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CNC PILOT 4290

Version V.7

Contouring Control for
Lathes and Turning Centers

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HEIDENHAIN CNC PILOT 4290: Ideal for Any Production Task

The CNC PILOT 4290 is the right control for your machining requirements. Regardless of whether you machine simple parts on a compact lathe or produce complex workpieces on machines with multiple slides, you profit from the convenient graphical entry of contours using TURN PLUS. You simply press a key to have the CNC PILOT generate the part program—even for full-surface machining with lathes.



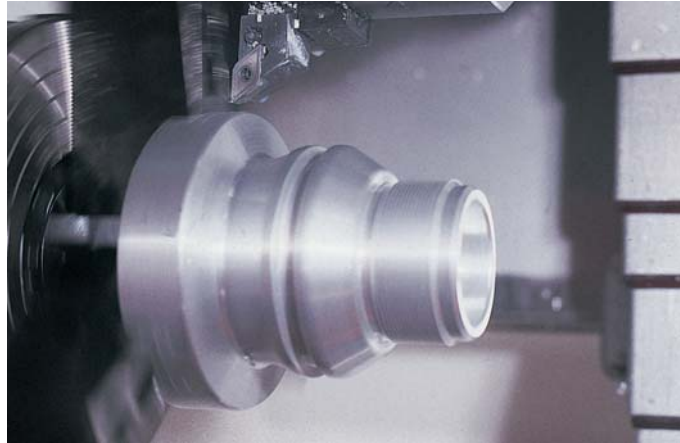
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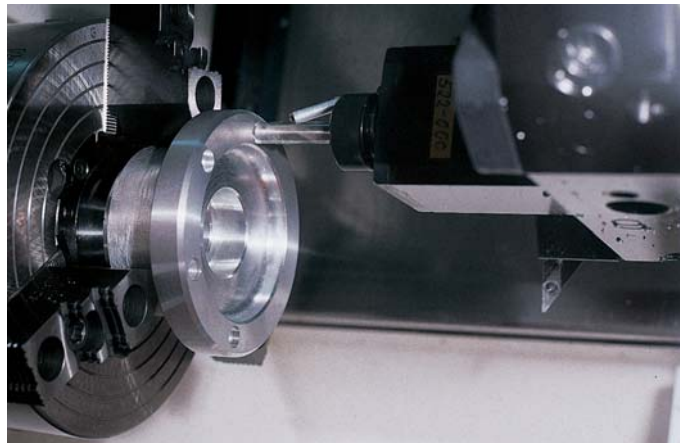
Universally Applicable — The Right Control for Scores of Applications

The CNC PILOT is versatile: it can be optimally adapted to the requirements of your company, regardless of whether you produce large numbers of complicated parts or just single parts.

CNC PILOT features special four-axis cycles, commands for synchronization, and much more, to support the programming of complex lathe machines with multiple slides and spindles. Since the graphic simulation displays all workpieces and all tool motions, you can check the created program quickly and effectively. The synchronous point analysis helps you to distribute the work to the available machine slides and spindles in the best manner possible. You can optimize your part programs for large batches in just a very short time.



From simple jobs on a compact machine...



...to complex tasks for full-surface machining...



...to large batch production

Fast and reliable operation

The easy-to-read screens of the CNC PILOT 4290 show only the information that the machinist needs in the given situation. The numeric keypad is used both for entering numerical values and for selecting menu functions. The soft keys at the bottom of the screen allow you to access frequently used functions by simply pressing a key.

In a short time you'll find that you can operate the CNC PILOT 4290 incredibly fast using a simple keypad for menu selection and numerical input, in addition to the soft keys for selecting frequently used functions.

Touch pad

The touch pad ensures precise and fast operation when you want to position the cursor in lists, dialog boxes or contours, when you want to activate menu options or soft keys, or when you want to position the zoom cursor during graphic simulation. You can operate your control in the same way as your PC.



Display of operating modes

Drop-down menus

Active functions are highlighted.

Machine display

You can choose a suitable function for each of the 16 segments, and save different display assignments for the automatic and manual mode.

Calendar date and service "traffic light"

- Date and time
- The "traffic light" indicates the maintenance status of the machine

Soft-key row

Fast selection of frequently used functions.

Numerical keypad for numerical input and menu selection

Operating mode keys
Info key

Touch pad

Machine operating panel

Feedrate override and electronic handwheel

DIN PLUS for Intuitive Programming

Well-structured part program

DIN PLUS helps you to write a clearly structured NC program. Under dialog guidance you enter in the following order:

- Program head
- Tool assignment in the turret
- Chucking equipment
- Workpiece-blank definition
- Description of machined part
- Individual machining steps
- Subprograms
- End of program

This places all important information for machining the workpiece in one part program. Powerful cycles help not only to enter the contours, but also to program the machining. This applies even for complex milling, drilling and boring operations with the C or Y axis.

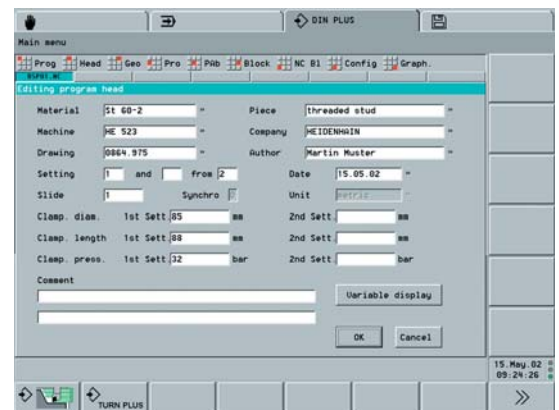
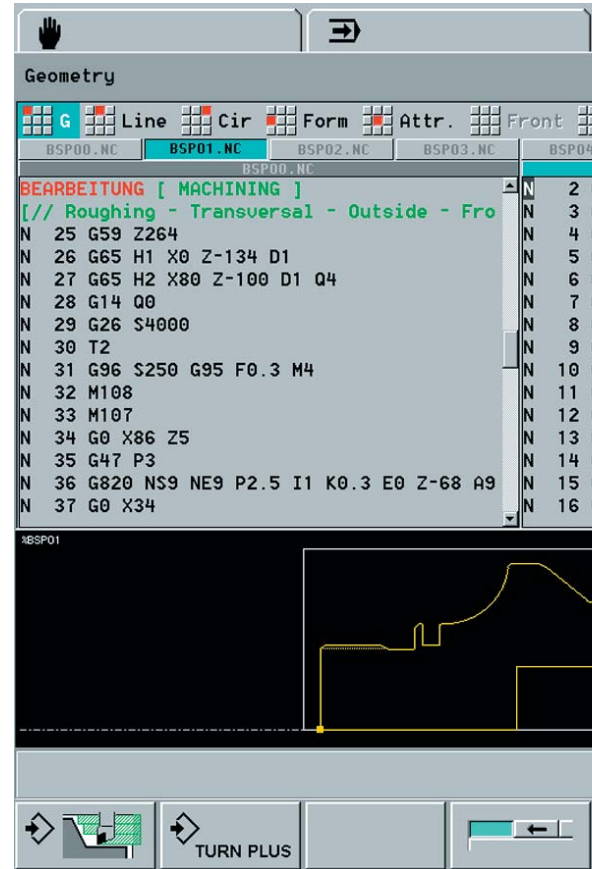
First the workpiece

With DIN PLUS you first describe the workpiece blank and finished part. The contours are shown as soon as you enter them. Then you program the machining steps. To do this, you define for each cycle the contour section to be machined. Here, too, you can immediately check each machining step in the simulation.

Production data at a glance

The program head includes all important information on the workpiece, e.g. drawing number, date, programmer, material, clamping, etc.

All information that is important for setting up and machining the workpiece, such as the tool assignment in the turret and the data for chucking devices, is included in the part program.



Setup and organizational data are included in the part program



The control graphics display the contour elements as soon as you enter them. This prevents programming errors as early as possible.

Graphically supported contour entry

You enter the geometry of the workpiece element by element. The CNC PILOT 4290 automatically calculates the intersections. Incompletely described contour elements are left open by the CNC PILOT 4290 until the missing information has been supplied and the contour can be completed.

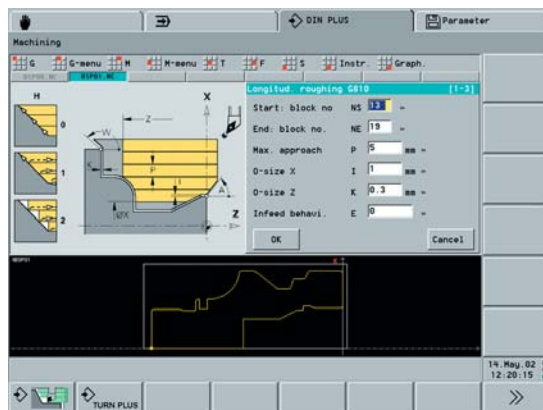
The contour develops on the screen as it is being defined, which helps avoid errors and facilitates the programming of the following element. Geometry macros and stored standard tables for form elements, such as undercuts and threads, help you define the contour and reduce the number of required entries. For milling, drilling and boring contours that are machined with the C axis or Y axis there is a large number of selectable figure and pattern descriptions.

