

WORKNC

CAM software for precision mould, die and tooling manufacturing



WORKNC

Continuous development and service

Since being introduced to the market in 1988, continuous development has made WORKNC the powerful, flexible and customisable system that today serves a fast-paced modern manufacturing environment.

As the ideal CAD/CAM solution for a diverse range of industries, WORKNC is used to serve the aerospace, automotive, defense, electronics, and medical sectors, among others. From prototype to production, WORKNC enables manufacturers to select their preferred level of automation and to customise programming processes to fit the needs of their shops.

Hexagon is proud of the quality of its customer service and, with the help of its worldwide service network, partners with customers to optimise the efficiency of CNC machinery.

The solution

Manufacturers across the globe trust in the quality, reliability and user-friendliness of WORKNC, one of the most widely used CAD/CAM systems in the world. Hexagon continuously invests in customer service and research and development to provide customers with highly innovative CNC software technology.





Waveform roughing strategy

The Waveform roughing strategy is a high-speed machining technique that maintains a constant tool cutting load by ensuring that tool engagement with the material is consistent. The cycle's smooth toolpath avoids sharp changes in direction, which help maintain machine-tool velocity. In addition to cutting machining time, use of the Waveform cycle extends tool life.

Auto5

A unique innovation in the field of 5-axis machining, WORKNC Auto5 automatically generates 5-axis toolpath from existing 3-axis toolpath, and takes into account the specific kinematics of the selected 5-axis milling centre.

Advanced toolform roughing

WORKNC Advanced Toolform technology eliminates inaccuracies characteristic of traditional parametric toolpath calculation, resulting in more accurate roughing stock.

By calculating toolpath based on accurate cutting-tool dimensions, Advanced Toolform roughing reduces rest-roughing time by up to 70 percent.

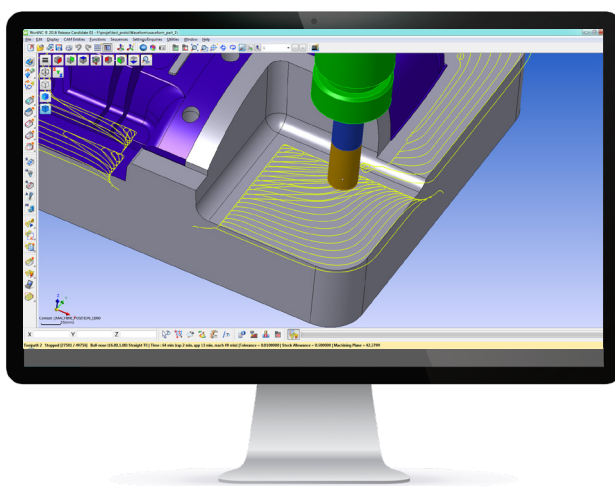
Re-machining and finishing

Several re-machining and finishing strategies in WORKNC enable users to effortlessly tailor machining processes to their individual requirements. Re-machining strategies automatically detect remaining material, eliminating unnecessary tool movements and reducing machining time.

2 to 5-axis machining

WORKNC's multi-thread calculation takes advantage of the benefits of multi-core computers with rapid calculating and processing times. Preparation times are also reduced thanks to predefined machining sequences and milling toolpath calculations in batch-processing mode.

WORKNC's dynamic stock management delivers toolpath updates in real time, and supports milling tools of all shapes. The result is high-precision post-processing, uniform tool stress, and reliable toolpath.



Waveform roughing



Roughing procedures can be programmed in half the time and run 70% faster.”

Roy Thomas,
Patterson Mold & Tool

Roughing

Toolpath for roughing and re-machining in WORKNC enables the removal of a large amount of raw material in single passes and with significant depths of cut. As operations are performed, dynamic stock management ensures precision in working with small-diameter tools.

