

***Electron*** S.R.L.

Design  
Production &  
Trading of  
Educational  
Equipment

## B55 – CNC TRAINING MACHINES



# MODULAR TRAINING SYSTEM FOR THE STUDY OF CNC PRODUCTION SYSTEMS

Based on the latest technology components and are specially designed to be used in various training environments where new CNC operators, programmers and planners must be prepared or former ones need to be updated on the current state of the art. This approach meets the requirements of both Education and Industry at all levels.

The components are:

- . a Lathe
- . a Milling Machine
- . a PC Interface and Control Board
- . the Control Software Package and a PC (the PC is not included)

Altogether they constitute a inexpensive, flexible, easy to learn and use compact system and working with it is just like working with a full size, industry production machine.

Besides the automatic mode of operation under PC and program control, manual control is also possible to experience a more direct "feeling" of the machining operation.

The operator can execute "on board" a series of "macro" instruction and manual instructions, without the need of any connected PC. This is an important feature as it represents a usual procedure in industrial mechanical workshops, where it must be possible to modify the program "on time" without going back to the CAD-CAM program.

**The on board control, together with enhanced dimensions and use of brushless motor makes the proposed units "workshop oriented" and particularly suited for Mechanical technology courses in addition to Electrical/Electronic technology courses.**

## B5555 - CNC MILLING MACHINE



### General:

The unit is based on the latest technology components and is specially designed to be used in various training environments where new CNC operators, programmers and planners must be prepared, or former ones need to be updated on the current state of the art.

This approach meets the requirements of both Education and Industry at all levels.

The unit is workshop oriented and particularly suited for both Mechanical and Electronic technology training.

The components are:

- the Milling Machine
- an integrated Numerical Control
- a Control Software Package

Altogether they constitute an inexpensive, flexible, easy to learn and use compact system. Working with it is just like working with a full size, industry production machine.

Besides the automatic mode of operation under PC and program control, manual control is also possible to experience a more direct "feeling" of the machining operation.

The operator can execute "on board" a series of "macro" instruction and manual instructions, without the need of any connected PC. This is an important feature as it represents a usual procedure in industrial mechanical workshops, where it must be possible to modify the program "on time" without going back to the CAD-CAM program.

## The Milling machine

Excellent visibility of the working parts and the solid construction allows working with a great variety of materials, such as plastic and wood, and metals such as steel, aluminum and brass with strict tolerances.

Safety is ensured by sensing switches on all covers and an emergency mushroom button that turn all power off when they are operated. Also, various electrical and electronic features protect the working units from overloading.

The axes motors are DC stepping with bi-polar chopper drivers that allow simultaneous movement on the three axes.

The on board control, together with working area dimensions and use of brushless motor main drive, makes the proposed unit particularly suited for Mechanical technology courses in addition to Electrical/Electronic technology courses.

The unit is suitable to be integrated into FMS (Flexible Manufacturing System) and CIM (Computer Integrated Manufacturing System).

## Technical Specifications

X Axis travel (longitudinal)	260 mm
Y Axis travel (cross)	150 mm
Z Axis travel (vertical)	240 mm
Working table area	400x180 mm
Spindle to table distance	47-275 mm
Main drive motor	1 HP Brushless
Axes motors	DC stepping, 400 steps/rev
Axes motors drives	bi-polar chopper
Programmable spindle speed range	0-4000 rpm
Cross slide tables	
Screws with recirculation balls	
System resolution	0.005 mm
Mechanical resolution	0.01 mm
Programmable tool changer (optional)	6 positions (expandable to 8)
Dimensions:	1100 x 690 x 920 mm



## Numerical control

Integrated Sensitive NC GE ISO-FANUC standard with 6" retro illuminated display

The unit is based on a PLC and allows manual and local program controls of the mill or, via PC interface, can be connected to a PC running CAD/CAM programs. With manual controls it is possible to operate the mill from the keyboard.

PLC programs to be run on this unit are written by the user according to the ISO or ISO PARAMETRIC standards with fixed cycles or Macro programming.

