

Operation Guidance function
FANUC MANUAL GUIDE *i*

1. What is MANUAL GUIDE ?

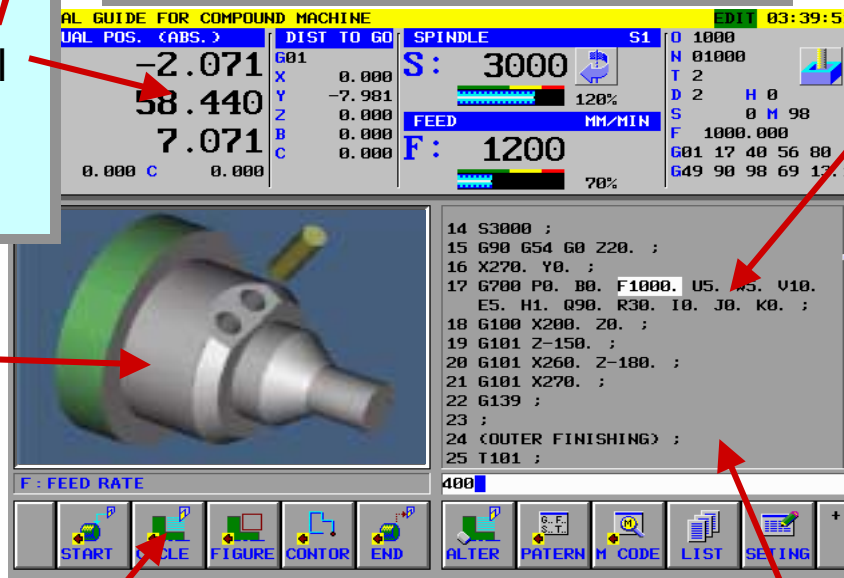
- Operation Guidance, which supports whole operations on an all-in-one screen for daily machining including creating a program on a lathe, machining center and compound machine.

All-in-one Screen

Only one screen concentrated all operations

Machine status window

Machine status such as actual position, feedrate and load meter are displayed always



Easy programming

Based on ISO-code program format, complex machining motions can be created easily by menu form

Realistic machining simulation

3-D solid model machining simulation is available

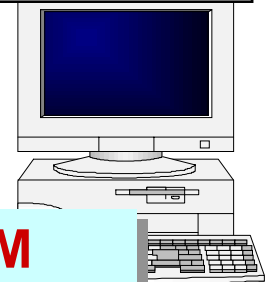
Intuitive menu selecting

Menu can be selected easily and intuitively by soft-key with icon

Good affinity with CAD/CAM

Most popular ISO-code program format on CAD/CAM can be dealt as it is

CAD/CAM



2. Market trend of Conversational programming

❑ Thanks to reducing a price, CAD/CAM on a PC are getting more popular

❑ Desire for more easy operations of a machine and CNC is getting strong

❑ The demand of **MANUAL GUIDE**, which has necessary and sufficient features and thoroughly simplified operations, is getting stronger rather than orthodox conversational programming functions such as Super CAPI T/M and Symbol CAPI T.

FANUC's conversational programming functions will be concentrated to **MANUAL GUIDE**

Simple operation on all-in-one screen (10.4"Color / 9.5 " Monochrome LCD)

All-in-one screen for Programming, Graphic simulation and Machining

Status Indicator Window

The screenshot shows a CNC control interface with the following components:

- MANUAL GUIDE** header at the top.
- ACTUAL POSITION** window showing X: 14.080, Y: -18.148, Z: 2.000, U: 0.000.
- DIST TO GO** window showing G00X: -67.794, Y: -3.338, Z: 0.000.
- SPINDLE** window showing S: 0, FEEDRATE: 0 MM/MIN.
- NEXT BLOCK** window showing G00X: 3.343, Y: 2.415, Z: 0.000.
- PROGRAM LIST** pop-up window showing:

O0001:DRILLING BOLT HOL	: 5M12S: 1998/06/10 10:32
O0010:SIDE CUTTING REC	: 4M32S: 1998/06/10 12:10
O0012:CONTOUR MACHIN	: 9M22S: 1998/06/10 13:30
- Graphic Display Window** showing a green contour plot with points 10-15.
- Program Window** showing G-code:


```

12 G102 X-5.685 Y1.92 I0. J6. ;
13 G101 X9.474 Y46.799 ;
14 G103 X-8. Y56. I-9.474 J3.201 ;
15 G101 X-32. Y24. ;
16 G103 X0. Y-40. I32. J-24. ;
      
```
- Key in Buffer** window at the bottom left.
- Soft-keys with Icon** at the bottom: PROGRM, CHECK, EXEC, WRKCRD, OFFSET, LIST.

Pop-up Window

Graphic Display Window

Program Window

Key in Buffer

Soft-keys with Icon

Various features to support screen operation

1. Icon menu

All menu is displayed with Icon soft-keys



Operator can select machining type easily by intuition



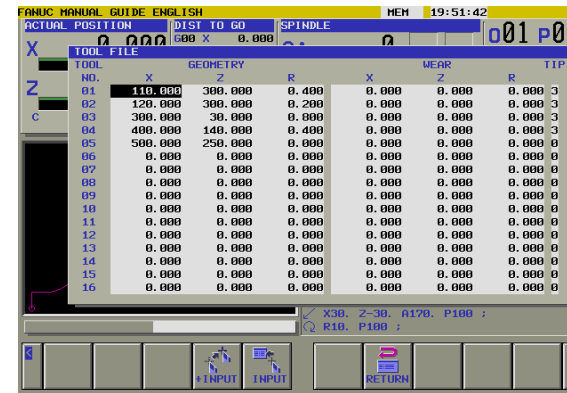
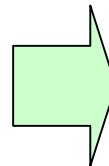
(Cycle machining menu soft-keys)

2. Application of Pop-up window

All data is displayed on one screen without screen switching



Supplemental data which can not displayed on one screen is displayed an pop-up window



(Tool file window)

FANUC MANUAL GUIDE *i* for Milling

Overview

1. Simple operation on all-in-one screen (10.4"color/9.5"monochrome LCD)

All operation can be done on one screen, and no screen switching is needed.

2. Guided ISO programming by conversational method

(ISO program has higher flexibility than machining process program.)

