

# CAPSturn™

Software for cycle time reduction and programming



For CNC Turning centers

# CAPSturn cuts your costs

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## **Reduce cycle time**

Specially designed to generate minimal cycle time programs

## **Reduce machine downtime**

For dry runs, program entry, program editing and correction

## **Reduce part rejections**

During tryouts

## **Reduce programming time**

First-time-right programs, fast

## **Reduce tool cost**

Efficient and appropriate tool paths

## **Reduce damage to machine**

Eliminate accidents, spindle overuse

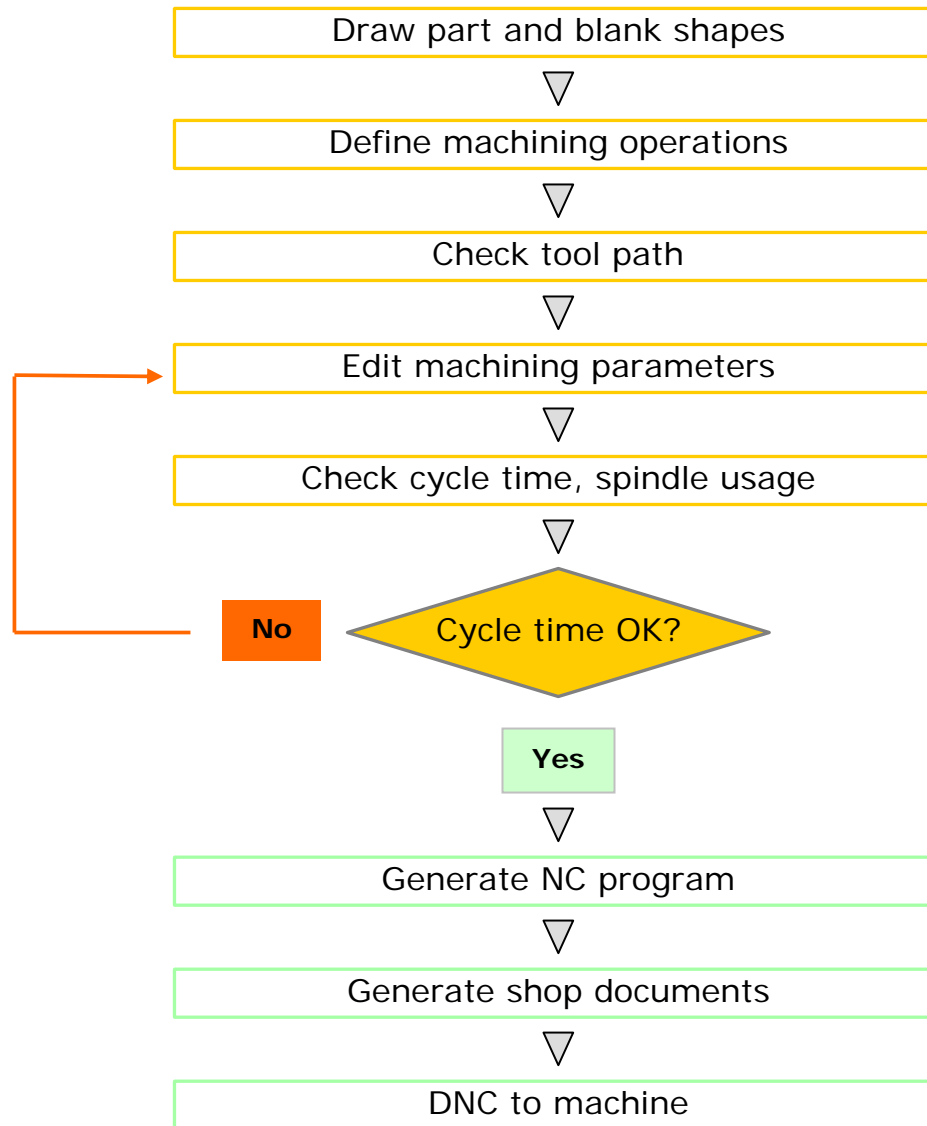
## **Reduce documentation time**

Shop documents generated automatically

## **Reduce skill level of programmer**

Does not need an engineer - a machinist can do the programming

# How CAPSturn works



# Conversational software

No CNC programming knowledge needed – just machining knowledge.  
Training time is typically 2 – 4 hours.

Reduce programming time  
Reduce skill level of programmer

The image displays three overlapping dialog boxes from a conversational CNC software interface:

- Worksetup:** Contains fields for Units (MM/Inch), Workpiece material (Steels, free-cutting, TS 400-700 N/mm2), Holding (External/Internal), Part load + unload time (0 seconds), Limiting spindle speed (3000 rpm), and Jaw position absolute Z (-35). It also features a 3D model of a part with dimensions for Clearance Z (5), Clearance ID (25), and Clearance (100).
- Drill:** Shows Drilling and Advanced settings tabs. The Operation name is Drill. It includes a 3D diagram of a drill bit with labels for Work face, Safe approach distance, Hole diameter, and Tool tip diameter. Fields include Tool axis X coordinate (0), Cutting speed (8 m/min), Feed rate, and Return to Z after this operation.
- Parting:** Shows Parting and Advanced settings tabs. The Operation name is Parting. It includes a 3D diagram of a parting tool with labels for Parting start diameter (99.74095), Parting end diameter (0), and Overshoot (1). Fields include Safe approach distance (2), Pecking required? (unchecked), Peck depth (0), Parting type (selected), Chamfer/Radius value (2), Diameter for reduced feed rate, Constant cutting speed ON? (checked), Cutting speed (125 m/min), Feed rate (0.25 mm/rev), and Reduced feed rate = 0.7 x Feed rate.

# Automatic cutting parameters selection

Eliminates a big cause of low cycle times – poor FS selection.  
Reduces tool wear caused by poor FS selection.

Reduce cycle time

Reduce tool cost

Reduce skill level of programmer

**Contour turn**

Operation name: Contour turn

Safe approach distance: X 0.5, Z 2

Finish allowance: X 0.3, Z 0.3

Process:  Roughing,  Finishing

Depth of cut: 1.5

Constant cutting speed ON?:

Omit undercuts?:

Nose radius compensation:  Left,  Right,  By Software

**Roughing parameters**

Cutting speed: 150 m/min

Feed rate: 0.179 mm/rev

**Finishing parameters**

Cutting speed: 0 m/min

Feed rate: 0.179 mm/rev

Buttons: Save as default, OK, Cancel, Help, Advanced >>

**Surface finish**

Surface finish ( Ra ): 0.99 microns

Calculated feed rate: 0.1786 m/min

Buttons: OK, Cancel, Help

**Cutting parameters**

Workpiece material

- Cast iron, alloy, medium hardness
- Cast iron, high-alloy, difficult to machine
- Cast iron, low-alloy, low hardness
- Cast iron, non-alloy, medium hardness
- Non-Fe mats, Al >16% Si, Aluminium bronze, cupro-nickel
- Non-Fe mats, free cutting, Al < 16% Si, Brass, Zn, Mg