You can enter all dimensions in absolute or incremental coordinates, and for operations with the C axis, in polar coordinates as well.

Powerful cycles

The individual machining steps are assigned to the applicable contour sections. You choose a fixed cycle and identify the section to be machined in the control graphics. Then you can test each work step immediately in the simulation. You select the respective commands from a menu or enter them directly with G codes. The screen displays a dialog box in which you enter the related parameters. All input is explained on screen in plain language and with graphic illustrations.

Thanks to the powerful fixed cycles and the assignment of cycles to machining sections, with DIN PLUS you attain a significantly better effectiveness and flexibility than in conventional part programming as per DIN 66025 (ISO 6983).



The cycle is graphically and interactively assigned to a contour section

Programming in more than one window

You can simultaneously load up to eight part programs into the DIN PLUS editor and display three of them in separate editing windows on the screen. The part program to be displayed is selected by soft key. This enables you to transfer program blocks from one part program to another and allows you to quickly get an overview of complex part programs including subprograms.

Faster Contour Creation with the Geometry Functions of TURN PLUS*

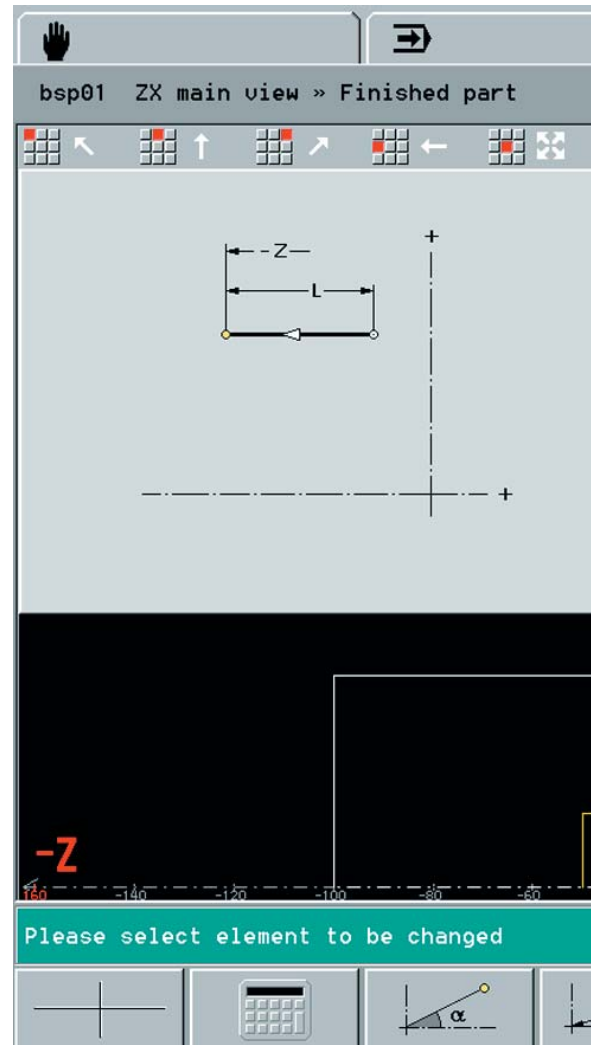
TURN PLUS provides you with several geometrical functions to help you program the contour of your workpiece even faster than before. For example, the control computes intersections or dimensions for each element that can be described by means of compass and ruler. Workpieces with three-dimensional geometries are programmed in the appropriate view. Standard tables with form elements, such as undercuts and threads, facilitate entry of the contour.

Simple contour description

The workpiece is described geometrically with interactive graphics—without a single G code. You program the basic contour using line segments and circular arcs. Then you superimpose form elements like chamfers, curves, undercuts, recesses, threads, etc. This procedure is simple, straightforward and fast. The number of entries is reduced because common form elements and fits can be selected from tables stored in the control. You program only the dimensions from the drawing—without converting them. Each coordinate can be entered either in the Cartesian or polar system, in absolute or incremental form. The control graphics display the entered contour immediately. This allows you to find any input errors immediately.

Incomplete contour elements

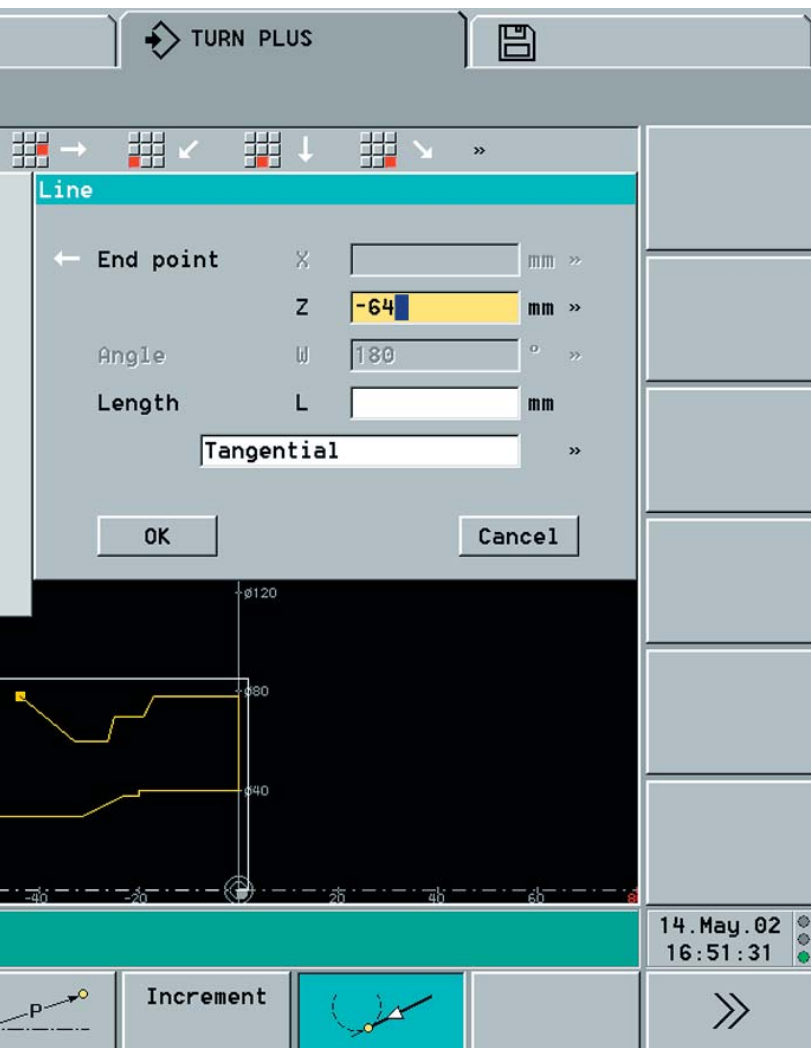
Very often the computation of an intersection or transition point is possible only after the input of several elements. Incomplete elements are therefore kept open until the geometrical solution is possible. If the entered data permit more than one geometrical solution for a contour element, the possibilities are displayed consecutively on the monitor for your selection.



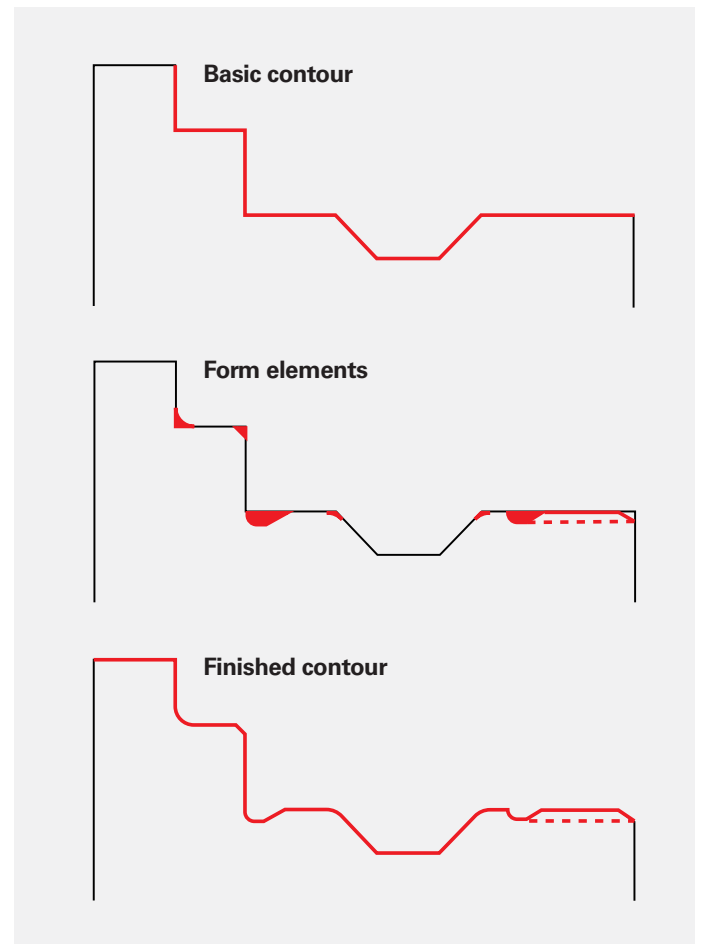
Editing dimensions in the control graphics

Workpiece geometry definition is further simplified by the possibility of taking dimensions from the control graphics or digitizing them using cross hairs. The selected points are displayed on the screen immediately. For example, to edit or insert contour elements you can call the cross hairs and position them on the point of the control graphics whose coordinates you want to enter. The dimensions then appear in the input menu.