- a) Easy operations using Icon menu soft-keys
- b) Guidance window to illustrate required parameter

3. Advanced canned cycles for complicated milling machining

Drilling, Facing, Side cutting, Pocketing, Contour machining

4. Easy program checking by sophisticated graphic simulation

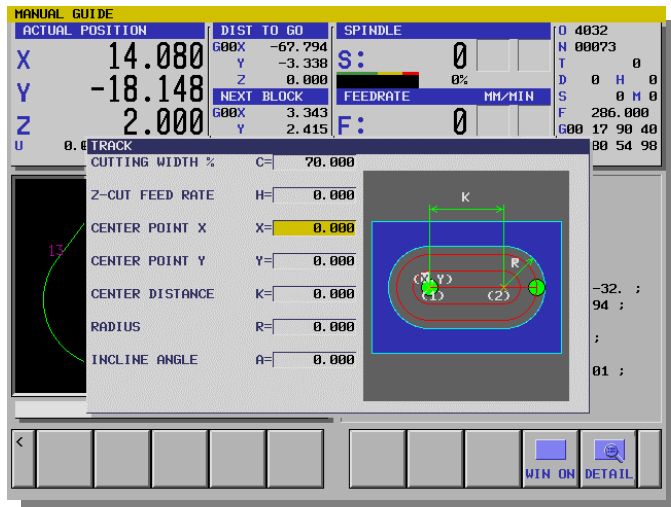
Realistic animated drawing simulation with solid model

5. Machining used handwheel for manual operation

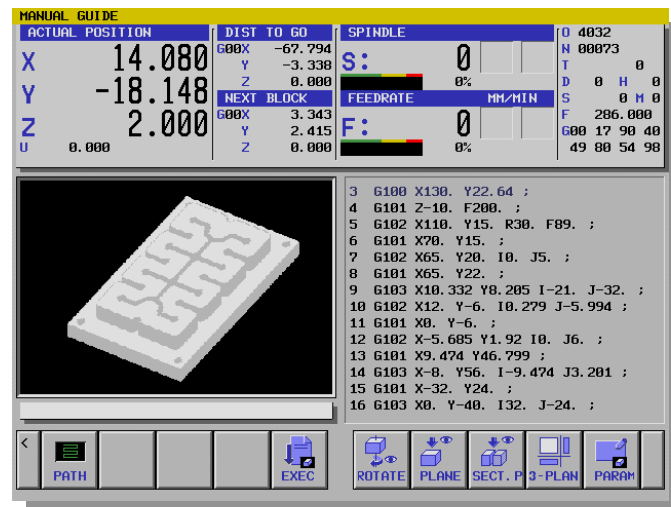
Guidance cutting and teach-in for playback

6. Optional function on Series 16i/18i/21i - MA/MB

Various features to support milling machine operations



(Data input screen)



(Animated drawing screen)

1. All operations can be done on one screen

2. Advance canned cycles for milling machining

- a) Drilling
- b) Hole pattern
- c) Facing
- d) Side cutting
- e) Pocketing
- f) Contour machining

3. Quick and realistic machining simulation

Tool path drawing, animated drawing on a solid model, rotation of a product and so on are available

4. Abundant customizing tools for building up the best suited milling machine system

Installing MTB's own tool set-up guidance, machining process and so on are available

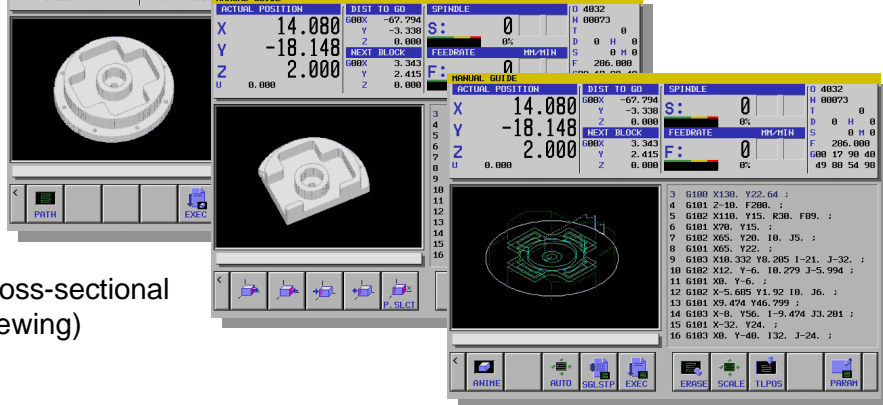
5. Abundant displaying language

In addition to standard 6 languages display, Japanese / English / German / French / Italian / Spanish, 4 extra languages can be installed easily

Easy program checking

MANUAL GUIDE		DIST TO GO		SPINDLE		D 4832	
X	14.080	G00X	-67.794	S:	0	T	0
Y	-18.148	Z	0.000	D	0	H	0
Z	2.000	NEXT BLOCK	F:	MM/MIN	S	0	H
U	0.000	G00X	3.343	F	286.000	F	286.000
		Z	2.415	G00	17.90 40		

(Animated drawing on a solid model)

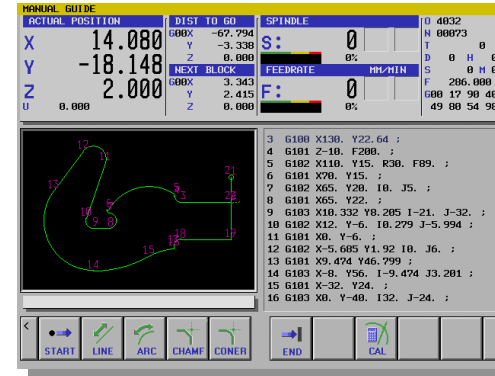


(Cross-sectional viewing)

(Tool path drawing)

Contour programming

Automatic calculation of intersections enables simple programming of complicated machining profile.



(Contour programming screen)

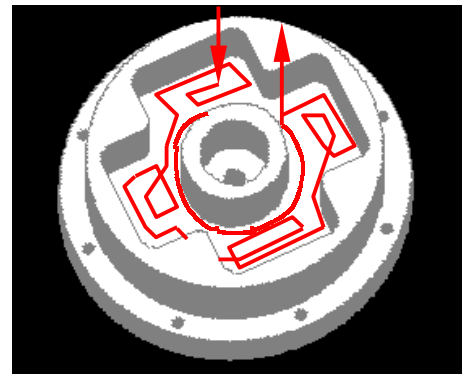
Contour editing function

- Symmetry
- Translation
- Rotation

Advanced canned cycles

- Contour machining (Side / Pocket / Groove)

By entering contour figure, tool path of contour machining will be created automatically.