Cutting speed: 139

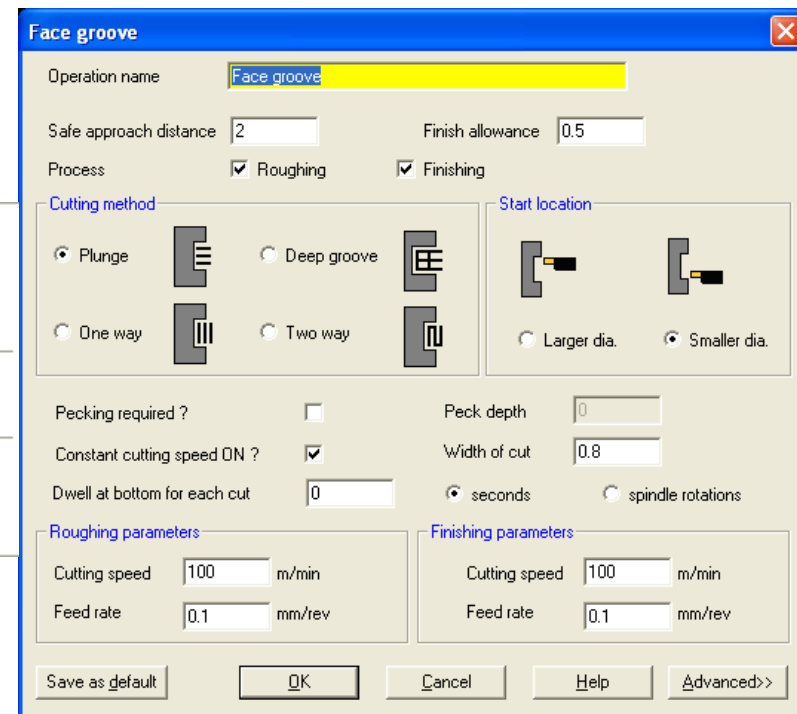
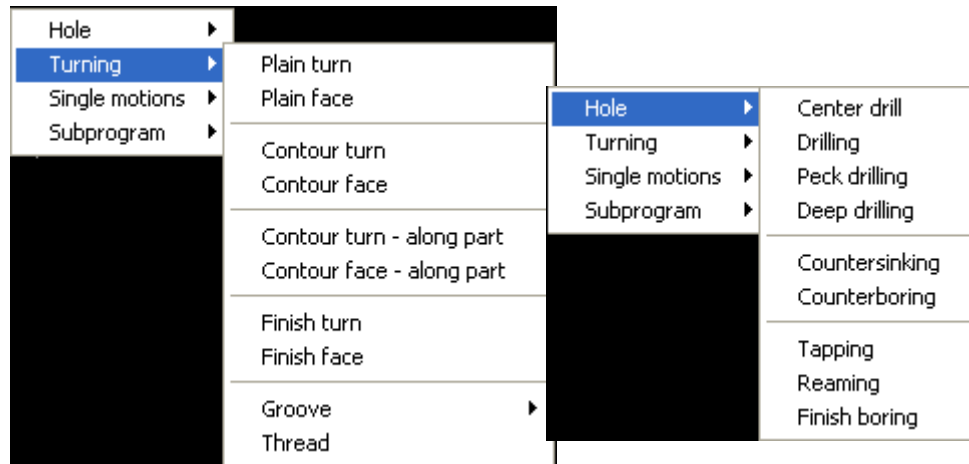
Feed rate: 0.3

Buttons: Done, Help

# Wide variety of operations with unique tool paths

Eliminates a big cause of low cycle times – inefficient tool paths.  
Improves tool life because of proper usage.

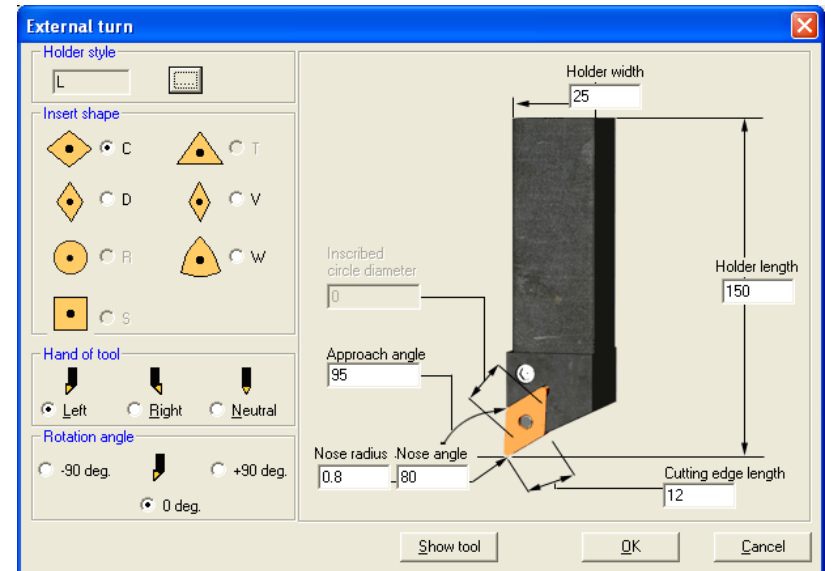
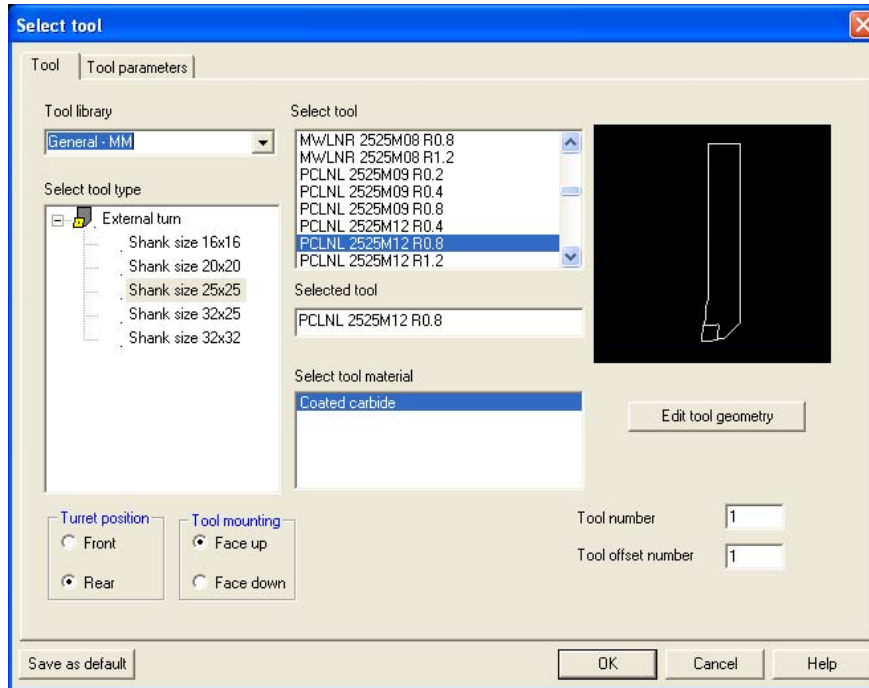
- Reduce cycle time
- Reduce tool cost
- Reduce programming time
- Reduce skill level of programmer



# Tool selection expert system

Suggests appropriate tools based on operation being performed.  
Spindle direction is automatically decided – eliminates a big cause of errors.  
Eliminates dry run to check for such errors.

