19	Tap	5					9	Slot/Bot	0.1
20	End Mill	10	0.1				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	8	0.06			5	5		
24	HSS Drill	9	0.08			10	5		
25	HSS Drill	10	0.12			20	5		
26	HSS Drill	11	0.16			30	5		
27	HSS Drill	12	0.18			35	5		

#1045ST	#4140ST	#6061AL	#30C.1.	#304ST	Ope. Chg	End	Others

Cutting Condition File (C903 BR.) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	200	0.35	3.5			5	OD/Face	0.2
2	Rough OD	200	0.4	4			5	OD	0.2
3	Finish OD	250					3	ID/Face	0.2
4	Rough ID	200	0.4	4			5	ID	0.2
5	Finish ID	250					3	Slot/Sid	0.1
6	Spot Drill	10	0.1				5	Slot/Bot	0.1
7	Carb. Drill	150	0.13		2.5		5		
8	Ext. Grv.	200	0.15				3		
9	Int. Grv.	200	0.15				3		
10	Face Grv.	200	0.15				3		
11	Face Form	200	0.25	2.5			5		
12	Ext. Thred	200					5		
13	Int. Thred	200					3		
14									

							
C903BR.	M2TSSTL	ADD-1	ADD-2		Ope. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.2
15	NeckingOD	200	0.15				3	OD	0.2
16	NeckingID	200	0.15				3	ID/Face	0.2
17	Cut Off	200	0.15				3	ID	0.2
18	Reamer	15	0.2				5	Slot/Sid	0.1
19	Tap	10					9	Slot/Bot	0.1
20	End Mill	35	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	40	0.1			5	5		
24	HSS Drill	40	0.12			10	5		
25	HSS Drill	45	0.16			20	5		
26	HSS Drill	45	0.2			30	5		
27	HSS Drill	45	0.22			35	5		

							
C903BR.	M2TSSTL	ADD-1	ADD-2		Ope. Chg	End	Others

Cutting Condition File (M2-TLSTL) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	150	0.25	2.5			5	OD/Face	0.2
2	Rough OD	150	0.3	3			5	OD	0.2
3	Finish OD	200					3	ID/Face	0.2
4	Rough ID	150	0.3	3			5	ID	0.2
5	Finish ID	200					3	Slot/Sid	0.1
6	Spot Drill	10	0.1				5	Slot/Bot	0.1
7	Carb.Dril	110	0.1		2.5		5		
8	Ext. Grv.	130	0.1				3		
9	Int. Grv.	130	0.1				3		
10	Face Grv.	130	0.1				3		
11	Face Form	130	0.2	2			5		
12	Ext. Thred	130					5		
13	Int. Thred	130					3		
14									



 C903BR.	 M2TSSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
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Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.2
15	NeckingOD	130	0.1				3	OD	0.2
16	NeckingID	130	0.1				3	ID/Face	0.2
17	Cut Off	130	0.1				3	ID	0.2
18	Reamer	10	0.15				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	30	0.07			5	5		
24	HSS Drill	30	0.1			10	5		
25	HSS Drill	35	0.15			20	5		
26	HSS Drill	35	0.2			30	5		
27	HSS Drill	35	0.23			35	5		



 C903BR.	 M2TSSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
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Cutting Condition File (ADD-1) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	130	0.25	2.5			5	OD/Face	0.2
2	Rough OD	130	0.3	3			5	OD	0.2
3	Finish OD	180					3	ID/Face	0.2
4	Rough ID	130	0.3	3			5	ID	0.2
5	Finish ID	180					3	Slot/Sid	0.1
6	Spot Drill	10	0.08				5	Slot/Bot	0.1
7	Carb.Dril	120	0.1		2.5		5		
8	Ext. Grv.	100	0.08				3		
9	Int. Grv.	100	0.08				3		
10	Face Grv.	100	0.08				3		
11	Face Form	100	0.2	2			5		
12	Ext.Thred	110					5		
13	Int.Thred	110					3		
14									



 C903BR.	 M2TSSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
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Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.2
15	NeckingOD	100	0.08				3	OD	0.2
16	NeckingID	100	0.08				3	ID/Face	0.2
17	Cut Off	100	0.08				3	ID	0.2
18	Reamer	8	0.15				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	20	0.07			5	5		
24	HSS Drill	20	0.1			10	5		
25	HSS Drill	25	0.15			20	5		
26	HSS Drill	25	0.2			30	5		
27	HSS Drill	25	0.23			35	5		



 C903BR.	 M2TSSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
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Cutting Condition File (ADD-2) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	130	0.25	2.5			5	OD/Face	0.2
2	Rough OD	130	0.3	3			5	OD	0.2
3	Finish OD	180					3	OD/Face	0.2
4	Rough ID	130	0.3	3			5	ID	0.2
5	Finish ID	180					3	Slot/Sid	0.1
6	Spot Drill	10	0.08				5	Slot/Bot	0.1
7	Carb.Dril	120	0.1		2.5		5		
8	Ext. Grv.	100	0.08				3		
9	Int. Grv.	100	0.08				3		
10	Face Grv.	100	0.08				3		
11	Face Form	100	0.2	2			5		
12	Ext.Thred	110					5		
13	Int.Thred	110					3		
14									



 C903BR.	 M2TSSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
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Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.2
15	NeckingOD	100	0.08				3	OD	0.2
16	NeckingID	100	0.08				3	OD/Face	0.2
17	Cut Off	100	0.08				3	ID	0.2
18	Reamer	8	0.15				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	20	0.07			5	5		
24	HSS Drill	20	0.1			10	5		
25	HSS Drill	25	0.15			20	5		
26	HSS Drill	25	0.2			30	5		
27	HSS Drill	25	0.23			35	5		



 C903BR.	 M2TSSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
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ST250

Cutting Condition File (#1045 ST) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	500	0.012	0.125			0.2	OD/Face	0.008
2	Rough OD	500	0.015	0.15			0.2	OD	0.008
3	Finish OD	700					0.1	ID/Face	0.008
4	Rough ID	500	0.015	0.125			0.2	ID	0.008
5	Finish ID	700					0.1	Slot/Sid	0.004
6	Spot Drill	50	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	450	0.006		2.5		0.2		
8	Ext. Grv.	330	0.004				0.15		
9	Int. Grv.	330	0.004				0.15		
10	Face Grv.	330	0.004				0.15		
11	Face Form	330	0.01	0.1			0.2		
12	Ext. Thred	200					0.2		
13	Int. Thred	200					0.2		
14									



#1045ST
 #4140ST
 #6061AL
 #30C. I.
 #304 ST

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	330	0.004				0.15	OD	0.008
16	NeckingID	330	0.004				0.15	ID/Face	0.008
17	Cut Off	330	0.004				0.15	ID	0.008
18	Reamer	50	0.006				0.2	Slot/Sid	0.004
19	Tap	20					0.4	Slot/Bot	0.004
20	End Mill	70	0.006				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	60	0.003			0.125	0.2		
24	HSS Drill	60	0.004			0.25	0.2		
25	HSS Drill	80	0.006			0.5	0.2		
26	HSS Drill	80	0.01			1	0.2		
27	HSS Drill	80	0.012			1.6	0.2		

#1045ST
 #4140ST
 #6061AL
 #30C. I.
 #304 ST

Cutting Condition File (#4140 ST) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	600	0.012	0.125			0.2	OD/Face	0.008
2	Rough OD	600	0.015	0.15			0.2	OD	0.008
3	Finish OD	750					0.1	ID/Face	0.008
4	Rough ID	600	0.015	0.125			0.2	ID	0.008
5	Finish ID	750					0.1	Slot/Sid	0.004
6	Spot Drill	50	0.003				0.2	Slot/Bot	0.004
7	Carb. Drill	400	0.006		2.5		0.2		
8	Ext. Grv.	300	0.004				0.15		
9	Int. Grv.	300	0.004				0.15		
10	Face Grv.	300	0.004				0.15		
11	Face Form	300	0.01	0.1			0.2		
12	Ext. Thred	180					0.2		
13	Int. Thred	180					0.2		
14									



1045ST
 4140ST
 6061AL
 30C.1.
 304 ST
 Ope. Chg
 End
 Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	300	0.004				0.15	OD	0.008
16	NeckingID	300	0.004				0.15	ID/Face	0.008
17	Cut Off	300	0.004				0.15	ID	0.008
18	Reamer	50	0.006				0.2	Slot/Sid	0.004
19	Tap	20					0.4	Slot/Bot	0.004
20	End Mill	70	0.006				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	60	0.003			0.125	0.2		
24	HSS Drill	60	0.004			0.25	0.2		
25	HSS Drill	80	0.006			0.5	0.2		
26	HSS Drill	80	0.01			1	0.2		
27	HSS Drill	80	0.012			1.6	0.2		



1045ST
 4140ST
 6061AL
 30C.1.
 304 ST
 Ope. Chg
 End
 Others

Cutting Condition File (#6061 AL) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	1000	0.015	0.15			0.2	OD/Face	0.008
2	Rough OD	1000	0.018	0.2			0.2	OD	0.008
3	Finish OD	1500					0.1	ID/Face	0.008
4	Rough ID	1000	0.015	0.2			0.2	ID	0.008
5	Finish ID	1500					0.1	Slot/Sid	0.004
6	Spot Drill	190	0.003				0.2	Slot/Bot	0.004
7	Carb. Drill	800	0.008		2.5		0.2		
8	Ext. Grv.	900	0.006				0.15		
9	Int. Grv.	900	0.006				0.15		
10	Face Grv.	900	0.006				0.15		
11	Face Form	900	0.012	0.12			0.2		
12	Ext. Thred	450					0.2		
13	Int. Thred	450					0.2		
14									



1045ST	4140ST	6061AL	30C.1.	304 ST	Ope. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	900	0.006				0.15	OD	0.008
16	NeckingID	900	0.006				0.15	ID/Face	0.008
17	Cut Off	900	0.006				0.15	ID	0.008
18	Reamer	120	0.01				0.2	Slot/Sid	0.004
19	Tap	50					0.4	Slot/Bot	0.004
20	End Mill	190	0.006				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	190	0.006			0.125	0.2		
24	HSS Drill	190	0.008			0.25	0.2		
25	HSS Drill	220	0.01			0.5	0.2		
26	HSS Drill	220	0.012			1	0.2		
27	HSS Drill	220	0.015			1.6	0.2		



1045ST	4140ST	6061AL	30C.1.	304 ST	Ope. Chg	End	Others

Cutting Condition File (#30 C.I.) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	450	0.012	0.125			0.2	OD/Face	0.008
2	Rough OD	450	0.015	0.15			0.2	OD	0.008
3	Finish OD	600					0.1	ID/Face	0.008
4	Rough ID	450	0.015	0.125			0.2	ID	0.008
5	Finish ID	600					0.1	Slot/Sid	0.004
6	Spot Drill	70	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	500	0.006		2.5		0.2		
8	Ext. Grv.	300	0.005				0.15		
9	Int. Grv.	300	0.005				0.15		
10	Face Grv.	300	0.005				0.15		
11	Face Form	300	0.01	0.1			0.2		
12	Ext.Thred	200					0.2		
13	Int.Thred	200					0.2		
14									












Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	300	0.005				0.15	OD	0.008
16	NeckingID	300	0.005				0.15	ID/Face	0.008
17	Cut Off	300	0.005				0.15	ID	0.008
18	Reamer	40	0.008				0.2	Slot/Sid	0.004
19	Tap	25					0.4	Slot/Bot	0.004
20	End Mill	55	0.005				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	60	0.003			0.125	0.2		
24	HSS Drill	60	0.004			0.25	0.2		
25	HSS Drill	80	0.006			0.5	0.2		
26	HSS Drill	80	0.01			1	0.2		
27	HSS Drill	80	0.012			1.6	0.2		












Cutting Condition File (#304 ST) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	300	0.012	0.125			0.2	OD/Face	0.008
2	Rough OD	300	0.015	0.15			0.2	OD	0.008
3	Finish OD	400					0.1	ID/Face	0.008
4	Rough ID	300	0.012	0.125			0.2	ID	0.008
5	Finish ID	400					0.1	Slot/Sid	0.004
6	Spot Drill	40	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	200	0.005		2.5		0.2		
8	Ext. Grv.	180	0.003				0.15		
9	Int. Grv.	180	0.003				0.15		
10	Face Grv.	180	0.003				0.15		
11	Face Form	180	0.008	0.08			0.2		
12	Ext. Thred	120					0.2		
13	Int. Thred	120					0.2		
14									

1045ST	4140ST	6061AL	30C.1.	304 ST	Ope. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	180	0.003				0.15	OD	0.008
16	NeckingID	180	0.003				0.15	ID/Face	0.008
17	Cut Off	180	0.003				0.15	ID	0.008
18	Reamer	25	0.004				0.2	Slot/Sid	0.004
19	Tap	15					0.4	Slot/Bot	0.004
20	End Mill	40	0.004				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	26	0.002			0.125	0.2		
24	HSS Drill	29	0.003			0.25	0.2		
25	HSS Drill	32	0.005			0.5	0.2		
26	HSS Drill	36	0.007			1	0.2		
27	HSS Drill	39	0.009			1.6	0.2		

1045ST	4140ST	6061AL	30C.1.	304 ST	Ope. Chg	End	Others

Cutting Condition File (C903 BR.) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	650	0.015	0.15			0.2	OD/Face	0.008
2	Rough OD	650	0.017	0.15			0.2	OD	0.008
3	Finish OD	820					0.1	ID/Face	0.008
4	Rough ID	650	0.017	0.15			0.2	ID	0.008
5	Finish ID	820					0.1	Slot/Sid	0.004
6	Spot Drill	120	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	600	0.006		2.5		0.2		
8	Ext. Grv.	650	0.006				0.15		
9	Int. Grv.	650	0.006				0.15		
10	Face Grv.	650	0.006				0.15		
11	Face Form	650	0.012	0.12			0.2		
12	Ext.Thred	350					0.2		
13	Int.Thred	350					0.2		
14									











Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	650	0.006				0.15	OD	0.008
16	NeckingID	650	0.006				0.15	ID/Face	0.008
17	Cut Off	650	0.006				0.15	ID	0.008
18	Reamer	50	0.008				0.2	Slot/Sid	0.004
19	Tap	40					0.4	Slot/Bot	0.004
20	End Mill	100	0.005				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	130	0.003			0.125	0.2		
24	HSS Drill	130	0.004			0.25	0.2		
25	HSS Drill	150	0.005			0.5	0.2		
26	HSS Drill	150	0.008			1	0.2		
27	HSS Drill	150	0.01			1.6	0.2		











Cutting Condition File (M2-TLSTL) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	300	0.012	0.125			0.2	OD/Face	0.008
2	Rough OD	300	0.015	0.15			0.2	OD	0.008
3	Finish OD	450					0.1	ID/Face	0.008
4	Rough ID	300	0.012	0.125			0.2	ID	0.008
5	Finish ID	450					0.1	Slot/Sid	0.004
6	Spot Drill	40	0.003				0.2	Slot/Bot	0.004
7	Carb. Drill	300	0.005		2.5		0.2		
8	Ext. Grv.	175	0.003				0.15		
9	Int. Grv.	175	0.003				0.15		
10	Face Grv.	175	0.003				0.15		
11	Face Form	175	0.008	0.1			0.2		
12	Ext. Thred	140					0.2		
13	Int. Thred	140					0.2		
14									



 C903BR.	 M2TLSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
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Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	175	0.003				0.15	OD	0.008
16	NeckingID	175	0.003				0.15	ID/Face	0.008
17	Cut Off	175	0.003				0.15	ID	0.008
18	Reamer	35	0.01				0.2	Slot/Sid	0.004
19	Tap	15					0.4	Slot/Bot	0.004
20	End Mill	50	0.003				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	40	0.002			0.125	0.2		
24	HSS Drill	40	0.003			0.25	0.2		
25	HSS Drill	45	0.005			0.5	0.2		
26	HSS Drill	45	0.008			1	0.2		
27	HSS Drill	45	0.011			1.6	0.2		



 C903BR.	 M2TLSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
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Cutting Condition File (ADD-1) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	500	0.012	0.125			0.2	OD/Face	0.008
2	Rough OD	500	0.015	0.15			0.2	OD	0.008
3	Finish OD	700					0.1	ID/Face	0.008
4	Rough ID	500	0.015	0.125			0.2	ID	0.008
5	Finish ID	700					0.1	Slot/Sid	0.004
6	Spot Drill	50	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	450	0.006		2.5		0.2		
8	Ext. Grv.	330	0.004				0.15		
9	Int. Grv.	330	0.004				0.15		
10	Face Grv.	330	0.004				0.15		
11	Face Form	330	0.01	0.1			0.2		
12	Ext.Thred	200					0.2		
13	Int.Thred	200					0.2		
14									



 C303BR.	 M2TLSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
-------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------	--	--------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	330	0.004				0.15	OD	0.008
16	NeckingID	330	0.004				0.15	ID/Face	0.008
17	Cut Off	330	0.004				0.15	ID	0.008
18	Reamer	50	0.006				0.2	Slot/Sid	0.004
19	Tap	20					0.4	Slot/Bot	0.004
20	End Mill	70	0.006				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	60	0.003			0.125	0.2		
24	HSS Drill	60	0.004			0.25	0.2		
25	HSS Drill	80	0.006			0.5	0.2		
26	HSS Drill	80	0.01			1	0.2		
27	HSS Drill	80	0.012			1.6	0.2		



 C303BR.	 M2TLSTL	 ADD-1	 ADD-2		 Ope. Chg	 End	 Others
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Cutting Condition File (ADD-2) <INCH>

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
1	Facing	500	0.012	0.125			0.2	OD/Face	0.008
2	Rough OD	500	0.015	0.15			0.2	OD	0.008
3	Finish OD	700					0.1	ID/Face	0.008
4	Rough ID	500	0.015	0.125			0.2	ID	0.008
5	Finish ID	700					0.1	Slot/Sid	0.004
6	Spot Drill	50	0.003				0.2	Slot/Bot	0.004
7	Carb.Dril	450	0.006		2.5		0.2		
8	Ext. Grv.	330	0.004				0.15		
9	Int. Grv.	330	0.004				0.15		
10	Face Grv.	330	0.004				0.15		
11	Face Form	330	0.01	0.1			0.2		
12	Ext.Thred	200					0.2		
13	Int.Thred	200					0.2		
14									



 C303BR.	 M2TLSTL	 ADD-1	 ADD-2	 Ope.Chg	 End	 Others
-------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------

Cutting Condition File								Amount	
No	Operation	C.S. (f/min)	Feed (in/rev)	C.D. (in)	L/D	Dia. (in)	S.D. (in)	Place	Amount (in)
14								OD/Face	0.008
15	NeckingOD	330	0.004				0.15	OD	0.008
16	NeckingID	330	0.004				0.15	ID/Face	0.008
17	Cut Off	330	0.004				0.15	ID	0.008
18	Reamer	50	0.006				0.2	Slot/Sid	0.004
19	Tap	20					0.4	Slot/Bot	0.004
20	End Mill	70	0.006				0.2		
21	Bar Stop	100	0.8			2.5	0.4		
22									
23	HSS Drill	60	0.003			0.125	0.2		
24	HSS Drill	60	0.004			0.25	0.2		
25	HSS Drill	80	0.006			0.5	0.2		
26	HSS Drill	80	0.01			1	0.2		
27	HSS Drill	80	0.012			1.6	0.2		



 C303BR.	 M2TLSTL	 ADD-1	 ADD-2	 Ope.Chg	 End	 Others
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ST250

Cutting Condition File (#1045 ST) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (m/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
1	Facing	130	0.3	3			5	OD/Face	0.2
2	Rough OD	130	0.4	4			5	OD	0.2
3	Finish OD	180					3	ID/Face	0.2
4	Rough ID	130	0.4	4			5	ID	0.2
5	Finish ID	180					3	Slot/Sid	0.1
6	Spot Drill	10	0.08				5	Slot/Bot	0.1
7	Carb.Dril	120	0.12		2.5		5		
8	Ext. Grv.	100	0.1				3		
9	Int. Grv.	100	0.1				3		
10	Face Grv.	100	0.1				3		
11	Face Form	100	0.25	2.5			5		
12	Ext.Thred	110					5		
13	Int.Thred	110					3		
14									

#1045ST	#4140ST	#6061AL	#30C.I.	#304 ST	Op. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (m/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
14								OD/Face	0.2
15	NeckingOD	100	0.1				3	OD	0.2
16	NeckingID	100	0.1				3	ID/Face	0.2
17	Cut Off	100	0.1				3	ID	0.2
18	Reamer	8	0.15				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	20	0.07			5	5		
24	HSS Drill	20	0.1			10	5		
25	HSS Drill	25	0.15			20	5		
26	HSS Drill	25	0.2			30	5		
27	HSS Drill	25	0.25			40	5		

#1045ST	#4140ST	#6061AL	#30C.I.	#304 ST	Op. Chg	End	Others

Cutting Condition File (#4140 ST) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (m/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
1	Facing	120	0.3	3			5	OD/Face	0.2
2	Rough OD	120	0.4	4			5	OD	0.2
3	Finish OD	180					3	ID/Face	0.2
4	Rough ID	120	0.4	4			5	ID	0.2
5	Finish ID	180					3	Slot/Sid	0.1
6	Spot Drill	10	0.08				5	Slot/Bot	0.1
7	Carb.Dril	110	0.12		2.5		5		
8	Ext. Grv.	95	0.1				3		
9	Int. Grv.	95	0.1				3		
10	Face Grv.	95	0.1				3		
11	Face Form	95	0.25	2.5			5		
12	Ext.Thred	100					5		
13	Int.Thred	100					3		
14									

								
#1045ST	#4140ST	#6061AL	#30C.1.	#304 ST		Op.Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (m/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
14								OD/Face	0.2
15	NeckingOD	95	0.1				3	OD	0.2
16	NeckingID	95	0.1				3	ID/Face	0.2
17	Cut Off	95	0.1				3	ID	0.2
18	Reamer	8	0.15				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	20	0.07			5	5		
24	HSS Drill	20	0.1			10	5		
25	HSS Drill	25	0.15			20	5		
26	HSS Drill	25	0.2			30	5		
27	HSS Drill	25	0.25			40	5		