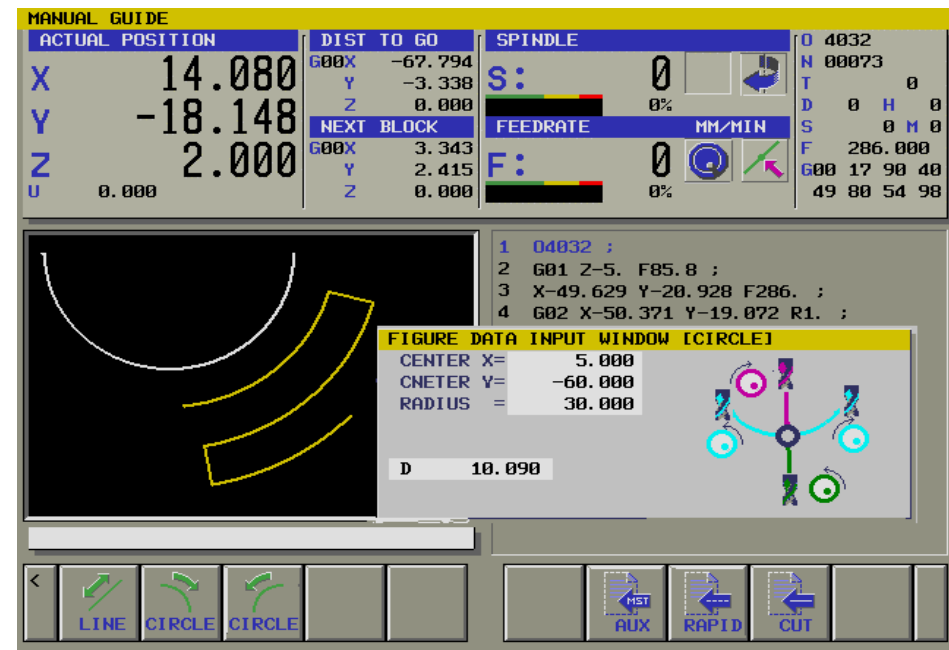
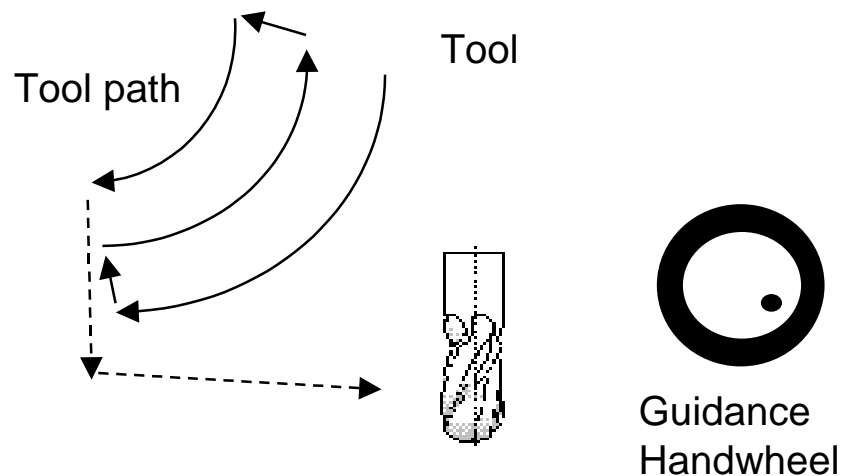
(Tool path of contour pocketing)

- Drilling
(Center drill / Drill / Tap / Reamer / Bore / Back bore)
- Hole pattern
(Line / Arc / Circle / Square / Grid)
- Facing
(Square / Circle / Ring)
- Side cutting
(Square / Circle / Track / One side)
- Pocketing
(Square / Circle / Track / Groove)

Guidance cutting to support manual operation

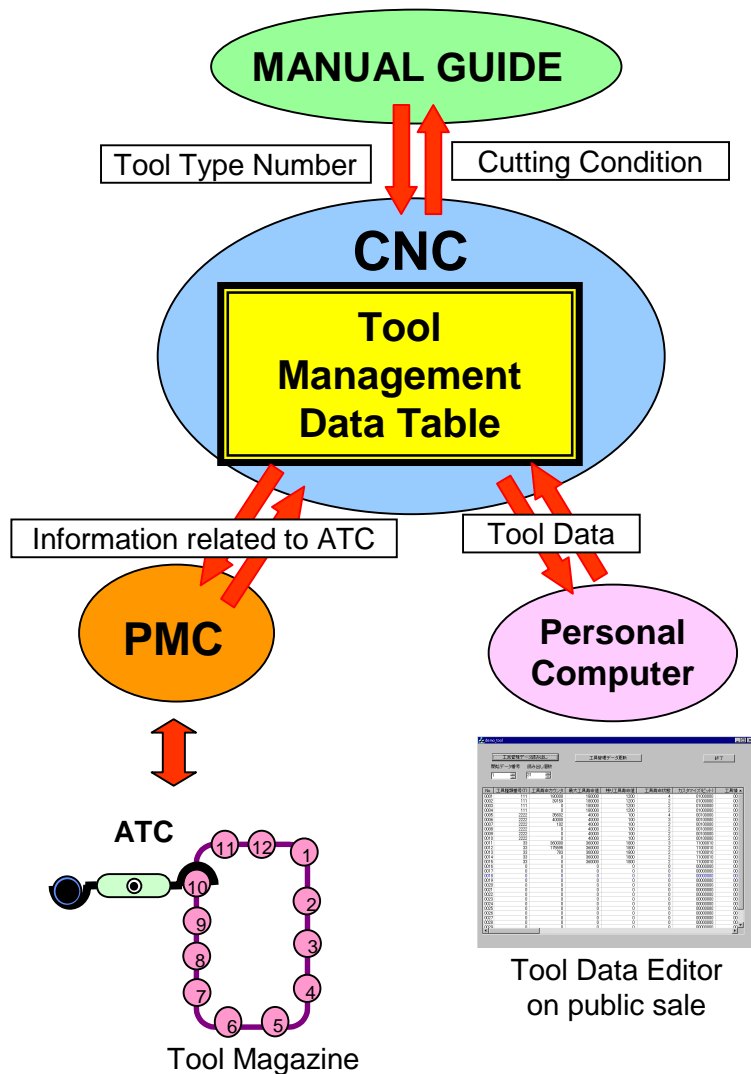
Guidance cutting, with teaching of auxiliary functions and others, support manual operations strongly