* Software option



The separate input of basic contour and form elements reduces the number of entries



Enter the basic contour, insert form elements — finished!

Finding the correct diameter — automatically

The machining diameter of a fit always uses the center of the tolerance as datum. Before, you had to calculate the center yourself using the diameter of the workpiece and the type and quality of the fit to determine the nominal diameter. Now the CNC PILOT 4290 makes that calculation unnecessary. You simply enter the fit (e.g. H6). The control system automatically computes the dimension to be machined. When describing an internal thread, you enter only the nominal diameter and—for special threads—the pitch. The CNC PILOT 4290 will then compute the core diameter.

Coordinate transformation

While defining the contour you can shift the workpiece datum to a position permitting the input of the original drawing dimensions. If contour elements are dimensioned in relation to another contour element in any position (e.g. a taper), the CNC PILOT 4290 will help you with its transformation functions. Shifting and rotation puts the contour in a position from which dimensions can be entered directly from the drawing. Then you transform the contour back to its initial position. Tedious conversions to the workpiece datum, which frequently are extremely hard to solve, become unnecessary.

DXF import* of contours

Why should you painstakingly enter contour elements if the data already exists in the CAD system? TURN PLUS makes it possible to import contours directly. Not only does this save time otherwise spent on programming and testing, but you can also be sure that the finished contour is exactly according to the designer's specifications. DXF contours can describe workpiece blanks, finished parts, contour trains and milling contours. They must exist as two-dimensional elements in a separate layer, i.e. without dimension lines, wraparound edges, etc.

Since the DXF format is fundamentally different from the format used by TURN PLUS internally, the contour is converted from DXF to TURN PLUS format during the import. It can then be treated as a normal TURN PLUS contour.

The Part Program at a Keystroke

With TURN PLUS you can create part programs in a very short time. After you have entered the geometry you only need to select the material and clamping devices. TURN PLUS does everything else automatically: it generates the work plan, selects the machining strategy, selects the tools and cutting data, and generates the NC blocks.

The result is a thoroughly commented DIN PLUS program that gives you room for optimization and ensures safety when you're breaking in the program.

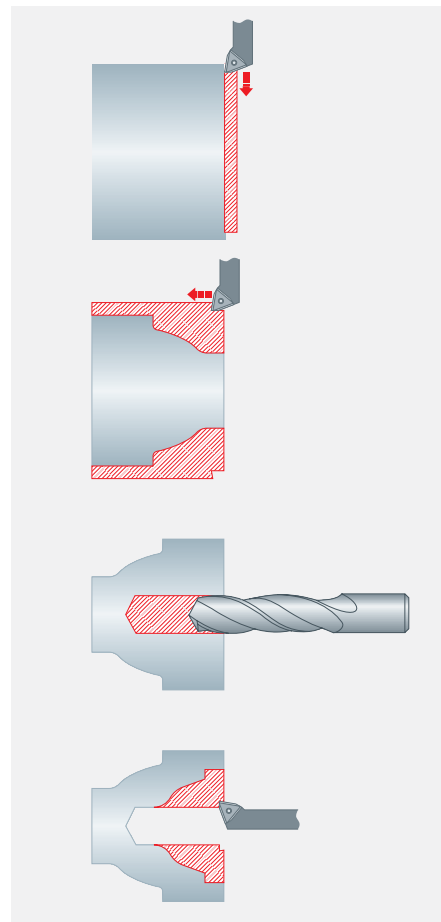
TURN PLUS can do all that for milling, drilling and boring operations with the C or Y axis on face and cylindrical surfaces as well on rear-face surfaces in machines with opposing spindles.



Go from programming to machining reliably and in the shortest possible time

Part program at a keystroke

If short programming times are important to you, you can generate all machining steps by pressing a single key. On the basis of the contour entered and the information from the technological database, TURN PLUS independently prepares the working plan and chooses suitable machining strategies, tools and cutting data. The whole operation takes only a few seconds. You can monitor each individual step in the control graphics. TURN PLUS uses a reasonable sequence of possible operations, such as "first roughing transverse, then roughing longitudinal" or "finishing inside, then finishing outside." However, you can adapt this sequence yourself to specific tasks, so the CNC PILOT 4290 also uses your company's machining know-how for the automatic generation of working plans.



Automatic selection of all cycles, tools and cutting data

Automatic program generation for full-surface machining*

The CNC PILOT 4290 automatically generates the part program even for complex workpieces that need to be machined on the front face, back face, and lateral surfaces. After defining the geometry, this can save you about 90% of the time otherwise needed to create a program.

Automatic program generation for the second setup*

TURN PLUS knows the contour of the clamping devices when it generates the working plan. It automatically limits the tool path to a safe distance from the clamping device. When the program for the first setup is completed, you can "rechuck" using interactive graphics. The control then automatically generates the program for the second setup using the workpiece geometry that has already been entered.

Inclined contours are no problem

The control is presented with special requirements when it has to generate the part program for inclined contours. Very often the angle of inclination is steeper than the tool tip angle. In that case the control automatically chooses another tool and machines the contour in the opposite direction or as a recess. In any case the result is an executable part program.

Program optimization in TURN PLUS

The automatically generated part program can later be altered or optimized in TURN PLUS. You simply watch all the machining steps and stop at the program point you would like to optimize.

You edit the program using the interactive graphics, choosing the sector for machining and the appropriate fixed cycle. TURN PLUS provides proposals for tool and cutting data. Following that, the control automatically generates the new machining step.

* Software option

Graphical Programming System with Machining Know-How

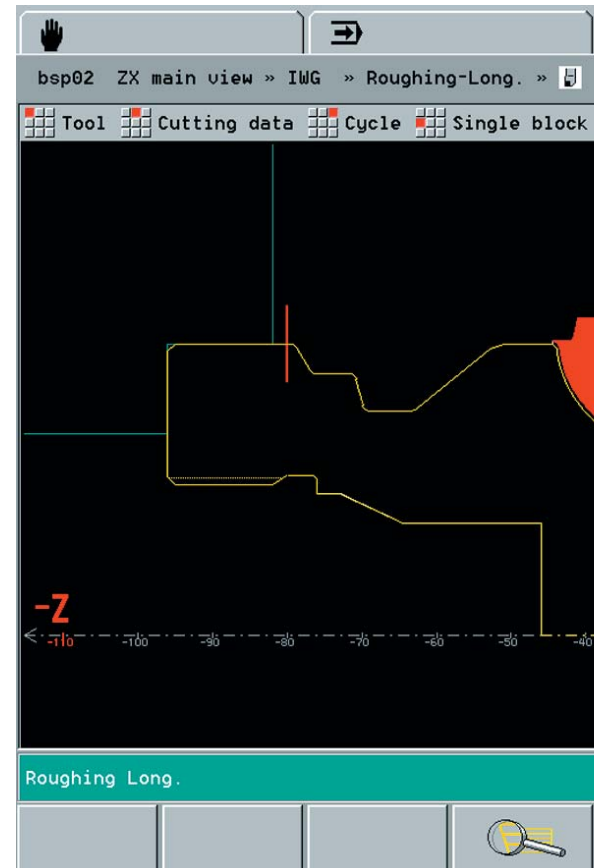
Even if you do not want to generate a part program automatically, TURN PLUS offers a variety of performance features to make your programming work easier. Following each processing step the blank is automatically recomputed. The fixed cycles automatically avoid abrasive cuts and air cuts; they machine only to the cutting limits before the chuck. At each working step the control graphics show the volume to be machined before generating the program.



Programming with interactive graphics

If you want to decide yourself which tool and which fixed cycle are to be used to machine your workpiece, you can program the individual machining steps using interactive graphics.