CAD/CAM programs can be run on the optionally connected PC.

## General Functions of Numerical Control

- ISO standard and ISO PARAMETRIC programming
- Fixed cycle or macro programming
- Auto-learning programming
- RS 232 programming
- Programs receipt from post processor CAM
- Manual execution of fixed cycle directly from menu (keys with icon)
- Management of electronic hand-wheel
- Tool magazine or tool table
- 24 program origins
- Potentiometer control of axes override and chuck speed

## Specific Functions for Milling

- Control of speed and position spindle axes (rigid tapping)
- Fourth axis (C axis) for continuous rotary table



## Hardware features:

- Tight Keyboard
- 6" back-lighted LCD display
- Integrated PLC for user programming
- 6 opto-isolated analogue axes outputs ( $\pm 10 V_{DC}$ )
- 3 digital axes outputs (square waves, 12  $V_{DC}$ , PNP)
- 6 differential encoder input line drivers
- 2 opto-isolated analog inputs (0 to 10  $V_{DC}$ )
- Power on/off and emergency button
- 32 PNP opto-isolated digital inputs
- 20 PNP opto-isolated digital outputs
- RS232 port
- Optional floppy disk interface

## Power requirements

110/240  $V_{AC}$ , 50/60 Hz, single phase (3 phase supply is not required)

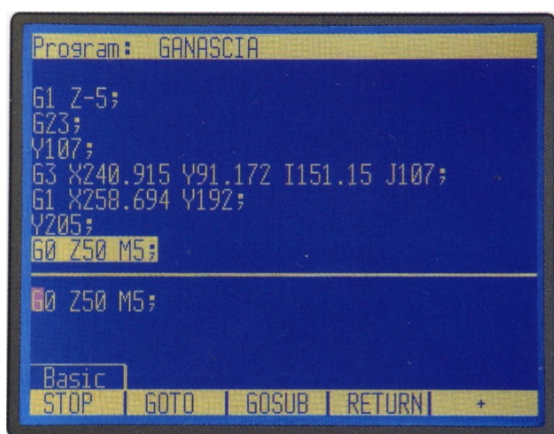
The compressor is not required as in our units we have replaced all pneumatic actuators with electrical actuators, to eliminate the workshop compressed air distribution.

## Software Package

The software B55SW includes ESPRIT SOLIDMILL, which is the ideal CAM software to operate the B5555 – CNC MILLING MACHINE.

ESPRIT SOLIDMILL can be used at three levels, TRADITIONAL, PRODUCTION and FREEFORM, with gradually increasing complexity.

The technical specifications of the 3 levels are described in the relevant section.



## Standard Tooling package B5555TP (other configurations on request)

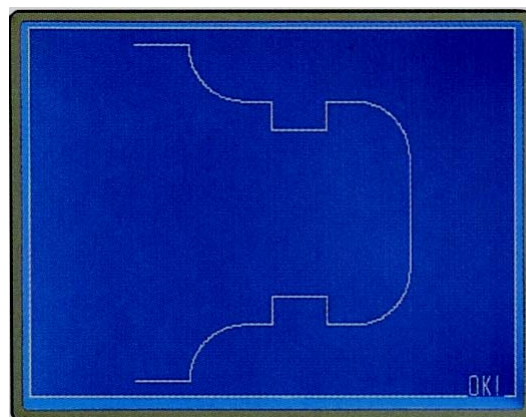
- Qty 6 Tool holders complete with pull stood
- Slot drill and mill 2 mm, 3mm, 4mm, 5mm, 6mm
- Set of end mills 4,6,8 and 10 mm
- Ball end mill HSS 6 mm
- Facing cutter
- Machine Vice
- Collets
- Angle milling cutter 45°
- Grooving milling cutter
- Internal grooving insert
- Facing cutter

## Included products:

- Numerical Control
- Starting tool set

## Optional products for system enhancement:

- Integrated automatic tool changer 6 stations B5555 TH6
- Cabinet base with lockable door B55 CB
- Refrigeration system B5555 R
- Tooling package B5555 TP
- PC (Personal Computer)
- CAD-CAM software package B55 SW
- Multi functional keyboard for imitation of original control panels of CNC tool machines B55 K
- PC Workstation bench B55WB