1. Manual operations such as positioning and cutting
2. Auxiliary functions, such as coolant on/off and spindle rotation
3. Approach cutting toward Line and Circle by a Guidance Handwheel
4. Along cutting of Line and Circle by a Guidance Handwheel
5. These motions can be teach-in for playback



(Sample of guidance cutting screen)

Tool management function



Applicable CNC : **FANUC** Series 16*i*/18*i*/21*i* - MB

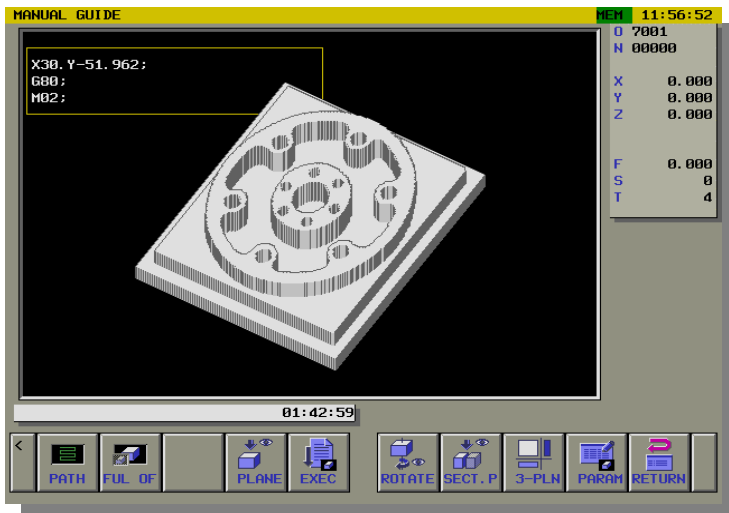
1. What is Tool Management function ?

- Tool Management Data Table is available, into which all tool data (Tool Offset value, Tool Life data and so on) are integrated.
- Tool Management Data Table can be managed collectively by CNC and can be accessed by PMC, MANUAL GUIDE and a personal computer.

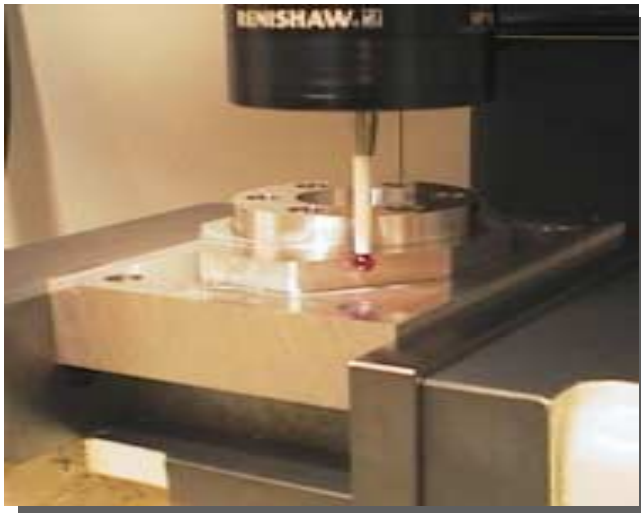
2. Adaptation of MANUAL GUIDE to Tool Management function

- Cutting condition (Feedrate, Spindle Speed) can be set automatically by inputting Tool Type Number.
- MTB can add their original data to Tool Management Data Table and use it in cycle machining (Available by MTB's customizing).

Other new features



(Background Drawing : Example of Full Screen Display)



(Example of an actual measuring motion)

1. Addition of Background Drawing Function

- Checking of machining motion can be done easily by machining simulation during other actual machining.

2. Addition of Automatic measuring cycles

- X/Y/Z single surface
- Outside/Inside circle
- Outside/Inside corner
- Work-piece angle
- Automatic calibration for a prove
- Stub/Groove
- Outside/Inside rectangular
- Hole position

3. Others

- Full screen display of machining simulation
- NC Program Expansion for milling canned cycle
- Hand held calculator type data calculation

FANUC MANUAL GUIDE *i* for Lathe

Overview

1. Simple operation on all-in-one screen (10.4"color/9.5"monochrome LCD)

All operation can be done on one screen, and no screen switching is needed.

2. Exclusive built operating methods for manual lathe

- a) Easy operations using Icon menu soft-keys
- b) Guidance window to illustrate required parameter
- c) Consistent operations from trial cutting until mass producing

3. Various machining menus

Bar machining, Grooving, Threading, Lathe drilling, C-axis drilling/grooving and so on

4. Easy program checking by sophisticated graphic simulation

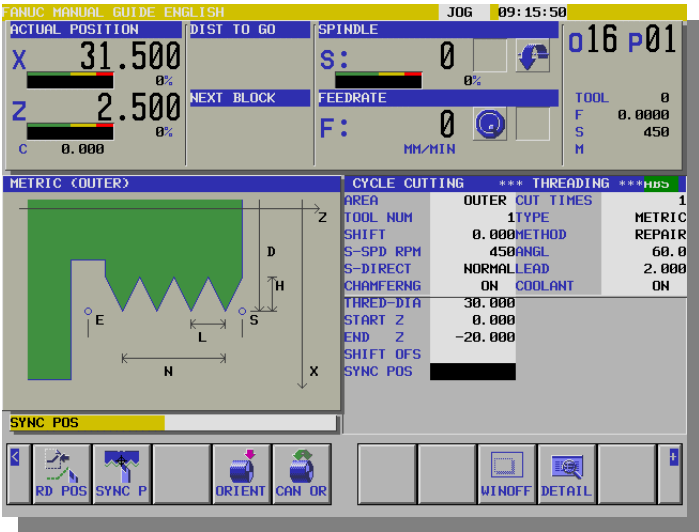
Realistic animated drawing simulation with solid model