Supported by the menu, you select the appropriate fixed cycle. The control proposes a suitable tool, but you also can select any other tool in the tool file. After you have determined the contour sector to be machined in the control graphics, the volume to be machined is immediately shown in red. This means that you can avoid errors by examining the cutting operation before you have programmed it. When all parameters are correct, press the start key to generate the program step.

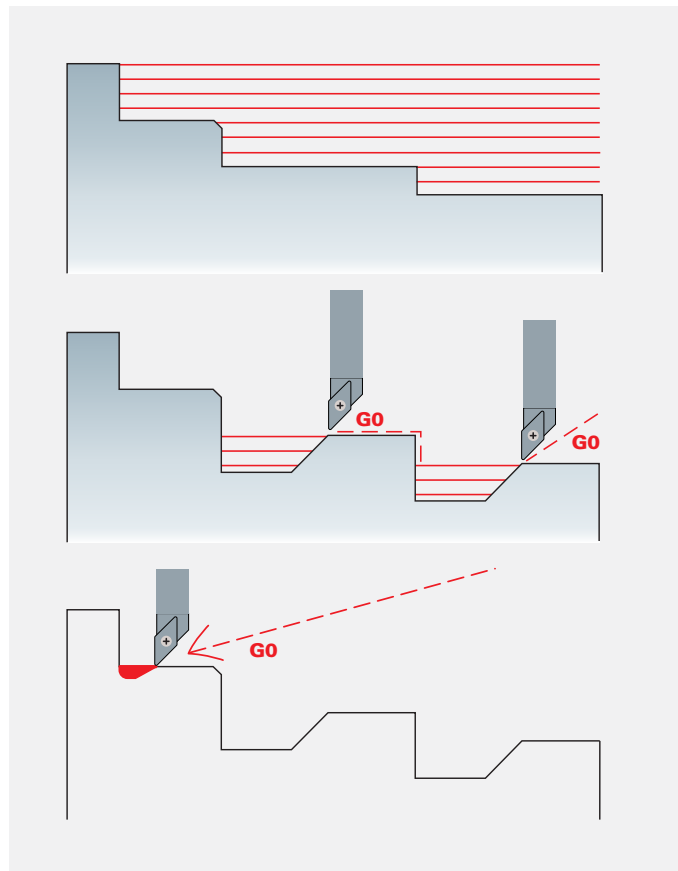


The active control graphics show the volume to be cut before generating the program step

Automatic regeneration of the blank

After each fixed cycle the control system computes the new blank for the following cycle. This saves a great deal of programming time because the control independently computes the approach path of each tool—even going through areas already machined.

Also, when programming the machining of rear surfaces you need not enter the new contour of the blank.



Automatic regeneration of the blank prevents abrasive cuts and air cuts, and enables automatic approach

Cycles with machining know-how

The fixed cycles of the CNC PILOT 4290 facilitate programming and accelerate machining operations with a number of intelligent functions:

- When computing the cut segmentation the control system chooses a cutting depth at which abrasive cuts cannot occur.
- The automatic blank part regeneration for every new cycle prevents air cuts.
- Machining is automatically limited by the protective zone of the chuck.
- The control features automatic tool and cutter radius compensation.

Dynamic control graphics

After you have entered all the required information and have started the generation of a program section, you can examine the machining process on the screen as a graphical simulation.

Semiautomatic programming

You can switch at any time during programming to semiautomatic mode. Then the complete work step will be generated for the contour element that you have selected.

Graphical Simulation of Tool Traverse in the Machining Zone

The CNC PILOT 4290 simulates tool traverse in the machining zone using the actual tool dimensions, because the simulation operates with the geometry values from the technological database.

Also, the CNC PILOT 4290 calculates the machining time required for your workpiece. Now you can submit your job quotations faster than before.

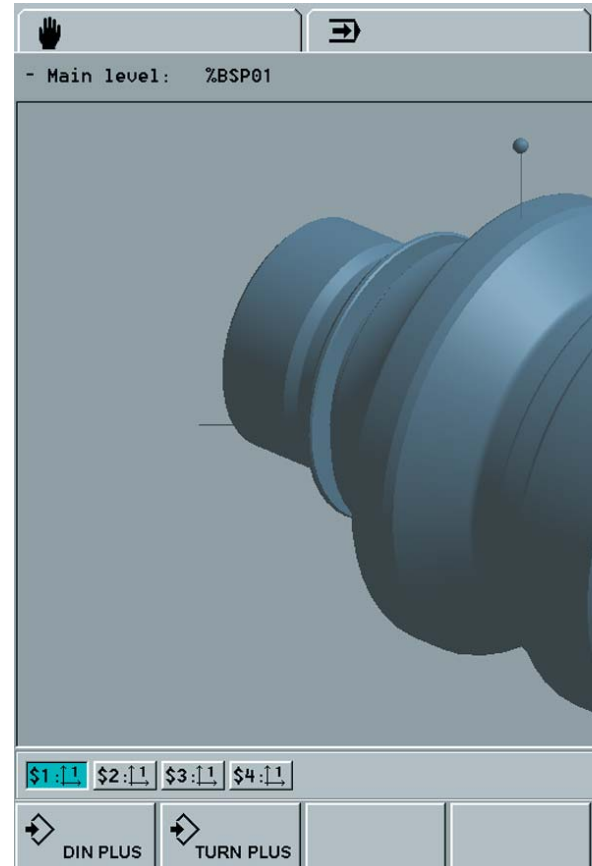
Simulation of the actual tool path

The CNC PILOT operates with vector graphics. This type of graphics provides several advantages over conventional pixel graphics:

- The entire working space is accurately illustrated. If you use additional clamping devices such as tailstock or a special chuck, they are automatically added to the simulation.
- The simulation shows the actual dimensions of the tool and clamping devices, because it refers to the values from the database in which the tools and clamping devices are defined for machining.
- The tool-path simulation shows the actual traverse of the tool tip.
- With the zoom function you can enlarge, reduce, or shift your view at any time.

3-D view

The 3-D view function enables you to display a 3-D image of the workpiece blank, the finished part or the production status that has been updated during the simulation. You can enlarge or reduce the image of the workpiece or rotate it in any direction.



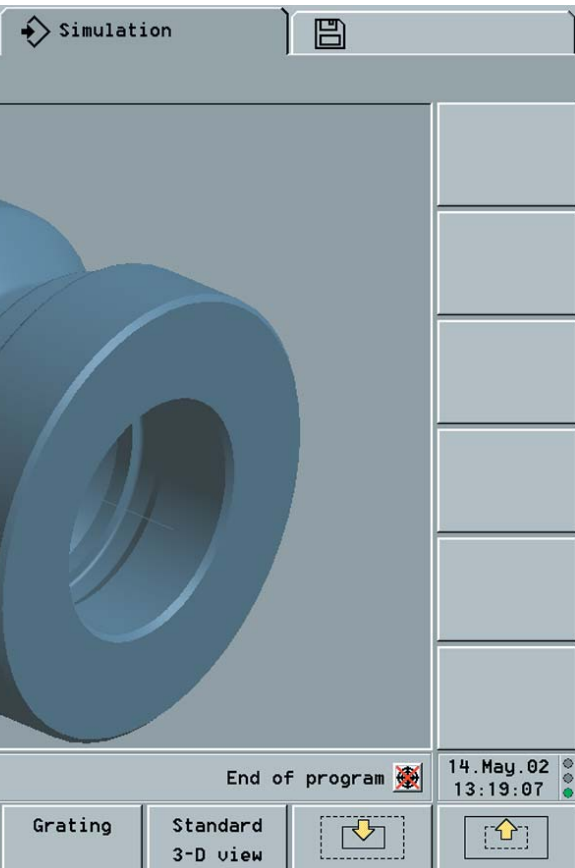
Measuring before the first cut

By simply switching to the workpiece measuring function you can select the individual contour elements in sequence and read their dimensions at the bottom of the screen. This lets you already check dimensions of your workpiece contour in the graphics.

Calculating the machining time

Let's assume that your customer urgently needs a quotation and you have to make an accurate cost estimate in the shortest possible time. The CNC PILOT 4290 provides valuable help in such cases by calculating the machining and per-piece times of your programmed workpiece.

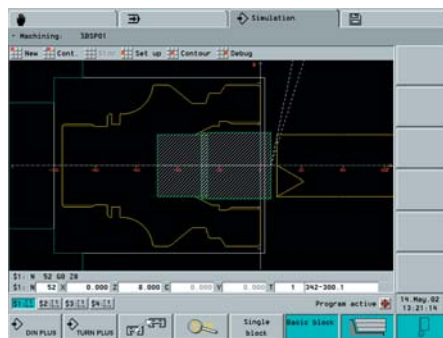
A table shows not only the total workpiece machining time, but also the productive time, non-productive time and total time for each tool. For effective program optimization the machining times are also shown in bar graphics: you can see at a glance where the greatest optimization potential lies in your part program.



