

NCT[®]
CONTROL | DRIVES | MOTORS
KEEP MOVING

NCT 304
SMART CNC FAMILY

NCT 304

In the NCT 304 control, behind the monitor there is a 4-core computer performing CNC and user interface (HMI) tasks. On three cores, the NCT user interface (HMI) installed on well-known WINDOWS operating system and wide range of applications run, while the NCT CNC system (CNC kernel) runs on one core.

Application of the WINDOWS operating system enables the NCT programming software, namely the VECTOR, the myNCT and the solid body graphical representation, to be integrated into the NCT 304. The system has been built up and made open in such a manner that either the NCT company or the machine tool builder himself can replace or develop further the user interface in accordance with his own demands or the given application. This development opened a totally new market for the NCT. Through it, we became able to design for machine tool builders a custom-tailored, own and special user interfaces. Thus, we can reach those OEM partners demanding CNC user and programmer interfaces of their own design.



New capabilities facilitating operation and data input

Touchscreen

The biggest advantage of the capacitive touchscreen is that it enables a highly user-friendly interface (HMI) to be created. Data input can also be carried out by using a virtual keyboard 'painted' on the touchscreen. Since we are talking about a virtual keyboard, it is not a problem to adjust to different languages. The size of the buttons and their location at the periphery of the screen provides a convenient data input.

PC keyboard

In the case, when user prefers the PC keyboard, any type of it can be connected to a USB port available on every NCT 304 control as standard accessory, and the keyboard can be placed at a convenient and ergonomic position on the support that can be mounted under the machine keyboard at the lower part of the desk offered by the NCT.

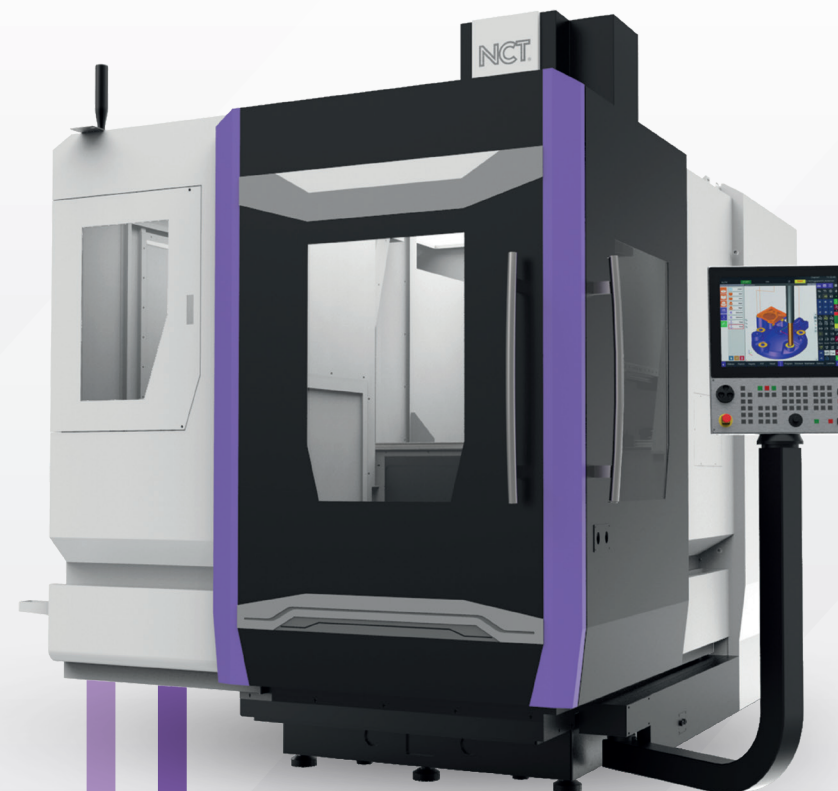
Plug & Play!

Manual data input

Features provided by the manual mode of the control play a significant role in user-friendly operation of the CNC machine tools. The NCT 304 performs prominently in this field too. The control stores the commands issued and lists them in the screen. Having selected any row of the list, the command series can be reissued any time, by the cycle start.



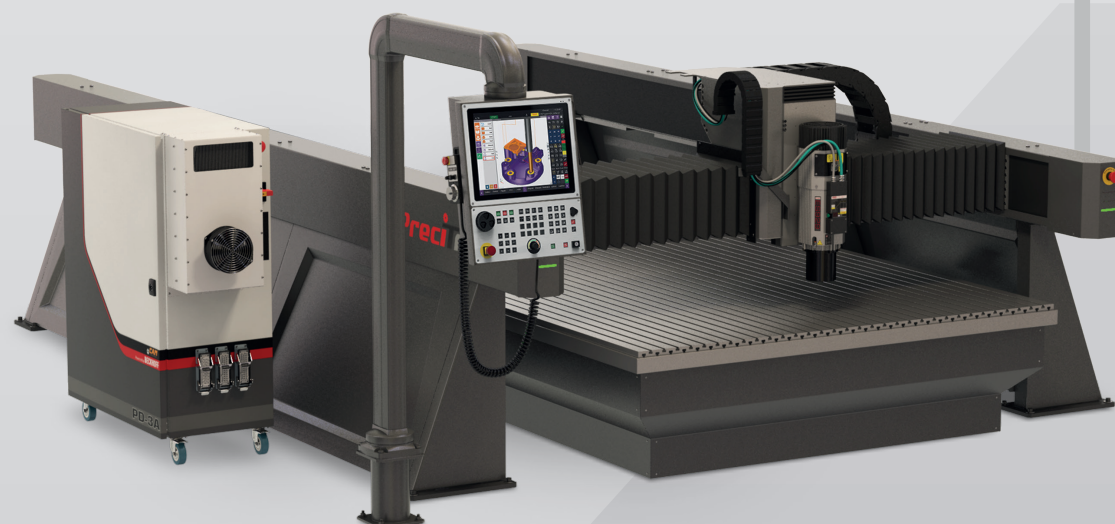
DENTAL MILLING
MACHINES



MILLING AND
LATHE MACHINES



ROUTER MACHINES
water / plasma / laser / milling



CONSTRUCTION
MACHINING CENTRES

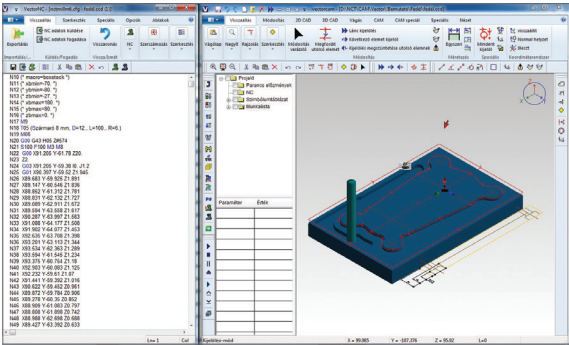
New services supporting programming and program testing

VECTORCAM

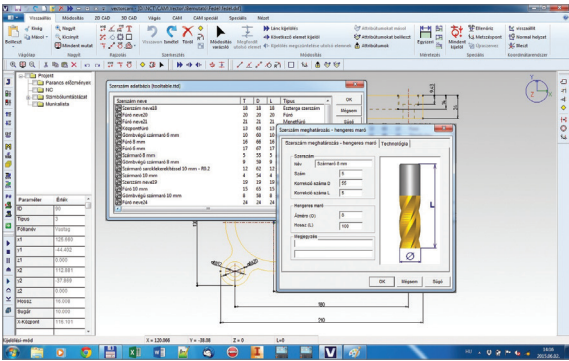
In the case of unit or short-run production, not the time of program execution but the time of program writing has to be reduced. The highly user-friendly VECTORCAM application (APP) integrated into the NCT 304 control serves this purpose. It is not CAD/CAM, but it is a real INDUSTRIAL SOFTWARE created for machine tool operators and programmers! Knowledge of high-level computing techniques is not required to use this software! With a machine tool, it can be used effectively from the simplest outline drawing to the 3D simulation.