## Ordering code:

B5555 - CNC MILLING MACHINE

**DUE TO CONTINUOUS UPGRADING  
SPECIFICATION MAY CHANGE WITH NO  
DIFFERENCE IN THE EDUCATIONAL  
QUALITY AND VALUE OF THE PRODUCT**

## B5565 - CNC TRAINING LATHE



### General

The unit is based on the latest technology components and is specially designed to be used in various training environments where new CNC operators, programmers and planners must be prepared, or former ones need to be updated on the current state of the art.

This approach meets the requirements of both Education and Industry at all levels.

The unit is workshop oriented and particularly suited for both Mechanical and Electronic technology training.

The components are:

- the Lathe
- an integrated Numerical Control
- a Control Software Package

Altogether they constitute an inexpensive, flexible, easy to learn and use compact system. Working with it is just like working with a full size, industry production machine.

Besides the automatic mode of operation under PC and program control, manual control is also possible to experience a more direct "feeling" of the machining operation.

The operator can execute "on board" a series of "macro" instruction and manual instructions, without the need of any connected PC. This is an important feature as it represents a usual procedure in industrial mechanical workshops, where it must be possible to modify the program "on time" without going back to the CAD-CAM program.

## The Lathe

Its slant bed allows excellent visibility of the working parts and the solid construction allows working with a great variety of materials, such as plastic and wood, and metals such as steel, aluminum and brass with strict tolerances.

Safety is ensured by sensing switches on all covers and an emergency mushroom button that turn all power off when they are operated. Also, various electrical and electronic features protect the working units from overloading.

The axes motors are DC stepping with bi-polar chopper drivers that allow simultaneous movement on the two axes.

The on board control, together with working area dimensions and use of brushless motor main drive, makes the proposed unit particularly suited for Mechanical technology courses in addition to Electrical/Electronic technology courses.

The unit is suitable to be integrated into FMS (Flexible Manufacturing System) and CIM (Computer Integrated Manufacturing System).

## Technical Specifications:

X Axis travel	145 mm
Z Axis travel	230 mm
Distance between centers	315 mm
Swing over cross slide	80 mm
Spindle bored to pass (suitable for 80 mm chuck)	16 mm
Main drive motor	1 HP Brushless
Axes motors:	DC stepping, 400 steps/rev
Axes motor drives	bi-polar chopper
Continuously variable chuck speed	0-4000 rpm
Cross slide tables	
Screws with recirculation balls	
System resolution	0.005 mm
Mechanical resolution	0.01 mm
Programmable tool post (optional)	8
Dimensions	800x600x800 mm



## Numerical control

Integrated sensitive NC ISO-FANUC standard with 6" retro illuminated display

The unit is based on a PLC and allows manual and local program controls of the lathe or, via PC interface, can be connected to a PC running CAD/CAM programs.

With manual controls it is possible to operate the lathe from the keyboard.

PLC programs to be run on this unit are written by the user according to the ISO or ISO PARAMETRIC standards with fixed cycles or Macro programming.

CAD/CAM programs can be run on the optionally connected PC.

## General Functions of Numerical Control

- ISO standard and ISO PARAMETRIC programming
- Fixed cycle or macro programming
- Auto-learning programming
- RS 232 programming
- Programs receipt from post processor CAM
- Manual execution of fixed cycle directly from menu (keys with icon)
- Management of electronic hand-wheel
- Tool magazine or tool table
- 24 program origins
- Potentiometer control of axes override and chuck speed

## Specific Functions for Turning

- Control of speed and position spindle axes (rigid tapping)
- Position control of motorized tailstock