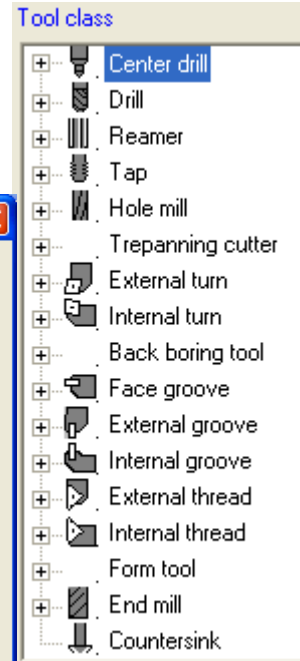
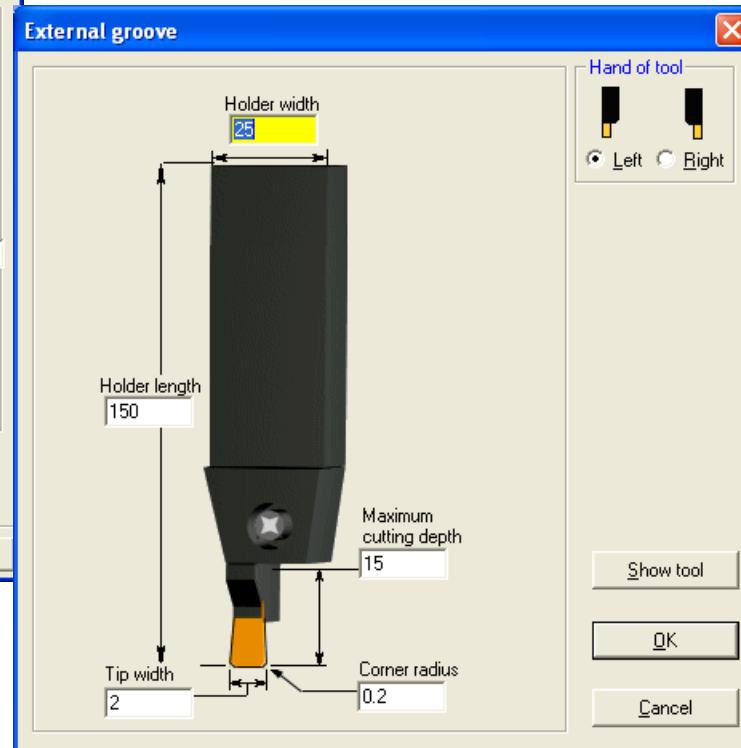
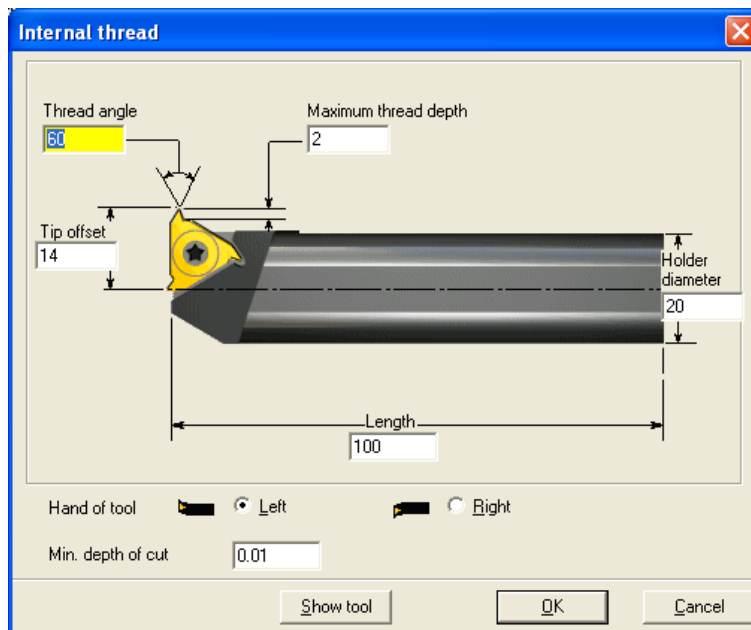
Reduce machine downtime  
Reduce programming time  
Reduce skill level of programmer



# Tools database

Extensive library of tools commonly used in machining.  
Can be configured by the user.  
Tools can be classified according to manufacturer.

Reduce machine downtime  
Reduce skill level of programmer

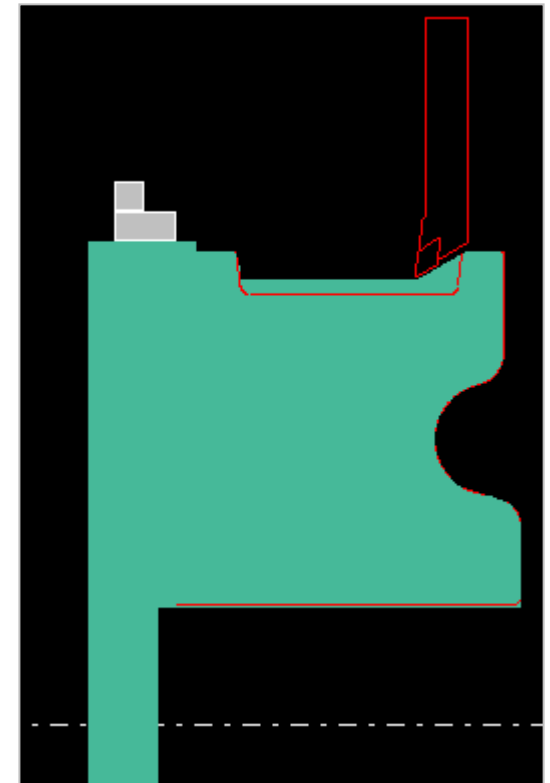
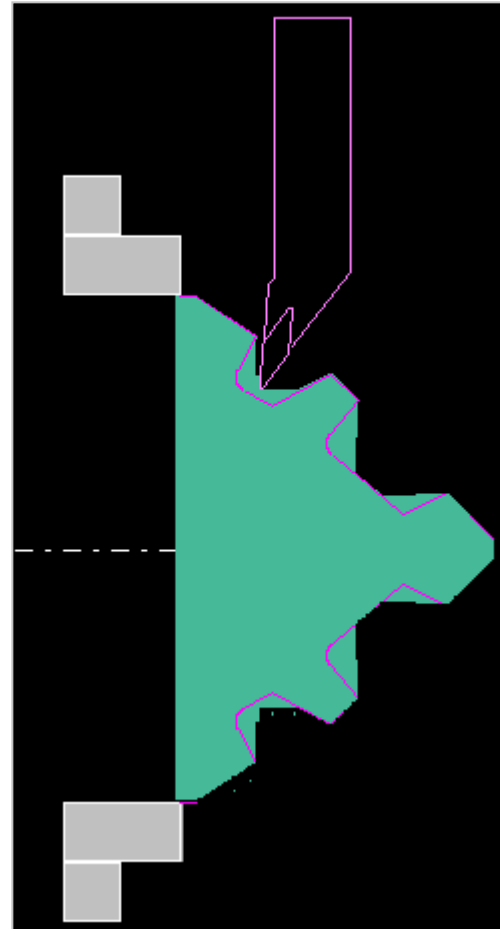




# Automatic tool gouge prevention

Tool removes only whatever material it can, does not gouge into part.  
Reduces cycle time - you can use roughing tools to the maximum.

- Reduce cycle time
- Reduce machine downtime
- Reduce tool cost
- Reduce damage to machine
- Reduce skill level of programmer



# Cycle time calculation

Extremely accurate cycle time – less than 1 % error.  
 Try out many process options, decide on the one with least cycle time.  
 Generates printable cycle time sheet.