5. Machining used handwheel for manual operation

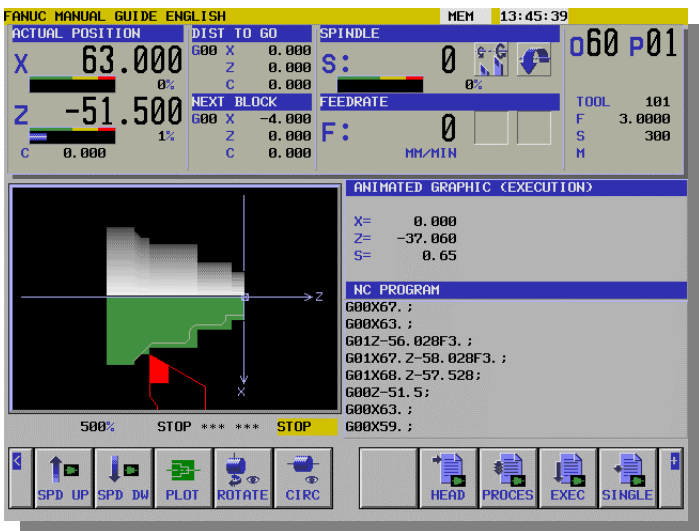
Guidance cutting and teach-in for playback

6. Optional function on Series 16i/18i/21i - TA/TB

Various features to support lathe machining operations



(Programming screen of Threading)



(Animated drawing screen)

Operation Guidance which possess both of Manual Lathe's Easiness and CNC Lathe's Functionality, and shop-floor programming is also available.

1. Advance canned cycles for lathe machining

- Bar machining
- Threading
- C-axis drilling
- Thread repair cycle
- Grooving
- Lathe drilling
- C-axis grooving

2. All operations can be done on one screen

3. Quick and realistic machining simulation

Tool path drawing, animated drawing on a solid model, rotation of a product are available

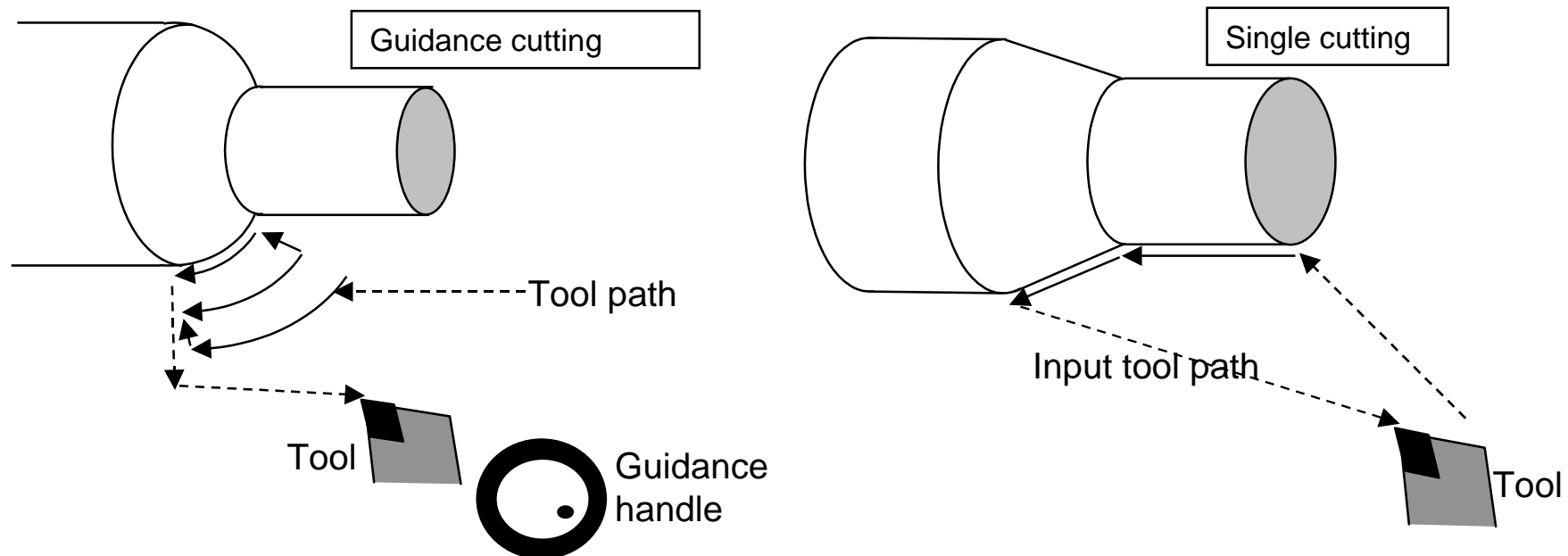
4. Teaching playback

By teaching operation of skilled worker, its playback machining can be done easily.

Various Machining menu for manual operations

1. Guidance Cutting

- Cutting of Line or Circle form can be done by Guidance Handwheel.
- Teaching, Editing of taught-in blocks and Playback machining are available.

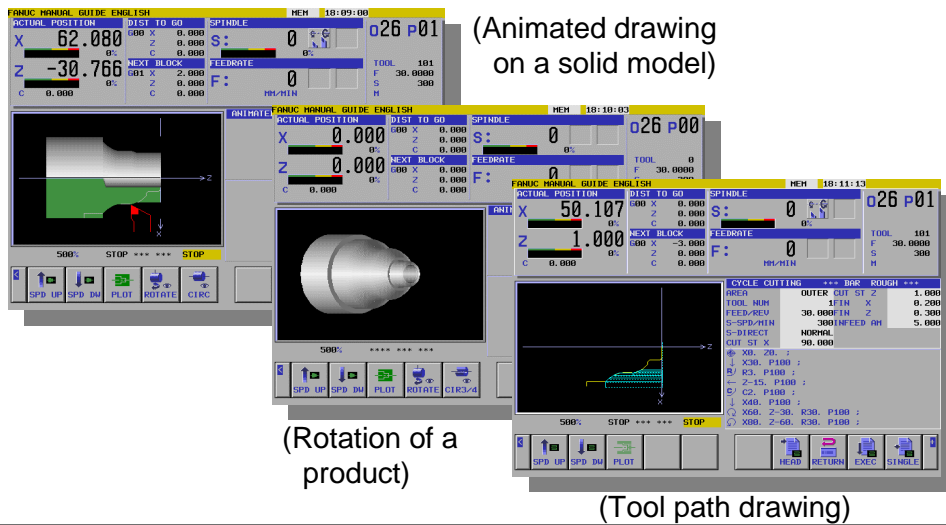


2. Single Cutting

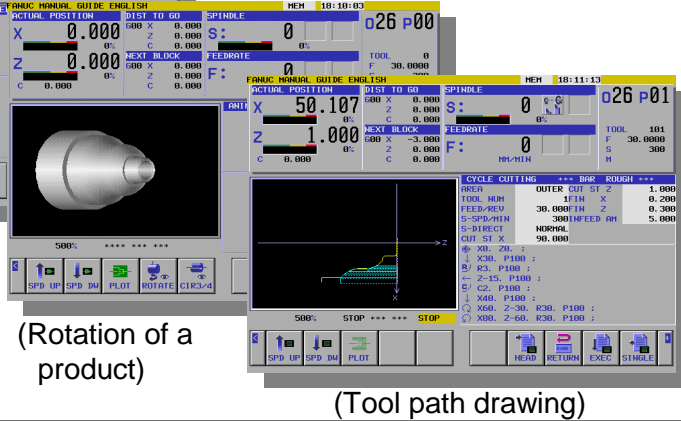
- Tool path such as Positioning, line and Circle can be inputted directly.
- Teaching, Editing of taught-in blocks and Playback machining are available.