Simple and fast CNC programming without knowing G codes. Making some motions, the contour of machining can be drawn; the tooling, the technology offered to it automatically and the machining strategy can be selected, and then the 3D simulation of the machining can already be started. At the end of the process, the solid body model of the finished workpiece will be displayed, which can be reduced, enlarged and rotated. When the virtual workpiece is accepted, the machining can be started.



Simultaneously with representing the solid body, the finished technological program can already be seen on the left side of the screen.



Tooling can be selected from the tool directory. Loading tools and technological parameters is an automatic simultaneous process. The data base size can be increased by the user freely.

Turning

- Roughing strategies
- Finishing methods
- Threading
- Drilling, boring
- C-axis machining
- Tool directory
- Technology selection
- Deburring, chamfering
- Profilin

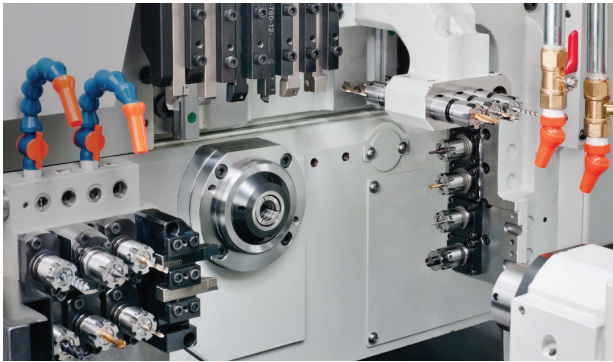
Milling

- Drilling on point pattern
- Contour milling
- Face milling
- Milling pocket with bosses
- Engraving onto surface of any kind
- Remnant removal
- Milling outer/inner tread
- Helical hole milling
- Wide variety of contour approach and depart
- Deburring, chamfering
- Profiling
- Tool directory
- Technology selection

Multi-channel and 5-axis machining, measurement within the working space

Multi-channel

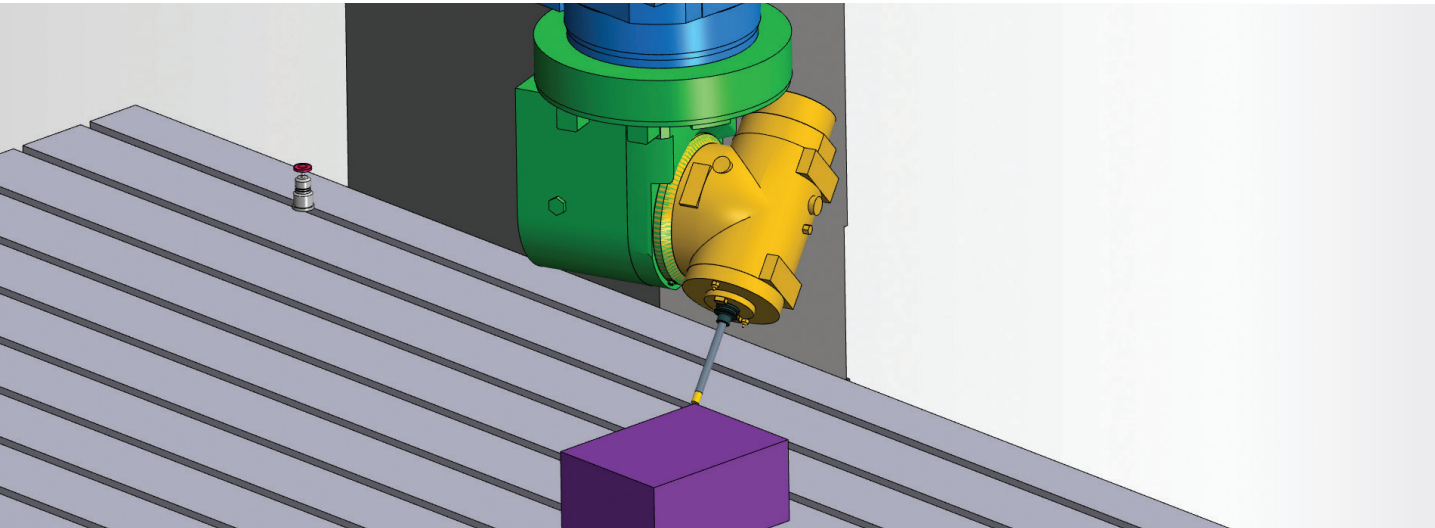
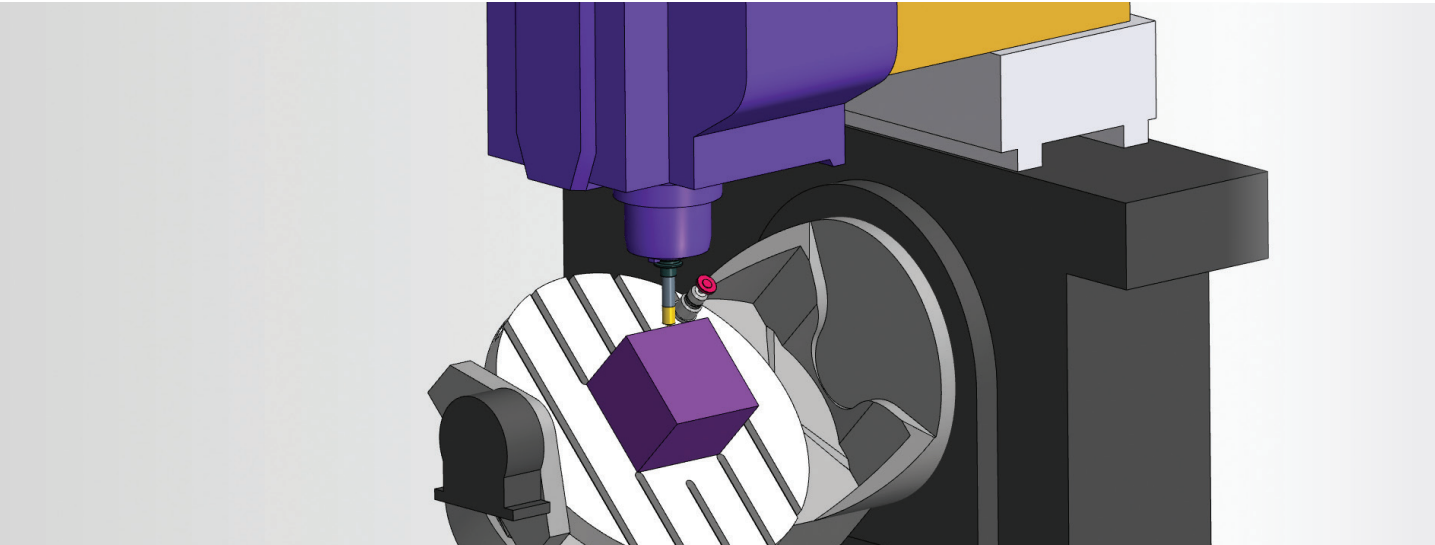
The NCT 304 is a multi-channel control. Actually, it means several logical CNC controls in one physical unit. Each channel is an independent CNC control executing its own technological program while synchronizing with the other channels continuously.