## Hardware features:

- Tight Keyboard
- 6" back-lighted LCD display
- Integrated PLC for user programming
- 6 opto-isolated analogue axes outputs ( $\pm 10 V_{DC}$ )
- 3 digital axes outputs (square waves, 12  $V_{DC}$ , PNP)
- 6 differential encoder input line drivers
- 2 opto-isolated analog inputs (0 to 10  $V_{DC}$ )
- Power on/off and emergency button
- 32 PNP opto-isolated digital inputs
- 20 PNP opto-isolated digital outputs
- RS232 port
- Optional floppy disk interface

## Power requirements

110/240  $V_{AC}$ , 50/60 Hz, single phase (3 phase supply is not required)

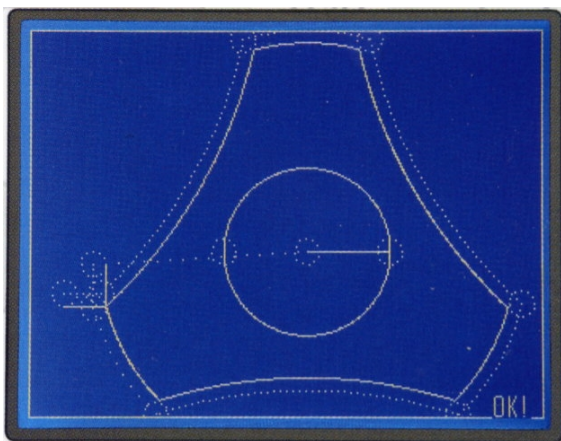
The compressor is not required as in our units we have replaced all pneumatic actuators with electrical actuators, to eliminate the workshop compressed air distribution.

## Software Package

The software B55SW includes ESPRIT SOLIDTURN, which is the ideal CAM software to operate the B5565 – CNC LATHE.

ESPRIT SOLIDTURN can be used at three levels, TRADITIONAL, ADVANCED and PRODUCTION, with gradually increasing complexity.

The technical specifications of the 3 levels are described in the relevant section.



## Standard Tooling package B5565TP (other configurations on request)

- LH turning
- RH turning
- Pack of 10 inserts for above
- Parting off plus 10 inserts
- External threading plus 10 inserts
- Boring bar plus 10 inserts
- Centre drill
- Set of 5 twist drills (2 to 6 mm diameter)

## Included products:

- Numerical Control
- Starting tool set

## Optional products for system enhancement:

- Integrated automatic tool post 8 stations B5565 TH
- Tailstock B5565T
- Standard Tooling package B5565 TP
- Starting material set
- Refrigeration system B5565 R
- Cabinet base with lockable door B55CB
- PC (Personal Computer)
- CAD-CAM software package B55 SW
- Multi functional keyboard for imitation of original control panels of CNC tool machines B55 K
- PC Workstation bench B55WB

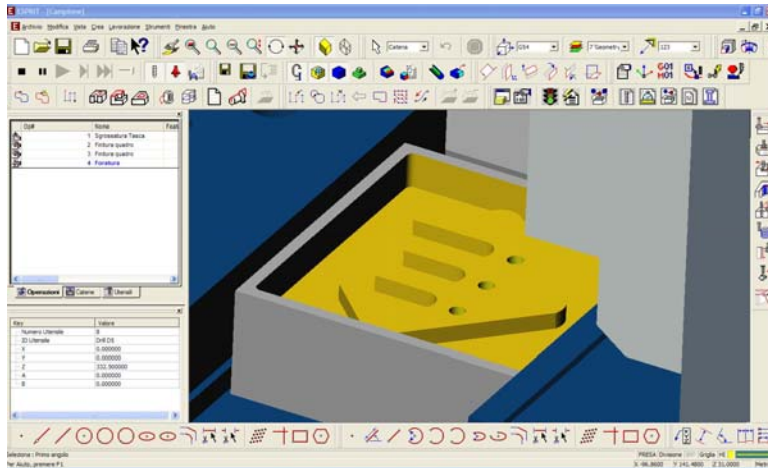


## Ordering code:

B5565 CNC LATHE

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# B55SW – ESPRIT SOLIDMILL + SOLIDTURN



## ESPRIT SOLIDMILL

The software B55SW includes ESPRIT SOLIDMILL, which is the ideal CAM software to operate the B5555 – CNC MILLING MACHINE.