Easy program checking

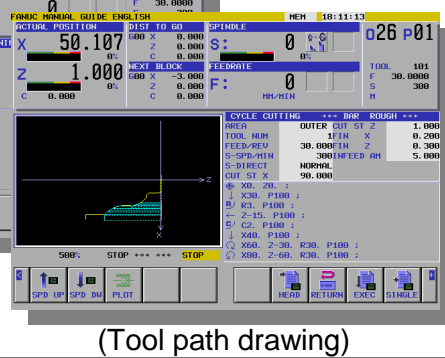
(Animated drawing on a solid model)



(Rotation of a product)

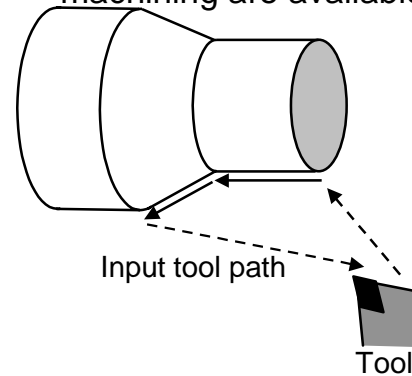
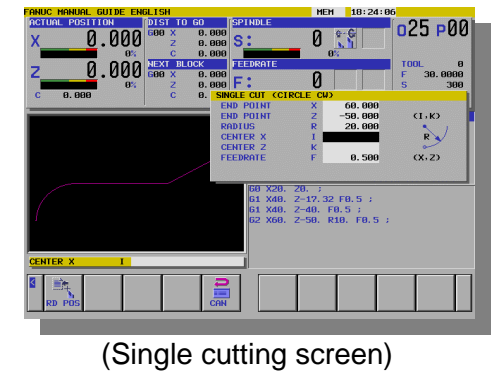


(Tool path drawing)



Single cutting

- Tool path such as positioning, line and circle can be inputted directly
- Teaching and editing of taught-in blocks and playback machining are available

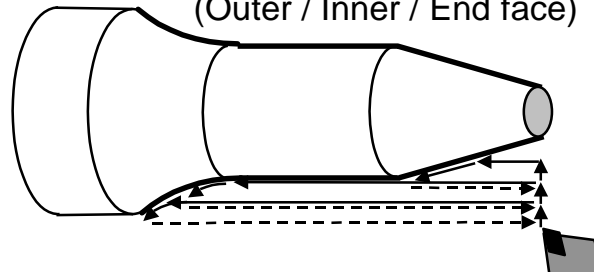



(Single cutting screen)

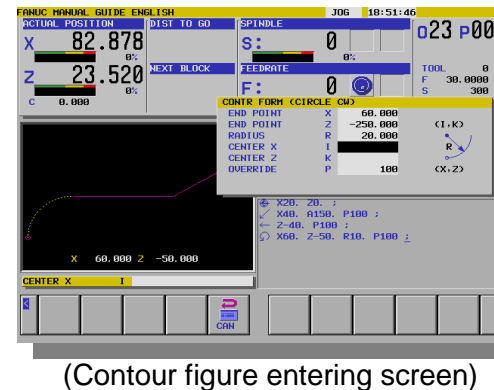
Cycle cutting

By inputting a machining figure, all of the machining motions can be done automatically.

- Bar machining (Outer / Inner / End face)

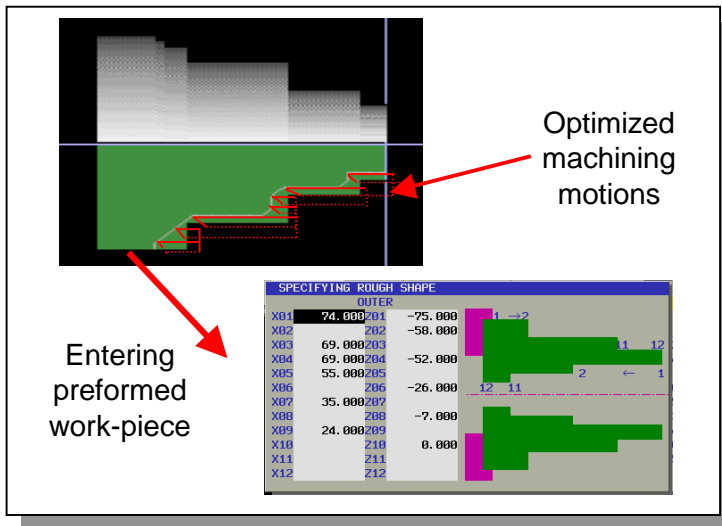


- Grooving (Standard / Trapezoidal)
- Threading (General / Metric / Unified / PT / PF)
- Necking (DIN509E / DIN76)
- Drilling (Center drilling / Drilling / Reaming / Boring / Tapping)



(Contour figure entering screen)

New features exclusively designed for shop-floor operations (1)



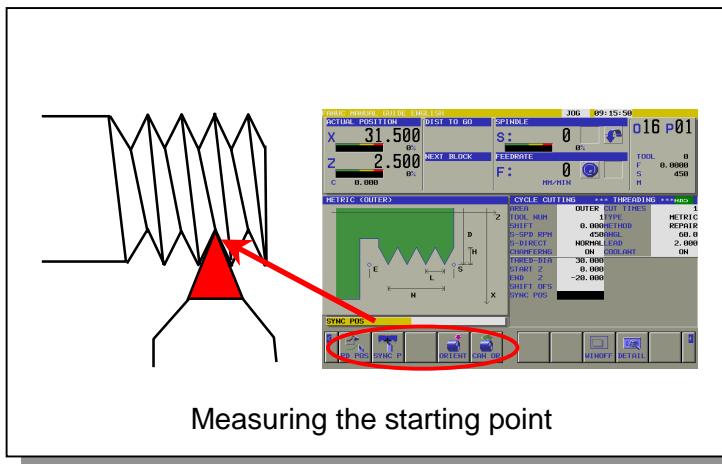
(Air Cut Canceling)

1. Air Cut Canceling function

- The optimized machining motions can be carried out automatically in accordance to the entered preformed work-piece figure data.
- Processing time can be reduced.

