

VIRTUAL NC

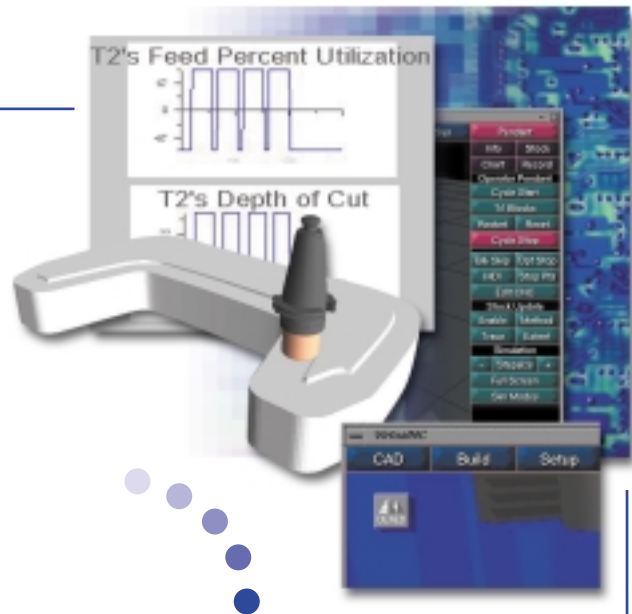
DELMIA
SOLUTIONS

Machine It Right the First Time, Every Time

Virtual NC is the complete digital manufacturing solution for rapidly emulating, validating and optimizing NC machine processes. Virtual NC's powerful simulation environment enables manufacturers to quickly and efficiently validate the post processed NC program off-line, in a digital environment, thereby keeping the actual machine tool in production. Using Virtual NC, manufacturers have improved part quality and saved thousands of dollars in man-hours, increased machine utilization, reduced engineering change orders and expensive machine tool crashes by implementing Virtual NC early in the production cycle.

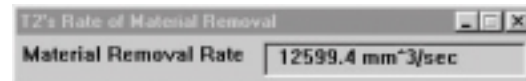
Simulating the Controller

Virtual NC's built-in configurable controller emulator, "Mimic," allows even the most complex CNC programs to be emulated and verified in the digital environment. Mimic provides continuous monitoring and feedback of the machining cycle and automatically creates user-defined reports. Mimic also provides an open environment in which user-defined process algorithms can be evaluated, refined and implemented. A unique Mimic configuration file can be easily created for each machine tool.



Advanced Material Removal Technologies

Virtual NC's advanced Boolean material removal technology dramatically increases simulation speeds. Virtual NC offers the fastest and most accurate material removal technology available in today's market.



Eliminate Collisions

Virtual NC automatically detects near misses and collisions, and will stop the cycle or log the event noting the NC program block in which the collision occurred plus the machine components and the parts damaged. Near miss tolerances can be specified to maintain safe distances between any two components. Users can enforce machine parameters by setting limits for axis over travel, maximum axis speed and maximum acceleration.

The Complete Part and Process Verification Solution

Virtual NC's robust environment first assists manufacturers in planning the machining process through early simulation of the tool path operations. This early tool path verification can be accomplished using pre-post processed APT or CL data or post-processed NC code and a "floating tool" simulation model. Once the tool path is verified and optimized, the programmer can validate the entire NC process using a model of the machining center including tool changer and material handling devices using the post-processed NC code.

Virtual NC can be used to validate new, or modified post processors. The analysis data collected during the machining cycle is used to optimize the program cycle time, tool life and surface finish. Through

the use of Virtual NC, manufacturers have eliminated expensive machine tool collisions, optimized and validated the NC process without having to take their machine tools out of production for dry runs.

Optimizing the parts and processes in a digital environment reduces man-hours, increases machine utilization, and improves product

and process quality. From concept to customer, Virtual NC offers the only complete solution for improving quality, reducing costs and speeding time to market.