ESPRIT SOLIDMILL can be used at three levels, TRADITIONAL, PRODUCTION and FREEFORM, with gradually increasing complexity.

The technical specifications of the 3 levels are described here below.

### ESPRIT SOLIDMILL TRADITIONAL

A CAM system for 2 1/2-axis programming, SolidMill Traditional delivers complete support for all machining cycles, including 2-1/2 axis machining, roughing, finishing, and all point-to-point canned cycles. This package also includes all the "core" functionality as described in the general specifications of the Product Overview brochure. The capabilities of SolidMill Traditional are included inside all the ESPRIT milling packages listed here.

- **CAM for 2½-axis milling**
- Feature Based Machining from any solid, surface, 3D wire frame model or 2D drawing automatically recognizing depth, thickness, holes, pockets, slots, profiles, etc.
- Extensive control over all cutting conditions
- Contour – profile cutting for roughing, slotting, semi-finishing, and finishing straight or tapered walls with constant or variable cutting depths

- Hole making cycles - drilling, peck drilling, boring, tapping and up to 13 other point to point machining cycles
- Face milling - climb, conventional and alternating zigzag
- Pocketing – concentric-in, concentric-out, bi-directional zigzag, one way zigzag with control over climb versus conventional cutting and straight or tapered walls.
- Spiral cutting – outside-in or inside-out cutting as a true spiral or tangent arcs
- Thread milling – internal or external climb or conventional thread cutting
- Library of standard tools - flat, ball nose, tapered, corner round, chamfered, and dovetail end mills. Face mill, thread mill, drill, center drill, reamer, tap, boring bar
- Library of standard holders - 30, 40, 45, 50, and 60 taper
- Unlimited custom tools and holders with any geometry
- Library for materials, speeds and feeds
- Knowledge Based Machining
  - Project Manager to organize your work with Feature tab, Operation tab, and Tool tab
  - Property Browser providing extensive control over all cutting conditions
  - Process Manager to machine one or more part features with one or more machining cycle(s) in one simple step
- Universal post processing with an extensive library and custom post generator
- Solid simulation and verification with comprehensive collision detection

## ESPRIT SOLIDMILL PRODUCTION

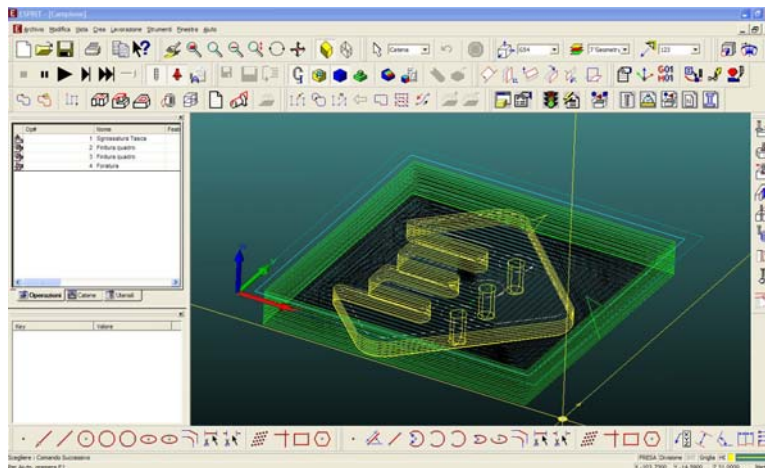
SolidMill Production includes all the capabilities of SolidMill Traditional and the “core” ESPRIT functionality with the additional support for 4th and 5th axis, giving you the ability to use any style 4/5-axis machine utilizing any combination of rotary axes, tilting heads, rotary tables.