3+2D, 5D, TCP, CPC

With our 5D capabilities, we became able to control the most complex types of machining centres. The opportunity presented itself to provide our controls for machines used in wood industry, stone machining, medical technology, laser cutting and for the most expensive machines of metal industry. In the world market, only a few CNC manufacturers are able to offer this service!

TCP is the first step of the 5D machining. In such a case, the linear and the rotating axes move together so that the well-defined point of the tool travels along the programmed contour at a feed rate specified in the program. The next level of the 5D machining is TPC, when the shank of the tool is guided along the programmed path; and CPC, when not a well-defined point of the tool, but its cutting point varying continuously is guided along the programmed path.



15-19" CAPACITIVE TOUCHSCREEN

BROAD OPTIONS TO USE



Remote diagnostics, machine monitoring and energy management



Remote diagnostics

Our remote diagnostics service will provide simple, fast and economic error detection and troubleshooting if the user allows us to connect to the NCT control via Internet. Through remote diagnostics, the NCT expert being at home has almost as many capabilities for operating the control as many capabilities he had standing next to the machine.

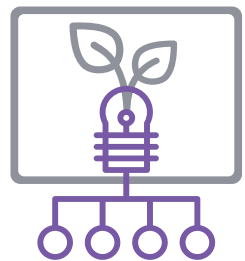
There is no call-out fee, and what is the most important, the expensive waiting time can be avoided! The use of the remote diagnostics service extends warranty time and this service is absolutely free of charge during warranty.



Machine monitoring

The NCT control records every operator' action, PLC and CNC event in a so-called log file. From the log data of a selected interval, the most important operation modes of the machine tool (MACHINING, SETTING, STANDSTILL, ERROR STATE) are filtered and plotted graphically against time. From the diagrams, degree of the utilization of the machine can be read out, and retroactively (even for many months) the times and reasons for standstill of the machine will be displayed. The log file data are very helpful to find the reason of machine tool failure.

For precise and fast service or for preparation for repair, please forward log file data to the NCT centre!



Energy management

The increasing price of energy and environmental consciousness demand a very strict energy management from all of us.

The NCT control constantly monitors the electric network of the machine tool, the sequence of phases; it monitors and logs the consumption and the network errors, to which the machine tool builder can react through PLC (for example, in the case of power failure he can stop the machine in time or he can limit number of electric equipment in case of energy consumption peak).

Consumption during a selected period within the logged interval (even in case of one workpiece) can be displayed in a table or graphically and even in the currency unit set.

In serial production, the price of electric energy can be managed in an economical way. More dynamic machining or lower energy price – the opportunities that can be chosen.

High-speed and high-precision path tracking

High-Speed and High-Precision (HSHP) path tracking

The five basic elements of this capability are as follows: read ahead, third-degree (bell-shaped curve) acceleration and deceleration, speed and acceleration feedforward, NANOmètre-resolution computing and smooth interpolation.

These capabilities provide the user with high speed, high precision and high surface quality during machining.

Read ahead

Along a zigzag and unknown road, we travel more slowly; whereas, along the same way we will travel more rapidly if somebody informs us about the speed the next corner can be turned with safety. In order to reach the highest speed along the path, the contour elements will be read ahead and the speed valid at each subsequent contour element will be calculated again and again taking into account that the calculated value can be reached without exceeding the safe acceleration and deceleration parameters specified for the machine.

Third-degree acceleration/ deceleration

With development of a new mathematical model for speed calculation, it became possible to build the third-degree acceleration/deceleration in the NCT controls by using which the highest dynamics of all drive systems and mechanisms can be produced.

Speed and acceleration feedforward

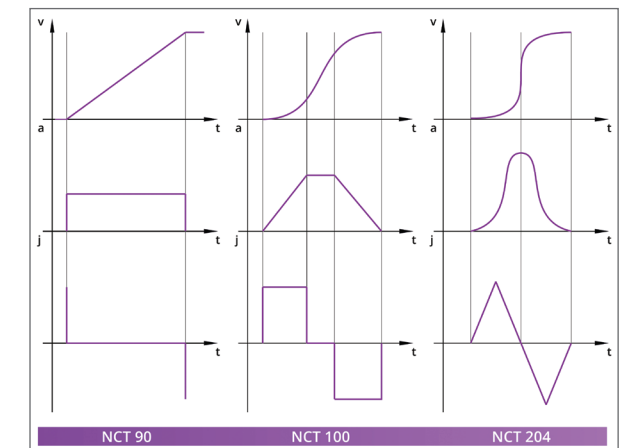
It is a system consisting of one servo axis and several elements connected in series. In respect of control engineering, the time elapsed while a command runs from the starting point to the last element of the system, is very long. The path generator of the NCT control calculates speed and acceleration for each displacement and feeds them forward to the speed and current regulator of the servo drive. Since the regulating units receive these data before dataflow would run through the control loop, the control time decreases and thus dynamics, speed and accuracy of the system can be increased.

NANOmètre-resolution

The internal data handling system of the NCT control makes possible a nanometre-resolution path generation and speed calculation. The EnDat 2.2 measuring system and the EtherCAT communication channel perfectly provide resolution and bandwidth required by the nanointerpolation.

SMOOTH path calculation

Usually, the CAM systems generate series of points interconnected by straight lines. After turning the SMOOTH on, in order to reach a better surface quality and a higher feed rate, the path generator of the control uses not straight lines to interconnect these points but it generates a so-called SPLINE curve; this curve advances not through the points specified by the CAM system but in a 3D tube the diameter of which is specified by the maximum permissible path tracking error.

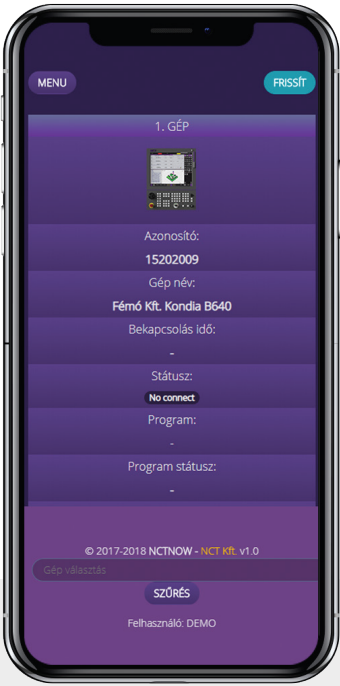
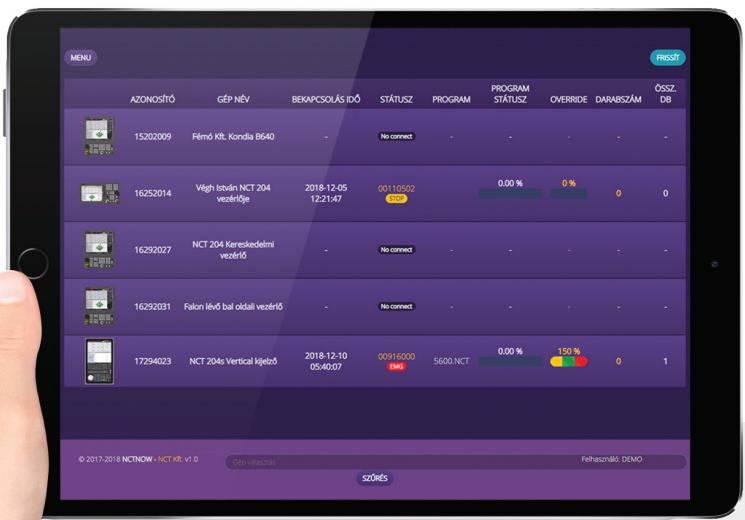


From left to right, the drawings illustrate the development, as they show the dynamic behaviour of the NCT 90, NCT 100 and NCT 204. In the bottom row it is clearly seen, that in the case of the NCT 204 control the jerk (the acceleration change) does not jump and it takes the axis the least amount of time and distance to reach its target speed.