								
#1045ST	#4140ST	#6061AL	#30C.1.	#304 ST		Op.Chg	End	Others

Cutting Condition File (#6061 AL) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (m/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
1	Facing	300	0.4	4			5	OD/Face	0.2
2	Rough OD	300	0.45	4.5			5	OD	0.2
3	Finish OD	600					3	ID/Face	0.2
4	Rough ID	300	0.45	4.5			5	ID	0.2
5	Finish ID	600					3	Slot/Sid	0.1
6	Spot Drill	12	0.1				5	Slot/Bot	0.1
7	Carb.Dril	250	0.18		2.5		5		
8	Ext. Grv.	300	0.15				3		
9	Int. Grv.	300	0.15				3		
10	Face Grv.	300	0.15				3		
11	Face Form	300	0.3	3			5		
12	Ext. Thred	350					5		
13	Int. Thred	350					3		
14									

1045ST	4140ST	6061AL	30C.L.	304 ST	Ope. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (m/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
14								OD/Face	0.2
15	NeckingOD	300	0.15				3	OD	0.2
16	NeckingID	300	0.15				3	ID/Face	0.2
17	Cut Off	300	0.15				3	ID	0.2
18	Reamer	20	0.3				5	Slot/Sid	0.1
19	Tap	10					9	Slot/Bot	0.1
20	End Mill	40	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	50	0.17			5	5		
24	HSS Drill	50	0.2			10	5		
25	HSS Drill	60	0.25			20	5		
26	HSS Drill	60	0.3			30	5		
27	HSS Drill	60	0.35			40	5		

1045ST	4140ST	6061AL	30C.L.	304 ST	Ope. Chg	End	Others

Cutting Condition File (#30 C.I.) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (#/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
1	Facing	110	0.3	3			5	OD/Face	0.2
2	Rough OD	110	0.4	4			5	OD	0.2
3	Finish OD	150					3	ID/Face	0.2
4	Rough ID	110	0.4	4			5	ID	0.2
5	Finish ID	150					3	Slot/Sid	0.1
6	Spot Drill	9	0.07				5	Slot/Bot	0.1
7	Carb.Dril	110	0.15		2.5		5		
8	Ext. Grv.	95	0.1				3		
9	Int. Grv.	95	0.1				3		
10	Face Grv.	95	0.1				3		
11	Face Form	95	0.25	2.5			5		
12	Ext.Thred	100					5		
13	Int.Thred	100					3		
14									

1045ST	4140ST	6061AL	30C.I.	304 ST	Ope. Chg	End	Others



Cutting Condition File								Amount	
No	Operation	C.S. (#/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
14								OD/Face	0.2
15	NeckingOD	95	0.1				3	OD	0.2
16	NeckingID	95	0.1				3	ID/Face	0.2
17	Cut Off	95	0.1				3	ID	0.2
18	Reamer	10	0.2				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	15	0.07			5	5		
24	HSS Drill	15	0.1			10	5		
25	HSS Drill	20	0.15			20	5		
26	HSS Drill	20	0.2			30	5		
27	HSS Drill	20	0.25			40	5		

1045ST	4140ST	6061AL	30C.I.	304 ST	Ope. Chg	End	Others



Cutting Condition File (#304 ST) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (#/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
1	Facing	80	0.25	2.5			5	OD/Face	0.2
2	Rough OD	80	0.3	3			5	OD	0.2
3	Finish OD	120					3	ID/Face	0.2
4	Rough ID	80	0.3	3			5	ID	0.2
5	Finish ID	120					3	Slot/Sid	0.1
6	Spot Drill	8	0.06				5	Slot/Bot	0.1
7	Carb.Dril	70	0.08		2.5		5		
8	Ext. Grv.	60	0.06				3		
9	Int. Grv.	60	0.06				3		
10	Face Grv.	60	0.06				3		
11	Face Form	60	0.2	2			5		
12	Ext.Thred	70					5		
13	Int.Thred	70					3		
14									





1045ST



4140ST



60S1AL



30C.1.



304 ST



Ope. Chg



End



Others

Cutting Condition File								Amount	
No	Operation	C.S. (#/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
14								OD/Face	0.2
15	NeckingOD	60	0.06				3	OD	0.2
16	NeckingID	60	0.06				3	ID/Face	0.2
17	Cut Off	60	0.06				3	ID	0.2
18	Reamer	6	0.1				5	Slot/Sid	0.1
19	Tap	5					9	Slot/Bot	0.1
20	End Mill	10	0.1				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	8	0.06			5	5		
24	HSS Drill	9	0.08			10	5		
25	HSS Drill	10	0.12			20	5		
26	HSS Drill	11	0.16			30	5		
27	HSS Drill	12	0.2			40	5		





1045ST



4140ST



60S1AL



30C.1.



304 ST



Ope. Chg



End



Others

Cutting Condition File (C903 BR.) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (m/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
1	Facing	200	0.4	4			5	OD/Face	0.2
2	Rough OD	200	0.45	4.5			5	OD	0.2
3	Finish OD	250					3	ID/Face	0.2
4	Rough ID	200	0.45	4.5			5	ID	0.2
5	Finish ID	250					3	Slot/Sid	0.1
6	Spot Drill	10	0.1				5	Slot/Bot	0.1
7	Carb.Drill	150	0.15		2.5		5		
8	Ext. Grv.	200	0.15				3		
9	Int. Grv.	200	0.15				3		
10	Face Grv.	200	0.15				3		
11	Face Form	200	0.3	3			5		
12	Ext.Thred	200					5		
13	Int.Thred	200					3		
14									



C903BR.

M2TLSTL

ADD-1

ADD-2

Ope. Chg

End

Others

Cutting Condition File								Amount	
No	Operation	C.S. (m/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
14								OD/Face	0.2
15	NeckingOD	200	0.15				3	OD	0.2
16	NeckingID	200	0.15				3	ID/Face	0.2
17	Cut Off	200	0.15				3	ID	0.2
18	Reamer	15	0.2				5	Slot/Sid	0.1
19	Tap	10					9	Slot/Bot	0.1
20	End Mill	35	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	40	0.1			5	5		
24	HSS Drill	40	0.12			10	5		
25	HSS Drill	45	0.16			20	5		
26	HSS Drill	45	0.2			30	5		
27	HSS Drill	45	0.24			40	5		



C903BR.

M2TLSTL

ADD-1

ADD-2

Ope. Chg

End

Others

Cutting Condition File (M2-TLSTL) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (#/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
1	Facing	150	0.3	3			5	OD/Face	0.2
2	Rough OD	150	0.4	4			5	OD	0.2
3	Finish OD	200					3	ID/Face	0.2
4	Rough ID	150	0.4	4			5	ID	0.2
5	Finish ID	200					3	Slot/Sid	0.1
6	Spot Drill	10	0.1				5	Slot/Bot	0.1
7	Carb.Drill	110	0.12		2.5		5		
8	Ext. Grv.	130	0.1				3		
9	Int. Grv.	130	0.1				3		
10	Face Grv.	130	0.1				3		
11	Face Form	130	0.25	2.5			5		
12	Ext. Thred	130					5		
13	Int. Thred	130					3		
14									

C903BR.	M2TLSTL	ADD-1	ADD-2		Opc. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (#/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
14								OD/Face	0.2
15	NeckingOD	130	0.1				3	OD	0.2
16	NeckingID	130	0.1				3	ID/Face	0.2
17	Cut Off	130	0.1				3	ID	0.2
18	Reamer	10	0.15				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	30	0.07			5	5		
24	HSS Drill	30	0.1			10	5		
25	HSS Drill	35	0.15			20	5		
26	HSS Drill	35	0.2			30	5		
27	HSS Drill	35	0.25			40	5		

C903BR.	M2TLSTL	ADD-1	ADD-2		Opc. Chg	End	Others

Cutting Condition File (ADD-1) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (#/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
1	Facing	130	0.3	3			5	OD/Face	0.2
2	Rough OD	130	0.4	4			5	OD	0.2
3	Finish OD	180					3	ID/Face	0.2
4	Rough ID	130	0.4	4			5	ID	0.2
5	Finish ID	180					3	Slot/Sid	0.1
6	Spot Drill	10	0.08				5	Slot/Bot	0.1
7	Carb.Dril	120	0.12		2.5		5		
8	Ext. Grv.	100	0.1				3		
9	Int. Grv.	100	0.1				3		
10	Face Grv.	100	0.1				3		
11	Face Form	100	0.25	2.5			5		
12	Ext.Thred	110					5		
13	Int.Thred	110					3		
14									

C303BR.	M2TLSTL	ADD-1	ADD-2		Ope. Chg	End	Others

Cutting Condition File								Amount	
No	Operation	C.S. (#/min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
14								OD/Face	0.2
15	NeckingOD	100	0.1				3	OD	0.2
16	NeckingID	100	0.1				3	ID/Face	0.2
17	Cut Off	100	0.1				3	ID	0.2
18	Reamer	8	0.15				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	20	0.07			5	5		
24	HSS Drill	20	0.1			10	5		
25	HSS Drill	25	0.15			20	5		
26	HSS Drill	25	0.2			30	5		
27	HSS Drill	25	0.25			40	5		

C303BR.	M2TLSTL	ADD-1	ADD-2		Ope. Chg	End	Others

Cutting Condition File (ADD-2) <METRIC>

Cutting Condition File								Amount	
No	Operation	C.S. (μ /min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
1	Facing	130	0.3	3			5	OD/Face	0.2
2	Rough OD	130	0.4	4			5	OD	0.2
3	Finish OD	180					3	ID/Face	0.2
4	Rough ID	130	0.4	4			5	ID	0.2
5	Finish ID	180					3	Slot/Sid	0.1
6	Spot Drill	10	0.08				5	Slot/Bot	0.1
7	Carb.Dril	120	0.12		2.5		5		
8	Ext. Grv.	100	0.1				3		
9	Int. Grv.	100	0.1				3		
10	Face Grv.	100	0.1				3		
11	Face Form	100	0.25	2.5			5		
12	Ext.Thred	110					5		
13	Int.Thred	110					3		
14									

							
C903BR.	M2TLSTL	ADD-1	ADD-2		Ope. Chg	End	Others

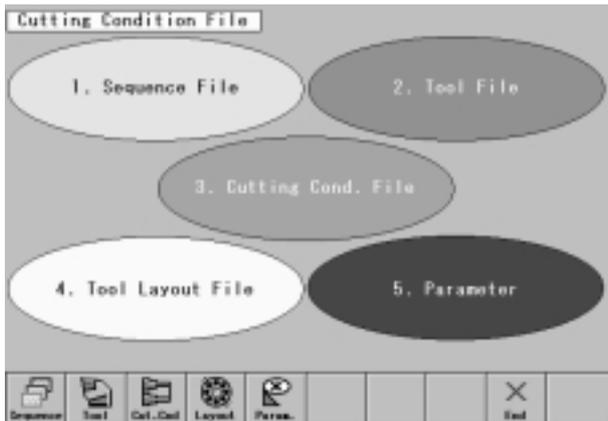
Cutting Condition File								Amount	
No	Operation	C.S. (μ /min)	Feed (mm/rev)	C.D. (mm)	L/D	Dia. (mm)	S.D. (mm)	Place	Amount (mm)
14								OD/Face	0.2
15	NeckingOD	100	0.1				3	OD	0.2
16	NeckingID	100	0.1				3	ID/Face	0.2
17	Cut Off	100	0.1				3	ID	0.2
18	Reamer	8	0.15				5	Slot/Sid	0.1
19	Tap	6					9	Slot/Bot	0.1
20	End Mill	20	0.15				5		
21	Bar Stop	100	9			30	10		
22									
23	HSS Drill	20	0.07			5	5		
24	HSS Drill	20	0.1			10	5		
25	HSS Drill	25	0.15			20	5		
26	HSS Drill	25	0.2			30	5		
27	HSS Drill	25	0.25			40	5		

							
C903BR.	M2TLSTL	ADD-1	ADD-2		Ope. Chg	End	Others

5. PARAMETERS

1. Selecting the Item

Note) Various Parameters for automatic programming
Before creating a program, alter the set values of these parameters as required.
Note that automatic determination is not made when the conditions in the parameters are not met.



Item Select Screen



Press the F5 (Param.) Key.

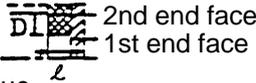
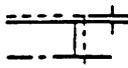
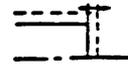
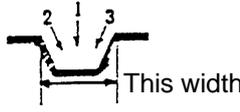
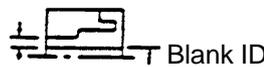
Select a desired item.

F1/Sequence	Order of machining
F2/Tool	Tool file
F3/Cut. chd	Cutting condition file
F4/Layout	Layout
F5/Param.	Various parameters
F9/End	

There are the following types of parameters:

Real value parameter	0 ~ 127	: Setting of various conditions
Alphabet parameter 1	0 ~ 159	: Setting of address, number of digits, preparatory function (G code) and miscellaneous function (M code) Setting of material name (151 ~ 159)
Alphabet parameter 2	2000 ~ 2059	: Setting of NC data format
Bit parameter	0 ~ 63	: Setting of each function
Integer parameter	0 ~ 31	: Setting of max. speed r.p.m. for each rotating range

2. Real Value Parameters

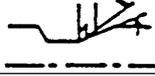
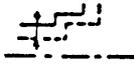
No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
0	Unused (Don't change.)	0	0
1	Unused (Don't change.)	0	0
2	Unused (Don't change.)	0	0
3	Unused (Don't change.)	0	0
4	Unused (Don't change.)	0	0
5	Unused (Don't change.)	0	0
6	Unused (Don't change.)	0	0
7	Unused (Don't change.)	0	0
8	Unused (Don't change.)	0	0
9	Unused (Don't change.)	0	0
10	Unused (Don't change.)	0	0
11	Unused (Don't change.)	0	0
12	Unused (Don't change.)	0	0
13	Unused (Don't change.)	0	0
14	Ratio ($\frac{D}{L}$) of diametrical direction (radius value) and length for end facing.  End facing is performed when larger than a set value.	10	10
15	Single wall thickness removal amount when only OD and ID finishings are performed without OD and ID roughing. Only OD and ID finishings are performed when larger than a finish allowance and smaller than a set value. (except the formed bar) 	0.015	0.3
16	Removal amount when only end face finishing is performed without end face roughing. Only end face finishing is performed when larger than a finish allowance and smaller than a set value. (except the formed bar) 	0.015	0.3
17	Unused	0	0
18	Cutting amount at one time when cut off process and step feed machining.	0	0
19	Returning amount at cut off process and step feed machining.	0.02	0.5
20	Determination of a sequence number outputting method 0 : Outputs up to Nxx98. 1 : Outputs only the top of each process.	1	1
21	Coefficient of grooving by three passes. Groove width/Output the three passes if selected tool width is smaller than setting value. 	0	0
22	Unused	0	0
23	Blank inner diameter of a hollow round bar to be drilled. When lower than a set value, drilling is performed. 	0.75	20
24	Single wall thickness removal amount of a hollow round bar to be drilled. When lower than a set value, drilling is performed. 	0.4	10

Both conditions are required

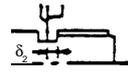
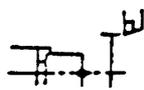
Real Value Parameters

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
25	Minimum removal amount to be machined with the 2nd drill (radius value). When exceeding a set value, machining with the 2nd drill is performed.	0.4	10
26	Ratio of longitudinal dimension and diametrical dimension (diameter value) to be machined with the 2nd drill. When exceeding a set value, machining with the 2nd drill is performed.		1.5
27	Maximum inner diameter when ID finishing is performed by only drilling (with the 1st drill only). When lower than a set value and a finish symbol is " ∇_{50} ", ID finishing is performed by drilling.	0.4	10
28	Coefficient which determines a return feed rate in reaming. Feed rate in cutting \times set value = Return feed rete	5	5
29	Coefficient which determines the approach and retreat distance of the boring bar which cuts a part left uncut in ID denting. Clearance set in the cutting condition file for ID roughing \times set value = distance	8	8
30	For other machines (Don't change.)	0	0
31	Setting method of rough tool for end surface, OD and ID. 0 : One for end surface, OD rough and one for recessing rough, total two. 1 : One for end surface rough, one for OD rough, one for recessing rough total three. 2 : One for end surface rough, one for OD or recessing rough, total two. 3 : One for end surface, OD rough one for recessing rough and finish by grooving tool, total two. 4 : One for end surface rough, one for OD rough, one for recessing rough and finish by grooving tool, total three. 3x : Rough and finish by one grooving tool for end surface recessing. 3xx : Rough and finish by one grooving tool for ID recessing.	0	0
32	Finish symbol when roughing and finishing are performed with a roughing tool. When lower than a set value, roughing and finishing are profaned with the same tool.	10	50
33	Output the NC data to machine the remaining area of OD, ID recessing by grooving tool. 3 : Remaining area of OD recessing. 300 : Remaining area of ID recessing.	0	0
34	Unused	0	0
35	Coefficient for deciding a fixed depth of cut for trapezoidal screw thread and square thread etc. Input pitch \times Set value = Fixed depth of cut (Radius value)	0.02	0.02
36	The last depth of cut in case of the fixed cutting-in system of trapezoidal screw thread and squire thread etc. (Radius value)	0.0008	0.02

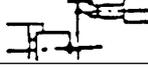
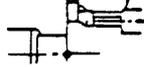
Real Value Parameters

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
37	Maximum diameter for tapping (premachined hole diameter for thread + thread pitch) When lower than a set value, tipping is performed. 	ST200 0.629 ST250 0.787	ST200 16 ST250 20
38	Removal amount without roughing 0 : All removed 0.1 or more : No roughing is performed when a removal amount is less than a set value. (ID, OD and end face roughing)	0	0
39	How to decide a tool setting position 0 : It is decided by the setting value of the machining order file. 1 : For the same tool No., it is decided by the status of the tool layout at the operation side.	0	0
40	Protective angle to a tool's sub-cutting edge angle 	5	5
41	Ratio (D/l) of length and diametrical direction (radius value) when parts other than the 1st end face of a formed bar is faced.  When exceeding a set value, end facing is performed.	10	10
42	Escaping amount at drilling (cycles 2 and 3) in turning.	0.02	0.5
43	Difference between a blank minimum diameter and a finish minimum diameter (radius value) when a formed bar is drilled. When exceeding a set value, drilling is performed. 	0.787	20
44	Factor which determines a cutting depth for the drilling cycle 2 or 3. Tool diameter × Set value = Cutting depth (effective when integer value parameter 0011 is either 2 or 3)	0.5	0.5
45	Coefficient which determines a diameter of a spot drilling tool. Selects the maximum diameter registered in the tool file within "blank" outer diameter × set value" Note) 0 is unacceptable.	0.1	0.1
46	Coefficient which determines a diameter of a high-speed steel drilling tool (diameter value). Selects a drilling tool with "machining hole diameter – set value". Note) 0 is unacceptable.	0.0312	1
47	Chamfering in the cutting-off process 0 : Chamfering not performed 0.1 or more : C chamfering with a set value performed  -0.1 or less : R chamfering with a set value Performed	0	0
48	Tool nose radius (nose R) of the tool used when chamfering in the cutting-off process 	0.0075	0.2
49	Number of final depth of out in threading	1	1
50	Unused (Don't change.)	0	0
51	Unused	0	0

Real Value Parameters

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
52	Indentation depth (radius value) to be finished in the finishing process. A shallow indentation smaller than a set value is finished with a finishing tool. 	0.02	0.5
53	Unused	0	0
54	Unused	0	0
55	Stepwise move is output when there is a move amount smaller than a set value (both in longitudinal and a diametrical directions), in roughing. Note) The same applies when a move amount is less than nose R, even if this is 0.	0	0
56	Tool nose R when a special tool is selected.	0.015	0.4
57	Roughing allowance when both roughing and finishing are performed with an OD roughing tool (when OD and end face roughness exceeds a set value for the parameter 0032). Finishing is performed with the same tool after roughing with the set value left.	0.012	0.3
58	Roughing allowance when both roughing and finishing are performed with an ID roughing tool (when ID roughness exceeds a set value for the parameter 0032). Finishing is performed with the same tool after roughing with the set value left.	0.012	0.3
59	Amount to be added to a machining depth auto-matically determined in spot drilling.	0.04	1
60	Projection amount from the rear end face of a blank in drilling 	0.08	2
61	Coefficient which determines δ_1 in threading $\frac{\text{Lead} \times \text{Spindle speed}}{1,800} \times \text{set value} = \delta_1$ 	5	5
62	Coefficient which determines δ_2 in threading $\frac{\text{Lead} \times \text{Spindle speed}}{1,800} \times \text{set value} = \delta_2$ 	1.2	1.2
63	Coefficient which determines the 1st depth of cut for thread (radius value). Set Value $\times \sqrt{\text{Pitch Entered}} = 1\text{st Depth of Cut (Radius Value)}$ When entering data with a minus sign, the first cutting depth regarding the specific value as a radius value is output.	0.04	0.225
64	End face removal amount value of the blank shape displayed on the NC view screen	0.1	2
65	OD value of the blank shape displayed on the NC view Screen	4.0	100
66	Length value of the blank shape displayed on the NC view screen	4.0	100
67	Turret index time (sec.)	0.5	0.5
68	Z-axis rapid traverse rate (m/min)	40.0	40.0
69	X-axis rapid traverse race (m/min)	40.0	40.0
70	OD tool change position in the X direction 	ST200 10.0 ST250 10.0	ST200 250.0 ST250 250.0