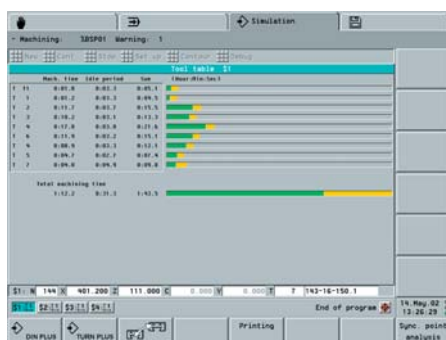
The 3-D view provides a realistic image of the workpiece



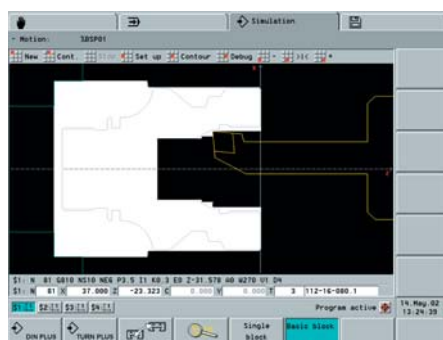
Contour simulation for checking the workpiece geometry



Tool-path simulation compensates the geometry of the tool cutting edge



Machining time and idle time for each tool, shown as bar diagrams



Machining simulation accurately depicts the cutting process

Verification during production

The CNC PILOT 4290 graphically simulates machine movements in synchronism with the running program. This allows you to recognize critical program sections at an early stage. This becomes particularly important when a part program is being run for the first time, for example during intricate inside machining where the machined surface is hidden from view. During production the "concurrent simulation" gives you an overview of the progress of machining.

Your Work Becomes Easier Thanks to Extensive Information and Help Functions

The CNC PILOT 4290 makes your work at the machine easier with its many help functions and comprehensive informational aids.

The parameters to be entered for G commands and cycles as well as the parameters for operating resources are explained in graphic illustrations. The comprehensive information system supports you in every operating situation. Detailed error messages inform you when your input is incorrect or when problems have occurred on the machine.

The configurable machine display gives you a constant overview of the machine situation. The display of every path of traverse gives you the assurance you need to break in the program.



Graphic support for every fixed cycle

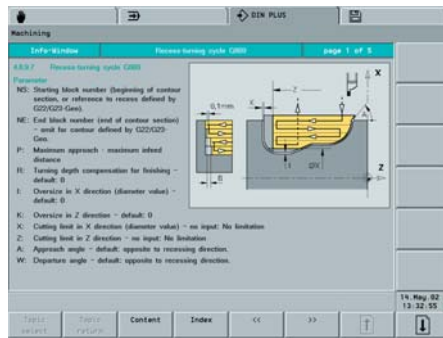
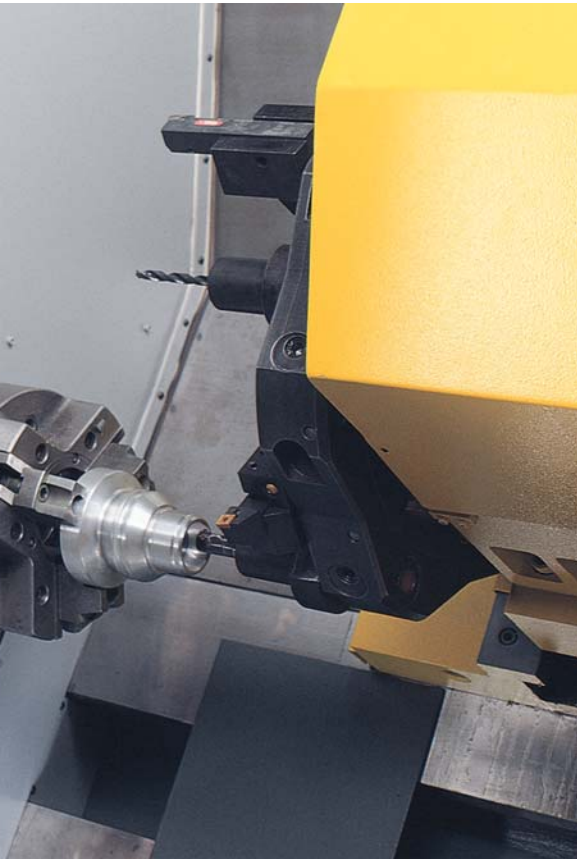
Comprehensive service functions

If a problem ever occurs in the machine, the CNC PILOT 4290 will quickly help with detailed diagnostic, self-testing and service functions that ensure that the cause is found quickly. The service and maintenance engineer is provided with support ranging from a simple maintenance plan to a listing of all error messages, even to a diagnosis of the drives by TNCdiag.

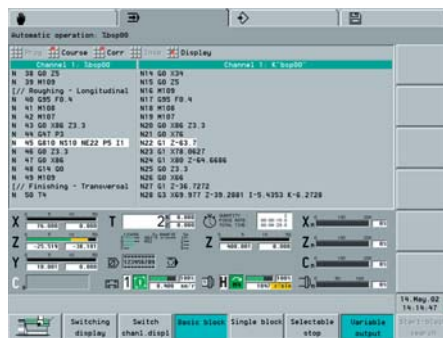
TNCdiag supports quick and easy troubleshooting of the drives. With its dynamic display of status signals, you can even examine ambient conditions that lead to errors.

Complete information on every function

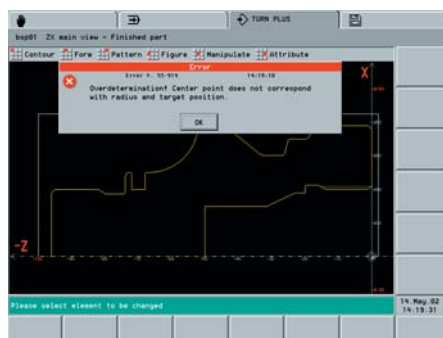
If you should become stuck, there's no need to go looking for an operating manual for a solution. The entire manual is already stored in the contextual information system of the CNC PILOT 4290. You simply press the information key to call a detailed explanation, including illustrations, of the presently selected function. With the information key you have immediate access to relevant information without having to leave the machine.



Understandable explanations for every menu item of the help graphics



Comprehensive information gives you the assurance you need to break in the part program



Error messages that actually help

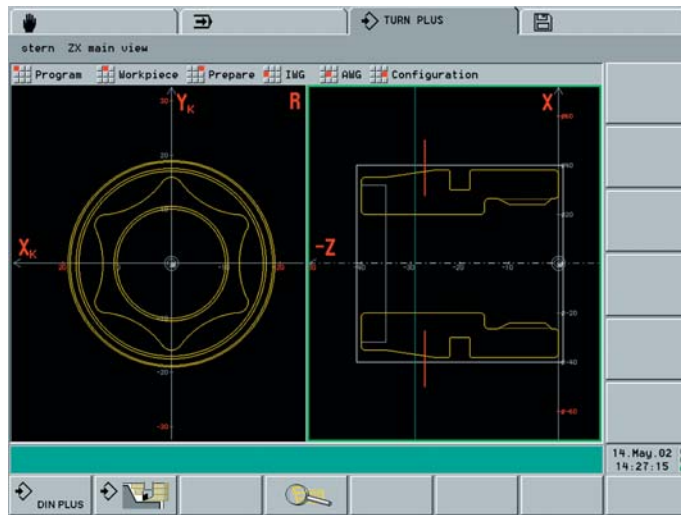
Unambiguous error messages

The CNC PILOT 4290 provides meaningful, comprehensive error messages. The message in the illustrated example indicates which parameters are still missing or which sign was incorrect. Every error message provides the information you need to quickly correct the error.

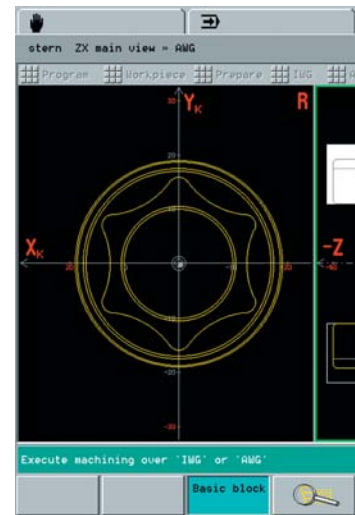
Expandable for Complex Tasks: Full-Surface Machining plus C and Y Axes

The CNC PILOT 4290 provides a solution for any machining task and any machine configuration: it performs complex machining tasks with a C or Y axis. It also controls full-surface cutting on dual-spindle machines.