Reduce cycle time

Reduce documentation time

Reduce skill level of programmer

Cycle time sheet												
Machine name		Fanuc 0iT		Workpiece material		Cast iron, low-alloy, low hardness						
Part number		2		Fixture		Chuck						
Part name		Sample-mm-02		Programmer		SENTHIL						
Date		07 May 2008		Set up number		1						
Sl. no.	Operation	Tool	Tool no.	Cutting speed		Feed rate		Cut length	Cutting time	TC time	Rapid time	Total time
				m/min	RPM	mm/min	mm/rev					
1	Plain face	PCLNL 2525M12 R0.8	1	200.0	CSS	0.00	0.358	117.00	.30	.02	.03	0.35
2	Contour OD turn	PCLNL 2525M12 R0.8	1	200.0	795	284.61	0.358	1049.69	3.69	.00	.09	3.78
3	Drilling	12.7 mm Insert drill	2	60.0	636	95.49	0.150	117.00	1.23	.02	.02	1.27
4	Groove 1	25x25, 2.00W, 0.20R,	3	120.0	CSS	0.00	0.120	27.02	.51	.02	.04	0.57
5	Finish turn	PDJNL 2525M15 R0.4	5	220.0	CSS	0.00	0.179	198.74	1.23	.02	.01	1.26
6	M38 thread	Thread dia. 20.0, 60 deg.,	6	100.0	838	1676.0	2.000	729.61	.44	.02	.09	0.55

<b>Summary</b>		
Total cutting time	:	7.39
Total tool change time	:	0.08
Total rapid motion time	:	0.30
Total miscellaneous time	:	0.34
<b>Total cycle time</b>		<b>8.11</b>

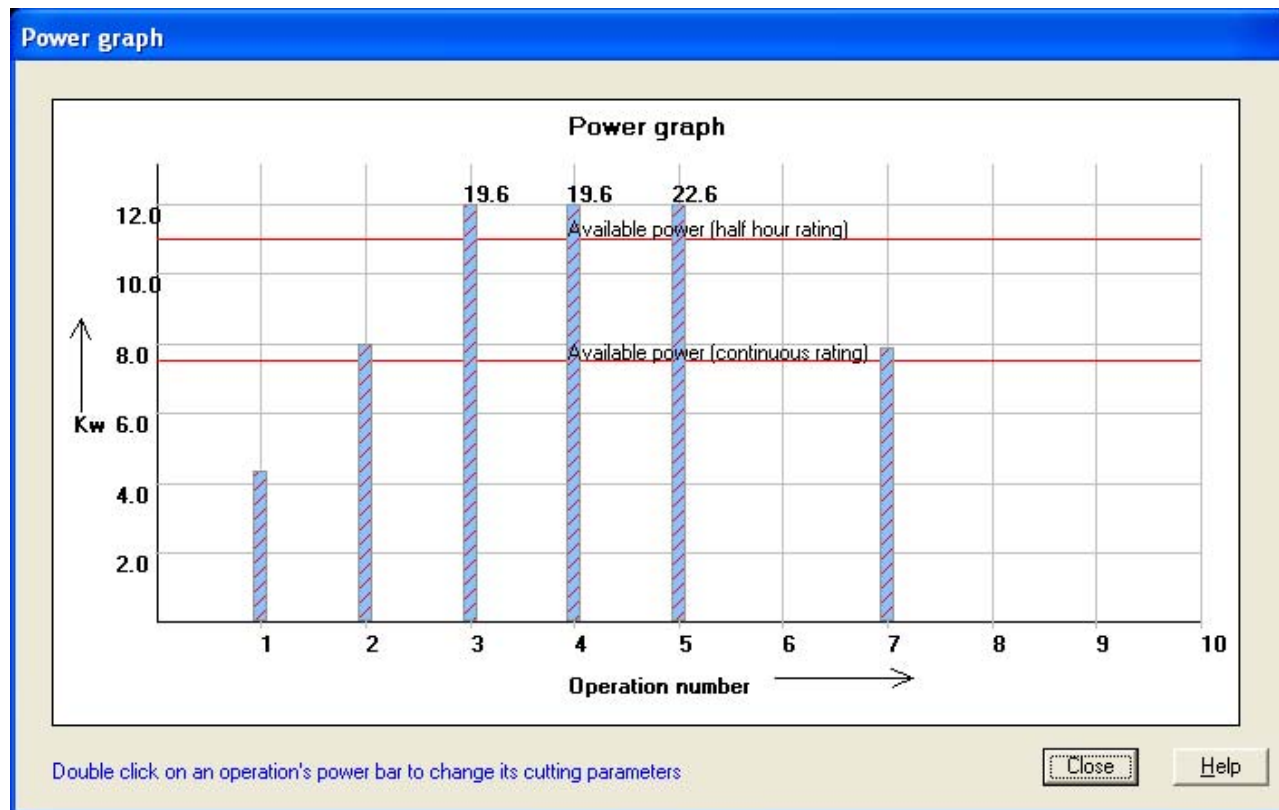
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# Spindle power graph

Check if you are using the available spindle power to the maximum.  
Check if you are over-using the spindle.

Reduce cycle time

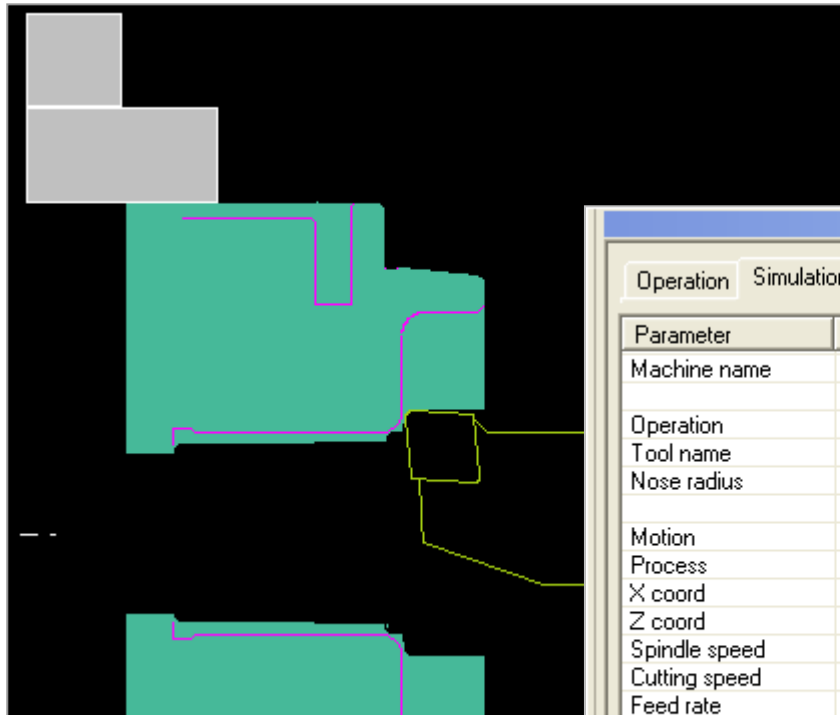
Reduce damage to machine



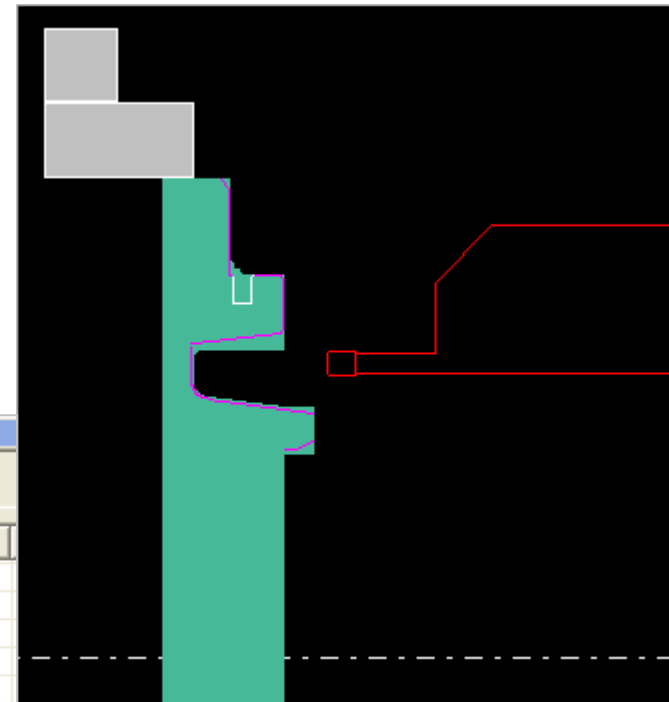
# Highly effective tool path simulation

Variety of simulation options - Zoom, pan, single block, tool-wise, auto  
Dynamic tool position and parameter display.  
Eliminates dry run, rejections and accidents.