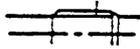
Real Value Parameters

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
71	OD tool change position in the Z direction 	ST200 6.0 ST250 8.0	ST200 150.0 ST250 200.0
72	ID tool change position in the X direction 	ST200 8.8 ST250 10.0	ST200 220.0 ST250 250.0
73	ID tool change position in the Z direction 	ST200 3.0 ST250 4.0	ST200 75.0 ST250 100.0
74	Output format of turret indexing position 0 : Output with the value of real value parameter (0070, 0071, 0072, 0073) 1 : Output with the 2nd reference point (G30 U0 W0_)	1	1
75	Drill cycle of rotating tool (used for display of cycle in animation) (For other models) 1 : Drill cycle 2 0 : Drill cycle 3	0	0
76	Unused	0	0
77	For other machines (Don't change.)	0.02	0.5
78	Length added to approach of the chamfering part Tool nose radius R selected automatically + setting value = Approach length  <set value> 200.0 or more : The position where Tool nose R × 2 parts direction of X is approached.	0.08	2.0
79	Coefficient which determines a feed rate in finishing. Feed Rate = $\sqrt{8 \times (\text{Nose R}) \times \text{Roughness}} \times \text{Set Value}$ Note) Roughness (METRIC) $\sqrt{50}$: 0.05 $\sqrt{25}$: 0.025 $\sqrt{12}$: 0.012 $\sqrt{6}$: 0.006 Roughness (INCH) $\sqrt{50}$: 0.001 $\sqrt{25}$: 0.005 $\sqrt{12}$: 0.0002 $\sqrt{6}$: 0.0001	0.8	0.8
80	Limit of rotating speed of the turning spindle (Chuck work)	ST200 5000 ST250 4200	ST200 5000 ST250 4200
81	Limit of rotating speed of the turning spindle (Center work)	ST200 5000 ST250 4200	ST200 5000 ST250 4200
82	Limit of rotating speed of the turning spindle (Bar work)	1500	1500
83	Blank OD which determines a depth of cut in OD roughing. When the blank OD is smaller then a set value, it results in "depth of cut in the cutting condition file × set value for the parameter 0084".	1.125	30
84	Coefficient which determines a depth of cut in OD roughing. When a blank OD is smaller than a set value for the parameter 0083, it results in "depth of cut in the cutting condition file × set value".	0.7	0.7
85	Coefficient which determines a cutting speed for the OD roughing and cutting-off of a hexagonal bar. The cutting speed is "cutting speed for OD roughing and cutting off in the cutting condition file × set value". 	0.8	0.8

Real Value Parameters

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
86	Coefficient which determines a feed rate for the OD roughing and cutting-off of a hexagonal bar. The feed rate is "feed rate for OD roughing and cutting-off in the cutting condition file × set value". 	0.8	0.8
87	Coefficient which determines a depth of cut for OD roughing of a hexagonal bar. The depth of cut is "depth of cut for OD roughing in the cutting condition file × set value". 	0.8	0.8
88	Factor which determines a cutting depth in grooving. Note) Ineffective when 0. Set value × Tool width = Cutting depth Ineffective at roughness $\frac{50}{\sqrt{}}$.	0	0
89	Coefficient which determines a cutting width in grooving. Set Value × Tool Width = cutting Width	0.8	0.8
90	Setting of dwell at the groove bottom in grooving (seconds)	ST200 0.3 ST250 0.5	ST200 0.3 ST250 0.5
91	Coefficient which determines a total depth of cut in threading. (Set Value × Pitch) - Final Depth of Cut (0092 Set Value/2) = Total Depth of Cut (Radius Value)	0.65	0.65
92	Final depth of cut in threading (diameter value)	0.002	0.1
93	Coefficient which determines number of cuts in threading. 0.5 ; A half number of cuts of automatic program.	1.0	1.0
94	Selection of feeding when the bar stopper is used. 0 : Feed per revolution (G99), r.p.m. is stored in the cutting condition file (for weight bar feeder) (Ex.) 2000 : Specifies feed per minute (G98) -1 : When the super bar feed (BS65) is used	-1	-1
95	Dwell setting when the chuck is opened with the bar stopper used (seconds).	3	3
96	Dwell setting when no workpiece is detected with the bar stopper used (seconds).	0.5	0.5
97	Dwell setting when a process is completed (M01) with the bar stopper used (seconds).	0.5	0.5
98	Dwell setting when chuck is closed with the bar stopper used (seconds).	3	3
99	Maximum pitch for threading method 1 (forward threading). When lower than a set value, threads are cut in the method 1. Method 1 	0.08	2
100	Maximum pitch for threading method 2 (thread angle cutting). When larger than a set value, the method 3 (zigzag type) is employed. Method 2  Method 3 	0.15	4

Real Value Parameters

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
101	Tool diameter which determines a feed rate and a depth of cut in ID roughing. When the tool diameter is smaller than a set value, it results in "feed rate and depth of cut in the cutting condition file \times set value in 0102".	1	25
102	Coefficient which determines a feed rate and a depth of cut in ID roughing. When the tool diameter is smaller than a set value in 0101, it results in "feed rate and depth of cut in the cutting condition file \times set value".	0.7	0.7
103	User setting for the bar stopper process 0 : Determines by setting of the real value parameter 0094. 5 : Outputs the NC data set in 2022 through 2026 of the character parameter 2.	0	0
104	Unused	0	0
105	Unused	0	0
106	Dwell at the bottom in tapping (seconds) 	0.5	0.5
107	Coefficient of feed rate at cutting in end milling process with a rotating tool (C-axis) Set value \times Feed rate entered = Feed rate at cutting (Optional)	0.3	0.3
108	The first cutting amount of radial direction at roughing end mill of rotating tool. Setting value \times Diameter of end mill = The first cutting amount of radial direction	0.7	0.7
109	On and after the second cutting amount of radial direction at roughing end mill of rotating tool. Setting value \times Diameter of end mill = On and after the second cutting amount of radial direction	0.7	0.7
110	Coefficient of cutting amount at a time in end milling of rotating tool. Setting value \times Diameter of end mill = Cutting amount at a time of depth direction	0.6	0.6
111	Unused	0	0
112	Minimum value of X minus direction when processing of automatic programming operation of rotating tool. Setting value \leq Output the coordinate X	-5.1	-130.0
113	For other machines (Don't change.)	0	0
114	Feed axis when cutting axis 3 by end milling of rotating tool. 0 = X-axis 1 = Y-axis	0	0
115	Finishing allowance of side facing or key way by end milling of rotating tool.	0.02	0.5
116	Machining sequence (when equally spaced designation) when machining with both rough and finish by end milling of rotating tool 0 : Perform finishing after completion of roughing. 1 : Perform roughing and finishing at every pattern.	0	0
117	Feedrate (mm/min.) to cutting point at side facing at side facing and one side R key way cutting by end milling of rotating tool.	80	2000
118	Connecting time of C-axis (second)	5.0	5.0
119	Disconnecting time of C-axis (second)	3.0	3.0

Real Value Parameters

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
120	Connecting time of rotating tool (second)	3.0	3.0
121	Disconnecting time of rotating tool (second)	3.0	3.0
122	For other machines (Don't change.)	0	0
123	Depth of cut for the first tool radius direction at the finishing operation by a rotating tool end milling. Setting value + End mill diameter = Depth of cut for the first tool radius direction	0.7	0.7
124	Initial value of "Feed method" of rotating tool tap.	1	1
125	Unused	0	0
126	A coefficient for cutting feed at 2 or 4 of "Feed method" of rotating tool tap Cutting feed = Feed per minute × Setting value	0.95	0.95
127	A coefficient for retracting feed at 3 or 4 of "Feed method" of rotating tool tap Retracting feed = Feed per min. × Setting value	1.05	1.05

<METRIC>

Real Number		
No.	Param.	Explanation
14	10	Ratio D/L of diametrical direction (radius value) and length for end facing.
15	0.3	Single wall thickness removal amount when only OD and ID finishings are performed without OD and ID roughing.
16	0.3	Removal amount when only end face finishing is performed without end face roughing.
17	0	Unused
18	0	Cutting amount at one time when cut off process and step feed machining.
19	0.5	Returning amount at cut off process and step feed machining.
20	1	Determination of a sequence number outputting method.
21	0	Coefficient of grooving by three passes.

Real	Char	Chr	Bit	Int				X	
RealNo.	Alph.P.1	Alph.P.2	BitPara.	Int.No.				End	

3. Alphabet Parameters

Format Description of Set Values for 0 ~ 9, 47, 48, 64 ~ 69, 82, 88 and 89

Example : X-7.3 where ; X : Address

- : 0 at the beginning can be omitted.

7 : Number of digits

. : A decimal point can be input.

3 : Number of digits

Alphabet Parameters 1

No.	Description	Set Value	
		(INCH)	(MM)
0	Program No. address and number of digits	O-4	O-4
1	Sequence No. address and number of digits	N-4	N-4
2	Address in the longitudinal direction and number of digits	Z-7.4	Z-7.3
3	Address in the diametrical direction and number of digits	X-7.4	X-7.3
4	Spindle speed, address for constant surface speed and number of digits	S-4	S-4
5	Feed address and number of digits	F-6.4	F-6.3
6	Inch thread feed address and number of digits	E-8.4	E-8.4
7	Tool selection address and number of digits	T-4	T-4
8	Program No., sequence No. specification address and number of digits	P-4	P-4
9	Dwell address and number of digits	P-7.4	P-7.3
10	G code for rapid traverse	G00	G00
11	G code linear feed	G01	G01
12	G code for circular feed (clockwise)	G02	G02
13	G code for circular feed (counterclockwise)	G03	G03
14	G code for dwell operation	G04	G04
15	G code for threading	G32	G32
16	G code for threading cycle	G92	G92
17	G code for specifying tool nose radius compensation left	G141	G141
18	G code for specifying tool nose radius compensation right	G142	G142
19	G code for automatic zero return	G28	G28
20	G code for programming of absolute zero point and maximum spindle speed setting	G50	G50
21	G code for constant surface speed control	G96	G96
22	G code for spindle speed specification	G97	G97
23	G code for feed per minute	G98	G98
24	G code for feed per revolution	G99	G99
25	G code for OD/ID groove width offset	G152	G152
26	G code for groove width offset cancel	G150	G150
27	M code for program stop	M00	M00

Alphabet Parameters 1

No.	Description	Set Value	
		(INCH)	(MM)
28	M code for optional stop	M01	M01
29	M code for program end & rewind	M30	M30
30	M code for spindle forward start	M03	M03
31	M code for spindle reverse start	M04	M04
32	M code for spindle stop	M05	M05
33	M code for coolant start	M08	M08
34	M code for coolant stop	M09	M09
35	M code for enabling thread chamfering	M23	M23
36	M code for disabling thread chamfering	M24	M24
37	M code for tail spindle forward	M25	M25
38	M code for tail spindle retract	M26	M26
39	M code for no workpiece detection	M31	M31
40	M code for spindle range 1 selection	M40	M40
41	M code for spindle range 2 selection	M41	M41
42	M code for spindle range 3 selection		
43	G code for end face groove width offset	G151	G151
44	M code for chuck close	M68	M68
45	M code for chuck open	M69	M69
46	M code for sequence No. call	M99	M99
47	I code	I-7.4	I-7.3
48	K code	K-7.4	K-7.3
49	M code for starting forward rotation of rotating tool spindle	M13	M13
50	M code for starting reverse rotation of rotating tool spindle	M14	M14
51	M code for stopping of rotating tool spindle	M15	M15
52	Unused	M18	M18
53	Unused	M19	M19
54	Unused	M400	M400
55	Unused	M401	M401
56	G code for tool radius compensation cancel	G40	G40
57	G code for tool radius compensation left	G41	G41
58	G code for tool radius compensation right	G42	G42
59	G code for X Y plane designation	G17	G17
60	G code for X Z plane designation	G18	G18
61	G code for Y Z plane designation	G19	G19
62	M code for rotating tool connection	M44	M44
63	M code for rotating tool connection cancel	M45	M45
64	Address and number of digits for front/rear direction	Y-7.4	Y-7.3

Alphabet Parameters 1

No.	Description	Set Value	
		(INCH)	(MM)
65	Address and number of digits for rotating direction (absolute)	C-7.4	C-7.3
66	Address and number of digits for rotating direction (increment)	H-7.4	H-7.3
67	Address and number of digits for R point coordinate value in drilling canned cycle of C-axis	R-7.4	R-7.3
68	Address and number of digits for dwell time at the bottom of hole in drilling canned cycle of C-axis	P-7.4	P-7.3
69	Address and number of digits for cutting amount specification in drilling canned cycle of C-axis	Q-7.4	Q-7.3
70	Address and number of digits for M code for 5° indexing	M-3	M-3
71	G code for cancelling drilling canned cycle of C-axis	G80	G80
72	G code for Z-direction drill cycle in drilling canned cycle of C-axis	G83	G83
73	G code for tapping cycle in drilling canned cycle of C-axis	G84	G84
74	G code for X-direction boring cycle in drilling canned cycle of C-axis	G85	G85
75	Unused		
76	Unused		
77	G code for X-direction boring cycle in drilling canned cycle of C-axis	G89	G89
78	G code for initial point return command in drilling canned cycle of C-axis	G198	G198
79	G code for R point return command in drilling canned cycle of C-axis	G199	G199
80	G code for drilling cycle in drilling canned cycle of C-axis	G82	G82
81	G code for Z-direction drill cycle in drilling canned cycle of C-axis	G831	G831
82	Feed per minute address and number of digits	F-4.1	F-4
83	G code for automatic tool nose R compensation effective	G143	G143
84	G code for tool radius compensation ineffective	G144	G144
85	G code for tool radius compensation effective	G145	G145
86	G code for pole coordinate interpolation mode effective	G121	G121
87	G code for pole coordinate interpolation mode ineffective	G120	G120
88	J code	J-7.4	J-7.3
89	Feed per minute address and number of digits	E-4.1	E-4
90	G-code for direct tapping cycle in drilling canned cycle of C-axis.	G842	G842
91	G-code for reverse direct tapping cycle in drilling canned cycle of C-axis.	G843	G843
92	G-code for reverse tapping cycle in drilling canned cycle of C-axis.	G841	G841
93	G code for X-direction boring cycle in drilling canned cycle of C-axis	G861	G861
94	Cylinder interpolation mode Enabled G code	G271	G271
95	Cylinder interpolation mode Disabled G code	G272	G272
96	Unused	G140	G140
97	Unused		

Alphabet Parameters 1

No.	Description	Set Value	
		(INCH)	(MM)
98	Unused		
99	Unused		
100	Unused		
101 150	Unused		
151	1st (F1 key) material name	#1045 ST	#1045 ST
152	2nd (F2 key) material name	#4140 ST	#4140 ST
153	3rd (F3 key) material name	#6061 AL	#6061 AL
154	4th (F4 key) material name	#30 C. I.	#30 C. I.
155	5th (F5.key) material name	#304 ST	#304 ST
156	6th (F1 key) material name	C903 BR.	C903 BR.
157	7th (F2 key) material name	M2-TLSTL	M2-TLSTL
158	8th (F3 key) material name	ADD-1	ADD-1
159	9th (F4 key) material name	ADD-2	ADD-2

Alphabet Parameters 2

No.	Description
2000	Unused
2001	Unused
2002	NC data pattern of a beginning portion in case of bar work(chuck work)
2003	NC data pattern of a beginning portion in case of chuck work (without robot)
2004	NC data pattern of the beginning portion of each process
2005	NC data pattern of the ending portion of each process
2006	NC data pattern of an ending portion in case of chuck work (without robot)
2007	NC data pattern of the beginning portion in case of center work (without robot) Note) Change a value of G50Sxxxx, depending on the center used.
2008	NC data pattern of an ending portion in case of center work (without robot)
2009	NC data pattern of the beginning portion of a cutting-off process in case of bar work (chuck work) (without parts catcher)
2010	NC data pattern of an ending portion in case of bar work (chuck work) (without parts catcher)
2011	NC data pattern of a beginning portion in case of bar work (center work)
2012	NC data pattern of an ending portion in case of bar work (center work) (without parts catcher)
2013	NC data pattern of a beginning portion in case of center work (without robot)
2014	NC data pattern of an ending portion in case of chuck work (with robot)
2015	NC data pattern of the beginning portion of a cutting-off process in case of bar work (chuck work) (with parts catcher)
2016	NC data pattern of an ending portion in case of bar work (chuck work) (without parts catcher)
2017	NC data pattern of a beginning portion in case of center work (with robot) Note) Change a value of G50Sxxxx, depending on the center used.
2018	NC data pattern of an ending portion in case of center work (with robot)
2019	NC data pattern of the beginning portion of a cutting-off process in case of bar work (center work) (with parts catcher)
2020	NC data pattern of an ending portion in case of bar work (center work) (with parts catcher)
2021	NC data pattern of the beginning portion of a cutting-off process in case of bar work (center work) (without parts catcher)
2022 2026	NC data for the bar stopper in case of bar work (chuck work, center work) (when the real value parameter 0103 is "5")
2027	Unused
2028	Unused
2029	Unused

Alphabet Parameters 2

No.	Description
2030	NC data of a beginning portion of a program with 5° index + rotating tool specification
2031	NC data of a beginning portion of each process of a program with 5° index + rotating tool specification
2032	NC data of an ending portion of each process of a program with 5° index + rotating tool specification
2033	NC data of an ending portion of a program with 5° index + rotating tool specification
2034	Unused
2035	NC data of a beginning portion of a program with C-axis index + rotating tool specification
2036	NC data of a beginning portion of each process of a program with C-axis index + rotating tool specification
2037	NC data of an ending portion of each process of a program with C-axis index + rotating tool specification
2038	NC data of an ending portion of a program with C-axis index + rotating tool specification
2039	Unused
2040	NC data pattern of a beginning portion of each process (Turret index position is output with tool position)
2041	NC data pattern of a beginning portion of a cutting-off process in case of bar work (chuck work) (without parts catcher) (Turret index position is output with tool position)
2042	NC data pattern of a beginning portion of a cutting-off process in case of bar work (chuck work) (with parts catcher) (Turret index position is output with tool position)
2043	NC data pattern of a beginning portion of a cutting-off process in case of bar work (center work) (without parts catcher) (Turret index position is output with tool position)
2044	NC data pattern of a beginning portion of a cutting-off process in case of bar work (center work) (with parts catcher) (Turret index position is output with tool position)
2045	For other machines (Don't change.)
2059	

Details of function (*xx) in Alphabet Parameters

mark	Description	mark	Description	mark	Description
*00	NC data output Start from an automatic program	*01	NC data output of each process	*02	Limit of rotating speed of the turning spindle G50 Sxxxx
*03	Tool change command Txx00				
*06	Spindle gear range output M40,M41 and M42	*07	Spindle speed or constant surface speed G97 Sxxxx or G96 Sxxxx		
*09	Coolant start M08	*10	Return to tool change G00 Xxxxx Zxxxx	*11	Coolant stop M09
				*14	Spindle start M03 or M04
*15	Return to tool replacement G30 W0┘ G30 U0┘ or G00 Zxxxx┘ G00 Xxxxx┘	*16	Queue M code that has been input	*17	Value of *16 plus queue M code of 1
*18	Rapid transverse amount during chuck changeover (Tri-cell)	*19	Cutting feed amount during chuck changeover (Tri-cell)	*20	G136 S1 (double cut) G137 (double feed) G130 S1 (third independent) (Tri-cell)
*21	G136 S2 (double cut) G137 (double feed) G130 S2 (third independent) (Tri-cell)	*22	Rotating spindle 1st group P3 2nd group P4 (Tri-cell)	*23	Rotating spindle start M13 or M14

<METRIC>

Alphabet 1		
No.	Param.	Explanation
0	0-4	Program No. address and number of digits.
1	N-4	Sequence No. address and number of digits.
2	Z-7.3	Address in the longitudinal direction and number of digits.
3	X-7.3	Address in the diametrical direction and number of digits.
4	S-4	Spindle speed, address for constant surface speed and number of digits.
5	F-6.3	Feed address and number of digits.
6	E-8.4	Inch thread feed address and number of digits.
7	T4	Tool selection address and number of digits.

<u>Real</u>	<u>Char</u>	<u>Grp</u>	<u>Bit</u>	<u>Int</u>				X	
RealNo.	Alph.P.1	Alph.P.2	BitPara.	Int.No.				End	

<Common with each machine>

Alphabet 2	
No.	Param.
2002	N01#02;N02G28U0;N03G28W0;N04M01;;
2003	N01#02;N02G28U0;N03G28W0;N04M01;;
2004	*01;*10*06;*03;G143;*28G99*07*09;*00*14
2005	G97*10;M01;;
2006	M09;M05;G28U0W0M40;M30;
2007	N01#02;N02G28U0;N03G28W0;N04M01;;
2008	M09;M05;G28U0;G28W0;M30;
2009	*01;*10*06;*03;G143;*28G99*07*09;*14;

<u>Real</u>	<u>Char</u>	<u>Grp</u>	<u>Bit</u>	<u>Int</u>				X	
RealNo.	Alph.P.1	Alph.P.2	BitPara.	Int.No.				End	

4. Bit Parameters

No.	Description	Standard set Value
0	Unused	0
1	Unused	0
2	Unused	0
3	Unused	0
4	Unused	0
5	Unused	0
6	Unused	0
7	Unused	0
8	Unused	0
9 l 63	Unused	0

Bit Parameter

No.	Param.	Explanation
0	0	Unused
1	0	Unused
2	0	Unused
3	0	Unused
4	0	Unused
5	0	Unused
6	0	Unused
7	0	Unused

Real
RealNo.

Char
Alph.P.1

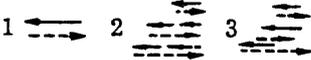
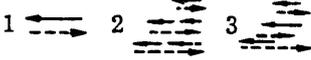
Char
Alph.P.2

Bit
BitPara.

Int
Int.No.

×
End

5. Interger Value Parameters

No.	Description	Standard set Value
0	Unused	0
1	Unused	0
2	Unused	0
3	Unused	0
4	Unused	0
5	Unused	0
6	Spindle maximum speed (min ⁻¹) for spindle rotating range 1	1500
7	Spindle maximum speed (min ⁻¹) for spindle rotating range 2	ST200 5000 ST250 4200
8	Spindle maximum speed (min ⁻¹) for spindle rotating range 3	0
9	Spindle maximum speed (min ⁻¹) for spindle of rotating tool	3000
10	Unused	0
11	Drilllirtg cycle 	1
12	Drilllirtg cycle (Rotating tool) 	1
13 19	Unused	0
20	For other machines	7
21	For other machines	1
22 31	Unused	0

No.	Description	Standard set Value
	<p>Description of Spindle Maximum Speed (min^{-1}) for 7: A maximum spindle speed for a process (spot drilling, drilling, threading, tapping, reaming or endmilling) to be output can be limited by a spindle speed command for 0007 (G97 Sxxxx). (changeable) Example) when threading the inner diameter of a material AL with a cutting speed of 350 m/min and a machining diameter of 20 mm in the cutting condition file, although the maximum speed is $5,570 \text{ min}^{-1}$, it is output "G97 S3600".</p>	
	<p>Description of Drilling Cycle for 11 (when the real value parameter 0044 is "0.5") When set to 2</p> <p style="text-align: center;">When set to 3</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Set value of real value parameter 0042</p> </div> <div style="text-align: center;"> <p>Set value of real value parameter 0042</p> </div> </div> <p style="text-align: center;"> ← - - - - : Rapid traverse ← - - - - : Cutting Feed </p>	

Integer Number		
No.	Param.	Explanation
6	1500	Spindle maximum speed for spindle rotating range 1.(r.p.m.)
7	5000	Spindle maximum speed for spindle rotating range 2.(r.p.m.)
8	0	Spindle maximum speed for spindle rotating range 3.(r.p.m.)
9	3000	Maximum rotation count of rotating tool spindle (r.p.m.)
10	0	Unused
11	1	Drilling cycle
12	1	Drilling cycle (Rotating tool)
13	0	Unused

Real
RealNo.