NCT NOW

By using either your computer in the office or any of your mobile devices, you can have access to your machine tools any time from any places in the world. For this nothing else but Internet connection and the NCT NOW capability is needed.

You can see the momentary operational condition and utilization level of your machines. In case of failure, it is not necessary to take trouble with sending the log file. Through the NCT NOW, our service centre can download the log file.



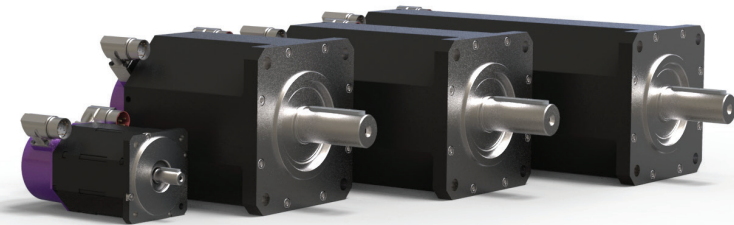
Structure and peripherals of the NCT 304 and the new compact drive technology

NCT servomotors

The A-, Ai-, AiS-, AMS- and TORQUE-type NCT motors meet even the highest user's requirements. As far as the mechanical design, the size, the speed and the electrical parameters are concerned, our motors have been developed specifically for machine tool application.

EnDat 2.2

In standard design, HEIDENHAIN EnDat 2.2 absolute measuring systems are built into the NCT servomotors; these systems assure resolution of 10-50 nm, high accuracy and such degree of reliability, which was unthinkable in the case of former incremental technology.



NCT compact servo drive family

It is a space-saving, easy-to-assemble and economic construction because drive boxes can be placed next to each other, and keeping a distance between the units is not required.

The cooling elements of the transistors can be place in a ventilated space isolated from the electric cabinet.

Automatic control for cooling ventilator– Energy saving

Covered buses – Smart appearance

EtherCAT – Standard (SoE) communication

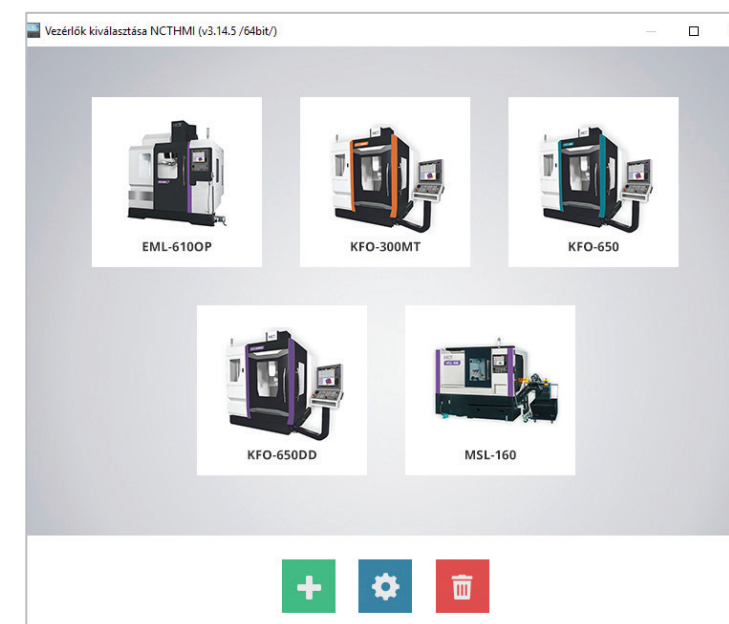
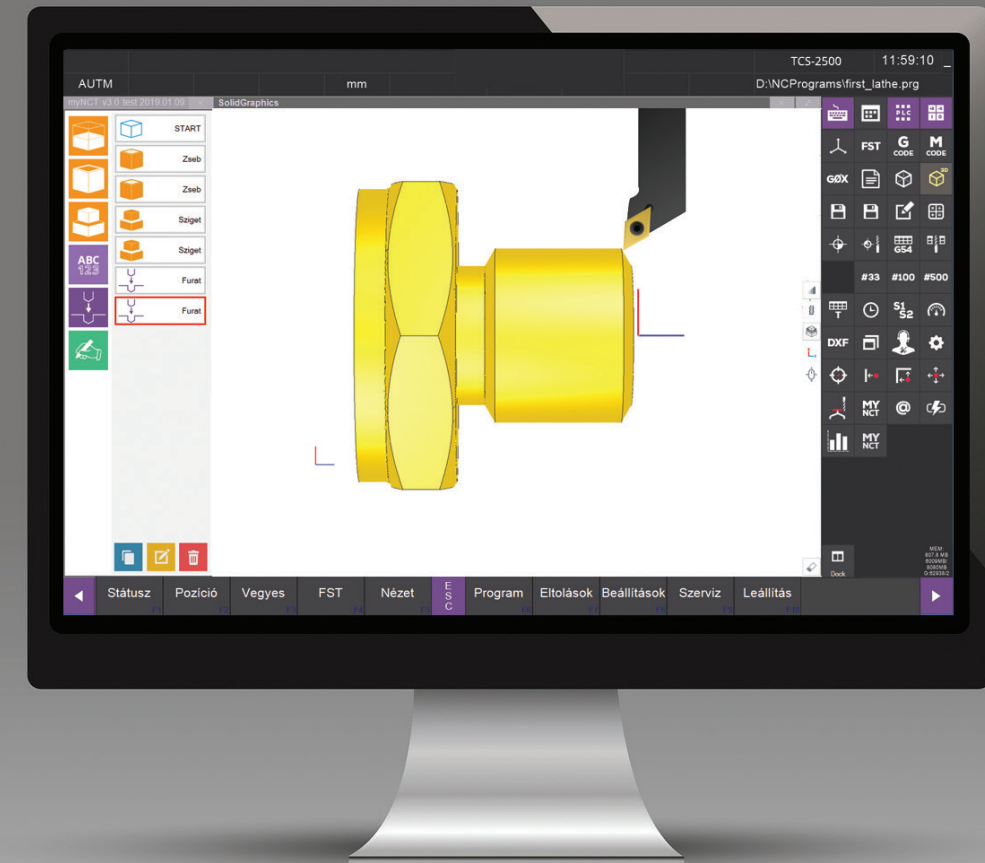
The NCT servo drives play a key role in the NCT remote diagnostics service, too.