2. Thread Repair Cycle

- The starting point of threading can be measured by making a threading tool touch onto the actual thread.
- A broken thread can be repaired easily.



(Thread Repair Cycle)

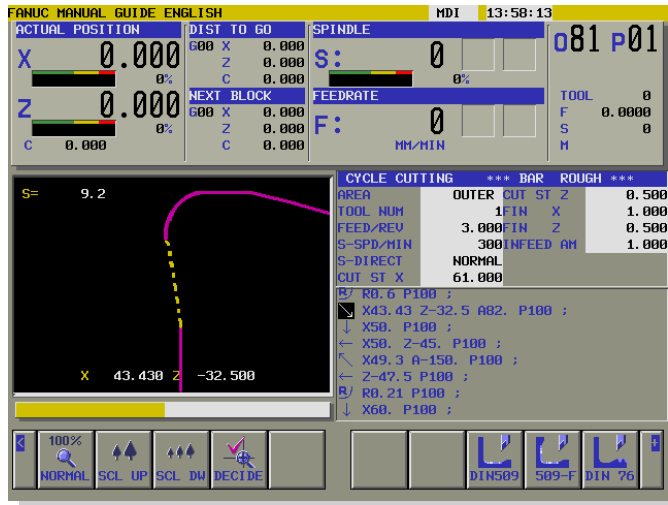
3. Necking cycles

- DIN509-F necking pattern can be input easily in addition to DIN509-E and DIN76.

4. Adaptation to work coordinate (G55-G59)

- G55-G59 work coordinate can be selected in addition to G54.

New features exclusively designed for shop-floor operations (2)



(Enlarging input contour)

5. Addition of contour enlarging function

- Detail of contour can be checked easily by enlarging.

6. Addition of a Process List for selecting a executing process

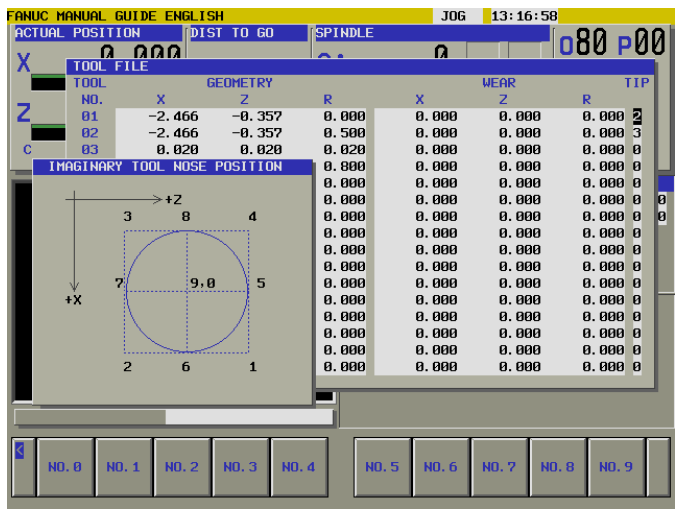
- Only finishing as the need arises after measuring can be executed.

7. Implementation of explanatory diagram

- Diagram explaining a position of imaginary tool nose was added.

8. Other improvement for operation

- A function to prevent selecting a wrong machining program was added.
- Zooming operation in animation screen was optimized.
- Positions for spindle orientation and the second reference can be set in initial screen.

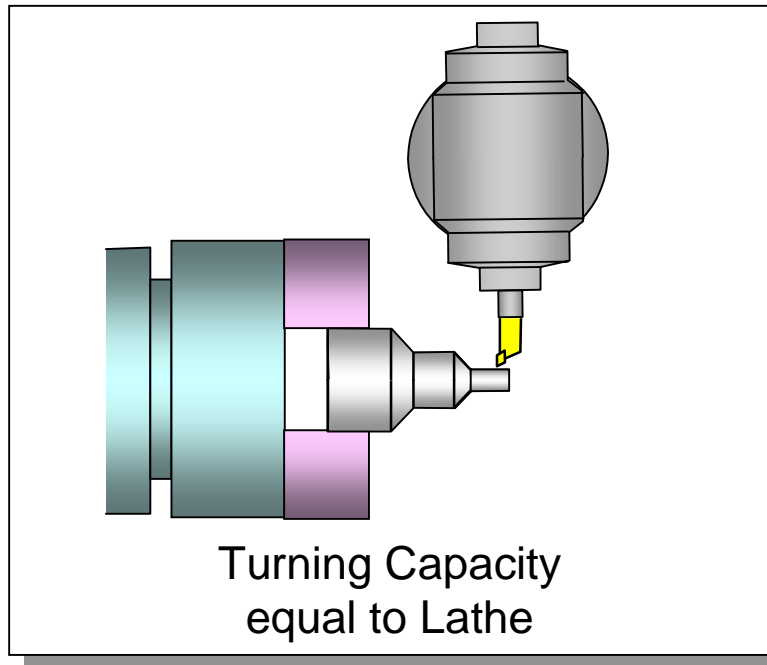


(Tool File window)