Char
Alph.P.1

Char
Alph.P.2

Bit
BitPara.

Int
Int.No.

×

End

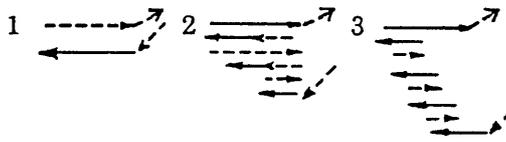
6. Details of Parameter Functions

(Described with standard set values)

Integer Value Parameters

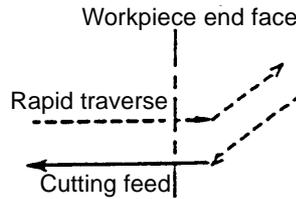
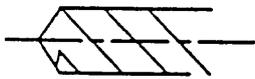
No.	Description	Standard set Value
7	Spindle maximum speed (min^{-1}) of gear range 2 The maximum speed for a process (spot drilling, drilling, threading, tapping, reaming or endmilling) to be output can..be limited by a spindle speed command (G97 Sxxxx).	ST200 5000 ST250 4200

No.	Description	Standard set Value
11	Drilling cycle	1
12	Cycle of drilling, spot facing machining (rotary tool).	1



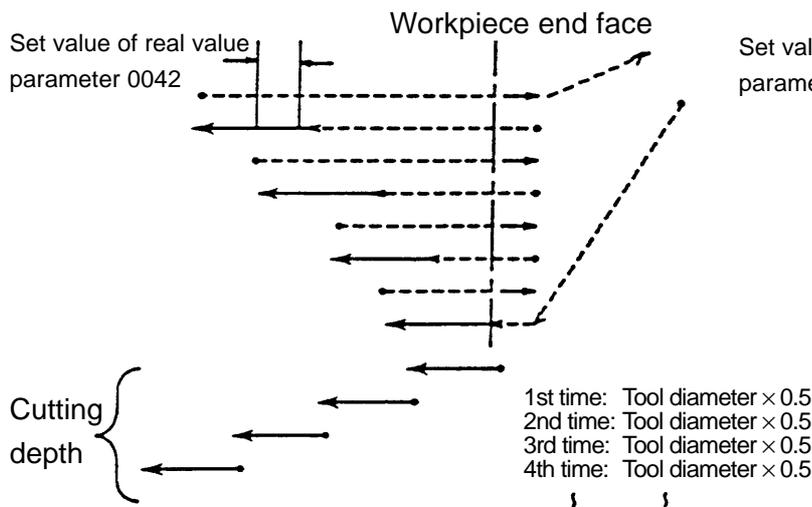
Drilling movement can be changed by setting the integer value parameter No. 11 to 1, 2 and 3 respectively. (The cut depth of cycles 2 and 3 is based on the set value of real value parameter 44.)

When a parameter set value is 1



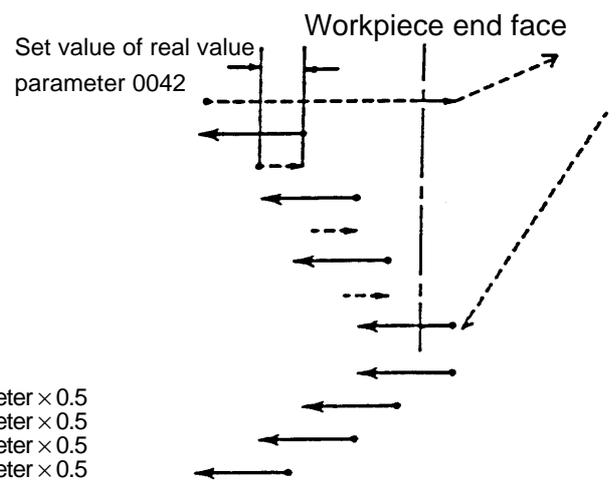
When a parameter set value is 2

When the real value parameter 0044 is "0.5"



When a parameter set value is 3

When the real value parameter 0044 is "0.5"



Example)

(INCH specification)

- For drill diameter of 1 INCH
- 1st depth of cut 0.5 INCH
- 2nd depth of cut 0.5 INCH
- 3rd depth of cut 0.5 INCH
- 4th depth of cut 0.5 INCH

(METRIC specification)

- For drill diameter of 20 MM
- 1st depth of cut 10 MM
- 2nd depth of cut 10 MM
- 3rd depth of cut 10 MM
- 4th depth of cut 10 MM

Every time a tool cuts in, it returns to a position of "workpiece end face + clearance amount" at a rapid traverse rate.

Example)

(INCH specification)

- For drill diameter of 1 INCH
- 1st depth of cut 0.5 INCH
- 2nd depth of cut 0.5 INCH
- 3rd depth of cut 0.5 INCH
- 4th depth of cut 0.5 INCH

(METRIC specification)

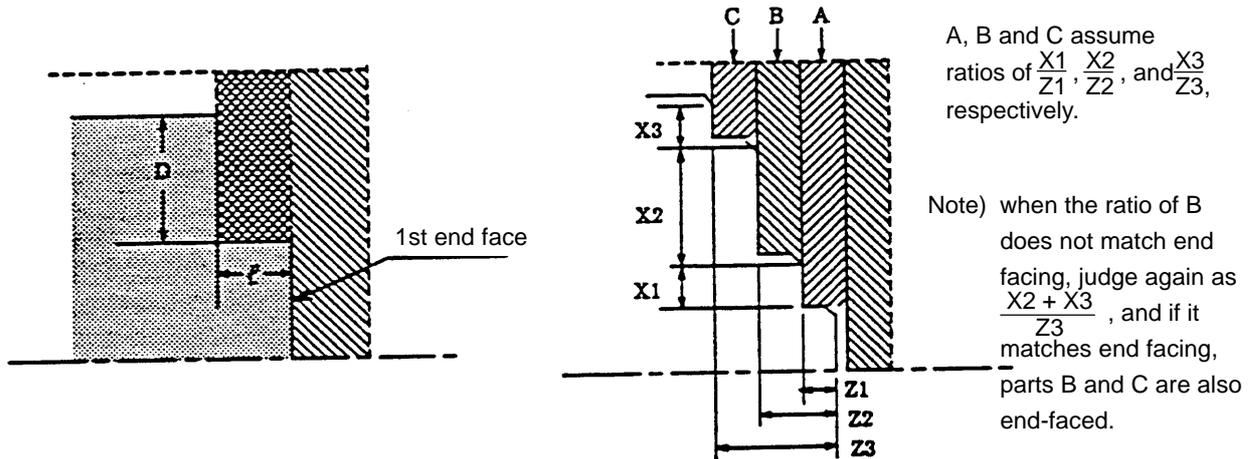
- For drill diameter of 20 MM
- 1st depth of cut 10 MM
- 2nd depth of cut 10 MM
- 3rd depth of cut 10 MM
- 4th depth of cut 10 MM

Every time a tool cuts in, it returns by the set value of real value parameter 0042.

Real Value Parameters

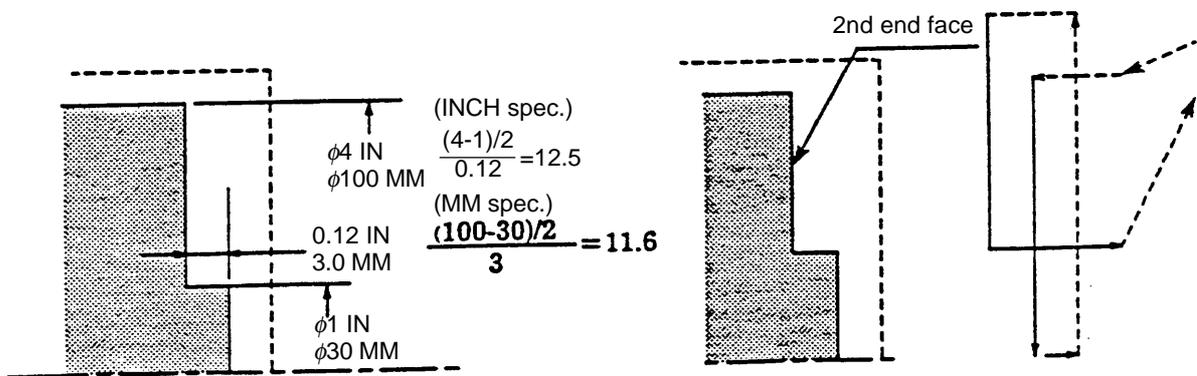
No.	Description	Standard set Value
14	Ratio $\frac{D}{L}$ of diametrical direction (radius value) and length for end facing. End facing is performed when larger than a set value.	10

Whether parts other than the 1st end face is to be cut in a longitudinal or diametrical direction is determined, depending on the set value of the real value parameter No. 14.

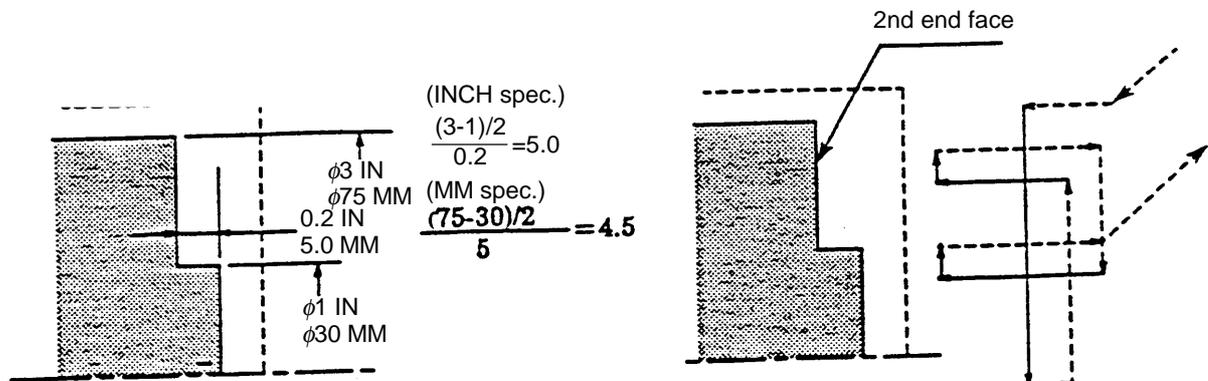


When a parameter set value is 10

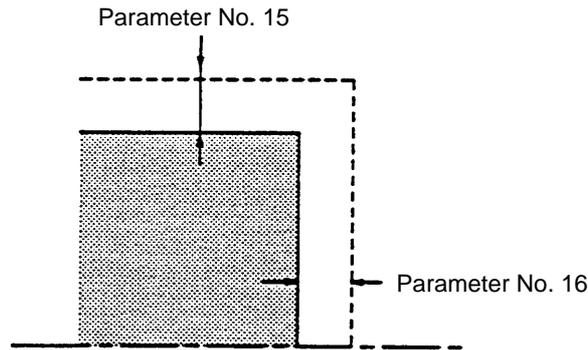
Work which cuts parts other than the 1st end face in the diametrical direction



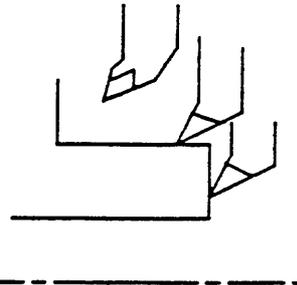
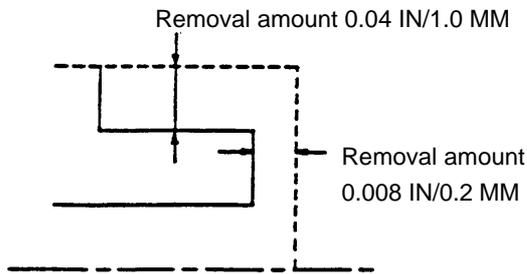
Work which cuts parts other than the 1st end face in the longitudinal direction



No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
15	Single wall thickness removal amount when only OD and ID finishings are performed without OD and ID roughing. Only OD and ID finishings are performed when larger than a finish allowance and smaller than a set value. (except the formed bar)	0.015	0.3
16	Single wall thickness removal amount value when only end face finishing is performed without end face roughing. Only end face finishing is performed when larger than a finish allowance and smaller than a set value. (except the formed bar)	0.015	0.3

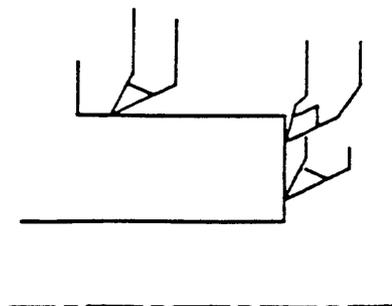
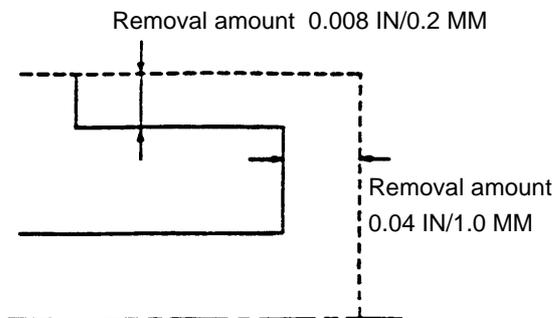


Selecting the tool for the following workpieces with a standard set value



An end face is to be provided with finishing only.

An outer diameter and inner diameter is to be provided with roughing and finishing.



An end face is to be provided with roughing and finishing.

An outer diameter and inner diameter is to be provided with roughing and finishing only.

No.	Description	Standard set Value
20	Determination of a sequence No. outputting method 0 : Outputs up to Nxx98. 1 : Outputs the top of each process only.	1

When 0 is set:

```

}
N100 T0100 M40┘
N101 G96 S500 M08┘
}
N198 X_Z_┘
X_Z_┘
}

```

When 1 is set:

```

}
N100 T0100 M40┘
G96 S500 M08┘
}
M01┘
:
N200 T0200 M40┘
G97 S_ M08┘
}

```

Note) The top sequence number of a program depends on the set data for Alphabet Parameter 2 and 3.

```

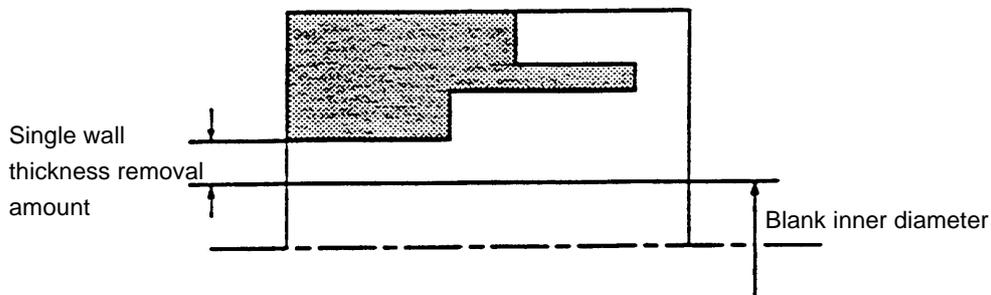
Oxxxx
N01 G50 S3600┘
N02 G28 U0┘
N03 G28 W0┘
N04 M01┘
:

```

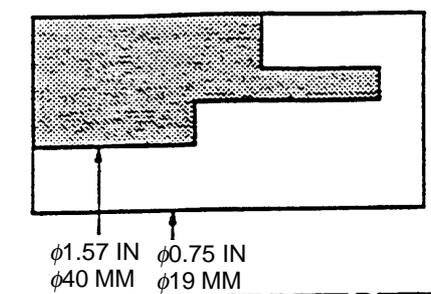
No output is made if Nxx is assumed in Alphabet Parameter 2 and 3.

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
23	Blank ID of a hollow round bar to be drilled. When lower than a set value, drilling is performed.	0.75	20
24	Single wall thickness removal amount of a hollow round bar to be drilled. When exceeding a set value, drilling is performed.	0.4	10

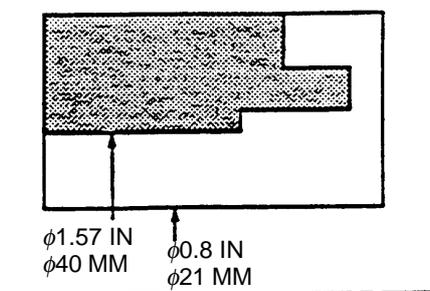
When a blank inner diameter is 0.75 IN/20 MM or less and an inner diameter removal amount is over 0.4 IN/10 MM drilling is performed.



Workpiece with drilling



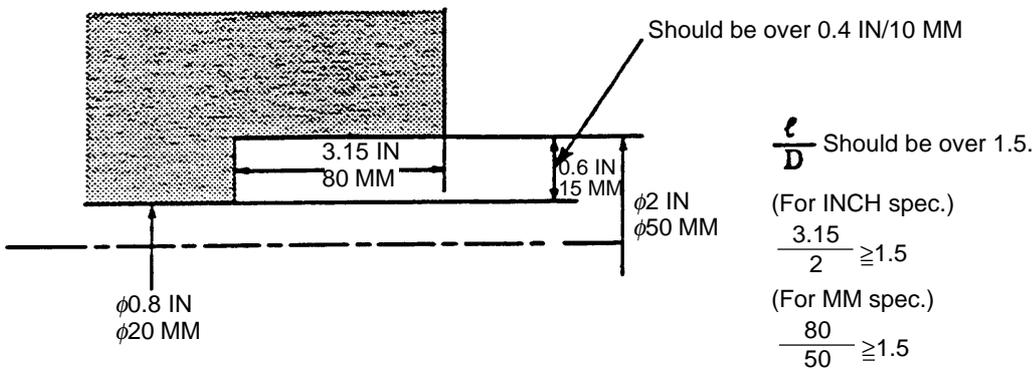
Workpiece without drilling



Drilling is not performed, unless both set values for parameter No. 23 and 24 meet conditions.

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
25	Minimum removal amount when machining with the 2nd drill (radius value). When exceeding a set value, machining is performed with the 2nd drill.	0.4	10
26	Ratio of a longitudinal dimension and diametrical dimension (diameter value) which are to be machined with the 2nd drill. When exceeding a set value, machining is performed with the 2nd drill.	1.5	1.5

Conditions for machining the inner diameter with 2 drills (in ease of standard set value)

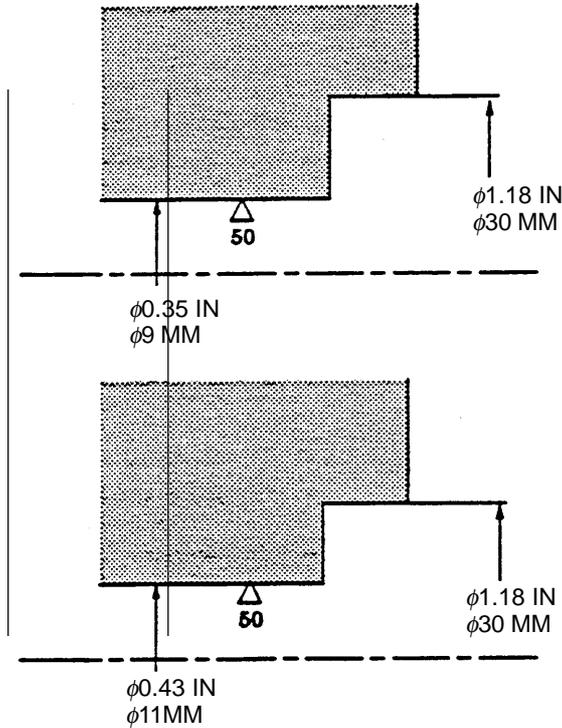


The inner diameter is not machined with 2 drills, unless both set values for the parameter No. 25 and 26 are met.

The 2nd drill is output first.

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
27	Maximum inner diameter when finishing an inner diameter by drilling only. When lower than a set value and a finish symbol is " ∇^{50} ", the inner diameter is finished by drilling.	0.4	10

In case of standard set value



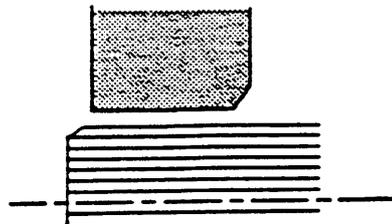
Only drilling for $\phi 0.35$ IN/ $\phi 9$ MM
 $\phi 1.18$ IN/ $\phi 30$ MM to be machined with an ID boring bar

Both $\phi 0.43$ IN/ $\phi 11$ MM and $\phi 1.18$ IN/ $\phi 30$ MM to be machined with an ID boring bar

Note) Only the 1st drill can cope with.

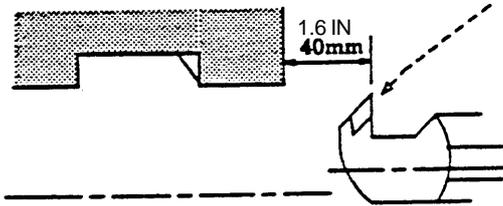
No.	Description	Standard set Value
28	Coefficient which determines a return feed rate in reaming Feed rata in cutting set value = return feed rate	5

When the parameter No. 28 is set to its standard set value "5"



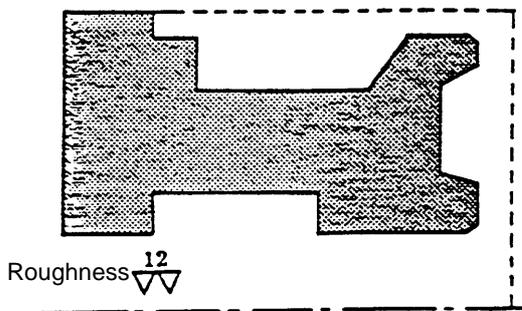
Example) When the feed rate in cutting is 0.006 INCH/rev. 0.2 MM/rev., the return feed rate is $0.006 \times 5 = 0.03$ INCH/rev. $0.2 \times 5 = 1.0$ MM/rev.