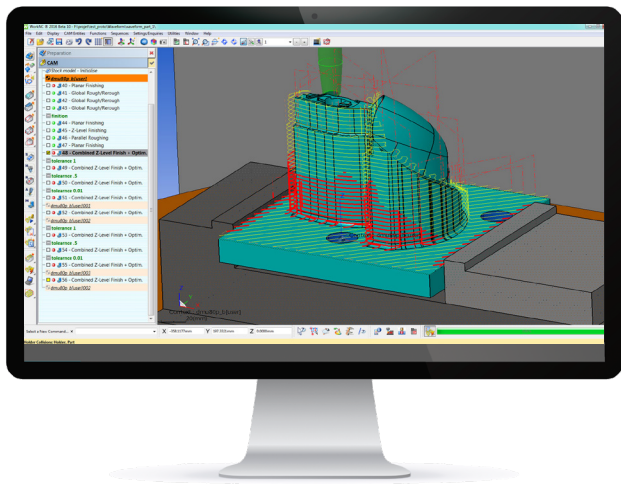
Toolpath optimisation

Optimised toolpath for high-speed processing makes it easy, quick, and safe to machine even the hardest of metals, thus reducing the need for electrical-discharge machining.



Cutting the die directly has eliminated the need for EDM processes, thus reducing the production time by 82%.”

Hirki Takama,
Riken Forge



Collision detection

Collision detection

Expanded collision detection and prevention checks parts, part fixtures, cutting tools, tool holders, and machine tools to ensure that the toolpath is collision free.



WORKNC allows us to successfully machine with tools with a diameter of 0.2mm and a length of 10.5mm, which corresponds to a length-to-diameter ratio of 26 - without bending or damage”

Mr. Kazuya Fukushima,
Shinkoh Mold Co. Ltd

WORKNC users include:

Virtually all automotive companies in the world:

Audi®, Toyota®, Ford®, Peugeot®, Citroen®,

Renault®, Volkswagen®, Mercedes-Benz®,

BMW®, Jaguar®, Rolls-Royce®, Bentley®,

General Motors®, Nissan® and Honda®;

aerospace companies, including Snecma® and

Eurocopter®; home appliance manufacturers

like Calor®, Miele® and Whirlpool®; consumer

electronics manufacturers, such as Samsung®

and Motorola® as well as a great number of

mould, die and press tool construction, such as

the multinational corporation Arrk® Group.

Application-specific CAD for CAM

User interface

WORKNC's intuitive graphical user interface empowers new users to work productively within a short period of time.

Analytical tools

Analytical tools simplify the process of querying CAD data to check features, such as draft angles and small radii. Intuitive operation and automated processing strategies make WORKNC the ideal production tool.

Toolpath editing

Thanks to WORKNC's high-performance graphical toolpath editor, users can quickly and intuitively edit toolpath and adjust it to their individual requirements with a single command.

Work plan preparation

WORKNC includes specialised CAM-oriented CAD functions that can be used prior to programming to increase efficiency. Custom automation tools, such as sequences that can be repeatedly applied to specific processes, are useful for optimising programming time and establishing process standards.

CAD data

WORKNC imports solid models from all leading CAD systems and handles even the largest of files with ease. The software works seamlessly with all conventional neutral data formats, such as IGES, STEP, STL, Parasolid and SOLIDWORKS®. WORKNC's CAD interfaces are also regularly updated to ensure that they can accommodate the latest innovations in native file formats.

WORKNC Toolpath Viewer

The WORKNC Toolpath Viewer allows machine-tool operators to load, analyse and simulate CAM programs prior to running them on a machine. The viewer also provides more detailed information than printed process sheets, which helps reducing or eliminating interruptions once the program is up and running.