Reduce machine downtime  
Reduce part rejections  
Reduce damage to machine



Operation Simulation	
Parameter	Parameter
Machine name	Fanuc-OTC
Operation	Contour turn
Tool name	S20S SCLCL 09 R0.8
Nose radius	0.8000 mm
Motion	Linear
Process	Rough
X coord	32.5000
Z coord	-10.7000
Spindle speed	3000.0000 rpm
Cutting speed	150.0000 m/min
Feed rate	0.1790 mm/rev
Spindle status	CCW
Operation time	0.21672 min
Total time	0.92803 min



# Efficient, fully documented programs

Easy to understand because of extensive comments  
Has canned cycles, nose radius compensation commands  
No editing required on machine.  
Build your own machine-specific program format, easily.

Reduce programming time  
Reduce machine downtime  
Reduce skill level of programmer

General program format

Program format 1 | Program format 2 | Tool and offsets | Tool motions | Subprogram

Text at start of program file

Text at end of program file

Text at start of sub program file

Text at end of sub program file

Output decimal point ?  Yes  No

Output decimal point always ?  Yes  No

Character for decimal point

Replacement character for space

Maximum number of blocks in program

Maximum number of characters in program

Maximum number of characters in block

Output rapid feed rate ?  Yes  No

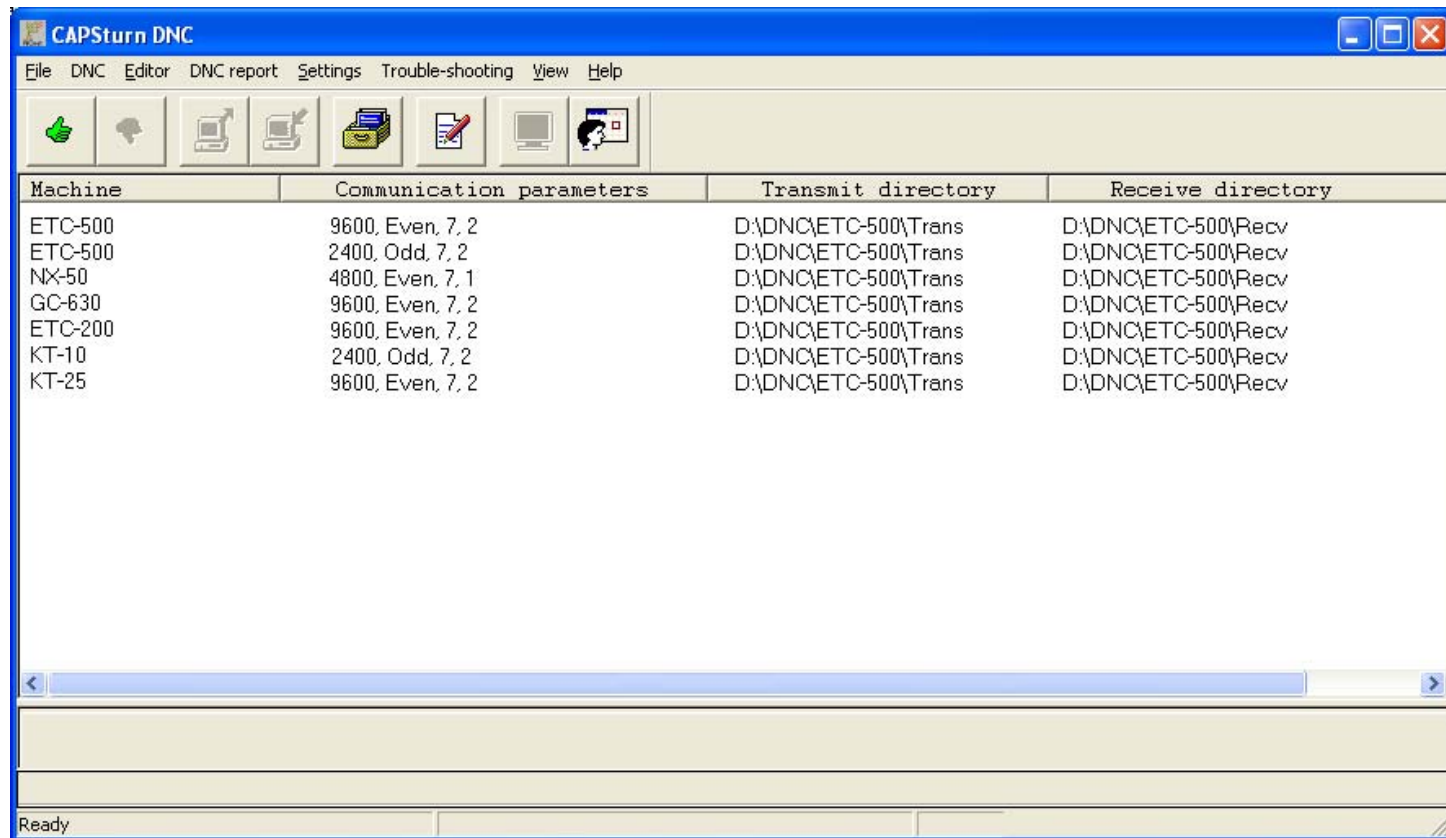
OK Cancel Help

```
O1234
(PART NAME           :SAMPLE-MM-02)
(PART NUMBER        :2)
(SET UP NO.         :1)
(PROGRAMMER NAME    :CADEM)
(DATE               :03-06-2009)
G54
N1 GO X400.0 Z200.0 T00
T0101 (PCLNL 2525M12 R0.8)
G54
G92 S3000
G96 S200 M04
(PLAIN FACE)
X114. Z7. M08
G72 U3. R0.5
G72 P25 Q40 U0. W0.5 FO.358
N25 GO Z0.
N30 G01 X110. Z0.
N35 X-3.
N40 Z5.
GO X114.
(CONTOUR TURN)
Z2.5
G97 S795
G71 U3. R0.5
G71 P45 Q130 U1. W0.2 FO.358
N45 G00 X49.2
N50 G01 X49.2 Z0.5
```