No.	Description	Standard set Value
29	Coefficient to determine the approach and retreat of the boring bar which cuts a part left uncut in ID denting. Clearance set in the cutting condition file for ID roughing × set value = distance	8



When the clearance set in the cutting condition file for ID roughing is 0.2 IN/5 MM
 $0.2 \text{ IN} \times 8 = 1.6 \text{ IN}$
 $5 \text{ MM} \times 8 = 40 \text{ MM}$

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
31	Setting method of rough tool for end surface, OD and ID. 0 : One for end surface, OD rough and one for recessing rough, total two. 1 : One for end surface rough, one for OD rough, one for recessing rough total three. 2 : One for end surface rough, one for OD or recessing rough, total two. 3 : One for end surface, OD rough one for recessing rough and finish by grooving tool, total two. 4 : One for end surface rough, one for OD rough, one for recessing rough and finish by grooving tool, total three. 3x : Rough and finish by one grooving tool for end surface recessing. 3xx : Rough and finish by one grooving tool for ID recessing.	0	0

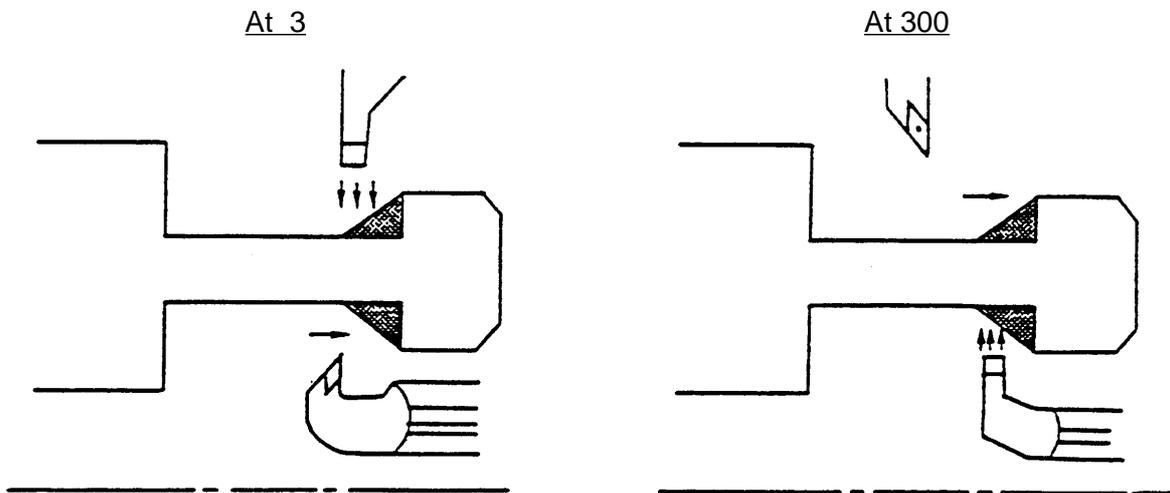


In case of using a tool file which has been set at shipping, NC data is prepared by selecting tools as follows.

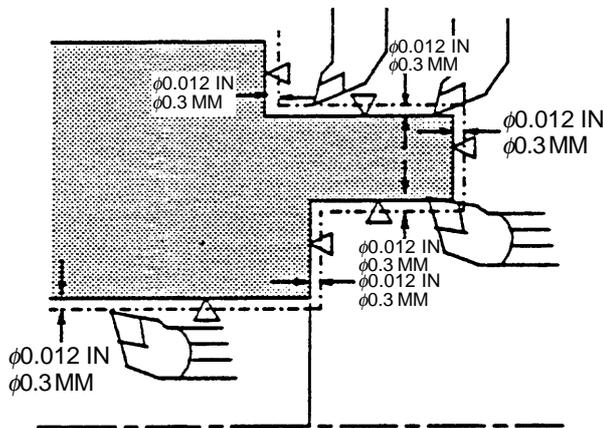
- 0 : Rough facing and OD turning by tool No. 01.
Rough recessing by tool No. 09.
- 1 : Rough facing by tool No. 01.
Rough facing by tool No. 07.
Rough recessing by tool No. 09.
- 2 : Rough facing by tool No. 01.
Rough OD recessing by tool No. 09.
- 3 : Rough facing and OD turning by tool No. 01.
Recessing rough and finish by grooving tool No. 17.
- 4 : Rough facing by tool No. 01.
Rough facing by tool No. 07.
Recessing rough and finish by grooving tool No. 17.

- 30 : Rough and finish surface recessing by grooving tool No. 157.
(When number of tens is 3.)
- 300 : Rough and finish ID recessing by grooving tool No. 48.
(When number of hundreds is 3.)

No.	Description	Standard set Value
33	Output the NC data to machine the remaining area of OD, ID recessing by grooving tool. 3 : Remaining area of OD recessing. 300 : Remaining area of ID recessing.	0



No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
32	Finish symbol when roughing and finishing are to be performed with a roughing tool. When exceeding a set value, roughing and finishing are performed with the same tool.	10 ▽	50 ▽
57	Roughing allowance when roughing and finishing are to be performed with an OD roughing tool (when the roughness of an OD end face exceeds a set value for the parameter No. 0032). Finishing is performed with the same tool after roughing with only a set value left.	0.012	0.3
58	Roughing allowance when roughing and finishing are to be performed with an ID roughing tool (when the roughness of an inner diameter exceeds a set value for the parameter No. 0032). Finishing is performed with the same tool after roughing with only a set value left.	0.012	0.3



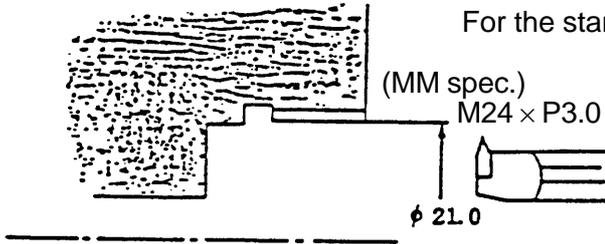
Both roughing and finishing of OD and ID are performed with the same tool.
A finishing allowance is 0.012 IN/0.3 MM

When either an OD end face element or ID element has a symbol smaller than a set value for the parameter No. 0032, finishing is performed with a finishing tool.

- Notes) ○ Both roughing and finishing are performed with a roughing tool only when the roughness of ID and end face elements all exceeds a set value for the parameter No. 0032.
- Both roughing and finishing are performed with a roughing tool only when the roughness of ID elements all exceeds a set value for the parameter No. 0032.
 - When the roughness of OD and end face elements exceeds a set value for the parameter No. 0032, a machining sequence is as follows:
 1. End face roughing
 2. End face finishing
 3. OD roughing
 4. OD finishing

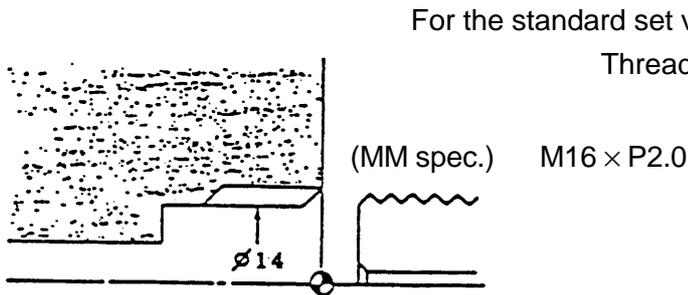
Note) ○ With a formed bar used, when the roughness of OD and end face elements all exceeds a set value for the parameter No. 0032, an end face is roughed without leaving a finish allowance.

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
37	Maximum diameter for tapping (premachined hole diameter for thread + thread pitch). When lower than a set value, tapping is performed.	ST200 0.629	ST200 16
		ST250 0.787	ST250 20
106	Dwell time (seconds) at the thread bottom in tapping.	0.5	0.5



For the standard set value (ST200)

When a sum of premachined hole diameter + pitch is larger than the set value, machining is performed with a threading boring bar.

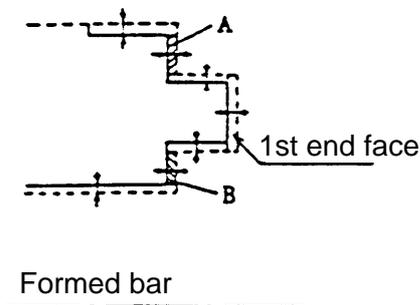


For the standard set value (ST200)

Threading is performed with a tap.

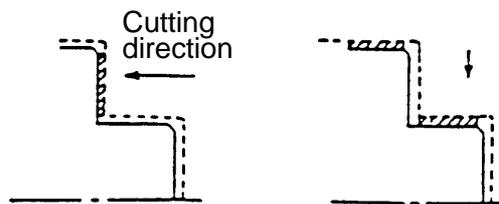
No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
38	Removal amount without roughing 0 : All removed 0.1 or more : No roughing is done when a removal amount is less than a set value. (OD roughing, ID roughing, OD end face roughing, ID end face roughing) Note) Set a value larger than a finish allowance. (when the formed bar is used)	0	0

When the set value is 0.5 and respective removal amounts are 0.5



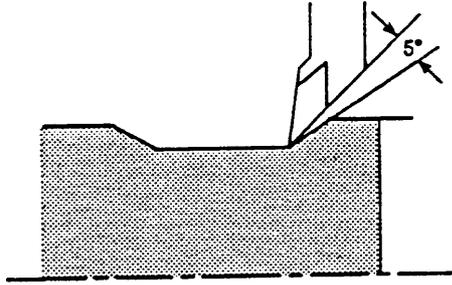
Although the 1st end face is machined, the parts A and B are not machined. However, those parts are machined when they are to be end-faced due to setting of the real value parameter 0041.

That is, no roughing is performed when the removal amount is less than the set value in the same direction as the cutting direction.

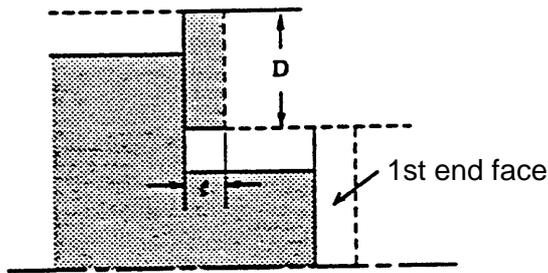


Parts are not roughly cut.

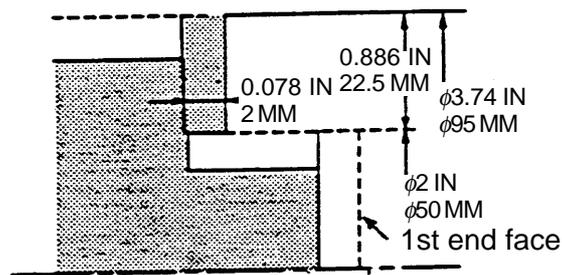
No.	Description	Standard set Value
40	Protective angle to a tool's sub-cutting edge angle	5



No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
41	Ratio $\left(\frac{D}{L}\right)$ of a length and diametrical direction (radius value) when facing a formed bar other than its 1st end face. When exceeding a set value, end facing is performed. (Cutting is performed only once.)	10	10



Cutting other than the 1st end face



(INCH spec.)

$$\frac{0.886}{0.078} \geq 10$$

(MM spec.)

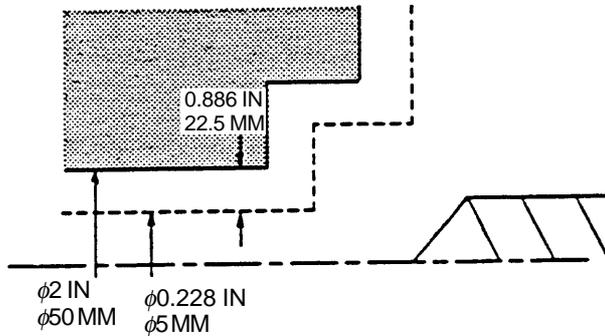
$$\frac{22.5}{2} \geq 10$$

Note) End facing means cutting in an arrow direction.

Note) Since NC data for cutting a specified outer diameter is output in case of end facing, specify larger than an actual workpiece diameter.

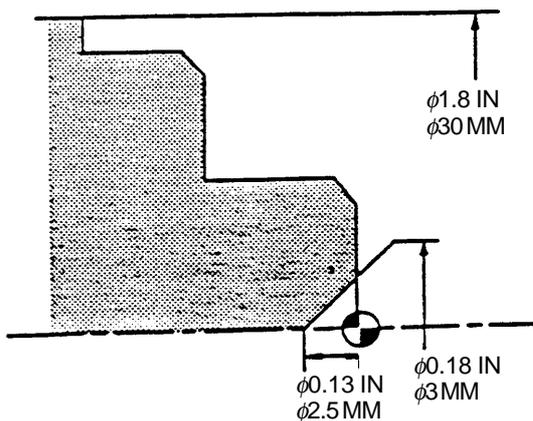
No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
43	Difference between a blank minimum diameter and a finish minimum diameter when drilling a formed bar (radius value). When exceeding a set value , drilling is performed.	0.787	20

When an ID removal is over 0.787 IN / 20 MM for single wall thickness, drilling is performed.



No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
45	Coefficient which determines a grooving tool diameter . Note) 0 is unacceptable. Selects a tool with a maximum diameter registered in the spot drilling tool file within “blank outer diameter × set value”.	0.1	0.1
59	Amount to be added to a machining depth automatically determined in spot drilling	0.04	1.0

Spot drilling tool diameter = Maximum diameter registered in the tool file < Blank OD × set value for the parameter No.45



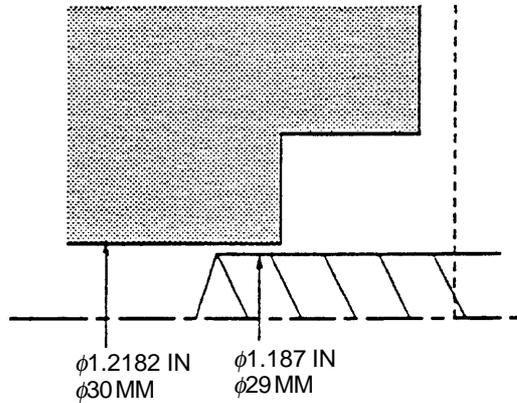
$$\text{Spot drilling depth} = \frac{\text{Tool diameter}}{2} + \text{Set Value for parameter 59}$$

Conditions for spot drilling

1. When Yes is input for an inquiry “centering”
2. When bar work (center work) is selected for “selection of machining type”

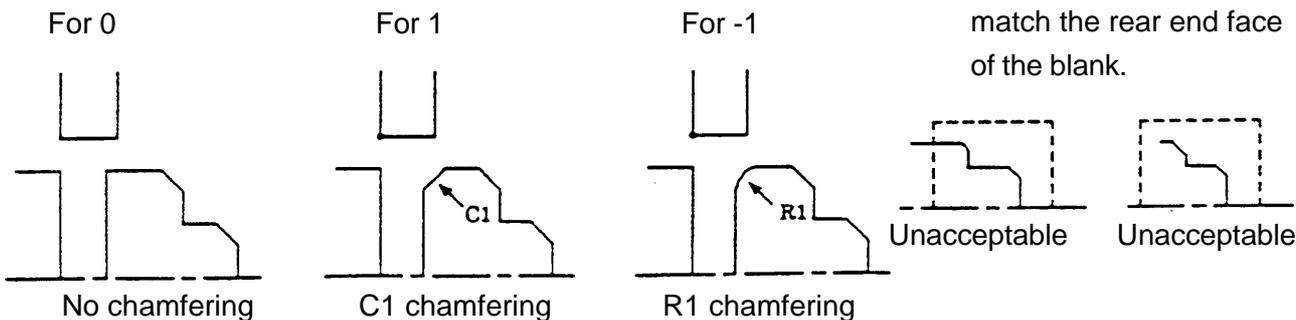
No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
46	Constant which determines a high-speed steel drilling tool diameter (diameter value). Selects a drilling tool of "machining hole diameter-set value". Note) Setting of 0 is unacceptable.	0.0312	1

In the following work, machining is performed with a $\phi 1.187$ IN/ $\phi 29$ MM drill.



No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
47	Setting of chamfering in the cutting-off process 0 : Chamfering is not performed. 0.1 or more : C chamfering with a set value is performed. -0.1 or less : R chamfering with a set value is performed.	0	0
48	Tool nose radius (nose R) of the tool used when chamfering in the cutting-off process	0.0075	0.5

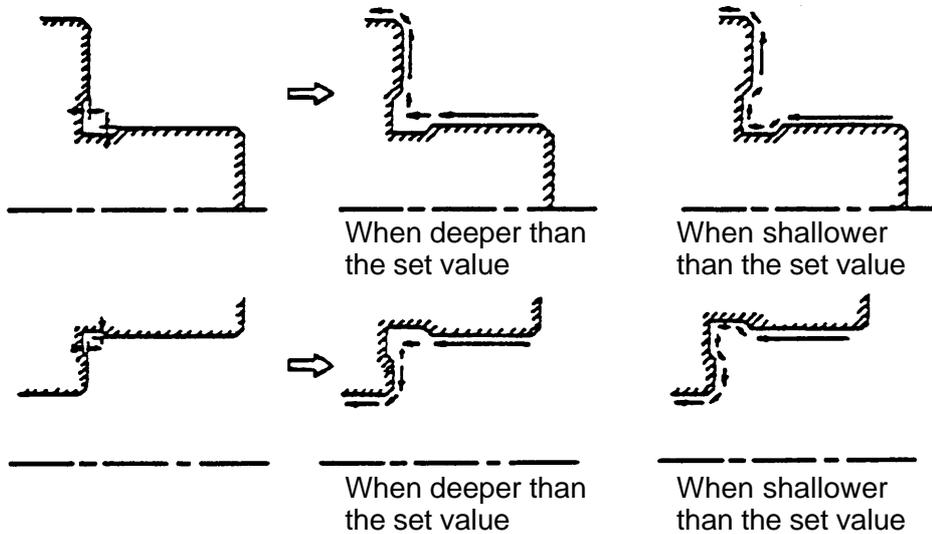
Note) In case of figure input, make a finish shape line match the rear end face of the blank.



Note) ○ When inputting the finish shape, C chamfering and R chamfering are not required to be specified.

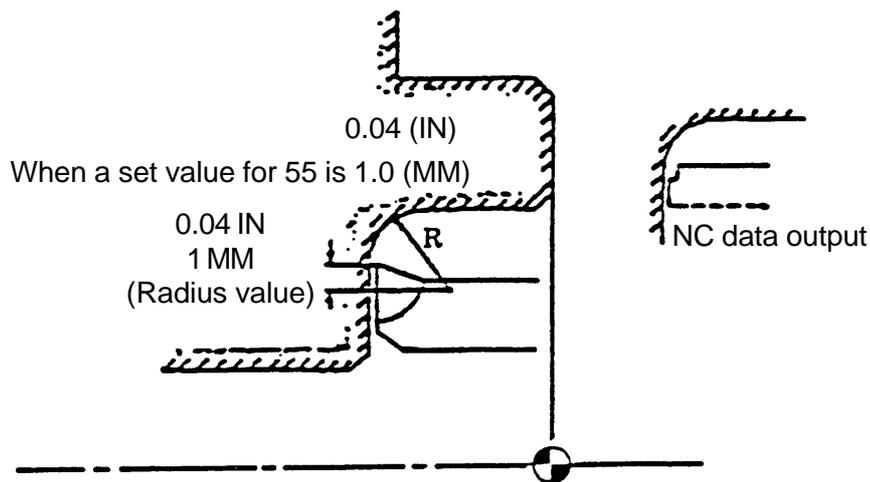
○ For the NC data for chamfering, the program at the tool nose point 3 is output. Tool width compensation G150 and G152 are not used.

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
52	Indentation depth (radius value) finished in the finishing process. A shallow indentation smaller than a set value is finished with a finishing tool.	0.02	0.5

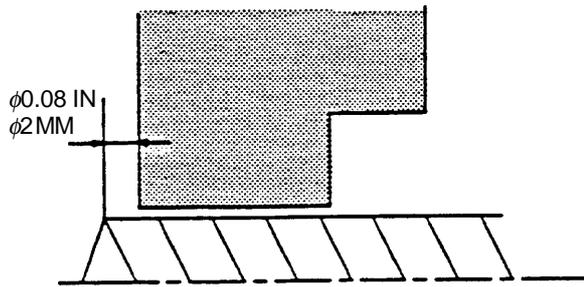


Note) NC data for roughing in a square indentation are not output.