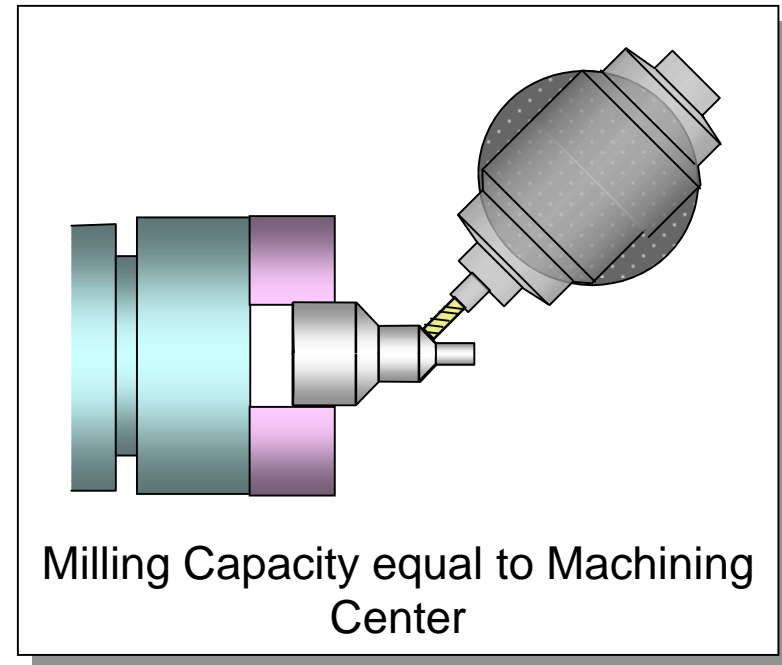
FANUC MANUAL GUIDE *i*
for Compound Machine

Operation Guidance for Compound Machine

Compound Machine



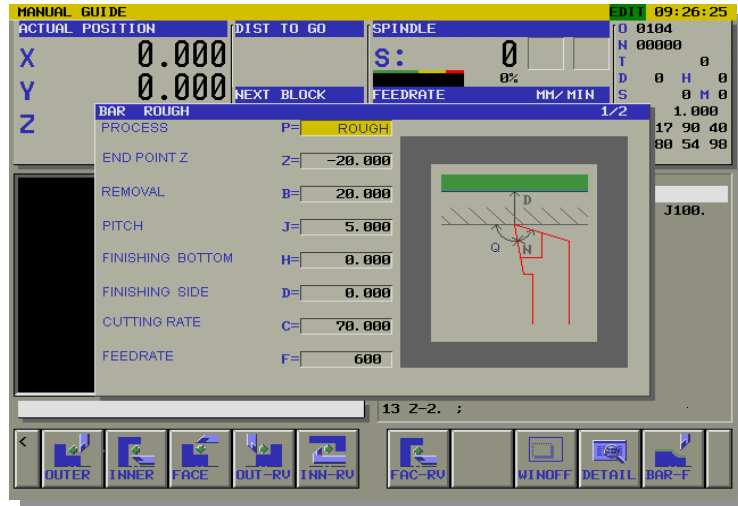
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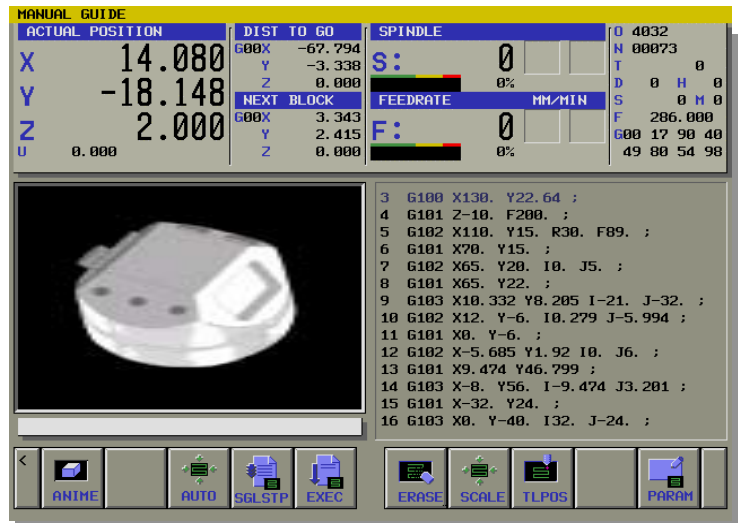
High efficient machining, but complicated operation

Simple operation with MANUAL GUIDE for Compound Machine

Accomplish simple operation on a Compound Machine



(Example of making a program)



(Example of machining simulation)

Applicable CNC : **FANUC** Series 16*i*/18*i* - TB
for compound machining function

● Relief of the complicated operation

- Display and operations were integrated to one screen.
- Offset data, Work coordinate system
- Current position, G/M/S/T-code display

● Easy making of machining program

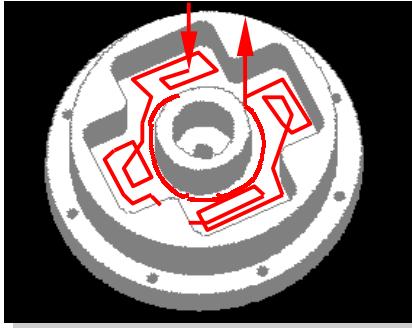
- Operator can make program easily in dialogue form without knowledge for turning and milling.

● Easy checking of machining program

- Realistic drawing both of turning and milling with 3-D solid model is available.
- Milling on a slanted surface can be simulated.
- Cutter mark according to a tool tip shape can be expressed.

Support whole machining and turning facilities

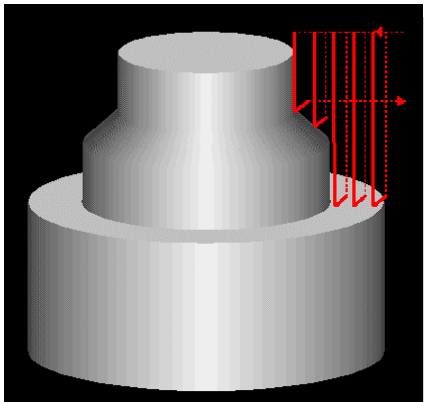
Milling Cycles



(Tool path of Contour Pocketing)

- Contour machining (Side wall, Pocket, Groove)
- Hole Machining (Center drilling, Drilling, Reaming, Boring, Tapping)
- Hole pattern (Points, Line, Arc, Circle, Square, Grid)
- Facing (Square, Circle)
- Side cutting (Square, Circle, Track, One side)
- Pocketing (Square, Circle, Track, Groove)
 - Note) All of the above can be done also on a slanted surface
- Measuring (Centering/Product measuring for turning/milling)

Turning Cycles



(Tool path of Bar Roughing)

- Bar machining (Roughing)
- Bar machining (Finishing)
- Threading
- Grooving (Normal, Trapezoidal)
- Hole machining for lathe (Center drilling, Drilling, Reaming, Boring, Tapping)
- C-axis hole machining
- C-axis grooving
- C-axis cylindrical machining