- CAM for 5-axis milling (indexing and rotary cutting)
- Includes SolidMill Traditional plus:
- Rotary 4-axis simultaneous “Wrap” machining cycles
  - Contour - profile cutting for roughing, slotting, semi-finishing, and finishing straight or tapered walls with constant or variable cutting depths
  - Pocketing - concentric
  - Hole making - drilling, peck drilling, boring, tapping and up to 13 other point to point machining cycles
- 4th and 5th axis index positioning used in conjunction with any machining cycles
- Any style HMC and VMC rotary axes
- Using any combination rotary axes, tilting heads, and rotary tables
- Local or global coordinates with any number of workshifts and fixture offsets
- Solid simulation and verification in 5-axis
- Universal post processing for 5-axis

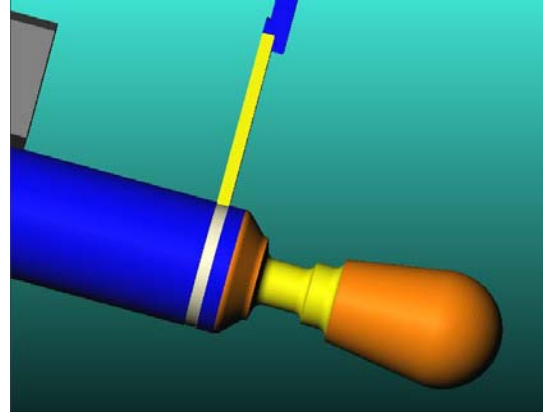
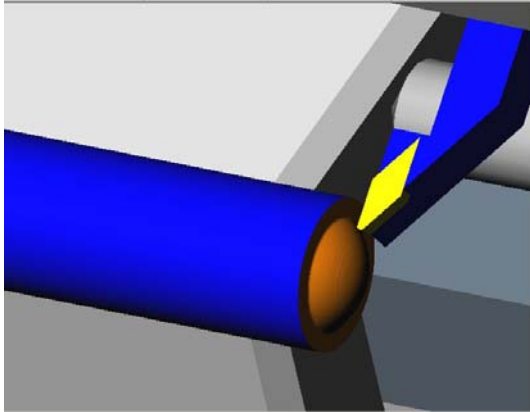
## ESPRIT SOLIDMILL FREEFORM

A full 3D CAM system for all your 3D surface and solid machining needs. SolidMill FreeForm includes all the functionality of SolidMill Traditional and SolidMill Production plus the “core” functionality of ESPRIT while adding the power to program full 3-axis machining of any complex 3D free-form shape.

- CAM for 3-axis multi-surface/solid 3D milling
- Includes SolidMill Traditional and SolidMill Production plus:
- NURBS based 3-axis solid machining
- NURBS based 3-axis surface machining
- Unlimited number of surfaces, solid bodies and faces as “Part Surfaces” or “Check Surfaces”
- Roughing - zigzag or offset from any shape stock using any boundaries and check surfaces
- Finishing - Planar, Translation, Normal, Rotation, Offset, Parametric, Spiral on the entire part or a sub-section
- Z-Level machining – climb, conventional, uni-direction, bi-direction, optimized for near horizontal and near vertical zones
- Rest Material – automatic re-machining of un-cut areas with pencil tracing, parallel flowline, or spiral cutting
- Project-Contour – Profile cutting projected onto any set of surfaces
- High Speed Machining (HSM) support and G-code optimization
- High-speed solid simulation and verification including “as designed” versus “as machined” comparisons
- Universal post processing for NURBS and 3D NC cutter compensation



## ESPRIT SOLIDTURN



The software B55SW includes ESPRIT SOLIDTURN, which is the ideal CAM software to operate the B5565 – CNC LATHE.

ESPRIT SOLIDTURN can be used at three levels, TRADITIONAL, ADVANCED and PRODUCTION, with gradually increasing complexity.

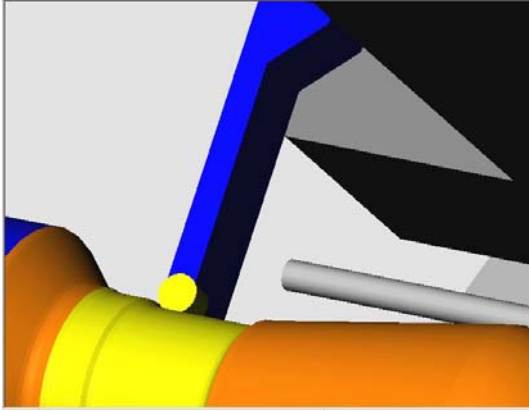
The technical specifications of the 3 levels are described here below.