# DNC

Inbuilt DNC eliminates program entry time

Reduce machine downtime



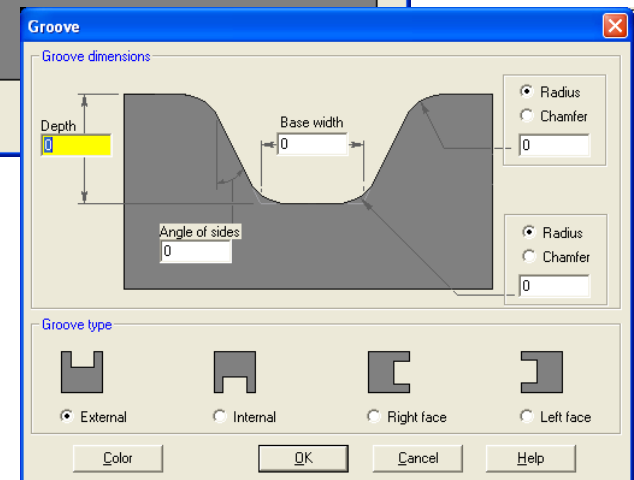
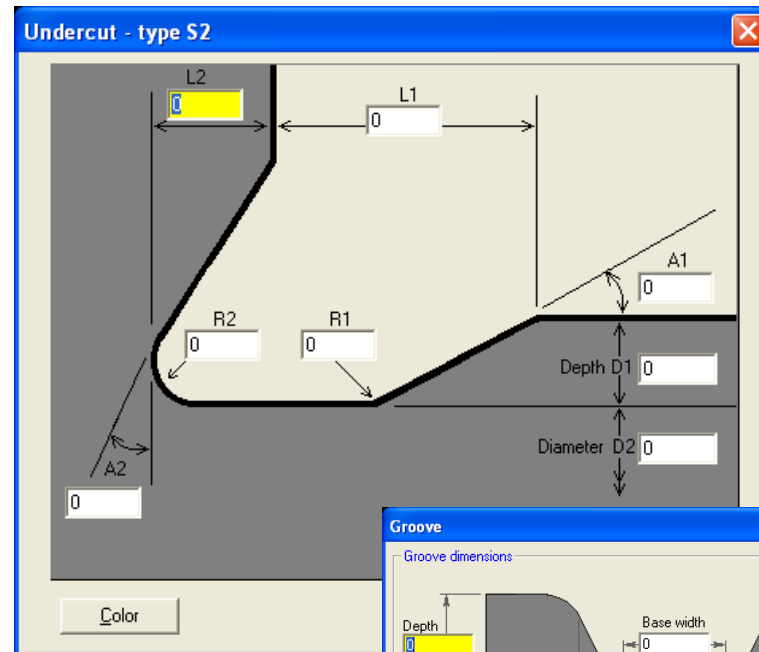
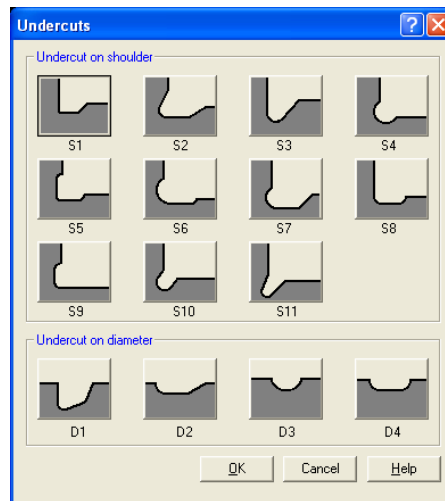
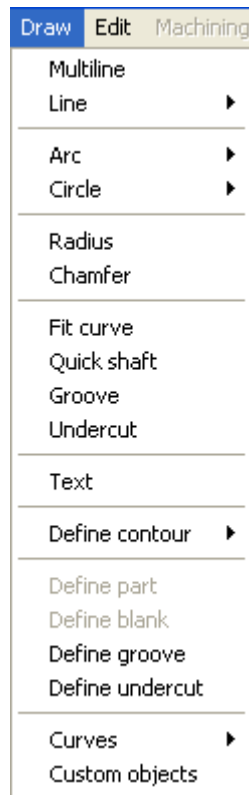
The screenshot shows the CAPSturn DNC software window. The title bar reads "CAPSturn DNC". The menu bar includes "File", "DNC", "Editor", "DNC report", "Settings", "Trouble-shooting", "View", and "Help". Below the menu bar is a toolbar with icons for a thumbs up, thumbs down, a printer, a document with a pencil, a monitor, and a help icon. The main area contains a table with four columns: "Machine", "Communication parameters", "Transmit directory", and "Receive directory". The table lists configurations for several machines, including ETC-500, NX-50, GC-630, ETC-200, KT-10, and KT-25. The status bar at the bottom left shows "Ready".

Machine	Communication parameters	Transmit directory	Receive directory
ETC-500	9600, Even, 7, 2	D:\DNC\ETC-500\Trans	D:\DNC\ETC-500\Recv
ETC-500	2400, Odd, 7, 2	D:\DNC\ETC-500\Trans	D:\DNC\ETC-500\Recv
NX-50	4800, Even, 7, 1	D:\DNC\ETC-500\Trans	D:\DNC\ETC-500\Recv
GC-630	9600, Even, 7, 2	D:\DNC\ETC-500\Trans	D:\DNC\ETC-500\Recv
ETC-200	9600, Even, 7, 2	D:\DNC\ETC-500\Trans	D:\DNC\ETC-500\Recv
KT-10	2400, Odd, 7, 2	D:\DNC\ETC-500\Trans	D:\DNC\ETC-500\Recv
KT-25	9600, Even, 7, 2	D:\DNC\ETC-500\Trans	D:\DNC\ETC-500\Recv

# CAD for turning

Special functions for quick definition of parts  
Can import part and raw material shapes from CAD software

Reduce programming time  
Reduce skill level of programmer

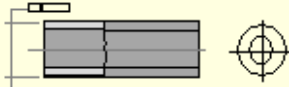


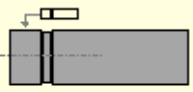
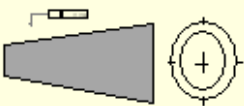
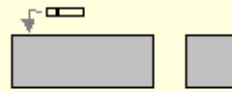
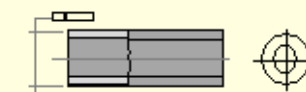
# Machining expert

Quick reference for machining data  
Diagnostics for machining problems

Reduce programming time  
Reduce skill level of programmer

## Geometrical accuracy definitions

Symbol	Meaning	Indication on the drawing
—	Straightness	
▱	Flatness	
○	Circularity	
∅	Cylindricity	



## Tolerances

### Basic hole



Diameter steps in mm		H6	H7	H8	H9	H11
Over	Upto					
1	3	+6 0	+10 0	+14 0	+25 0	+60 0
3	6	+8 0	+12 0	+18 0	+30 0	+75 0

## Tool and F-S selection

### ISO material classification

<b>P</b>	Steel	Blue
<b>M</b>	Stainless steel	Yellow
<b>K</b>	Cast Iron	Red

### Application classification

F: Finishing. Low depth of cut, low feed rate

Typical Depth of cut = 0.2- 0.8 mm., Feed rate = 0.2 mm/rev., Nose radius = 0.2 mm.

M: Medium rough machining. Single pass machining of casting / forging

Typical Depth of cut = 0.8- 3 mm., Feed rate = 0.3 mm/rev., Nose radius = 0.4 mm.

R: Rough machining.

Typical Depth of cut = 3- 7 mm., Feed rate = 0.5 mm/rev., Nose radius = 0.8 mm.