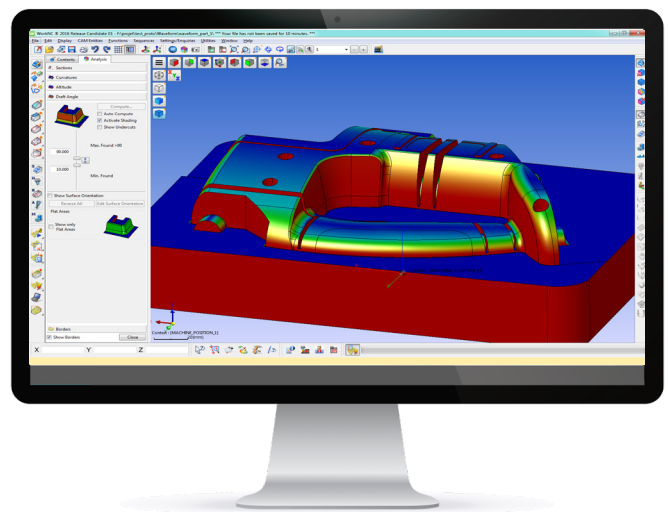
WORKNC Shop Floor Editor

The WORKNC Shop Floor Editor, offers the same features as the toolpath viewer, but goes a step further by allowing machine operators to post pre-programmed jobs right on the shop floor. Because it delivers greater flexibility, customers who use this tool no longer need to contact their programming departments just to post to different machines.



The analysis function assigns colour codes to radii so that we can select the right tools from the tool library. The analysis of complex components is simplified by the dynamic cross-section view and the semi-transparent part view.”

Haruki Matsui,
TOMCO Co Ltd



Draft angle analysis



Roughing: 3-axis, 3+2-axis and re-machining

Efficient roughing strategies

Specialised machining strategies for roughing and re-machining in WORKNC enable users to safely and consistently achieve unparalleled cutting volumes.

As the software offers dynamic stock management, programmers can easily track the state of the stock model throughout the process rather than just at the beginning and the end.

Parallel calculation technology

Advanced parallel processing allows users to calculate up to four toolpaths simultaneously in each WORKNC workzone, significantly reducing programming time.

Power users can upgrade to calculate up to 16 processes simultaneously, taking performance to the extreme.

Benefits of WORKNC roughing and re-machining strategies

- Constant tool engagement
- Ability to cut at significant Z-depths in single passes to maximise cutting volume and extend tool life
- Machining of planar surfaces over the entire part, in which the correct 3+2 machining orientation is automatically created

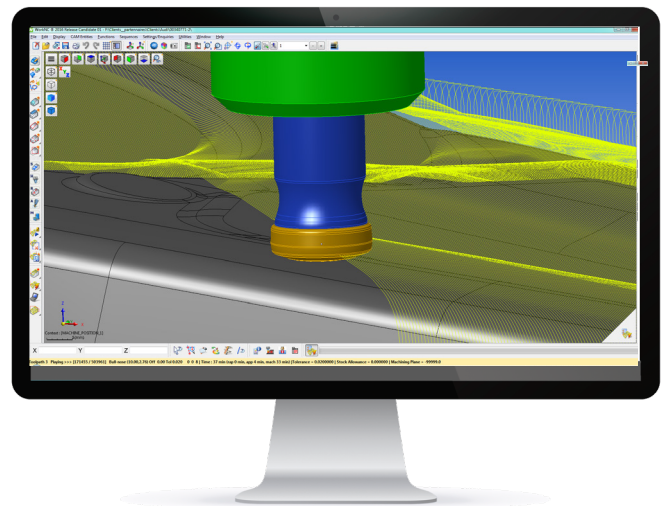
Re-machining

Re-machining toolpath is applied for the automatic removal of remaining material after an initial roughing operation is complete. Consecutively smaller cutting tools are used in subsequent operations to remove all of the remaining material. Re-machining reduces programming and machining time, and eliminates unnecessary tool movement.

High-speed machining is guaranteed with spiral lead-in moves, corner smoothing techniques. They ensure that the tool remains in contact with the part at all times.