### ESPRIT SOLIDTURN TRADITIONAL

A CAM system for 2-axis turning, SolidTurn Traditional is the ideal starting point for your 2-axis turning. From roughing and grooving, to threading and finishing, you have complete support for all machining cycles. This package also includes all the "core" functionality described in the general specifications of the Product Overview brochure. The capabilities of SolidTurn Traditional are included inside all the ESPRIT turning packages listed here.

- CAM for 2-axis turning
- Extensive control over all cutting conditions
- Contour - profile cutting for facing and OD / ID turning
- Hole making cycles - drilling, peck drilling, boring, tapping and up to 13 other point to point machining cycles

- Roughing - for rough turning / facing from regular or irregular shaped stock
- Pocket Rough -for rough turning / facing profiles with undercuts (pockets)
- Copy Rough -for rough turning / facing using an offset profile
- Grooving - seven machining cycles with single plunge, multi-plunge, peck grooving, and zigzag cutting styles
- Threading - single and multi-point threading of straight, tapered, constant and variable lead threads
- Cutoff - synchronized with part handling
- Part handling - bar feed, part catcher, and part pickup
- Tailstock - engage and disengage control
- Library of standard inserts - ANSI and ISO standard inserts for grooving, threading (top notch and lay down), and turning including square, round, trigon, and diamond
- Library of standard holders - ANSI and ISO standard holders with 25 turning and boring styles
- Unlimited custom tools and holders with any geometry
- Libraries for materials, speeds and feeds
- Project Manager to organize your work with Feature tab, Operation tab, and Tool tab
- Universal post processing with an extensive library and custom post generator
- Solid simulation and verification with comprehensive collision detection



## ESPRIT SOLIDTURN PRODUCTION

A full production turning CAM system for supporting any level of complexity in lathes, turning centers and "Swiss" style machines. SolidTurn Production includes all the functionality of SolidTurn Traditional and SolidTurn Advanced plus the "core" functionality of ESPRIT. SolidTurn Production extends your capabilities with the additional support of multi-spindles and multi-turrets to perform synchronized and synchronous machining.

## ESPRIT SOLIDTURN ADVANCED

SolidTurn Advanced includes all the capabilities of SolidTurn Traditional and the "core" ESPRIT functionality with the addition of "C" and "Y"-axis power tooling ability, the inclusion of a set of milling machining cycles, and access to the complete milling cutting tool libraries.

- CAM for C- and Y-axis mill-turn
  - Includes SolidTurn Traditional plus:
  - C 3-axis and Y 4-axis mill-turn with power tooling
  - Rotary 4-axis simultaneous "Wrap" machining cycles - Contour profile cutting, Pocketing, Hole making cycles
  - Work on part face or diameter with either ZXC or ZXY 2 1/2-axis machining
  - Library of standard milling tools: flat, ball nose, tapered, corner round, chamfered, and dovetail end mills. Face mill, thread mill, drill, center drill, reamer, tap, and boring bar
  - Unlimited custom milling tools and holders with any geometry
  - Libraries for materials, speeds, and feeds for milling
- CAM for multi-spindle / multi-turret turning
  - Includes SolidTurn Traditional and SolidTurn Advanced plus:
  - Synchronized and Synchronous 4-axis turning
  - Balanced Rough - for rough turning / facing from regular or irregular shaped stock
  - Advanced tooling for fixed turrets, gangs, and slides
  - "Swiss" style machine support including sliding head stock
  - Advanced "Machine Set-Up" - define unlimited number of spindles and turrets from 2- to 22- axis, including fixed or moving spindles and turrets, gang, slide or turret based cutting tools
  - Sync List - view cutting operations by turret, spindle or head; drag and drop editing of sync and wait codes; time study bar chart for program optimization