The SoE communication enables the remote monitoring up to the level of the EnDat 2.2 encoder mounted on the NCT motor.

For high-voltage supply for the drive modules, there is a pair of buses lowered into the front panel. After easy removing the plastic front panel protecting against shock hazard, by turning the bus elements without removing them, any unit can be taken out from the line of drive.



PC Simulator



Excellent device for editing and testing a program on a PC. It is advised for education, off-line programming and testing CAM programs.

When in the simulator, the virtual equivalents of the machine tools in the factory has been created by loading the parameters of the machine tools, even very large CAM files can be tested very quickly by representing real run-time of the program. With knowledge of the exact execution time, utilization of the machines can be increased and planned.

Since the same code runs both on the PC and on the machine tool, it is guaranteed that the result achieved on the PC and the result of the real machining will be the same.

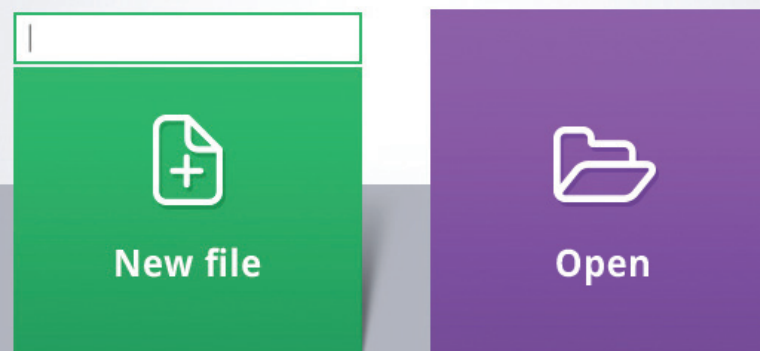


Solid body representation

Since the input for this graphical presentation is a command data issued to the servo drives, therefore the image of the workpiece is displayed on the high-resolution screen of the NCT controls perfectly as it will look like in reality, after processing.

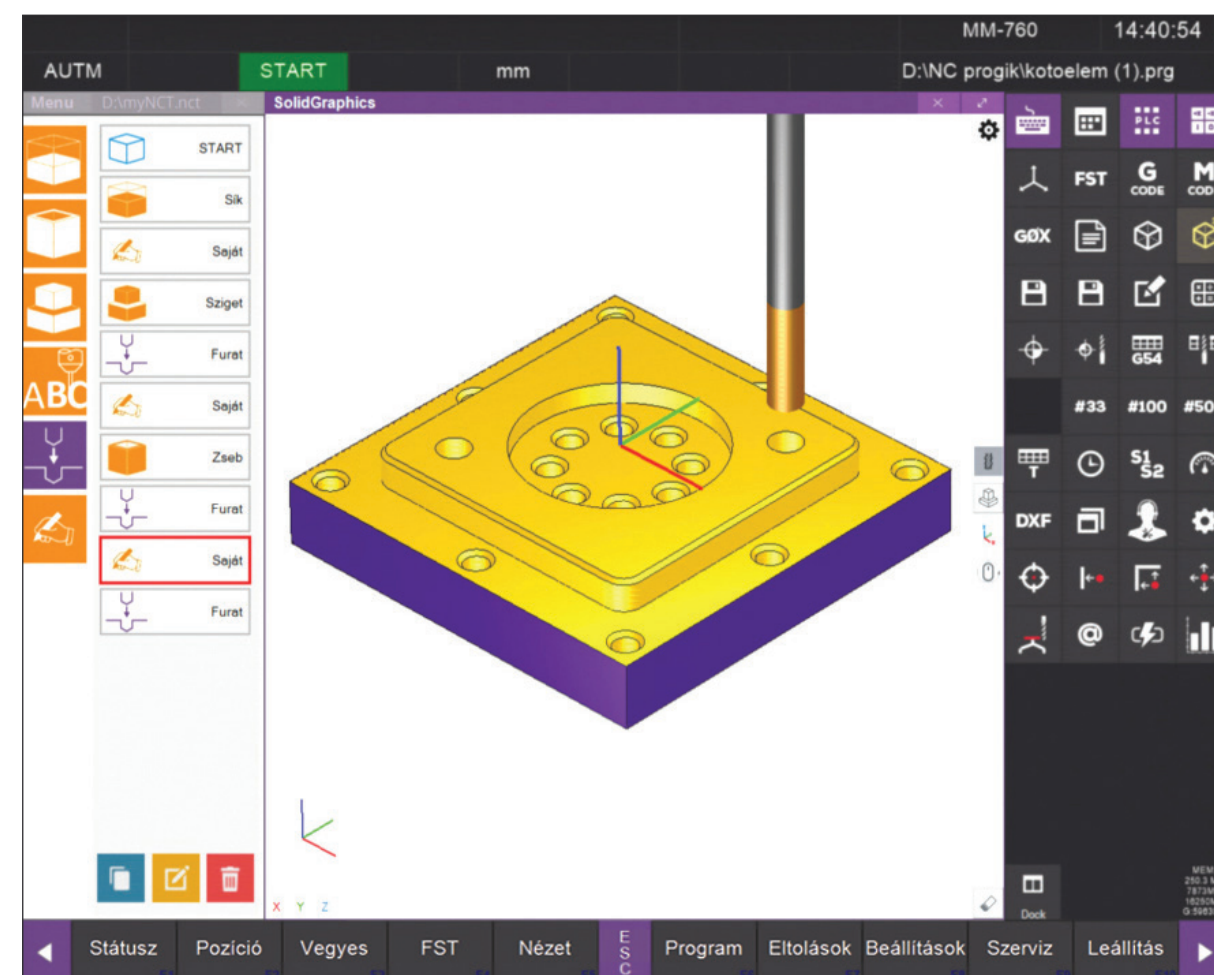
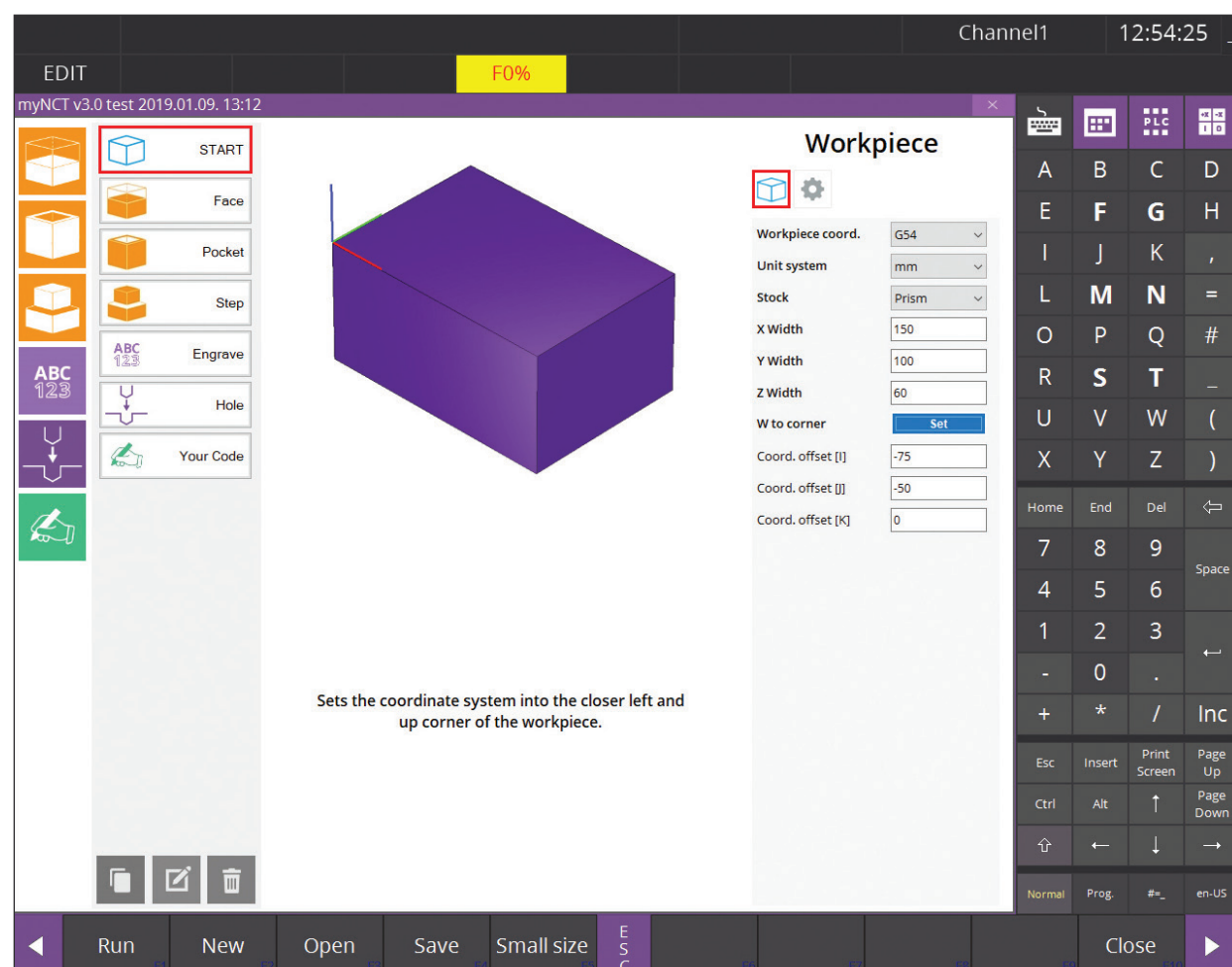
myNCT data input