Surface finishing

- Global finishing for a continuous spiral-shaped toolpath over a continuous surface
- Automatic finishing of level surfaces
- Z-constant finishing and subsequent optimisation for flat areas
- Undercut post-processing
- Z-level post-processing
- Contour-parallel residual material machining
- Finishing with guide curves
- Machining of thin-walled parts (such as electrodes)



Finishing with HSC tools



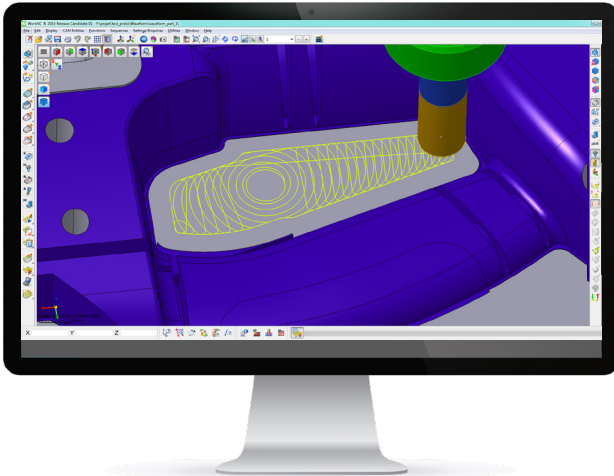
I was quite surprised at how easily WORKNC can be learned. Moreover, we are in regular contact with WORKNC application technicians, whose assistance and training sessions we are quite happy to take advantage of."

Marvin Sims,
Presrite Corporation

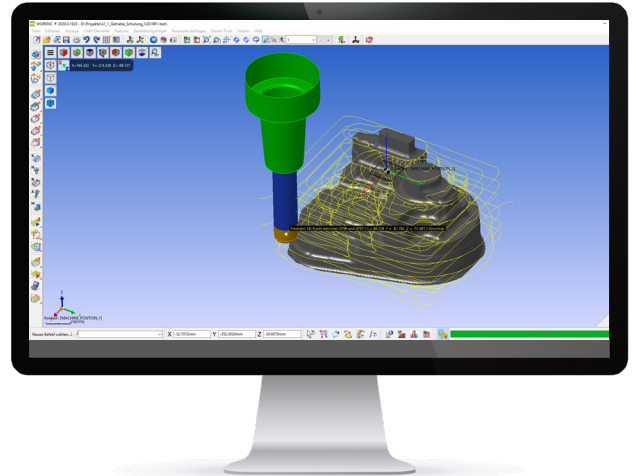


The 3D raw part model feature is a very useful option for us. Machining the part with smaller tools helps us remove as much material as possible before finishing."

Jason West,
Astro Machine Works



Waveform roughing strategy



Large-volume roughing



We have used the machining strategies of WORKNC for roughing and finishing, and the result was remarkable. WORKNC easily solved our problems through the use of the parameters of our old CAM system and generated dynamic paths without waviness or stripes and a significantly better surface quality directly from the machine."

Mr Liu,
Shandong Weifang Foton Mould Co. Ltd



Prospect Mold has profited enormously from WORKNC. We achieve a machine run time of 80%."

Mark Guic,
Prospect Mold

Automated 2-axis machining

2-axis machining

The machining of 2D geometries is simple with WORKNC, which combines 2D toolpath on curves or surfaces with automatic and manual hole programming functions to provide a complete solution for prismatic parts and all of your hole-boring needs.

WORKNC 2D delivers the power and reliability of global roughing, 2D toolpath on curves or surfaces, and automatic and manual hole programming functions in one package.

WORKNC contains 2D curve machining functions for machining directly from independent 2D entities or curves extracted from 3D models. To make programming even faster, many of the 2D functions can be performed directly on a solid face without the need to extract curve geometry.

WORKNC 2D machining strategies include:

- Tangent to the curve
- Curve re-machining
- Pocket milling
- Rib machining
- Planar milling in curves
- Drilling and tapping

Feature detection

WORKNC feature detection automates individual drilling processes in components with many holes. The resulting milling paths ensure top machining quality of the entire part.

The benefits of feature detection include:

- Automatic recognition of cylindrical shapes
- Automated detection of all features that require drilling
- Selection of predefined drilling sequences
- Automatically generated drilling processes
- Management of deep and intersecting boreholes

Interactive drilling

With the help of the interactive drilling functions in WORKNC, users can select the position and size of a hole directly from the solid model.