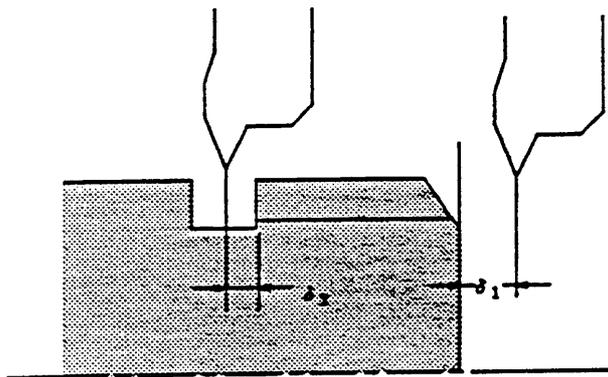
No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
55	Outputs a steplike motion when there is a move amount smaller than a set value (both longitudinal and diametrical directions) in roughing. Note) Even if a set value is 0, the steplike motion is output when the move amount is less than the nose R of the selected tool.	0	0
56	Nose R when a special tool is selected.	0.015	0.4



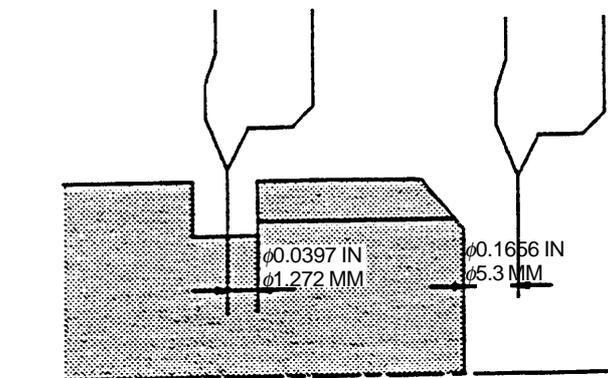
No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
60	Projection amount from a blank's rear end face in drilling	0.08	2



No.	Description	Standard set Value
61	Coefficient which determines δ_1 for threading. $\frac{\text{Lead} \times \text{Spindle Speed}}{1,800} \times \text{Set value} = \delta_1$	5.0
62	Coefficient which determines δ_2 for threading. $\frac{\text{Lead} \times \text{Spindle Speed}}{1,800} \times \text{Set value} = \delta_2$	1.2



When a spindle speed is 954 rpm and a pitch is 16 Top/INCH(0.0625 IN)/2.0 MM



(INCH spec.)

$$\delta_1 = \frac{0.0625 \times 954}{1800} \times 5.0$$

$$= 0.1656 \text{ IN}$$

$$\delta_2 = \frac{0.0625 \times 954}{1800} \times 1.2$$

$$= 0.0397 \text{ IN}$$

(MM spec.)

$$\delta_1 = \frac{2 \times 954}{1800} \times 5.0$$

$$= 5.3$$

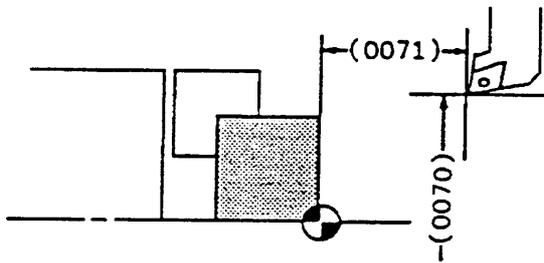
$$\delta_2 = \frac{2 \times 954}{1800} \times 1.2$$

$$= 1.272$$

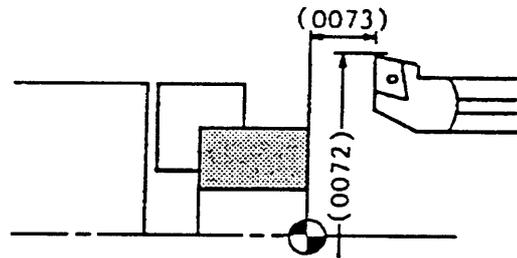
No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
70	OD tool change position in the X direction	ST200 10.0	ST200 250.0
		ST250 10.0	ST250 250.0
71	OD tool change position in the Z direction	ST200 6.0	ST200 150.0
		ST250 8.0	ST250 200.0
72	ID tool change position in the X direction	ST200 8.8	ST200 220.0
		ST250 10.0	ST250 250.0
73	ID tool change position in the Z direction	ST200 3.0	ST200 75.0
		ST250 4.0	ST250 100.0

Tool change positions with standard set values

OD tool change position



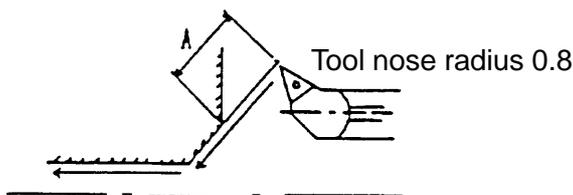
ID tool change position



No.	Description	Standard set Value
78	Length added to approach of the chamfering part Tool nose radius R selected automatically + setting value = Approach length < set value > 200.0 or more : The position where Tool nose $R \times 2$ parts direction of X is approached	2.0

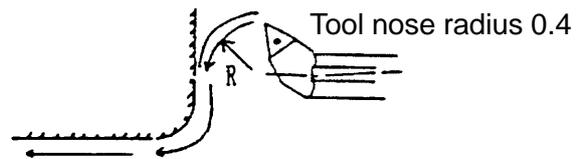
Set value = 2.0 (Less than 99.0)

For chamfer C



The length of A becomes
 $0.8 + 2.0 = 2.8$

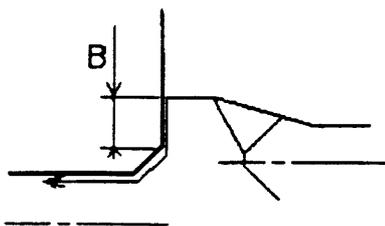
For chamfer R



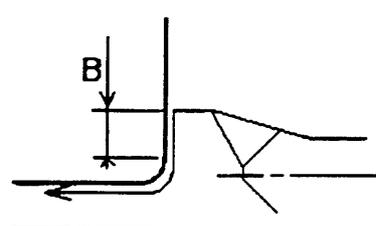
The magnitude of R becomes
 $0.4 + 2.0 = 2.4$

Set value = 200.0 or more

For chamfer C



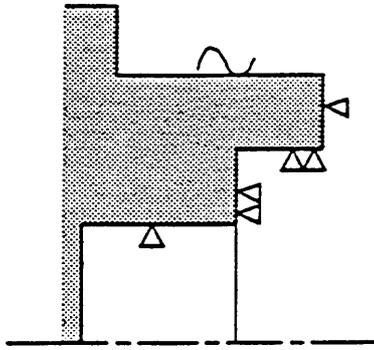
For chamfer R



The length of B becomes tool nose $R \times 2$.

No.	Description	Standard set Value
79	Coefficient which determines a feed rate for finishing. $\text{Feed Rate} = \sqrt{8 \times (\text{Nose R}) \times \text{Roughness} \times \text{Set value}}$	0.8
	(INCH spec.) $\frac{50}{\nabla} : 0.001$ $\frac{25}{\nabla} : 0.0005$ $\frac{12}{\nabla} : 0.0002$ $\frac{6}{\nabla} : 0.0001$	
	(MM spec.) $\frac{50}{\nabla} : 0.05$ $\frac{25}{\nabla} : 0.025$ $\frac{12}{\nabla} : 0.012$ $\frac{6}{\nabla} : 0.0006$	

Finish feed rate by finish symbol (nose R 0.0312 IN)(nose R 0.8 MM)



(INCH spec.)

$$\frac{50}{\nabla} \sqrt{8 \times 0.0312 \times 0.001 \times 0.8} = 0.0126 \text{ IN/rev}$$

$$\frac{25}{\nabla} \sqrt{8 \times 0.0312 \times 0.0005 \times 0.8} = 0.0089 \text{ IN/rev}$$

$$\frac{12}{\nabla} \sqrt{8 \times 0.0312 \times 0.0002 \times 0.8} = 0.0057 \text{ IN/rev}$$

$$\frac{6}{\nabla} \sqrt{8 \times 0.0312 \times 0.0001 \times 0.8} = 0.004 \text{ IN/rev}$$

(MM spec.)

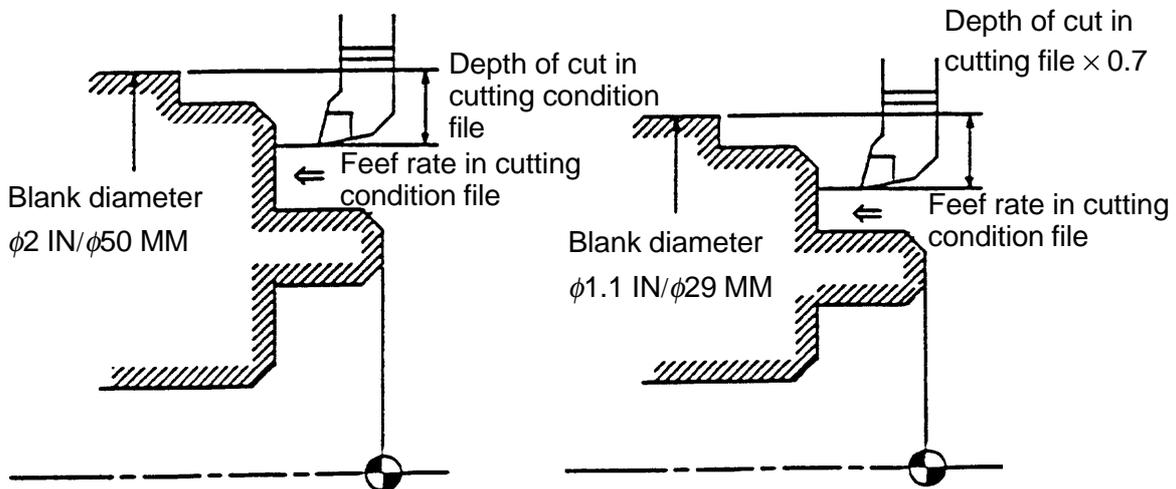
$$\frac{50}{\nabla} \sqrt{8 \times 0.8 \times 0.05 \times 0.8} = 0.45 \text{ MM/rev}$$

$$\frac{25}{\nabla} \sqrt{8 \times 0.8 \times 0.025 \times 0.8} = 0.32 \text{ MM/rev}$$

$$\frac{12}{\nabla} \sqrt{8 \times 0.8 \times 0.012 \times 0.8} = 0.22 \text{ MM/rev}$$

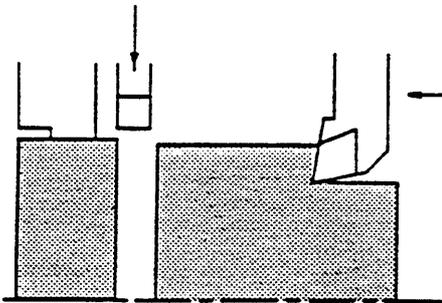
$$\frac{6}{\nabla} \sqrt{8 \times 0.8 \times 0.006 \times 0.8} = 0.15 \text{ MM/rev}$$

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
83	Blank OD which determines a depth of cut for OD roughing. When a blank OD is smaller than a set value, it results in "depth of cut in the cutting condition file \times set value for the parameter 0084".	1.125	30
84	Coefficient which determines a depth of cut for OD roughing. When a blank OD is smaller than a set value for the parameter 0083, it results in "depth of cut in the cutting condition file \times set value".	0.7	0.7



No.	Description	Standard set Value
85	Coefficient which determines a cutting speed for OD roughing/cutting-off of a hexagonal bar. The cutting speed is "cutting speed for OD roughing/cutting-off" in the cutting condition file \times set value.	0.8
86	Coefficient which determines a feed rate for OD roughing/cutting-off of a hexagonal bar. The cutting speed is "feed rate for OD roughing/cutting-off" in the cutting condition file \times set value.	0.8
87	Coefficient which determines a depth of cut for OD roughing a hexagonal bar. The depth of cut is "depth of cut for OD roughing" in the cutting condition file \times set value.	0.8

Depth of cut and feed rate when a hexagonal material #1045 ST



OD roughing

Cutting speed

$$500 \text{ FT/min} \times 0.8 = 400 \text{ FT/min}$$

$$130 \text{ m/min} \times 0.8 = 104 \text{ m/min}$$

Feed rate

$$0.012 \text{ IN/rev} \times 0.8 = 0.0096 \text{ IN/rev}$$

$$0.25 \text{ MM/rev} \times 0.8 = 0.2 \text{ MM/rev}$$

Depth of cut

$$0.1 \text{ IN} \times 0.8 = 0.08 \text{ IN}$$

$$2.5 \text{ MM} \times 0.8 = 2.0 \text{ MM}$$

Cutting-off

Cutting speed

$$330 \text{ FT/min} \times 0.8 = 264 \text{ FT/min}$$

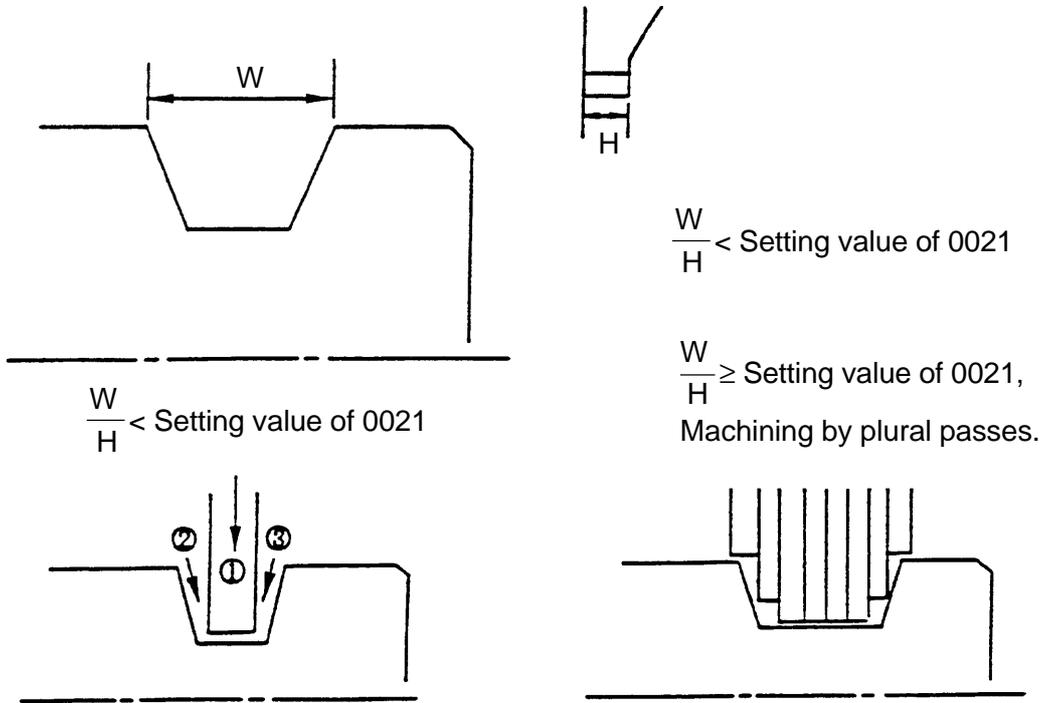
$$100 \text{ m/min} \times 0.8 = 80 \text{ m/min}$$

Feed rate

$$0.004 \text{ IN/rev} \times 0.8 = 0.0032 \text{ IN/rev}$$

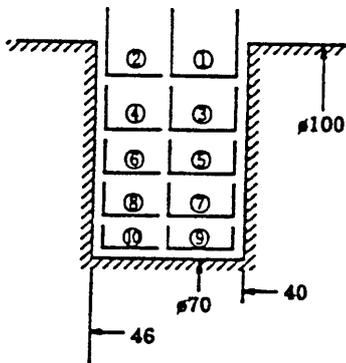
$$0.08 \text{ MM/rev} \times 0.8 = 0.06 \text{ MM/rev}$$

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
21	Coefficient of grooving by three passes. If "groove width/selected tool width" is smaller than setting value, output by the three passes.	0	0



No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
88	Factor which determines a cutting depth for grooving Note) Ineffective when 0. Set value \times Tool Width = Cutting Depth	0	0

Tool positions when grooving with a tool width of 0.125 IN/4 MM



When a set value is 0.8 $0.8 \times 4 \text{ mm} = 3.2 \text{ mm}$

Position ① $100 - (3.2 \times 2) = 93.6$

Position ③ $93.6 - (3.2 \times 2) = 87.2$

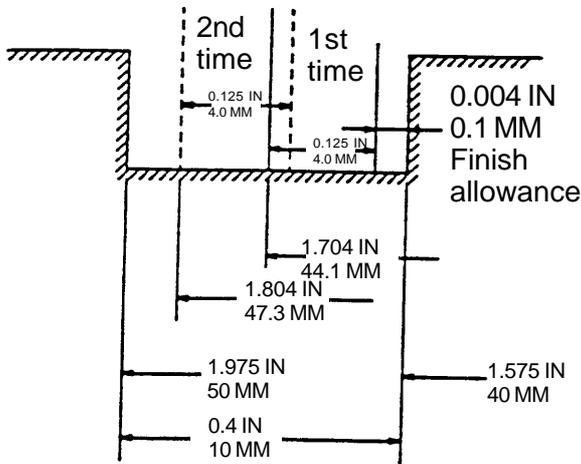
⋮ ⋮ ⋮ ⋮

Use for machining a deep groove.

Note) when a final removal amount is smaller than this cutting depth, it is included in previous cutting.

No.	Description	Standard set Value
89	Coefficient which determines a cutting width in grooving. Set Value \times Tool Width = Cutting Width	0.8

Tool position when grooving with the tool width of 0.125 IN/4 MM



2nd tool position

Set Value \times tool width = cutting width

$$0.8 \times 0.125 \text{ IN} = 0.1 \text{ IN}$$

$$0.8 \times 4 \text{ MM} = 3.2 \text{ MM}$$

$$1.704 \text{ IN} + 0.1 \text{ IN} = 1.804 \text{ IN}$$

$$44.1 \text{ MM} + 3.2 \text{ MM} = 47.3 \text{ MM}$$

No.	Description	Standard set Value
90	Dwell time at the groove bottom in grooving	ST200 0.3 ST250 0.5

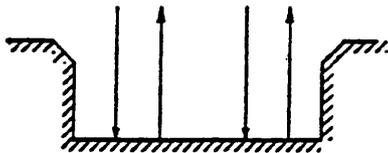
Conditions under which the parameter above becomes valid:

Groove sides should be parallel.

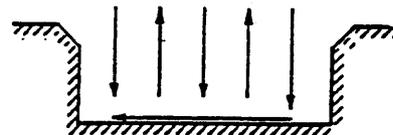
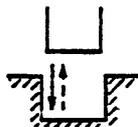
A groove bottom should have no chamfering.

Groove roughness should be $\sqrt[50]{\text{V}}$

When the conditions mentioned on the left are not met, a grooving method is changed.



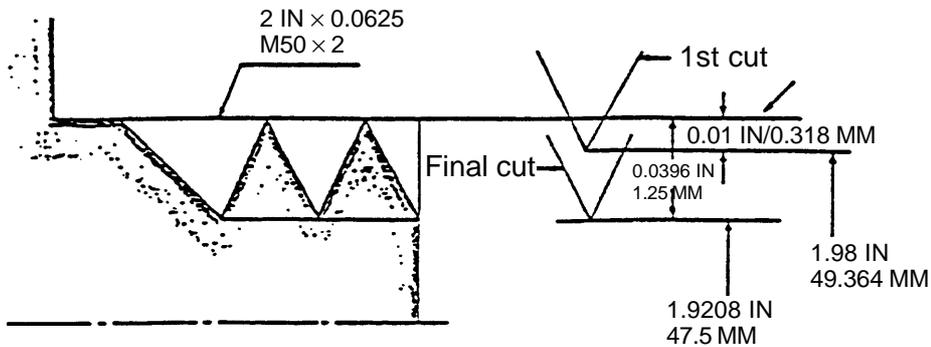
After cutting as far as the groove bottom, the tool stops for a set value time of the parameter 90. Under the conditions above, when no tool with the same width as a groove width has not been registered in the tool file (groove), the groove is machined at one time.



After roughing as far as a position leaving a groove bottom finish allowance intact, the tool cuts the groove bottom by final cutting.

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
63	Coefficient which determines the 1st depth of cut for thread (radius value). Set value $\times \sqrt{\text{Pitch entered}} = 1\text{st depth of cut}$ (Radius value) (Note) If the value is entered with - (minus) mark. The first cutting depth is output using the value as radius value.	0.04	0.225
91	Coefficient which determines a total depth of cut for thread. (Set Value \times Pitch) - Final Depth of Cut (Set Value for 0092/2) = Total Depth of Cut (Radius Value)	0.65	0.65
92	Final depth of cut for thread (diameter value)	0.002	0.1
49	Number of final depth of cut in threading	1.0	1.0
93	Coefficient which determines number of cuts in threading. 0.5 A half number of cuts of automatic program.	1.0	1.0

Cutting the lead of 16 Top INCH (0.0625 IN)/2.0 MM



(INCH spec.)

$$\begin{aligned} \text{1st depth of cut} &= 0.04 \times \sqrt{0.0625} \\ &= 0.01 \end{aligned}$$

$$\begin{aligned} \text{Total depth of cut for thread} &= (0.65 \times 0.0625) - \frac{0.002}{1} \\ &= 0.0396 \end{aligned}$$

(MM spec.)

$$\begin{aligned} \text{1st depth of cut} &= 0.225 \times \sqrt{2.0} \\ &= 0.318 \end{aligned}$$

$$\begin{aligned} \text{Total depth of cut for thread} &= (0.65 \times 2) - \frac{0.1}{2} \\ &= 1.25 \end{aligned}$$

No.	Description	Standard set Value
94	Selection of feeding when the bar stopper is used. 0 : Feed per revolution (G99), r.p.m. is stored in the cutting condition file (for weight bar feeder) (Ex.)2000: Specifies feed per minute (G98) -1: When the super bar feed (BS65) is used (Default value is for super bar feed (BS65).)	-1
95	Dwell setting at chuck open time when the bar stopper is used (sec.).	3
96	Dwell setting upon detection of no bar when the bar stopper is used (sec.).	0.5
97	Dwell setting at an end of process (M01) when the bar stopper is used.	0.5
98	Dwell setting at chuck close time when the bar stopper is used (sec.).	3

NC Data when 94 is "-1"
(when the super bar feed is used)

(Ex.)

N1000 T1000 M40]
G97 S100]
G00 Z120 M03]
X0.0]
G01 Z-98.0 F9.0]
M69]
G04 P3.0]
G01 Z2.0]
M68]
G04 P3.0]
G00 Z10.0]
X220.0]
Z75.0]
M31]
G04 P0.5]
M01]

NC Data when 94 is "0"
(Weight bar feeder)

(Ex.)

N1000 T1000 M40]
G97 S100]
G00 Z120 M03]
X0.0]
G01 Z-98.0 F9.0]
M69]
G04 P3.0]
G01 Z2.0]
M31 (M68)]
G04 P0.5]
M01]
G04 P0.5]
M68]
G04 P3.0]
G00 Z10.0]
X220.0]
Z75.0]
M01]

NC data which feeds a bar
with the spindle rotating

NC Data When 94 is "2000"

(Ex.)

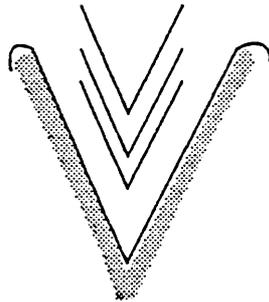
N1000 T1000 M40]
M05]
G00 Z120]
X0.0]
G98 G01 Z-98.0 F2000.0]
M69]
G04 P3.0]
G98 Z2.0]
M31]
G04 P0.5]
M01]
G04 P0.5]
M68]
G04 P3.0]
G00 Z10.0]
X220.0]
Z75.0]
G99]
M01]

NC data which feeds a bar with
the spindle stopped

No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
99	Maximum pitch for a threading method 1 (forward cutting). When lower than a set value, the method 1 is employed.	0.08	2
100	Maximum pitch for a threading method 2 (thread angle cutting). When larger than a set value, a method 3 (zigzag cutting) is employed.	0.15	4

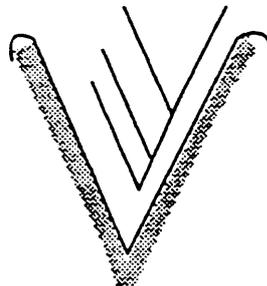
The following cutting method is employed up to a pitch of 0.08 IN/2.0 MM.