### Procedure



	F	M	R
P			
M			
K			

### Select insert shape

Negative insert for general

Positive insert for turning

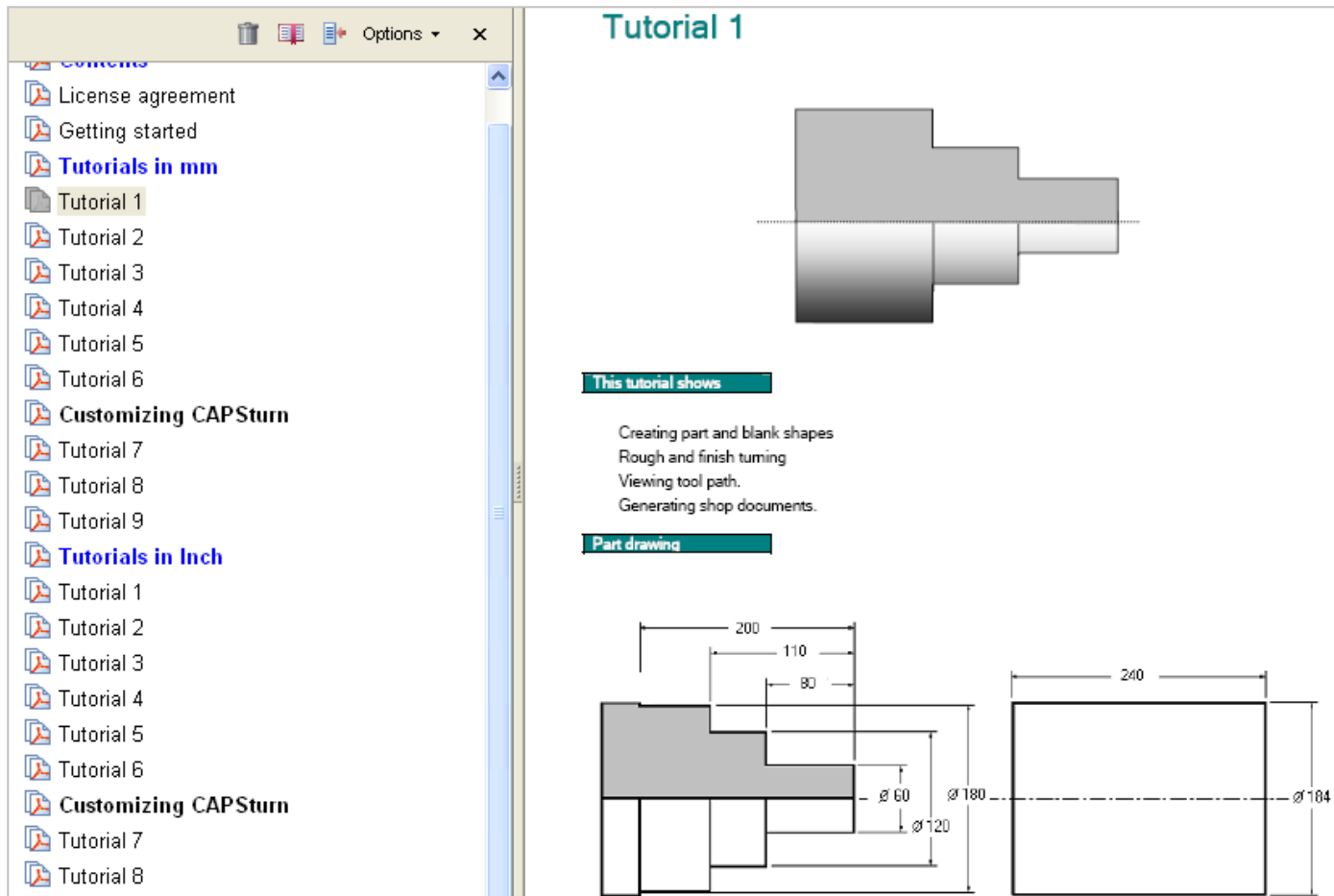
Select insert grade and



# Tutorials

Cover all aspects of the software  
Enable you to learn the software yourself, in 2 to 4 hours.

Reduce skill level of programmer



The screenshot displays a software interface with a left-hand navigation pane and a main content area. The navigation pane lists various tutorial topics, including 'License agreement', 'Getting started', 'Tutorials in mm', 'Tutorial 1' (highlighted), 'Tutorial 2' through 'Tutorial 6', 'Customizing CAPSturn', 'Tutorial 7' through 'Tutorial 9', 'Tutorials in Inch', and 'Tutorial 1' through 'Tutorial 8'. The main content area is titled 'Tutorial 1' and features a 3D model of a stepped shaft. Below the model, a text box titled 'This tutorial shows' lists the following topics: 'Creating part and blank shapes', 'Rough and finish turning', 'Viewing tool path.', and 'Generating shop documents.'. A second text box titled 'Part drawing' shows two technical drawings of the shaft. The left drawing is a side view with dimensions: a total length of 200, a diameter of  $\varnothing 180$  for the first section, a diameter of  $\varnothing 120$  for the second section, and a diameter of  $\varnothing 60$  for the third section. The right drawing is a front view with a diameter of  $\varnothing 184$  and a length of 200.

# Shop floor documentation – automatic

Use in shop floor, file away for future reference.

Tools list – can be given to operator for tool setting

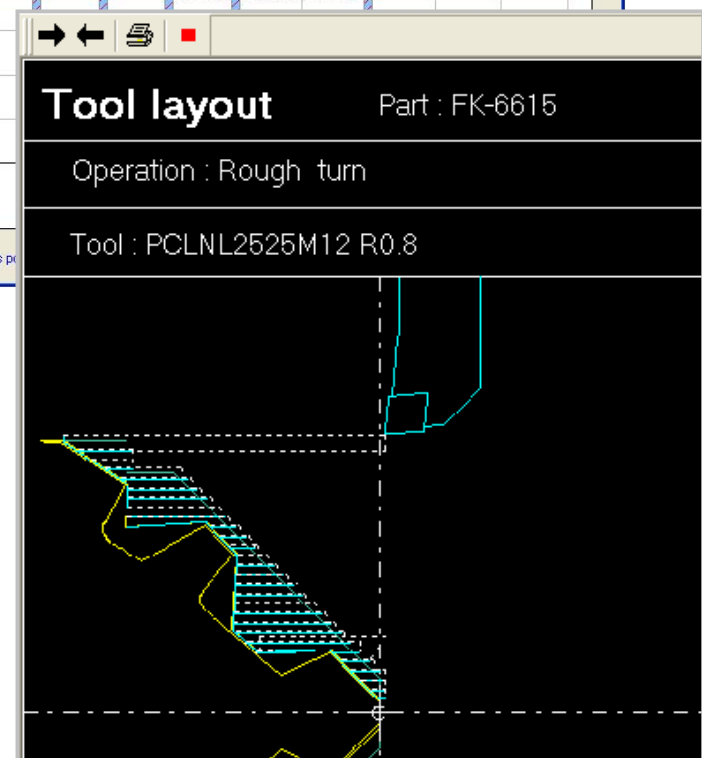
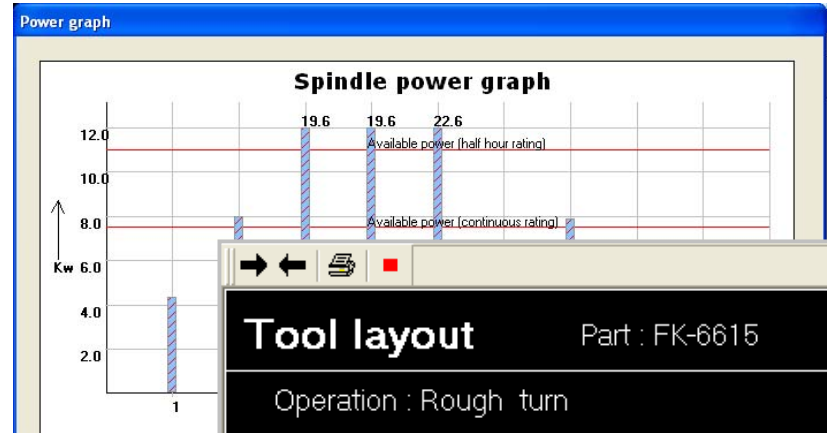
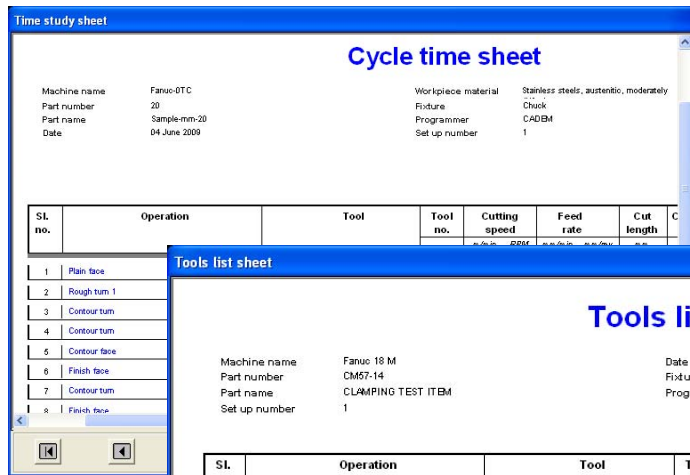
Tool layout sheet - graphical details of each operation.