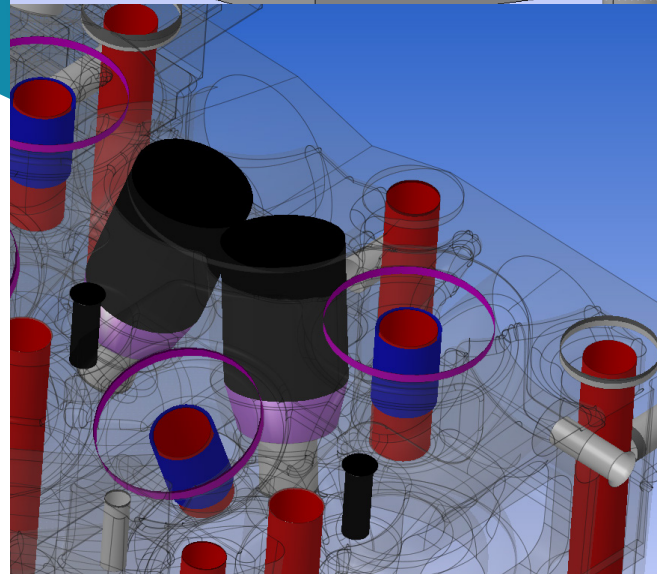
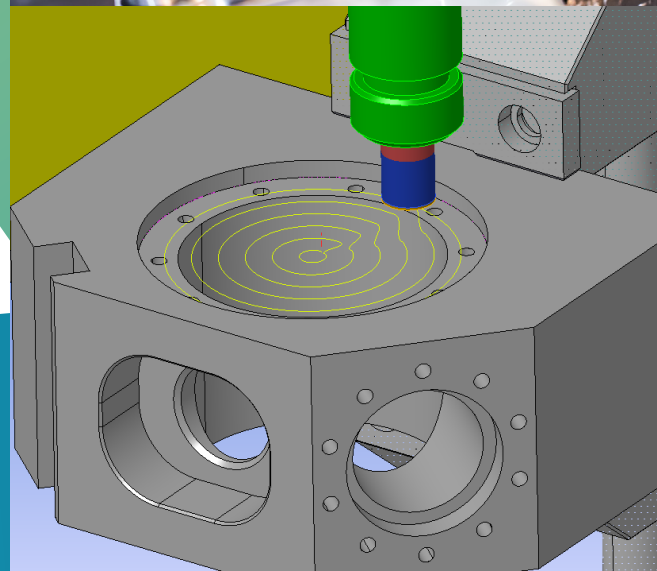
WORKNC's feature detection immediately paid for itself. We saved countless work hours. What's more, WORKNC made our production even more productive, eliminated many sources of faults and this significantly improved the precision of our finished tools."

Ed Busman,
Walker Tool and Die



The automatic feature detection recognises all kinds of boreholes, from fittings and threadings to blind holes. This reduces programming work and saves time.”

Joseph Batz,
Sable Engineering



Automated 5-axis machining

5-axis machining

WORKNC delivers the benefits of 5-axis machining to all users by taking the complexity out of programming. WORKNC 5-axis includes powerful, user-friendly programming tools and integrated collision avoidance.

Simultaneous 5-axis strategies

WORKNC also includes specialised 5-axis strategies for individual applications, like hobbing, trimming, engraving, impeller, shovel and tube machining, as well as wing wheels.

- Efficient toolpath generation
- Easy toolpath preparation based on guide curveset, sections or surfaces
- Complete simulation
- Specialised strategies for individual applications, such as trimming, pocketing, blade and tube machining, impellers, and laser cutting

Auto5

A revolutionary innovation in the field of 5-Axis machining, WORKNC Auto5 enables users to automatically generate 5-axis toolpath based upon existing 3-axis toolpaths while taking into account the kinematics of the selected 5-axis milling center.