Cutting method 1



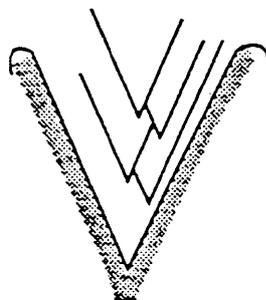
The following cutting method is employed up to a pitch of 0.15 IN/4.0 MM.

Cutting method 2

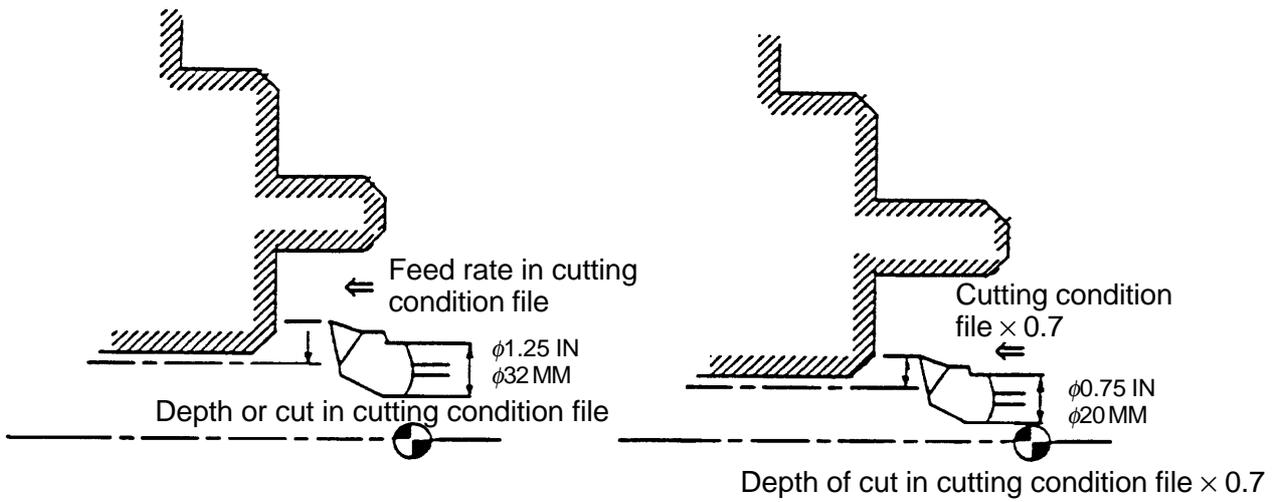


The following cutting method is employed when a pitch is larger than 0.15 IN/4.0 MM.

Cutting method 3



No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
101	Tool diameter which determines a feed rate and depth of cut for ID roughing. When a tool diameter is smaller than a set value, it results in "feed rate/depth of cut in the cutting condition file \times set value for the parameter 0102".	1	25
102	Tool diameter which determines a feed rate/depth of cut for ID roughing. When a tool diameter is smaller than a set value for the parameter 0101, it results in "feed rate/depth of cut in the cutting condition file \times sec value".	0.7	0.7



No.	Description	Standard set Value	
		(INCH spec.)	(MM spec.)
103	User setting for the bar stopper process 0 : Determines by setting of the real value parameter 0094. 5 : Outputs the NC data set in 2022 through 2026 of the character parameter 2.	0	0

When 0 is specified, it is determined by setting of the real value parameter 94.

When 5 is specified and data are set in 2022 through 2026 of the character parameter 2, those set data are output.

(Ex.) Character parameter 2

2022 N1000 T1000; G00 X100.0 Z10.0 M05 ;

2023 Z-55.0;X50.0;G01 G98 X-30.0 F100.0 ;

2024 G04 P3.0 M69 ;

2025 G99 G00 Z0.0 ;

2026 G04 P3.0 M68 ; G00 X100.0 Z10.0 ; X220.0 Z150.0 ; M01 ; ;

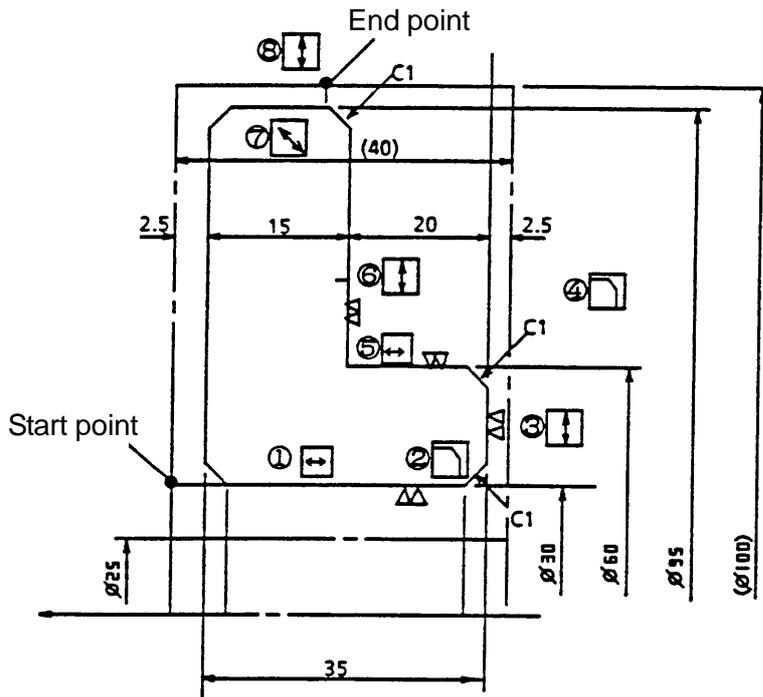
If you set as mentioned above and select the bar work in machining type selection, the NC data above will be output in automatic program creation.

Notes)○Make setting so that each line will absolutely end with “ ; “. When “ ; ” does not exist, no NC data is output.

○If the bar stopper process is executed CUSTOM PROGRAM after automatic program creation, the set program will be assumed, erasing the NC data. When using this parameter, do not execute the bar stopper process in CUSTOM PROGRAM.

2. Input Example of Blank Shape and Final Shape

[Example 1] OD/ID End Facing (METRIC spec.)



1. Blank shape input

MATERIAL : #1045 ST
 SHAPE : BAR W/HOLE
 O.D. : 100
 LENGTH : 40
 I.D. : 25
 FACE REMOVAL : 2.5

2. Final shape input

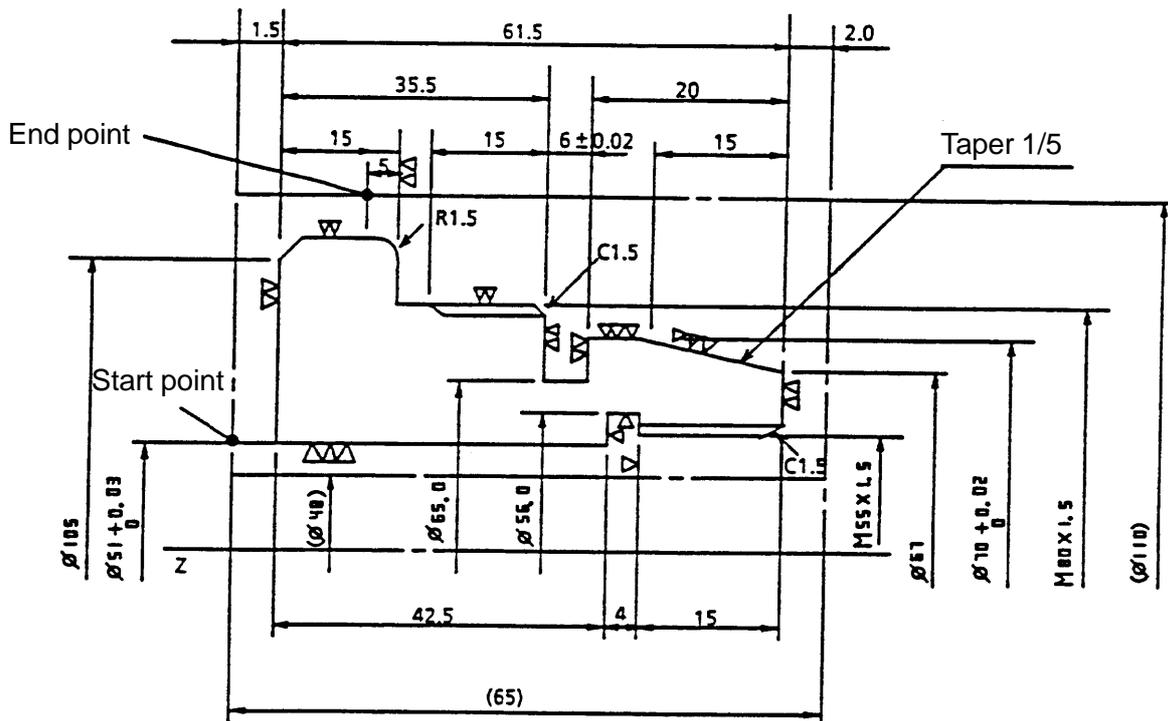
NEW PROGRAM
 START POINT : THRU HOLE
 START PT. X : 30
 START PT. Z : 37.5
 S. FINISH : $\frac{25}{\nabla}$
 END RELIEF : NO
 CENTERING : NO

Symbol Input (The items enclosed by parentheses in the following input display are defaults (only the **INPUT** key to be pressed).)

①	ELEM : \rightarrow	②	ELEM : \lrcorner	③	ELEM : \uparrow	④	ELEM : \lrcorner
	END PT. X : ()		SIZE (C/R) : 1		END PT. X : 60		SIZE (C/R) : 1
	END PT. Z : 0		S. FINISH : ()		END PT. Z : ()		S. FINISH : ()
	S. FINISH : ()				S. FINISH : ()		
	END RELIEF : ()				END RELIEF : ()		
⑤	ELEM : \leftrightarrow	⑥	ELEM : \uparrow	⑦	ELEM : \swarrow	⑧	ELEM : \uparrow
	END PT. X : ()		END PT. X : 93		END PT. X : 95		END PT. X : 100
	END PT. Z : 20		END PT. Z : ()		END PT. Z : 21		END PT. Z : ()
	S. FINISH : ()		S. FINISH : ()		ANGLE : ()		S. FINISH : ()
	END RELIEF : ()		END RELIEF : ()		S. FINISH : ()		END RELIEF : ()

Note) The element \lrcorner cannot be used.

[Example 2] OD Grooving, ID Grooving, OD Right-handed Threading and ID Right-handed Threading (METRIC spec.)



- | | |
|----------------------|-------------------------|
| 1. Blank shape input | 2. Final shape input |
| MATERIAL : #1045 ST | NEW PROGRAM |
| SHAPE : BAR W/HOLE | START POINT : THRU HOLE |
| O.D. : 110 | START PT. X : 51.015 |
| LENGTH : 65 | START PT. Z : 63 |
| I.D. : 48 | S. FINISH : ∇^6 |
| FACE REMOVAL : 2 | END RELIEF : NO |
| | CENTERING : NO |

Symbol Input (The items enclosed by parentheses in the following input display are defaults (only the **INPUT** key to be pressed).)

- | | | | | | |
|---|---------------------------|---------------------------------|------------------------|--------------------------|------------------|
| ① | ELEM : \rightarrow | END PT. X : () | END PT. Z : 19 | S. FINISH : () | END RELIEF : () |
| ② | ELEM : \square | 1ST ELEM : 1 | END PT. X : 56 | 2ND ELEM : \rightarrow | END PT. Z : 15 |
| | | 3RD ELEM : \uparrow | END PT. X : 53.6 | | |
| | | 1ST CORNER : () | SIZE : 1.0 | | |
| | | 2ND CORNER : () | NO. OF GRV. : 1 | | |
| | | 3RD CORNER : () | GRV. PITCH : () | | |
| | | 4TH CORNER : \curvearrowright | S. FINISH : ∇^5 | | |
| ③ | ELEM : \rightarrow | NO. OF STARTS : 1 | | | |
| | END PT. X : () | THREAD ANGLE : 60 | | | |
| | END PT. Z : 0 | END RELIEF : () | | | |
| | S. FINISH : THREAD | | | | |
| | THREAD LEAD : 1.5 | | | | |
| | THR. LENGTH : 15 | | | | |
| | L/R THREAD : RIGHT | | | | |
| | THR. CHAMFER : NO | | | | |
| ④ | ELEM : \curvearrowright | | | | |
| | SIZE (C/R9) : 1.5 | | | | |
| | S. FINISH : () | | | | |

⑤	ELEM : ↑	⑥	ELEM : ↘	⑦	ELEM : ↔
	END PT. X : 67.01		END PT. X : 70.01		END PT. X : ()
	END PT. Z : ()		END PT. Z : 15		END PT. Z : 20
	S. FINISH : $\frac{25}{\nabla\nabla}$		ANGLE : ()		S. FINISH : ()
	END RELIEF : ()		S. FINISH : ()		END RELIEF : ()
			END RELIEF : ()		

⑧	ELEM : 	1ST CORNER : 	NO. OF GRV. : 1
	1ST ELEM : ↑	SIZE : 0.2	GRV. PITCH : ()
	END PT. X : 65	2ND CORNER : ()	S. FINISH : $\frac{25}{\nabla\nabla}$
	2ND ELEM : ↔	SIZE : ()	
	END PT. Z : 26.01	3RD CORNER : ()	
	3RD ELEM : ↑	SIZE : ()	
	END PT. Z : 79.9	4TH CORNER : 	
		SIZE : 1.5	

⑨	ELEM : ↔	⑩	ELEM : ↔	⑪	ELEM : ↑
	END PT. X : ()		END PT. X : ()		END PT. X : 105
	END PT. Z : 41		END PT. Z : 46.5		END PT. Z : ()
	S. FINISH : THREAD		S. FINISH : $\frac{25}{\nabla\nabla}$		S. FINISH : $\frac{25}{\nabla\nabla}$
	THREAD LEAD : 1.5		END RELIEF : ()		END RELIEF : ()
	THRD. LENGTH : 15				
	L/R THREAD : RIGHT				
	THRD. CHAMFER : YES				
	NO. OF STATS : 1				
	THREAD ANGLE : 60				
	END RELIEF : ()				

⑫	ELEM : 	⑬	ELEM : ↔	⑭	ELEM : ↑
	SIZE (C/R) : 1.5		END PT. X : ()		END PT. X : 110
	S. FINISH : $\frac{25}{\nabla\nabla}$		END PT. Z : 51.5		END PT. Z : ()
			S. FINISH : $\frac{25}{\nabla\nabla}$		S. FINISH : $\frac{50}{\nabla}$
			END RELIEF : ()		END RELIEF : ()

⑦

ELEM : 
1ST ELEM : 
END PT. Z : 10.1
2ND ELEM : 
END PT. X : 95
3RD ELEM : 
END PT. Z : 2.1

1ST CORNER: 
SIZE : 1
2ND CORNER: ()
SIZE : ()
3RD CORNER: ()
SIZE : ()
4TH CORNER: 
SIZE : 1

NO. OF GRV. : 1
GRV. PITCH : ()
S. FINISH : ∇_{50}

⑧

ELEM : 
END PT. X : 112.6
END PT. Z : ()
S. FINISH : ∇_{50}
END RELIEF : ()

⑨

ELEM : 
SIZE (C/R) : 1
S. FINISH : ()

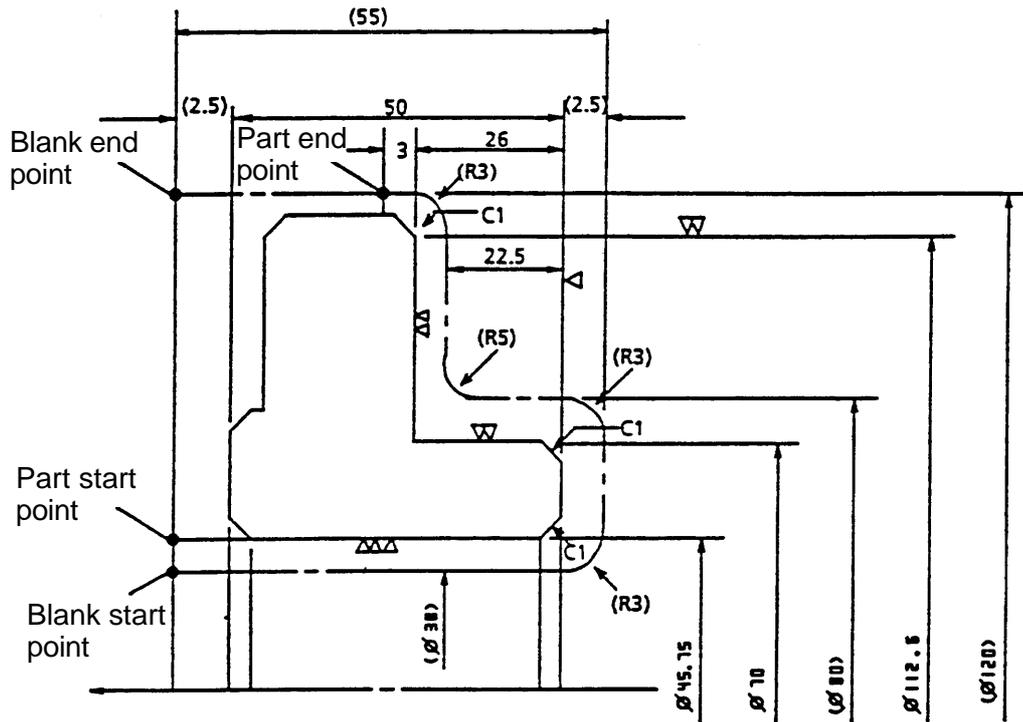
⑩

ELEM : 
END PT. X : ()
END PT. Z : 26
S. FINISH : ()
END RELIEF : ()

⑪

ELEM : 
END PT. X : 120
END PT. Z : ()
S. FINISH : ∇_{50}
END RELIEF : ()

[Example 4] Formed Bar (METRIC spec.)



1. Blank Shape input

MATERIAL	: #4140 ST	NEW PROGRAM
SHAPE	: FORMED	START POINT : THRU HOLE
O.D.	: 120	START PT. X : 38
LENGTH	: 55	START PT. Z : 52.5
FACE REMOVAL	: 2.5	

Symbol Input (The items enclosed by parentheses in the following input display are defaults (only the key to be pressed).)

① ELEM : ← END PT. X : () END PT. Z : -2.5	② ELEM : ↗ SIZE (C/R) : 3	③ ELEM : ↑ END PT. X : 80 END PT. Z : ()	④ ELEM : ↖ SIZE (C/R) : 3
------------------------------------------------------	---------------------------------	----------------------------------------------------	---------------------------------

⑤ ELEM : ← END PT. X : () END PT. Z : 22.5	⑥ ELEM : ↗ SIZE (C/R) : 5	⑦ ELEM : ↑ END PT. X : 120 END PT. Z : ()	⑧ ELEM : ↖ SIZE (C/R) : 3
------------------------------------------------------	---------------------------------	-----------------------------------------------------	---------------------------------

⑨
ELEM : ←
END PT. X : ()
END PT. Z : 52.5

2. Final shape Input
 NEW PROGRAM
 START POINT : THRU HOLE
 START PT. X : 45.75
 START PT. Z : 52.5
 S. FINISH : $\frac{50}{\nabla}$
 END RELIEF : NO
 CENTERING : NO

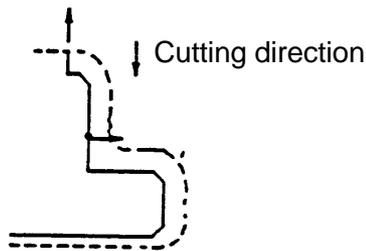
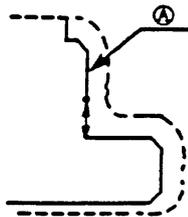
Symbol Input (The items enclosed by parentheses in the following input display are defaults
 (only the **INPUT** key to be pressed).)

- | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>①
 ELEM : \leftrightarrow
 END PT. X : ()
 END PT. Z : 0
 S. FINISH : $\frac{6}{\nabla\nabla\nabla}$
 END RELIEF : ()</p> | <p>②
 ELEM : \lrcorner
 SIZE (C/R) : 1
 S. FINISH : $\frac{6}{\nabla\nabla\nabla}$</p> | <p>③
 ELEM : \updownarrow
 END PT. X : 70
 END PT. Z : ()
 S. FINISH : ()
 END RELIEF : ()</p> | <p>④
 ELEM : \lrcorner
 SIZE (C/R) : 1
 S. FINISH : ()</p> |
| <p>⑤
 ELEM : \leftrightarrow
 END PT. X : ()
 END PT. Z : 26
 S. FINISH : $\frac{25}{\nabla\nabla}$
 END RELIEF : ()</p> | <p>⑥
 ELEM : \updownarrow
 END PT. X : 114.6
 END PT. Z : ()
 S. FINISH : $\frac{25}{\nabla\nabla}$
 END RELIEF : ()</p> | <p>⑦
 ELEM : \lrcorner
 SIZE (C/R) : 1
 S. FINISH : ()</p> | <p>⑧
 ELEM : \leftrightarrow
 END PT. X : ()
 END PT. Z : 29
 S. FINISH : ()
 END RELIEF : ()</p> |
| <p>⑨
 ELEM : \updownarrow
 END PT. X : 120
 END PT. Z : ()
 S. FINISH : $\frac{50}{\nabla}$
 END RELIEF : ()</p> | | | |

Note) When you want to specify the part ⑨ to be end-faced in CUSTOM PROGRAM, input the element in ⑥ separately.

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>⑥
 ELEM : \updownarrow
 END PT. X : 82
 END PT. Z : ()
 S. FINISH : $\frac{25}{\nabla\nabla}$</p> | <p>⑥'
 ELEM : \updownarrow
 END PT. X : 114.6
 END PT. Z : ()
 S. FINISH : $\frac{25}{\nabla\nabla}$</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

You can specify as follows in CUSTOM PROGRAM.