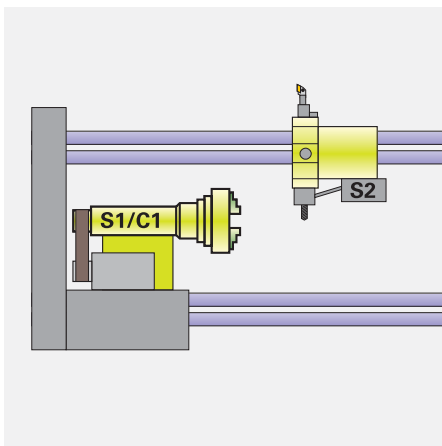
And for C-axis, Y-axis, and full-surface machining you can select from the DIN PLUS or TURN PLUS programming modes with automatic or semiautomatic program generation.



Graphic contour programming for C-axis machining (milling, drilling and boring)



Automatic working plan generation, 1st setup...



Option: spindle 1 (S1) with C axis (C1) and driven tool (S2)

C-axis option

For more complex tasks, the CNC PILOT 4290 can be expanded to also control a C axis and a driven tool. The driven tool makes it possible to drill off-center and to tap holes while the spindle is at rest. The C axis permits milling, drilling, and boring on the face and side of the workpiece. These elements can be displayed for programming and verification in side view, face view, and in the unrolled lateral surface view.

Y-axis option

With the Y-axis option of the CNC PILOT 4290 you can machine slots or pockets with plane bottoms and perpendicular slot edges. By defining the spindle angle, you can determine the position of the milling contours on the workpiece. For programming and verification of these program sections, the workpiece is shown in side and face view.

Dual-spindle option

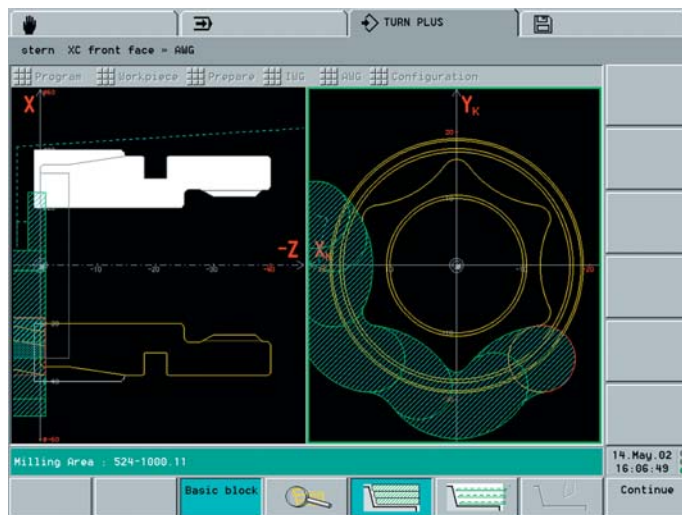
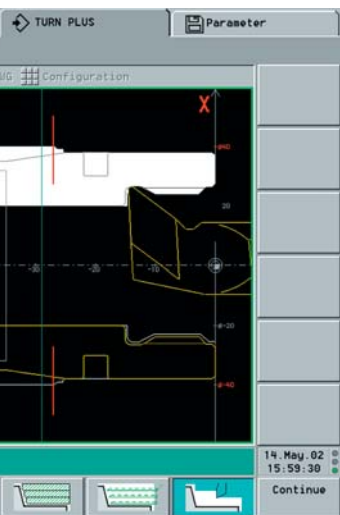
For full-surface lathes the CNC PILOT 4290 provides the following features:

- Opposing spindle with second C axis
- Second Z axis

These features are complemented by additional functions such as coordinate transformation, spindle synchronization and traversing to a stop surface. In this expanded configuration, also, TURN PLUS makes it possible to automatically generate the part program at the stroke of a key.

Coordinate transformation

Contours of workpiece blanks and finished parts can be mirrored about the X axis or shifted relative to the workpiece datum.



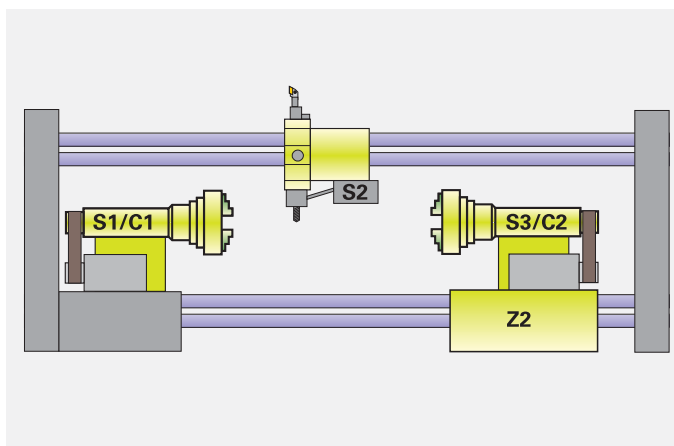
...machining of the rear side after automatic workpiece transfer

Spindle synchronization

Opposing spindles are electronically coupled and rotate synchronously. This makes it possible to transfer the workpiece from one spindle to the other while they are rotating, thereby saving the time otherwise spent braking and starting the spindles. The CNC PILOT 4290 detects any angular offset and compensates it during subsequent milling on the opposing spindle.

Traversing to a stop surface

To ensure that the workpiece is firmly pressed to the opposite spindle surface, the control monitors the nominal and actual positions while the longitudinal axis is moving. This ensures a defined pressure against the opposing spindle.



For full-surface machining, the CNC PILOT 4290 optionally controls a second spindle (S3) with C axis (C2) on a second Z axis and a driven tool (S2).

Machines with Multiple Slides, a Challenge for the NC Programmer

Regardless of whether several slides are used for one workpiece or if several workpieces are being machined simultaneously in the machining zone, the challenge for the NC programmer is to distribute the work to the available slides and spindles in the best manner possible.

Programming

Workpiece machining for complex machines is already programmed into the CNC PILOT's command set. Specialized four-axis cycles and synchronization commands facilitate creation of part programs for machines with multiple slides. The assignment of program sections to slides or spindles also helps to give the part program a clear structure.

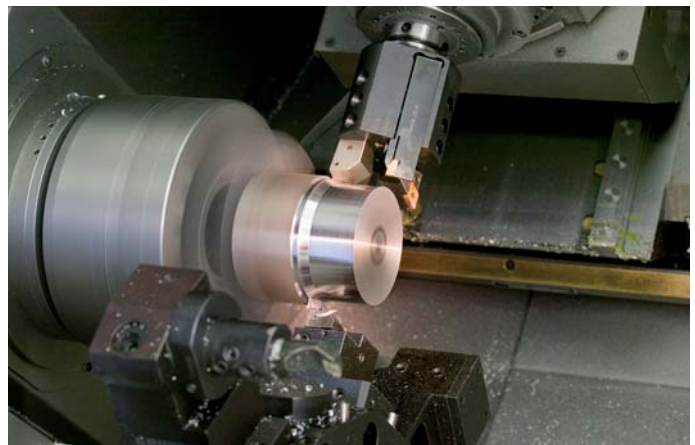
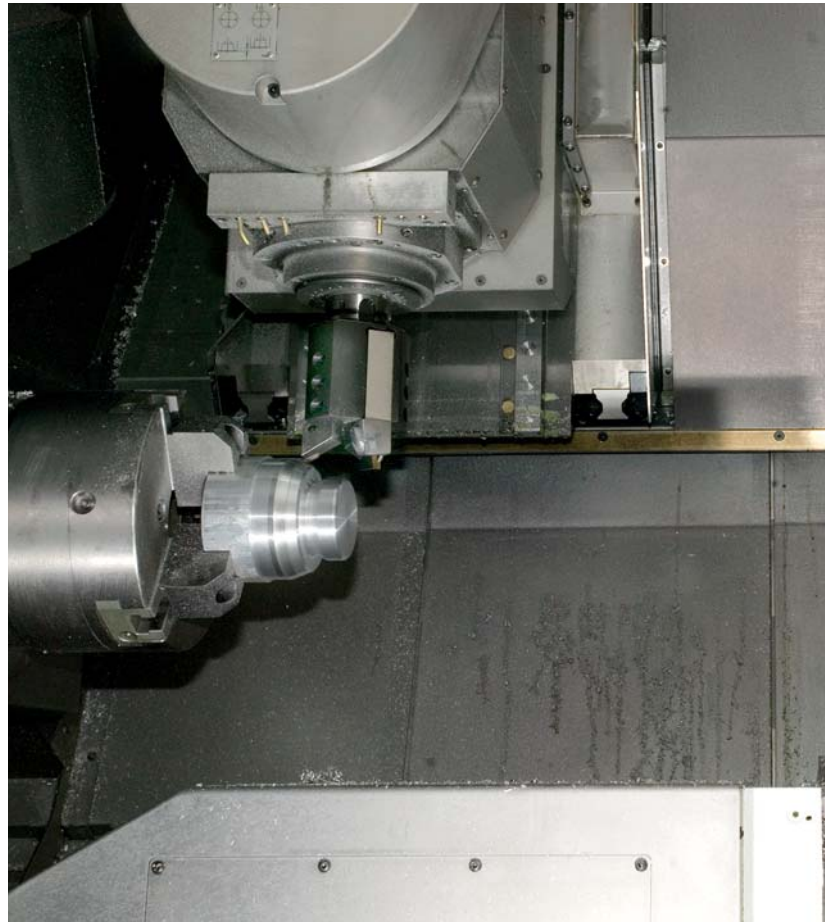
By mirroring and/or shifting the contour, and through the conversion of specialized NC commands, programming of turning with the opposing spindle as well as drilling and milling steps on the rear of the workpiece becomes easier, for nearly every type of machine design.