The most effective CNC program can be written in G code which is the alphabet of the CNC programming. The myNCT data input integrated into the NCT 304 supports efficient G programming. It is not necessary to keep complicated address linkages in mind! The control offers dialogue tables. Table filling can be mixed freely with program writing by the use of text editor. Necessarily, all this can be done simultaneously even with execution of another technological program.



The model of the pre-product can also be represented. Since, in this case, the machining is drawn on the pre-product, the user can directly see the result of machining.

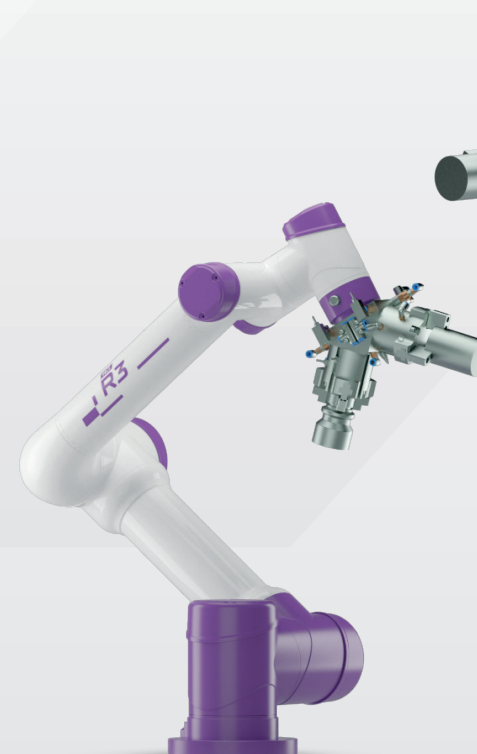
Where the two figures encounters, the colour of the lines changes, thus unwanted machining can be observed. Solid body representation can also be combined freely with line drawing of the tool path.





R3, R5, R10

INDUSTRIAL ROBOTS



R3 BASIC TECHNICAL DATA

- > Number of rotating axes: 6
- > Structure: series
- > Continuous / max. torque of wrists 1-2 (Nm): 50 / 100
- > Continuous / max. torque of wrists 3-4-5-6 (Nm): 20 / 40
- > Double measuring system: fully closed loop
- > Communication: EtherCAT
- > Loadability (kg): 3
- > Working radius (mm): 550
- > Movement range of wrists: + / - 360°
- > Max. rotation speed of each wrist: + / - 180° / sec
- > Repeatability at maximum load (mm): + / - 0,025
- > Rated / max. power consumption (W): 180 / 360
- > IP protection class: IP54
- > Weight (kg): 15

R5 BASIC TECHNICAL DATA

- > Number of rotating axes: 6
- > Structure: series
- > Continuous / max. torque of wrists 1-2-3 (Nm): 50 / 100
- > Continuous / max. torque of wrists 4-5-6 (Nm): 20 / 40
- > Double measuring system: fully closed loop
- > Communication: EtherCAT
- > Loadability (kg): 5
- > Working radius (mm): 850
- > Movement range of wrists: + / - 360°
- > Max. rotation speed of each wrist: + / - 180° / sec
- > Repeatability at maximum load (mm): + / - 0,035
- > Rated / max. power consumption (W): 210 / 420
- > IP protection class: IP54
- > Weight (kg): 25

R10 BASIC TECHNICAL DATA

- > Number of rotating axes: 6
- > Structure: series
- > Continuous / max. torque of wrists 1-2 (Nm): 80 / 160
- > Continuous / max. torque of wrist 3 (Nm): 50 / 100
- > Continuous / max. torque of wrists 4-5-6 (Nm): 20 / 40
- > Double measuring system: fully closed loop
- > Communication: EtherCAT
- > Loadability (kg): 10
- > Working radius (mm): 1250
- > Movement range of wrists: + / - 360°
- > Max. rotation speed of each wrist: + / - 180° / sec
- > Repeatability at maximum load (mm): + / - 0,05
- > Rated / max. power consumption (W): 270 / 540
- > IP protection class: IP54
- > Weight (kg): 38