⑦

ELEM : 
END PT. X : ()
END PT. Z : 3
S. FINISH : $\frac{12}{\nabla\nabla}$
END RELIEF : ()

⑧

ELEM : 
END PT. X : ()
END PT. Z : ()
RADIUS : 4
CENTER-X : 70.01
CENTER-Z : 3
INTERSECT : SMOOTH
S. FINISH : ()

⑨

ELEM : 
END PT. X : 61.9
END PT. Z : ()
ANGLE : 45
INTERSECT : SMOOTH
S. FINISH : ()
END RELIEF : ()

⑩

ELEM : 
SIZE (C/R) : 8
S. FINISH : ()

⑪

ELEM : 
END PT. X : ()
END PT. Z : 25.5
S. FINISH : $\frac{12}{\nabla\nabla}$
END RELIEF : ()

⑫

ELEM : 
SIZE (C/R) : 20
S. FINISH : $\frac{12}{\nabla\nabla}$

⑬

ELEM : 
END PT. X : ()
END PT. Z : ()
ANGLE : 11
S. FINISH : $\frac{12}{\nabla\nabla}$
END RELIEF : ()

⑭

ELEM : 
SIZE (C/R) : 3
S. FINISH : $\frac{12}{\nabla\nabla}$

⑮

ELEM : 
END PT. X : 85.1
END PT. Z : 61.5
ANGLE : 40
S. FINISH : $\frac{12}{\nabla\nabla}$
END RELIEF : ()

⑯

ELEM : 
SIZE (C/R) : 3
S. FINISH : ()

⑰

ELEM : 
END PT. X : 98.3
END PT. Z : ()
S. FINISH : ()
END RELIEF : ()

⑱

ELEM : 
SIZE (C/R) : 1
S. FINISH : ()

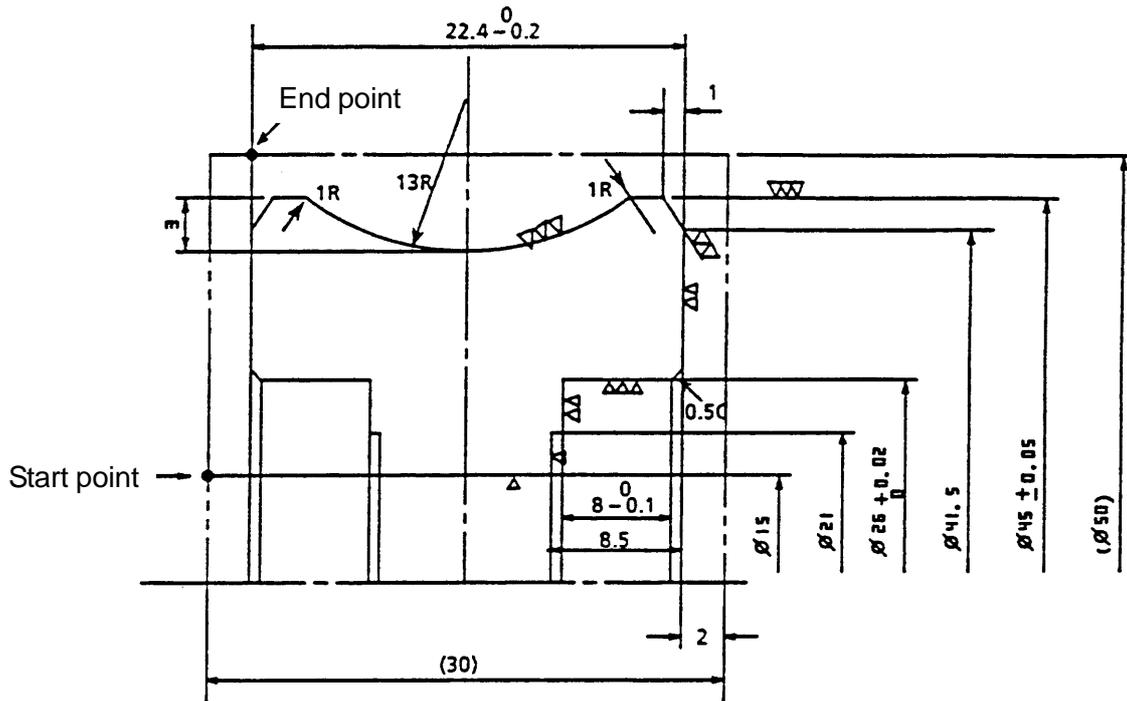
⑲

ELEM : 
END PT. X : ()
END PT. Z : 63.5
S. FINISH : ()
END RELIEF : ()

⑳

ELEM : 
END PT. X : 110
END PT. Z : ()
S. FINISH : $\frac{50}{\nabla\nabla}$
END RELIEF : ()

[Example 6] Intersecting Point of Straight Line and straight Line (METRIC spec.)



1. Blank Shape input

MATERIAL : #6061 AL
 SHAPE : ROUND BAR
 O.D. : 50
 LENGTH : 30
 FACE REMOVAL : 2

2. Final Shape Input

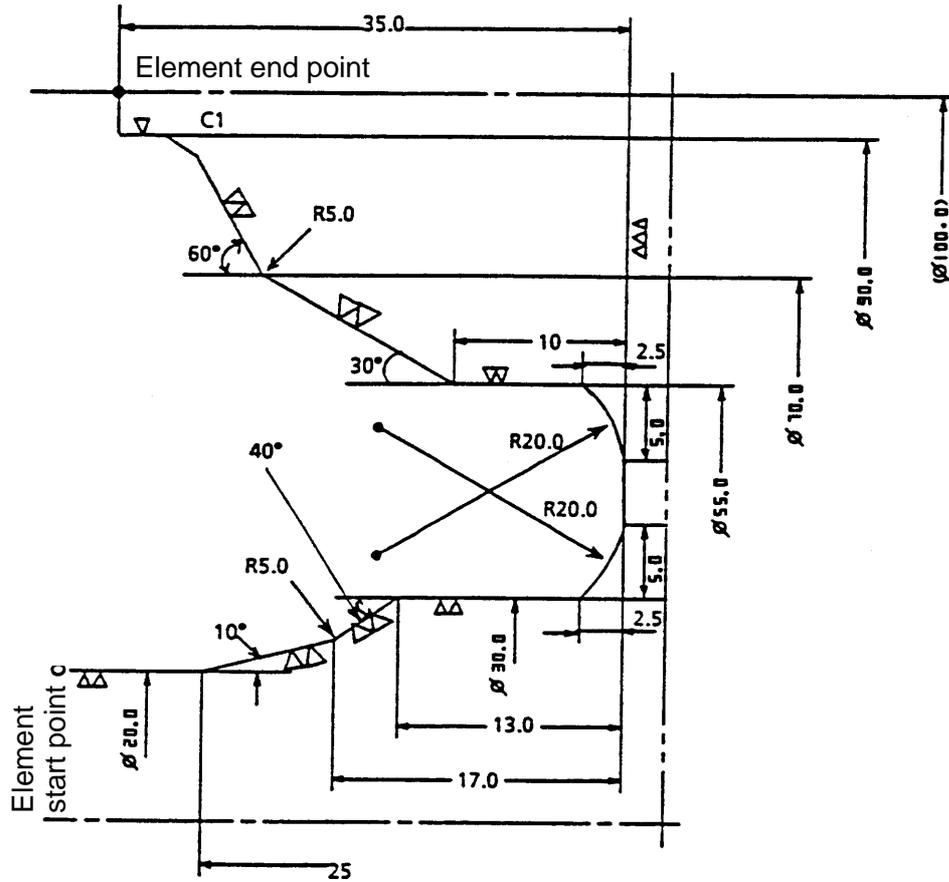
NEW PROGRAM
 START POINT : THRU HOLE
 START PT. X : 15
 START PT. Z : 28
 S. FINISH : $\frac{12}{\nabla\nabla}$
 END RELIEF : NO
 CENTERING : NO

Symbol Input (The items enclosed by parentheses in the following input display are defaults (only the **INPUT** key to be pressed).)

①	ELEM : \leftrightarrow	②	ELEM : \updownarrow	③	ELEM : \leftrightarrow
	END PT. X : ()		END PT. X : 21		END PT. X : ()
	END PT. Z : 8.5		END PT. Z : ()		END PT. Z : 7.95
	S. FINISH : $\frac{50}{\nabla}$		S. FINISH : $\frac{50}{\nabla}$		S. FINISH : $\frac{50}{\nabla}$
	END RELIEF : ()		END RELIEF : ()		END RELIEF : ()

④	ELEM : \updownarrow	⑤	ELEM : \leftrightarrow	⑥	ELEM : \curvearrowright
	END PT. X : 26.01		END PT. X : ()		SIZE (C/R) : 0.5
	END PT. Z : ()		END PT. Z : 0		S. FINISH : $\frac{6}{\nabla\nabla\nabla}$
	S. FINISH : ()		S. FINISH : $\frac{6}{\nabla\nabla\nabla}$		
	END RELIEF : ()		END RELIEF : ()		

[Example 7] Intersecting Point of Straight Line and Circle (METRIC spec.)



1. Blank Shape input

MATERIAL : #1045 ST
 SHAPE : ROUND BAR
 O.D. : 100
 LENGTH : 52
 FACE REMOVAL : 2

2. Final Shape Input

NEW PROGRAM
 START POINT : THRU HOLE
 START PT. X : 20.0
 START PT. Z : 50.0
 S. FINISH : $\frac{12}{\nabla}$
 END RELIEF : NO
 CENTERING : NO

Symbol Input (The items enclosed by parentheses in the following input display are defaults (only the **INPUT** key to be pressed).)

①	ELEM : \leftrightarrow	②	ELEM : \nearrow	③	ELEM : \lrcorner
	END PT. X : ()		END PT. X : ()		SIZE (C/R) : 5
	END PT. Z : 25		END PT. Z : 17		S. FINISH : ()
	S. FINISH : ()		ANGLE : 10		
	END RELIEF : ()		S. FINISH : ()		
			END RELIEF : ()		

④
ELEM : ↗
END PT. X : 30
END PT. Z : 13
ANGLE : 40
S. FINISH : ()
END RELIEF : ()

⑤
ELEM : ↔
END PT. X : ()
END PT. Z : 2.5
S. FINISH : ()
END RELIEF : ()

⑥
ELEM : ○
END PT. X : 40
END PT. Z : 0
RADIUS : 20
CENTER-X : ()
CENTER-Z : ()
INTERSECT : RIGHT
S. FINISH : ∇⁶∇

⑦
ELEM : ↓
END PT. X : 45
END PT. Z : ()
INTERSECT : BOTTOM
S. FINISH : ∇⁶∇
END RELIEF : ()

⑧
ELEM : ○
END PT. X : 55
END PT. Z : 2.5
RADIUS : 20
CENTER-X : ()
CENTER-Z : ()
INTERSECT : TOP
S. FINISH : ∇⁶∇

⑨
ELEM : ↔
END PT. X : ()
END PT. Z : 10
INTERSECT : RIGHT
S. FINISH : ()
END RELIEF : ()

⑩
ELEM : ↘
END PT. X : 70
END PT. Z : ()
ANGLE : 30
S. FINISH : ()
END RELIEF : ()

⑪
ELEM : ⌋
SIZE (C/R) : 5
S. FINISH : ()

⑫
ELEM : ↘
END PT. X : 90
END PT. Z : ()
ANGLE : 60
S. FINISH : ()
END RELIEF : ()

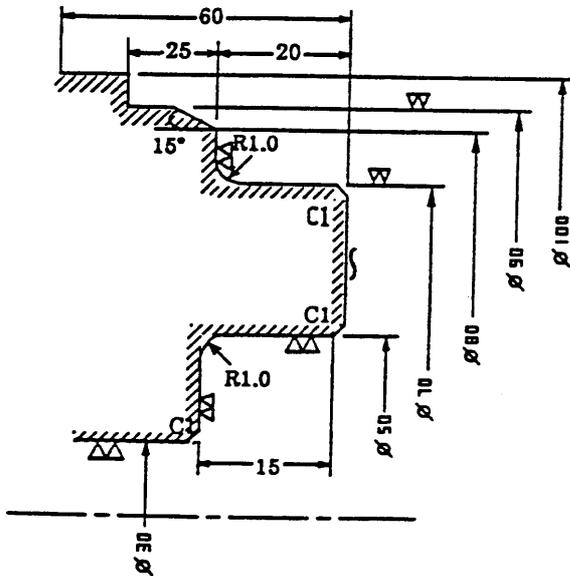
⑬
ELEM : ⌋
SIZE (C/R) : 1
S. FINISH : ()

⑭
ELEM : ↔
END PT. X : ()
END PT. Z : 35
S. FINISH : ∇²⁵∇
END RELIEF : ()

⑮
ELEM : ↓
END PT. X : 100
END PT. Z : ()
S. FINISH : ∇²⁵∇
END RELIEF : ()

[Example 8] When Not Roughing and Finishing the 1st End Face (METRIC spec.)

When the 1st end face has not cutting allowance, the use of a finish symbol “~” prevents it from being machined.



MATERIAL : #1045 ST
 SHAPE : ROUND BAR
 O.D. : 100
 LENGTH : 60
 FACE REMOVAL : Note) Input "0"

Final Shape Input
 START POINT : THRU HOLE
 DIAMETER (X) : 30
 LENGTH (Z) : 60
 S. FINISH : $\frac{12S}{\nabla}$
 END RELIEF : NO
 CENTERING : NO

Symbol Input (The items enclosed by parentheses in the following input display are defaults (only the key to be pressed).)

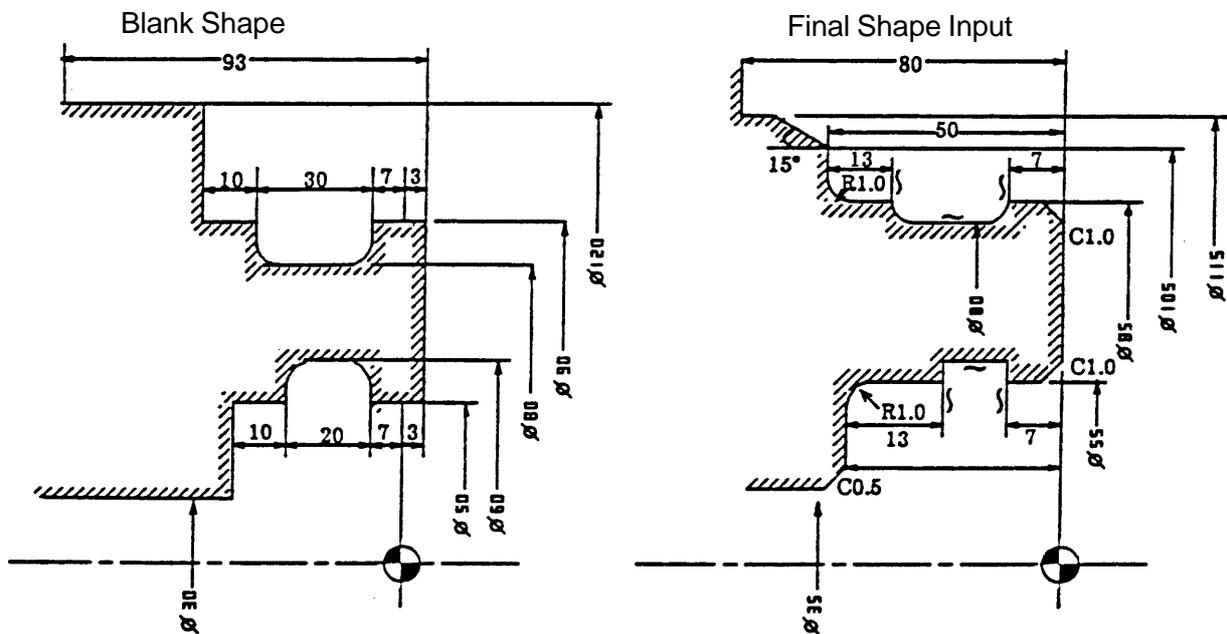
ELEM : ←	ELEM : ↗	ELEM : ↓	ELEM : ↘
END PT. X : ()	SIZE (C/R) : 1	END PT. X : 50	SIZE (C/R) : 1
END PT. Z : 15	S. FINISH : ()	END PT. Z : ()	S. FINISH : ()
S. FINISH : ()		S. FINISH : ()	
END RELIEF : ()		END RELIEF : ()	

ELEM : ←	ELEM : ↗	ELEM : ↓	ELEM : ↘
END PT. X : ()	SIZE (C/R) : 1	END PT. X : 70	SIZE (C/R) : 1
END PT. Z : 0	S. FINISH : ()	END PT. Z : ()	S. FINISH : ()
S. FINISH : ()		S. FINISH : ~	
END RELIEF : ()		END RELIEF : ()	

ELEM : ←	ELEM : ↗	ELEM : ↓	ELEM : ↘
END PT. X : ()	SIZE (C/R) : 1.0	END PT. X : 80	END PT. X : 90
END PT. Z : 20	S. FINISH : ()	END PT. Z : ()	END PT. Z : ()
S. FINISH : ()		S. FINISH : ()	ANGLE : 15
END RELIEF : ()		END RELIEF : ()	S. FINISH : ()
			END RELIEF : ()

ELEM : ←	ELEM : ↓
END PT. X : ()	END PT. X : 100
END PT. Z : 45	END PT. Z : ()
S. FINISH : ()	S. FINISH : ()
END RELIEF : ()	END RELIEF : ()

[Example 9] When the formed bar has an indentation on its outer/inner figure and it is not cut, it is possible to make both roughing and finishing not output by inputting the blank shape as an indentation and specifying a finish symbol "~" when inputting the finish shape. (METRIC spec.)



Blank shape input

MATERIAL : #4140 ST
 SHAPE : FORMED
 O.D. : 120
 LENGTH : 93
 FACE REMOVAL : 3

NEW PROGRAM

START POINT : THRU HOLE
 START PT. X : 30
 START PT. Z : 90

Symbol Input (The items enclosed by parentheses in the following input display are defaults (only the **INPUT** key to be pressed).)

ELEM : ←	ELEM : ↑	ELEM : ←	ELEM : ↑
END PT. X : ()	END PT. X : 50	END PT. X : ()	END PT. X : 60
END PT. Z : 37	END PT. Z : ()	END PT. Z : 27	END PT. Z : ()

ELEM : ←	ELEM : ↑	ELEM : ←	ELEM : ↑
END PT. X : ()	END PT. X : 50	END PT. X : ()	END PT. X : 90
END PT. Z : 7	END PT. Z : ()	END PT. Z : -3	END PT. Z : ()

ELEM : ←	ELEM : ↑	ELEM : ←	ELEM : ↑
END PT. X : ()	END PT. X : 80	END PT. X : ()	END PT. X : 90
END PT. Z : 7	END PT. Z : ()	END PT. Z : 37	END PT. Z : ()

ELEM	: ←	ELEM	: ↑	ELEM	: ←
END PT. X	:()	END PT. X	:120	END PT. X	:()
END PT. Z	: 47	END PT. Z	:()	END PT. Z	: 90

Final Shape Input

NEW PROGRAM

START POINT : THRU HOLE
 START PT. X : 35
 START PT. Z : 90
 S. FINISH : $\frac{12}{\nabla\nabla}$
 END RELIEF : NO
 CENTERING : NO

ELEM	: ←	ELEM	: ↷	ELEM	: ↑	ELEM	: ↷
END PT. X	:()	SIZE (C/R)	:0.5	END PT. X	: 55	SIZE (C/R)	:1.0
END PT. Z	: 40	S.FINISH	:()	END PT. Z	:()	S. FINISH	:()
S. FINISH	:()			S. FINISH	:()		
END RELIEF	:()			END RELIEF	:()		

ELEM	: ←	ELEM	: ↑	ELEM	: ←	ELEM	: ↑
END PT. X	:()	END PT. X	: 60	END PT. X	: 7	END PT. X	: 55
END PT. Z	: 27	END PT. Z	:()	END PT. Z	:()	END PT. Z	:()
S. FINISH	:()	S. FINISH	: ~	S. FINISH	: ~	S. FINISH	: ~
END RELIEF	:()						

ELEM	: ←	ELEM	: ↷	ELEM	: ↑	ELEM	: ↷
END PT. X	:()	SIZE (C/R)	:1.0	END PT. X	: 85	SIZE (C/R)	:1.0
END PT. Z	: 0	S.FINISH	:()	END PT. Z	:()	S. FINISH	:()
S. FINISH	:()			S. FINISH	:()		
END RELIEF	:()			END RELIEF	:()		

ELEM	: ←	ELEM	: ↑	ELEM	: ←	ELEM	: ↑
END PT. X	:()	END PT. X	: 80	END PT. X	:()	END PT. X	: 85
END PT. Z	: 7	END PT. Z	:()	END PT. Z	: 37	END PT. Z	:()
S. FINISH	:()	S. FINISH	: ~	S. FINISH	: ~	S. FINISH	: ~
END RELIEF	:()						

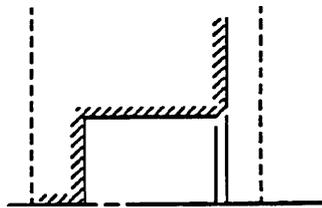
ELEM	: ←	ELEM	: ↷	ELEM	: ↑	ELEM	: ↘
END PT. X	:()	SIZE (C/R)	:1.0	END PT. X	:105	END PT. X	:115
END PT. Z	: 50	S.FINISH	:()	END PT. Z	:()	END PT. Z	:()
S. FINISH	:()			S. FINISH	:()	ANGLE	:15
END RELIEF	:()			END RELIEF	:()	S. FINISH	:()
						END RELIEF	:()

ELEM	: ←	ELEM	: ↑
END PT. X	:()	END PT. X	:120
END PT. Z	: 80	END PT. Z	:()
S. FINISH	:()	S. FINISH	:()
END RELIEF	:()	END RELIEF	:()

3. How to Always Output High-speed Steel Drill (Nose Angle 118°)

- <Procedure>
1. Display the tool file (drill) screen found in the machining condition file.
 2. Enter the line of file No. 73 as follows.
Classified No. 2, File No. 73, Shape No. 2, Tool nose angle 118, Minimum diameter 1, Maximum diameter 32, Interval 1, Cheap material 5 Delete following lines.

Note) If set as mentioned above, that tool is output as a special one in case of the shape shown below. A spindle speed depends on high-speed steel drill's conditions. A feed rate is output at (drill diameter \times 0.005). A tool diameter results in hole diameter - (real value parameter 46).



CNC LATHE
ST200/250
AUTO PROGRAMMING MANUAL
SEICOS-pcFLexi MULTI
(L-V9R1.00ENG)
Version 1.01
07-2001

07-2001 First Edition