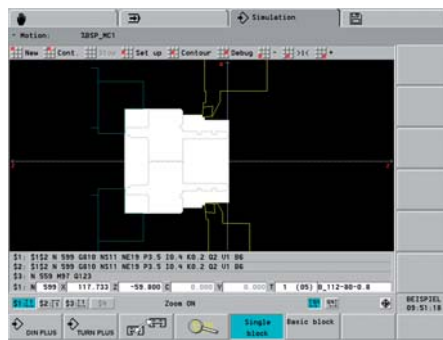
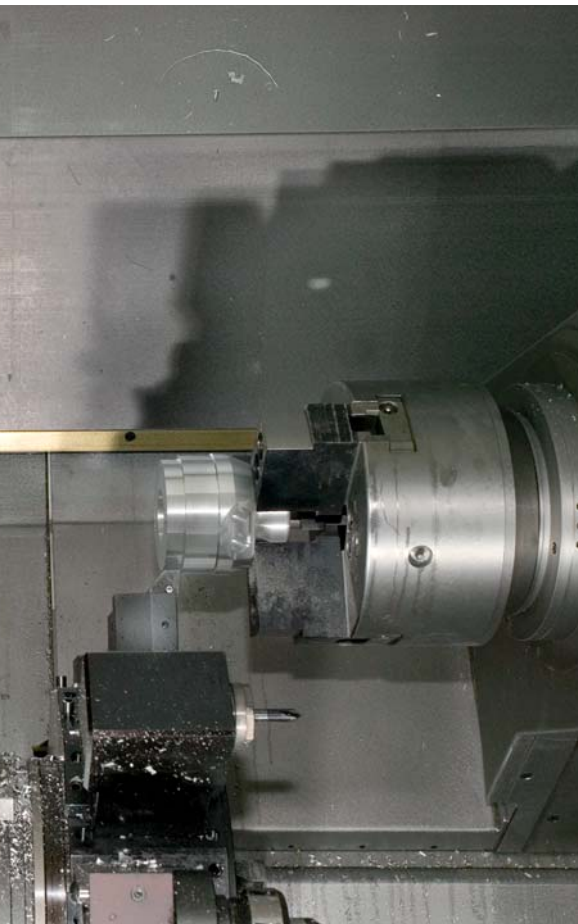
Simulation

The graphic simulation shows all workpieces and the tool movements of all slides. The CNC PILOT takes the entire machining zone into consideration. Tools and chucking equipment are shown to scale.

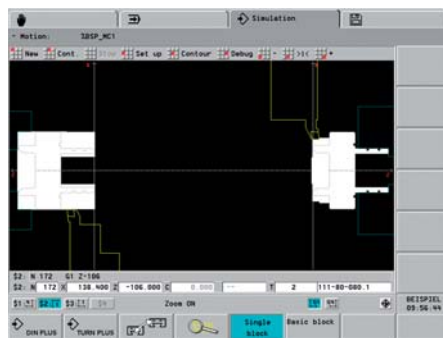
Furthermore, the graphic simulation is characterized by a high degree of flexibility. You can define what is shown in the simulation window. You can specify whether the window for lathe machining is shown, or for end face or for lateral machining, or a combination of these windows. You can also specify whether just the NC blocks of a certain slide are displayed, or the NC blocks of all slides.

With the help of this support, you can effectively and comprehensively check complex, multi-slide programs—even before making the first cut.

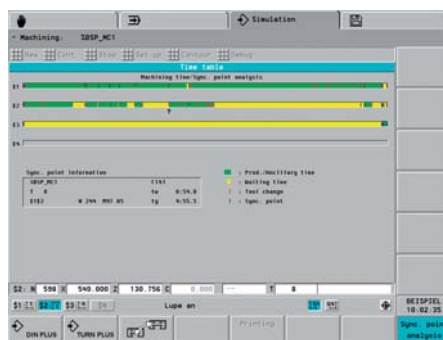




Four-axis cycles permit effective workpiece machining



The simulation of the machining zone gives you control over all slides



The synchronous point analysis makes the machining sequence more transparent

Synchronous point analysis

The synchronous point analysis shows the chronological sequence of the workpiece machining, and the interdependency of the slides.

During the simulation, the CNC PILOT calculates the productive, non-productive and idle times, as well as all tool changes and synchronization points. The synchronous point analysis graphically shows the times, tool changes and synchronous points for each slide.

This serves to make the sequence of the workpiece machining steps more transparent. This is a good basis for you, as the NC programmer, to analyze and optimize the machining process.

DataPilot 4290— Programming and Storing on a PC

The DataPilot 4290 is the PC programming station for the CNC PILOT 4290, and the organization system for the workshop and design office. By shifting the programming, program testing, and program optimization to the PC, machine idle times are greatly reduced.

Having the same conditions and same functions as the CNC PILOT contouring control gives you the assurance that a program created with DataPilot can be run on the machine immediately. That is why DataPilot 4290 is the ideal supplement to the control for program creation, archiving, and apprentice and advanced training.

Creating programs

Programming, testing and optimizing TURN PLUS and DIN PLUS programs with DataPilot on your PC substantially reduces idle machine times. You do not need to adjust your way of thinking, since you program and test with DataPilot in exactly the same way as on the lathe. DataPilot has the same software as the control. This ensures that a program created with DataPilot can be run on the machine immediately.

Storing programs

Even though the CNC PILOT has a nearly inexhaustible memory capacity, you should also back up your programs on an external system. The CNC PILOT has an Ethernet, a USB and a serial V.24 interface. This enables you to integrate the CNC PILOT into your existing network or to connect the DataPilot PC directly to the control.

Convenient program-transfer functions support both external programming and archiving on the DataPilot PC.



Training with DataPilot 4290

Because DataPilot 4290 is based on the same software as the CNC PILOT 4290, it is ideally suited for apprentice and advanced training. Programming and program testing on the DataPilot PC function exactly the same as they do on the machine. Even setup functions such as workpiece datum definition, tool measurement or machining of DIN programs are simulated with DataPilot. This gives the trainee the experience needed for safe operation of the machine.

System requirements

DataPilot runs on PCs with the following operating systems:

- Windows 98 SE / ME / 2000 / XP

CNC PILOT 4290 and DataPilot 4290 — Integration into Your Organization

A prerequisite for integrating these systems into your organization is the ability to exchange data. This is comfortably done with the CNC PILOT 4290 and DataPilot 4290, which support an Ethernet connection.

All programs at a glance

After entering the path of the partner terminal, your own programs will be listed on the left side of the screen, and the partner's programs are on the right side (prerequisite: you must be using Windows networks). Now select the programs that you want to transfer and press the send or receive button. Data transfer occurs reliably and almost instantaneously.

Transferring programs

The easiest and most convenient method of data transfer is to integrate the systems into your company network. The CNC PILOT supports the common Windows networks using the Ethernet interface. DataPilot uses your PC's networks.

If you only want to couple the CNC PILOT control to the DataPilot PC, the best method of data exchange is via a (crossed) Ethernet cable. You can establish a local network in this manner and comfortably transfer programs and tool data.

Exchanging tool data

Once you have captured tool data you may also transfer them. This is not just important for data backup, but is also useful when using DataPilot. Advantages include not having to capture the same data twice, and consistently current data.

Data transfer via the serial interface

If the system connected to the CNC PILOT or DataPilot does not have an Ethernet interface, you can send and receive programs or other data via the serial interface.

USB interface

The CNC PILOT supports standard memory media with USB interface. Using USB memory media (such as memory sticks), you can quickly and easily exchange TURN PLUS or DIN PLUS programs, DXF contours, tool parameters, etc., between systems that are not connected to each other.

The screenshot shows the 'Network' window in the CNC PILOT software. It displays two columns of NC programs for transfer. The left column is for the local system (C:\EP90_R70\NCPS\), and the right column is for the remote system (\\HHH082\DP90U61\MASCH\BEISPIEL\NCPS). Each program entry includes a checkbox, a file name, a size in bytes, and a date. Below the list, there are fields for 'Quantity' and 'Marked' for both sides. At the bottom, there are numerical readouts for X, Z, Y, B, C, and T coordinates, along with spindle speed and feed rate indicators. A toolbar at the very bottom includes buttons for 'Attributes', 'Delete', 'Rename', 'Copy', 'Transfer functions', 'Print', 'Mark all', and 'Mark'.