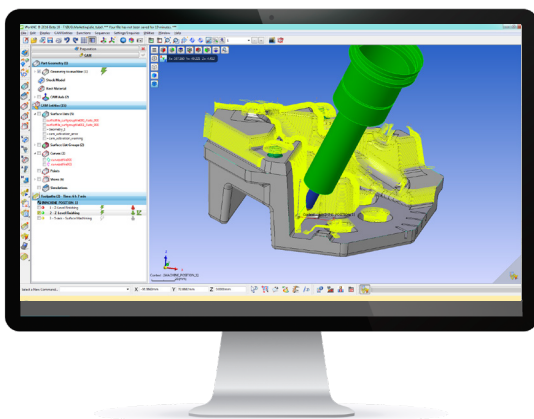
WORKNC Auto5 supports the use of short, rigid cutters and allows more of the job to be finished in one setting, reducing the number of electrode-burning operations required to finish a component.

Benefits at a glance:

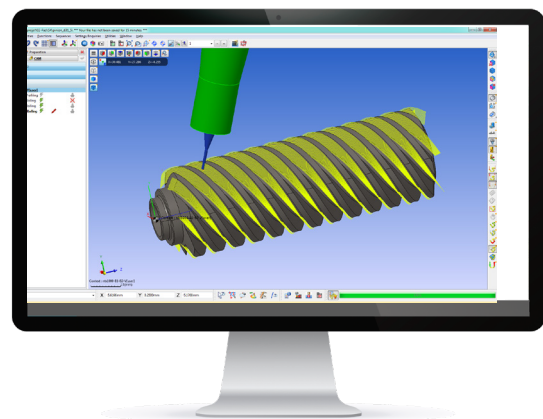
- Efficient toolpath generation
- Auto5: Automatic conversion of 3-axis toolpath to 5-axis
- Complete simulation
- Specialised strategies for individual applications, such as trimming, pocketing, blade and tube machining, impellers, and laser cutting

25% of our work consists of 5-axis machining. Our WORKNC users program them exclusively using the module Auto5, which is extremely easy to use.”

Roy Thomas,
Patterson Mold & Tool



Auto5



Toolpaths for 5-axis machining

WORKNC | Designer

The right CAD for CAM

WORKNC | Designer fills the gap between CAD and CAM. From fixture design to part repair and modification, WORKNC | Designer is the ultimate CAD solution for design through production.

Features at a glance:

- Easy to learn, intuitive user interface
- Direct modelling CAD environment
- Combined wireframe, surface and solid modelling
- Powerful sketching with automated region creation
- Surface repair of imported data
- Extensive list of CAD import formats

Direct modelling

Direct modelling frees the user from the constraints of a traditional modelling system. Rather than modifying a lengthy series of parameters to make a design change, direct modelling allows the user to push, pull and drag the geometry to obtain the desired shape. These changes can be completely freeform or driven by numeric increments and measurements taken from existing geometry. Knowledge of how the original model was constructed is no longer necessary, and design changes are not constrained to the original methods of creation. Direct Modelling gives the user complete freedom of construction whether creating a new component or modifying an existing design created in any of the myriad of CAD formats that WORKNC | Designer supports.

Ease of use

Simple menu and icon commands with context-sensitive online help make it quick and easy to start using WORKNC | Designer, combined with programmable function keys and mouse buttons, dynamic rotation, zoom and pan tools make it simple to quickly achieve results.. Unlimited “undo” and “redo” operations with user-definable bookmarks enable the designer to move backward and forward throughout the design process. Multi-layer and multi-origin control with user-definable colour pallets and line styles makes it easy to review, create and work

with highly complex designs. Lightning-fast rendering, transparency control and dynamic sectioning also make it easy to visualise CAD files and large assemblies.

Model healing

Small gaps between surfaces on imported models can be automatically healed, eliminating the time-consuming process of rebuilding small surface patches. Where surfaces are corrupt or missing, WORKNC | Designer automatically creates edge-curve geometry, making it easy to rebuild new faces using the comprehensive surfacing suite. Automation makes the time-consuming process of model cleanup much faster and simpler. Closing a surface model to produce a solid body eliminates construction problems later in the design process and immediately brings the benefits of solid modelling to the user. The ability to seamlessly switch between solid and surface technology provides unlimited freedom, ensuring the user can work with difficult CAD data.