Specifications of the NCT 304 control family

GROUP	ITEM	S/O	DESCRIPTION
HARDWARE	1.93 GHz 4 core (204)	S	High speed while minimal heat production The control panel does not need external cooling
	120 GB SSD (204)	S	It does not require an external computer to run CAD / CAM files either. Semiconductor hard disc There is no moving part, only one Compact Flash
	4 pcs USB	S	100% PC-compatibility Any type of PC keyboard can be used Any type of PC pointer can be used
	Ethernet	S	Connection to office computer network Standard TCP/IP protocol
	Graphic touchscreen	S	Size of 19" or 15" Touchscreen – basic pointer Basic programmer's keyboard in the touchscreen 1 million operating cycles at any point of the touchscreen Long lifetime, changeable protective foil
	Machine control panel	S	ALPS (Japanese) pushbuttons 1 million operating cycles IP 54 protection class Each button with LED light Operating modes, JOG, start/stop buttons, speed and spindle stepping switches 1 piece of key switch Built-in handwheel 20 freely usable pushbuttons for 19" version 8 freely usable pushbuttons for 15" version (expandable)
	Speed stepping switch (override)	S	Magnetic arrestment (without mechanical arresting element) – long lifetime Absolute position measurement with magnetic spacing 31 steps
	Handwheel built in the control panel	O	Magnetic arrestment (without mechanical arresting element) – long lifetime Angular motion measurement with magnetic spacing 50 positions / revolution
	External handwheel	O	Light weight Axis and step selection Spiral cable Magnetic arrestment
	EtherCAT communication with peripherals	S	Servo drives and IO peripherals can be strung on one Ethernet network Simple and chip cabling Compatibility – Using products of other manufacturers
	EtherCAT peripherals	O	Wide selection Producing custom-tailored solutions
CNC BASIC	Windows Embedded operating system (201)	S	Windows file management Use of standard WINDOWS peripherals
	Open Windows Professional platform	O	NCT 304 In addition to NCT HMI (user interface) any applications can be run CAD/CAM application (VECTOR, EdgeCAM)
	Intelligent software protection	S	EPU-ESIS – electronic protection card (EtherCAT Software Integrity Slave) Protection for options Managing the non-volatile dynamic memory PAYBIT EtherCAT branch (external handwheel)
	Software downloadable from the Internet	S	CNC system program Servo drive system program Servo parameters PLC programs ready to run and tested for several machine tools Application shop (NCT 304)
	Calculation of time per piece	S	Real calculation of time per piece Taking the tool change time and other secondary times into account It also works during test running Graphical representation

Specifications of the NCT 304 control family

GROUP	ITEM	S/O	DESCRIPTION
AXES	Cycle times	S	125 us speed control 125 us fine interpolation 1 ms path calculation 1 ms block processing 1 ms position control 10 ms PLC basic 1 ms PLC fast module
	Maximum number of axes	O	Max. 8 channels Max. 32 axes Max. 16 axes per channel Max. 16 spindle Max. 1 lead screw per channel (tread cutting, tapping)
	Number of axes at basic version	S	Lathe: 2 axes + 1 spindle Milling: 3 axes + 1 spindle or 4 axes
	PLC axes	O	Moving the axes from PLC program
	Number of PLC axes	O	There is no special limit, the PLC can assign any axis to PLC axis
	Speed reference signal output	S	EtherCAT
	Speed reference signal output IO train	O	Analog CAN BUS Pulse forward/backward Pulse + direction
	Generating the speed feedback (TACHO) signal	O	Issuing the analog (TACHO) signal proportional to the signal frequency of the encoder on the motor shaft Issuing a command signal through an analog line (reference signal – speed)
	Position feedback through the drive	O	EtherCAT TTL 1 Vcscs (voltage sinusoidal) 11 uAcscs (current sinusoidal)
	Position feedback through the IO train	O	EnDat 2.2 (HEIDENHAIN scale), TTL (retrofit), 1 Vcscs (voltage sinusoidal) 11 uAcscs (current sinusoidal)
	Reference point return – NCT servo drive	S	Absolute EnDat 2.2
	Reference point return – IO train	O	Absolute EnDat 2.2 C type (HEIDENHAIN scale, angle gauge) Reference pulse, Switch
	Compensations	S	Backlash error Thread pitch error Direction changeover acceleration Stick slip Straightness
	Max. number of spindles	O	Max. 16 spindles Max. 16 spindles per channel
	Synchronous running	O	Synchronous running of several spindles
SPINDLES	Electronic interlocking between the spindles	O	Electronic interlocking between the spindles Setting the ratio in parameter Gear cutting functions Polygon turning
	Rigid cutting	O	Different acceleration for drilling and retracting that can be set in parameter
	Orientating	S	To zero pulse of the encoder To switch
SEVERAL CHANNELS	Number of the channels	O	Max. 8
	Representation of channels	O	The user can create his own screen
	Interconnection between channels	O	Waiting for each other from technological program PLC
	Specific management of axes	O	Synchronous axes Composite axes Superimposed axes

Specifications of the NCT 304 control family			
GROUP	ITEM	S/O	DESCRIPTION
INTERPOLATION	Linear	S	Positioning Feed
	Circular	S	In several quadrants
	Variable-radius circle	S	Archimedean spiral
	Combined	S	Circular interpolation along 2 axes + Linear interpolation along max.14 axes
	Special	S	Polar coordinate Cylinder
	Thread cutting	S	Constant pitch Using several blocks Non-constant pitch
	SMOOTH	S	Fitting Bezier-spline to the points
FEED/ RAPID TRAVERSE	Feed	S	Per minute Per revolution
	Feed rate override	S	Managed from the PLC
	Acceleration/deceleration	S	Linear Quadratic
	Functions controlling the feed	S	Continuous machining Exact stop Thread cutting Disabling the feed rate override Decreasing the feed at internal corner
	Automatic decreasing the feed	S	In state G41, G42 when machining a circle, in proportion to the programmed and corrected radii When machining a circle, depending on the radius of the circle and the permissible acceleration / deceleration At a corner, depending on the speed difference specified in the parameter
HSHP HIGH-SPEED AND HIGH-PRECISION PATH TRACKING	Nanointerpolation	S	Path calculation, compensations in nanometre resolution Enhanced surface finish
	Acceleration / deceleration	S	Quadratic speed change Jerk-free acceleration / deceleration
	Multibuffer mode	S	Read-ahead of 1000 blocks Can be turned on Can be turned off
	Speed feedforward	S	Path tracking with reduced lag
	Point eliminator	S	Smoothing the path generated by an external device
	SMOOTH	S	Smooth interpolation Bezier-spline
COORDINATE SYSTEMS TRANSFOR- MATIONS	Number of workpiece coordinate systems	S	6 + 99
	Transformations	S	Rotating Mirroring Scaling
	Plane selection	S	X-Y X-Z Y-Z

Specifications of the NCT 304 control family			
GROUP	ITEM	S/O	DESCRIPTION
PLC	Logical PLC integrated in CNC	S	Fast, economical
	Max. number of IO lines	O	512 INPUT 512 OUTPUT
	IO modules	O	16-, 32-line inputs 16-, 32-line semiconductor outputs 4-, 8-line relay outputs Analog input/output units (+/-10 V, 4-20 mA) Receiving encoders Receiving probes Issuing pulses forward/backward Issuing pulses (A, AN, B, BN) Issuing pulses pulse/direction
	Ladder programming	S	Well-known programming language meeting international standards Simple error finding
	Displaying the ladder	S	Continuous real-time representation of the PLC on the CNC Green streaming
	Testing the PLC	S	Logical analyser, IO test symbolic, IO Displaying the green streaming
	Remote diagnostics	S	Remote access to machine
	Logging	S	Everything is seen and memorized by the monitoring module of the software Graphical representation
MACHINE MONITORING	Thermal diagnostics	O	Increased accuracy by compensation of thermal deformation Temperature measurement at 8 points
	Vibration diagnostics	O	Higher safety Machine monitoring
	myNCT	O	Easy and efficient programming The most effective tool for programming at the machine tool
	SUPPORT	S	Interactive screen supporting the programming Interactive screen supporting the handling
SOFTWARE SUPPORTING THE TECHNOLOGICAL PROGRAMMING	Running the CAD/CAM program on CNC	O	NCT 304 Windows platform VECTOR, Edgcam
	Cycles	S	Drilling cycles Simple turning cycles Combined cycles (Rough turning, rough facing, grooving, thread cutting etc.)
	User-specific cycles	O	Cycles written in MACRO program language
FUNCTIONS SUPPORTING THE TECHNOLOGICAL PROGRAMMING	Definition of chamfer	S	,C
	Definition of fillet	S	,R
	Calculations of points of intersection	S	Line – line Line – circle Circle – line Circle – circle
	Subroutine technique	S	4 call levels
	Conditional block skip	S	Max. 9 switches
PROGRAM ORGANIZATION	Macro programming	S	An effective tool for writing user cycles
	AUTOMATIC	S	Assigning the selected program file to run
	MDI	S	Execution of a new technological program when an AUTOMATIC execution is interrupted
PROGRAM EXECUTION	Handwheel	S	Program execution controlled by handwheel