Eliminates errors in information flow to shop floor.

Reduce machine downtime

Reduce documentation time

Reduce skill level of programmer



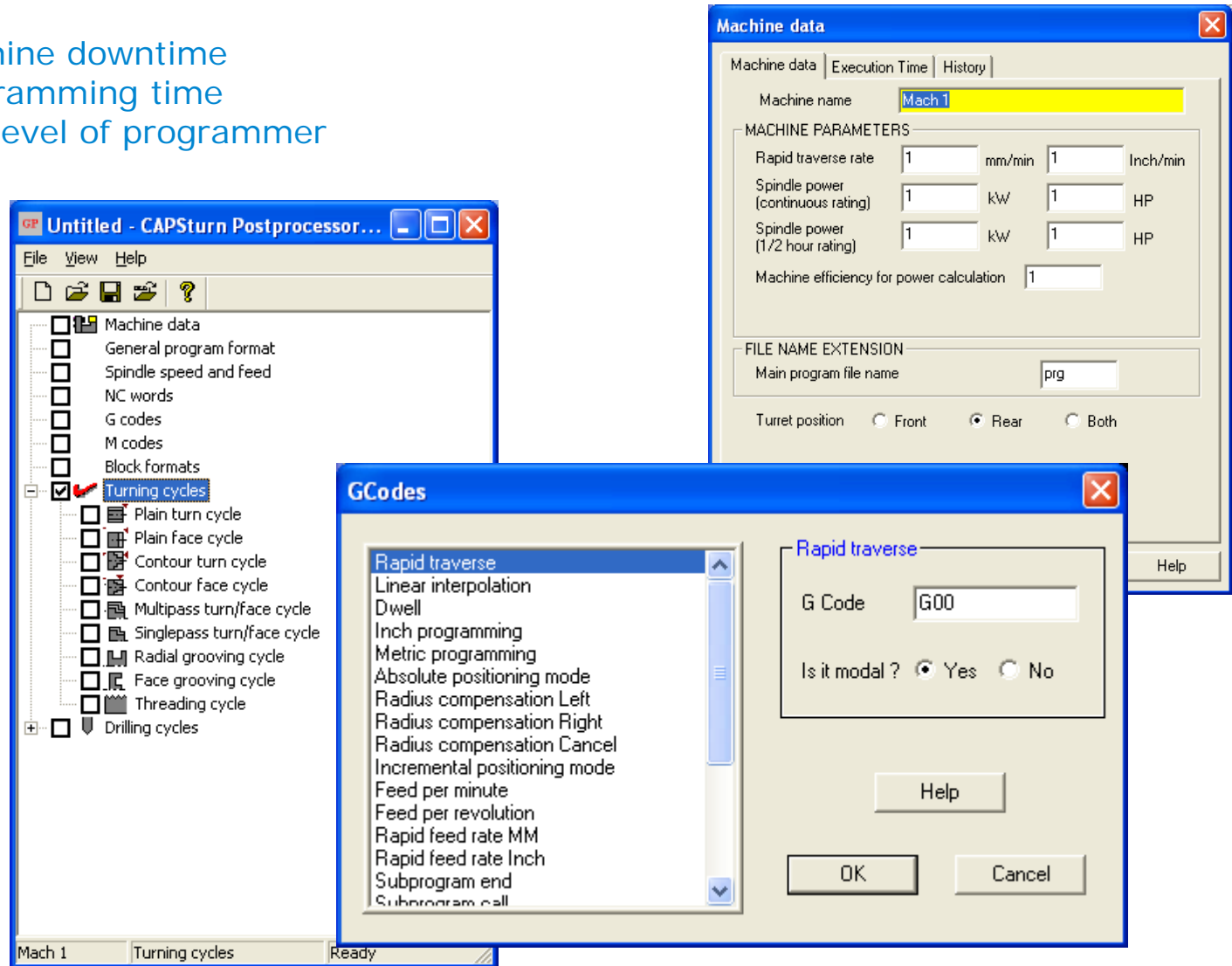
**Tools list**

Sl. no.	Operation	Tool	Tool no.	Length offset no.	Length offset mm.	Radius offset no.
1	Rough Face mill	80.00 mm. dia. round insert -	15			
2	Rough Pock et milling01	13.00 mm. dia. End	2			
3	Rough Pock et milling02	13.00 mm. dia. End	2			
4	Rough Side milling - contour	20.00 mm. dia. End	7			
5	Side milling-Rough	20.00 mm. dia. End	7			
6	Side milling-Rough	20.00 mm. dia. End	7			
7	Side milling-Rough	20.00 mm. dia. End	7			
8	Side milling-Rough	20.00 mm. dia. End	7			
9	Side milling-Rough	20.00 mm. dia. End	7			
10	Side milling-Rough	20.00 mm. dia. End	7			
11	RoughPock et milling - Hexagon	8.00 mm. dia. End	8			
12	RoughPock et milling - Slot	8.00 mm. dia. End	8			
13	Side slot mill	10.50 mm. dia. T-slot mill	11			

# Generic postprocessor

Makes posts to suit your machine and style of programming.  
Conversational, very easy to use.

- Reduce machine downtime
- Reduce programming time
- Reduce skill level of programmer



# Summary of features and benefits

Benefit	Features that enable the benefit
Reduce cycle time	Auto FS selection, Unique tool paths, Tool selection expert, Cycle time calculation, Spindle power graph
Reduce machine downtime	Tool path simulation, Tools database, Tool selection expert, Auto documentation, DNC
Reduce part rejections	Tool path simulation, Tool selection expert, Auto FS selection
Reduce programming time	Conversational screens, Tool selection expert, Auto tool gouge prevention, Tools database, Auto FS selection
Reduce tool cost	Auto FS selection, Unique tool paths, Tool selection expert
Reduce damage to machine	Auto tool gouge prevention, Tool selection expert, Tool path simulation, Spindle power graph, Auto FS selection
Reduce documentation time	Auto documentation
Reduce skill level of programmer	Conversational screens, Auto FS selection, Tools database, Unique tool paths, Tool selection expert, Cycle time calculation, Auto documentation, Tutorials

# CADEM used by top companies



# CADEM endorsed by OEMs

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