Feature suppression

There are often instances when incoming CAD data includes geometric features that are either unnecessary for CAM, or will not be machined. Regardless, secondary operations, such as laser engraving, electrode marking, and others, are often represented on the model. While important for the CAD design and the final component, this additional data often impedes the job of the CAM programmer.

With WORKNC | Designer, removing these features and even saving them for future operations is just a mouse click away.



Model simplification

Along with suppressing features of the model not used for machining, users may wish to simplify geometry during various stages of the machining process. Removing portions of the model, such as intersecting features, speeds up the machining process and yields better results.

Powerful sketching

WORKNC | Designer sketching capabilities enable the creation of two-dimensional shapes using free-form input. While the user can rely upon the traditional methods of coordinate-based input, free-form sketching intelligently interacts with surrounding geometry. This ability to intuitively create implied constraints with other geometry expedites the sketch-creation process while maintaining the maximum flexibility for future changes.

Geometry for machining

WORKNC | Designer provides a host of geometry-creation techniques that are critical to the machinist for model preparation.

Hole capping is a great example of the simple and user-friendly features of WORKNC | Designer that help to ensure that surface machining yields the best possible results. This feature can be used to cap anything from a simple drilled hole to a complex open cavity with just a few clicks of the mouse. An extensive range of curve creation routines vastly improves boundary generation and simple-but-powerful surface creation techniques provide the machinist with more power than ever before.

Working with 2D Data

WORKNC | Designer supports the import of DXF and DWG files, enabling users to transform existing 2D data into 3D models by simply reusing the imported profiles from the original data. Imported data automatically creates sketch profile regions, making the transformation from 2D to 3D easier than ever.

Extensive range of CAD interfaces

WORKNC | Designer imports data from a wide variety of exchange formats, including Parasolid, IGES, STEP, ACIS, DXF, DWG, STL and VDA files, as well as native data from the following CAD systems:

- CATIA V4, V5 & V6
- Pro/ENGINEER & PTC Creo
- Autodesk Inventor
- Siemens NX
- SOLIDWORKS
- Solid Edge
- VISI

The extensive range of translators ensure that users can work with data from all relevant suppliers. Large files can be handled with ease, and companies working with complex designs will benefit from the simplicity with which their customers' CAD data can be manipulated.

Electrode module - WORKNC | Designer

WORKNC's Advanced hybrid modelling system, WORKNC | Designer, introduces an Electrode module with intuitive and simple dedicated functions designed by engineers with experience in the mould and die industry.

The combination of the new, streamlined electrode functionality, easy to use direct modelling commands and powerful surfacing and healing tools. This means electrodes can be extracted quickly from imported models, to create finer details on parts which can't be machined using traditional milling techniques.

WORKNC enhanced link - WORKNC | Designer

WORKNC | Designer also brings an enhanced link to WORKNC Traditional, now preparing the entire workzone before sending it to the manufacturing planning phase of the process. The workflow has been streamlined, making sure the process is as simple, automated and straightforward as possible. The WORKNC solution is now empowered by a modern CAD preparation platform that will continue to bring WORKNC users closer to the digital thread.

NCSIMUL interface

WORKNC offers an integrated link to Hexagon's NCSIMUL simulation software for manufacturing, which means that manufacturing data created in WORKNC is brought automatically into NCSIMUL — including fixtures, roughed stock, solid model, workplane origins, machine programs, and complete cutting-tool library.

Using the WORKNC-to-NCSIMUL interface link, users can elect the Digital Twin Machine available to prove out NC programs. This seamless process can transfer multiple part set-ups for verifying G-code.

This link between the two solutions eliminates further manipulation in NCSIMUL for project set-up. Once the link between the two solutions is forged, NCSIMUL verification can troubleshoot the new programs using an easy three-step verification process.





Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that utilise data from design and engineering, production and metrology to make manufacturing smarter. For more information, visit hexagonmi.com.

Learn more about Hexagon (Nasdaq Stockholm: HEXA B) at hexagon.com and follow us [@HexagonAB](https://twitter.com/HexagonAB).



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