Specifications of the NCT 304 control family

GROUP	ITEM	S/O	DESCRIPTION
DRIVE TECHNOLOGY	EnDat 2.2 rotary encoder	S	Standard measuring system for Ai-series NCT servo motors High resolution Absolute measuring system through several revolutions
	EnDat 2.2 linear scale	O	Absolute measurement 50 nanometre resolution
	SoE protocol	S	Sercos over EtherCAT
	CoE protocol	S	Can Open over EtherCAT
	Drive parameterization	S	From CNC, without external tool Downloading ready-to-use and tested parameters from directory Producing the drive parameters of the synchronous servo motors from the data on the motor nameplate
	Updating the system program	S	From CNC, without external tool
	Drive adjustment	S	Oscilloscope Circular test
	Tandem mode	O	Tandem mode of synchronous drives Tandem mode of asynchronous drives
	Power supply unit	O	Mains-friendly recuperation
	Connection to external drives	O	By using EtherCAT standard protocol (SoE, CoE) Analog +/-10 V Issuing pulse forward/backward Issuing pulse (A, AN, B, BN) Issuing pulse pulse/ direction
SERVO MOTORS	A series	O	Ferrite magnet
	Ai series	O	Neodymium magnet
	AiS asynchronous motors	O	Liquid cooling Cooling the bearing Temperature measurement at several points 10000, 12000, 15000 speed
	AMS motor spindles	O	Liquid cooling A2-5, A2-6, A2-8 spindle nose Temperature measurement at several points
	TORQUE motors	O	Intensive liquid cooling Tilting the milling head Rotary table, indexing table
MONITORING	Oscilloscope	S	Representation of servo axes characteristics as a function of time
	Logical analyser	S	Representation of PLC inputs/outputs in time diagram
	Circular test	S	Graphical representation of synchronous running of the drive axes Testing the dynamics of drives There is no need for external tool Representation of mechanical errors on machine with linear scale
	Symbolic IO	S	Representation of PLC variables in any order
	IO test	S	Tabular representation of IO and memory field managed by PLC in tables
	Testing the measuring system	S	Tabular representation of the drive characteristics
ENVIRONMENTAL AWARENESS	Reversible braking	S	In the case of feeding back to the mains, when the capacitor of the power supply unit is charged, the energy flows from the motor operating in generator mode toward the mains. Since, in addition to the machine tools, generally there are other energy consumers in the electric mains, these energy consumers absorb the recuperated energy, i.e. the power meter will rotate slower.
	High capacitor capacity	S	In the course of braking, the motor changes over to generator mode, the energy flows from the motor toward the drive and firstly charges the capacitor battery.

Specifications of the NCT 304 control family

GROUP	ITEM	S/O	DESCRIPTION
ENVIRONMENTAL AWARENESS	Electronic range changer	O	An electronic range changer is cheaper than a mechanical one and requires less current from the mains than a higher-power motor not having range changer. Users are always short of power and network development is very expensive. In addition, smaller transistors and fewer capacitors are needed, making electronics cheaper.
	Removing heat from the electrical cabinet	S	The drives are the main heat generators in the electrical cabinet. If this heat does not heat the electrical cabinet but is removed from it, no energy needs to be used to cool the electronics.
	Switching the fans	O	Temperature of the electric cabinet and the cooling rib is measured, and, as soon as possible, the fans will be stopped. There is no overcooling.
	Reduced motor inertia	S	Smaller inertia = lower power consumption = smaller loss
	Advanced power switches	S	Minimal loss, minimal heat generation
	Fluid grease lubrication	O	It does not pollute the coolant It does not pollute the environment
INTERPRETED G CODES	Data input	S	G20/G21, G90
	Incremental programming	S	G91 Also with operator I
	Working space limitation On/Off	S	G22/G23
	Interpolations	S	G0, G1, G2, G3 G12.1/G13.1 G7.1 [axis address] G7.1 [axis address]0 G33, G34 G5.1 Q2 G28, G30, G31 Qn, G37, G36 G84.2, G84.3 G50.2/G51.2 G4
	Spindle speed fluctuation detection On/Off	S	G25/G26
	Feeds and their control functions	S	G94, G95, G96, G97 G9, G61, G62, G63, G64
	Control functions of high-speed machining	S	G5.1 (P0, P1, Q1, Q0, R1, R2, R3)
	Workpiece coordinate system	S	G54, G55, G56, G58, G59, G54.1 P1-99
	Coordinate systems, transformations	S	G52, G53, G92 G17, G18, G19, G50, G50.1, G51, G51.1, G68, G69
	Tool compensation	S	G36, G37, G40, G41, G42, G43, G44, G49
	Drilling cycles	S	G73, G74, G76, G80, G81, G82, G83, G84, G84.2, G84.3, G85, G86, G87, G88, G89, G98, G99
	Turning cycles	S	G70, G71, G72, G73, G74, G75, G76, G77, G78, G79
	Macro calls	S	G65, G66, G66.1, G67
MACRO PROGRAMMING	Variables	S	Symbolic Local up to 4 levels: #1-#33 Global: #100-#499, #500-#999
	Assignment statements	S	#i=<formula>
	Arithmetical	S	+, -, *, /, MOD
	Logical	S	NOT, OR, XOR, AND
	Other	S	ABS, BCD, FIX, FUP
	Functions	S	SQRT, SIN, COS, TAN, ASIN, ACOS, ATAN, EXP, LN
	Conditional expressions	S	EQ, NE, GT, LT, GE, LE
	Branch	S	GOTO(block number) IF [<conditional expression>] GOTO (block number)
	Cycle organization		WHILE [<conditional expression>] DOM...ENDm
	Data issue	S	POPEN, PCLOS, DPRNT, BPRNT, FOPON, FCLOS

NCT services and the NCT Academy

The NCT Academy Non-profit Ltd. is the No.1 CNC school in Hungary. The state-of-art machine tool fleet, the well-learned and experienced teaching staff and the NCT company behind the Academy – all of these guarantee the high quality.

Dual training:

- CNC programmer (National Qualification Register number: 407151001)

Education and trainings:

- NCT CNC programmer technologist
- Sub spindle lathe
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- Online CAD basics
- Online CAM basics
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- 5-axis CAM - Edgecam
- Advanced 3D modelling – Solid Edge



Special custom-tailored trainings are also available at the NCT Academy or even at your premises. Adult learning registration number: B/2020/004858

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