Local Programs (C:\EP90_R70\NCPS\)	Remote Programs (\\HHH082\DP90U61\MASCH\BEISPIEL\NCPS)
1.NC - [426] 09.01.2002	100098.NCS - [3152] 09.11.2000
100098.NCS - [3195] 18.01.2002	100099.NCS - [1291] 09.11.2000
100099.NCS - [1291] 27.10.1997	40E1U2.NCS - [11546] 09.11.2000
123.NC - [924] 17.12.2001	40E1U2A.NCS - [13776] 09.11.2000
12312.NC - [126] 25.01.2002	ABHAND.NCS - [3422] 09.11.2000
1234.NC - [162] 10.01.2002	AUS.NCS - [105] 05.06.1996
40E1U2.NCS - [11546] 27.10.1997	BSP00.NC - [2224] 15.02.2001
40E1U2A.NCS - [13776] 27.10.1997	BSP01.NC - [3840] 15.02.2001
500010.NCS - [1100] 24.10.1996	BSP02.NC - [3332] 15.02.2001
ABHAND.NCS - [3422] 11.11.1999	BSP03.NC - [2780] 15.02.2001
ABSTECH.NCS - [1128] 24.10.1996	BSP04.NC - [3299] 15.02.2001
BETRIART.NCS - [521] 06.07.2001	EIN.NCS - [125] 05.06.1996
BSP00.NC - [2224] 15.02.2001	EXABST1.NCS - [6421] 23.06.1997

Quantity: 273 Marked: 0 Quantity: 24 Marked: 0

X: 530.000 B: 90.386 T: 0.000

Z: 432.346 C: T: 0.000

Y: 0.000 D: 0.000

Spindle Speed: 1000.000 r/min Feed Rate: 0 r/min

BEISPIEL 10:13:44

Attributes Delete Rename Copy Transfer functions Print Mark all Mark

Overview

User Functions (Standard)

Standard functions	CNC PILOT 4290 Version V.7
DIN Editor	Programming as per ISO 6983
DIN PLUS	<ul style="list-style-type: none"> • Setup information on workpiece blank, workpiece material, tools, chucking equipment • Expanded command format (IF...THEN...ELSE...) • Dialog-guided user input and help graphics for each programming function • Subprograms and variable programming • Control graphic for workpiece blank and finished part • Parallel programming • Parallel simulation • Alphanumeric program name
Cycles for contour description	<ul style="list-style-type: none"> • Standard blank forms • Recesses • Undercuts • Threads • Hole patterns and figure patterns on the face and lateral surface (XC and ZC planes) • Hole patterns and figure patterns for the XY and ZY planes
Fixed cycles	<ul style="list-style-type: none"> • Area clearance cycles, longitudinal and transverse • Recessing cycles, radial and axial • Recess turning cycles, radial and axial • Undercut cycles • Parting cycle • Thread cycles, radial and axial (multiple threads, successive threads, taper threads, variable pitch) • Drilling, deep-hole drilling, and tapping cycles (conventional/rigid) radial and axial (C axis and Y axis) • Contour milling and pocket milling, radial and axial (C axis and Y axis) • Area milling, centric polygon milling, radial and axial (Y axis)
Info system	<ul style="list-style-type: none"> • Information on G functions • Information on parameters and operating resource data • Context-sensitive call of info system • Table of contents and index • Support during TURN PLUS graphic programming • Support during TURN PLUS interactive sequential programming
Tool monitoring	
Tool life monitoring	Tool life monitoring according to time and piece number
Load monitoring	Breakage and wear monitoring through motor current evaluation <ul style="list-style-type: none"> • Maximum of 4 drives • Display of load values through bar graphics or line graphics
Tool inspection	For checking the indexable inserts during machining; returning to the workpiece on the retraction path

User Functions (Options)

Software options	CNC PILOT 4290 Version V.7
TURN PLUS (option 1)	TURN PLUS features: <ul style="list-style-type: none"> • Programming with graphic support • Graphically supported, interactive sequential programming with DIN PLUS program generation • Automatic sequential programming with DIN PLUS program generation TURN PLUS is used for: <ul style="list-style-type: none"> • Turning • C-axis machining (option 1.1) • Yaxis machining • Full-surface machining with opposing spindles (option 1.2)
Graphic programming	Geometric description of workpieces for the workpiece blank and finished part, including the definition of hole patterns and milling contours for C-axis machining and/or Yaxis machining. Graphical geometry program for calculating and displaying contour points, even those not dimensioned for NC machining, in any length: <ul style="list-style-type: none"> • Simple entry of standardized form elements: chamfers, radii, undercuts, recesses, threads, fits • Simple entry of transformations: datum shift, rotation, mirroring, duplication • If more than one geometrical solution exists for calculated coordinates, all of them are presented for selection
C-axis machining (option 1.1)	<ul style="list-style-type: none"> • Additional display and programming in the front and surface views (XC, ZC plane) • Hole pattern and figure pattern • Creation of freely definable milling contours
Yaxis machining	<ul style="list-style-type: none"> • Additional display and programming in the XY and ZY planes • Hole pattern and figure pattern • Creation of freely definable milling contours
Full-surface machining (option 1.2)	<ul style="list-style-type: none"> • Workpiece description for both setups • Description of milling contours and hole patterns also for rear face for C-axis and/or Yaxis machining
DXF import (option)	Loading contours in DXF format: <ul style="list-style-type: none"> • View and select DXF layers • Load DXF contour in TURN PLUS
Sequential programming with interactive graphics	Sequential programming for individual machining steps with: <ul style="list-style-type: none"> • Calling of tools • Placement of tools on the turret • Calling of cutting data • Individual selection and specification of the operating mode • Individual selection and specification of section to be machined • Immediate graphic inspection of simulated cutting with subsequent correction capability • Fixed cycles for drilling and milling in the XC and ZC planes (option 1.1, C axis) • Fixed cycles for drilling and milling in the XY and ZY planes (Y axis) • Rechucking with machine-specific expert program for rear-face machining (option 1.2) • Interactive generation of work blocks for rechucking and for the second setup (option 1.2) • DIN PLUS program generation

Programming	CNC PILOT 4290 Version V.7
Automatic sequential programming	Automatic working plan generation with <ul style="list-style-type: none"> • Automatic tool selection • Automatic turret assignment • Automatic calculation of cutting data • Automatic generation of machining sequence in all working planes (also for C-axis machining (with option 1.1) and Y axis machining) • Automatic cutting limitation through chucking equipment • Automatic generation of work blocks for rechucking with machine-specific expert program (with option 1.2, full-surface machining) • Automatic generation of work blocks for rear-surface machining (with option 1.2, full-surface machining) • DIN PLUS program generation
Measuring	
In the machine (option 2)	For setting up and measuring workpieces in the "Manual" and "Automatic" modes using a touch probe
On external inspection stations (option 3)	Transfer of results from an external measuring device for processing the measured data in the "automatic" operating mode: <ul style="list-style-type: none"> • Up to 16 measuring points • Data interface: RS-232-C/V.24 • 3964-R communications protocol

Specifications, Accessories

Specifications	CNC PILOT 4290 Version V.7
Basic version	Contouring control with integrated motor control and integrated inverter <ul style="list-style-type: none"> • 2 closed-loop axes X1 and Z1 on slide 1 • 1 feedback-controlled spindle
Options	Expandable to maximum 10 control loops <ul style="list-style-type: none"> • Max. 6 slides • Max. 4 spindles • Max. 2 C axes
Display	15-inch TFT color flat-panel display
Program memory	Hard disk
Input resolution and display step	Linear axis 0.001 mm, C axis: 0.001 degrees
Interpolation Straight line Circle C axis Helix Look-ahead	In 2 principal axes, optional in 3 principal axes (max. ± 10 m) In 2 axes (circle radius max. ± 100 m) Interpolation of X and Z linear axes with the C axis Superimposition of circular and straight paths Precalculation of up to 20 blocks for determining the contouring velocity profile
Feed rate	<ul style="list-style-type: none"> • Max. rapid traverse at 0.001 mm, resolution: 400 m/min • Input in mm/min or mm/revolution • Constant cutting speed • Feed rate with chip breaking
Data interfaces	<ul style="list-style-type: none"> • RS-232-C/V.24 with max. 38.4 kilobaud • Ethernet 100 Base T (max. 100 megabaud) • USB interface

Accessories	CNC PILOT 4290 Version V.7
DataPilot 4290 Version V.7	PC software for programming and training for the CNC PILOT 4290 lathe and turning center control: <ul style="list-style-type: none"> • Programming and test runs • Program management • Operating resource management • Data backup • Training
Electronic handwheel	HR 410 portable handwheel

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