Part vs. Process Verification

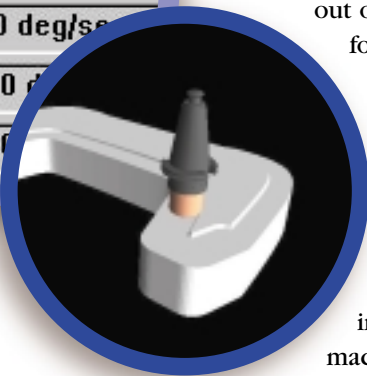
DELMIA's technology provides two sets of tools for verifying NC processes;

- **Part/Tool Path Verification or NC Process Verification.** Part/Tool Path Verification essentially verifies that the APT/CL code being sent to the post processor will produce the designed part.
- **NC Process Verification** verifies that the post-processed NC code (the actual machine tool code) will produce the designed part on a specific machine using designated resources, e.g., cutting tools, fixtures, etc.

Before determining what NC verification tool to use, it's important to understand what tools are available and how they fit into your current engineering needs. Typically, the post-processing phase of the CAM cycle is the line of demarcation for determining which set of tools to use when. Tool path verification will tell the user if the tool path program created as part of the CAM cycle will machine a beveled wall on a pocket. Process verification tells the user if trying to machine that particular feature on a particular machine will result in a collision. Virtual NC does both part and-process verification.

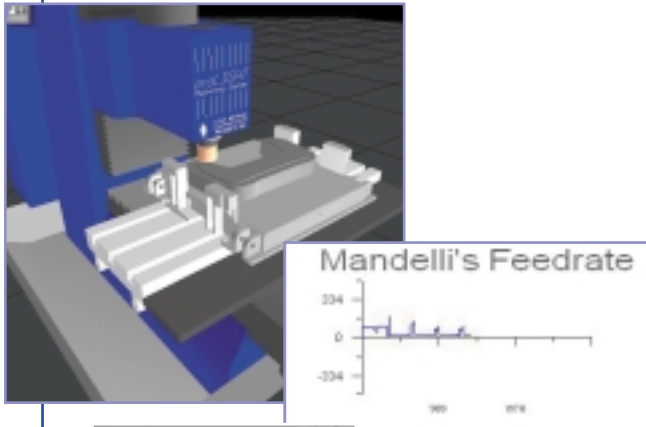


Axis Speeds	
Axis 1	-83.3330 mm/sec
Axis 2	0.000000 mm/sec
Axis 3	0.000000 mm/sec
Axis 4	-2.00000 deg/sec
Axis 5	0.000000 mm/sec
Axis 6	0.000000 mm/sec



Rapidly model workcells

Quickly and effortlessly import your existing CAD data using DELMIA's advanced CAD importing technology, import an STL file, or create the CAD geometry in DELMIA's CAD system. From simple 2-axis to complex multi-axis mill-turn machines, Virtual NC's powerful modeling environment, based on core DELMIA technologies, offers the best-in-class model building technologies.



Mandelli's Axis Speeds	
Axis 1	-81.3330 mm/sec
Axis 2	0.800000 mm/sec
Axis 3	0.800000 mm/sec
Axis 4	-2.00000 deg/sec
Axis 5	0.800000 deg/sec
Axis 6	0.800

Mandelli's Feedrate	
Feedrate	4.50134 mm/sec

Process Analysis

Machining in Full

- Cycle Times
- Access Speed
- Volumetric Rate
- Depth of Cut
- Feed Rates
- Acceleration
- Tool Utilization

Easily import CAD data

Most mechanical CAD databases are supported by Virtual NC. Natively use CATIA® or Unigraphics data within Virtual NC with a simple button click. Other optional direct CAD interfaces are available for IDEAS, Pro/ENGINEER and CADD55. Neutral CAD data translators that are available as options include IGES, DXF, DWG, VDA, DES, STL, and STEP.

Launch Virtual NC from CATIA® Manufacturing Programs

With the click of a button, users can launch, simulate and validate preprocessed APT programs from within CATIA's manufacturing programs. DELMIA and CATIA's bidirectional functionality also allows users to write CATIA geometry files from within all DELMIA products.

Multi-axis Gouge Detection System

Virtual NC provides a mechanism for checking gouges that exceed a user-defined tolerance. This mechanism requires the design part to be embedded in the workpiece. Gouge data is recorded in a table for post-simulation analysis. It also allows the user to display the tool movement which caused the gouge.

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Maintenance and Training

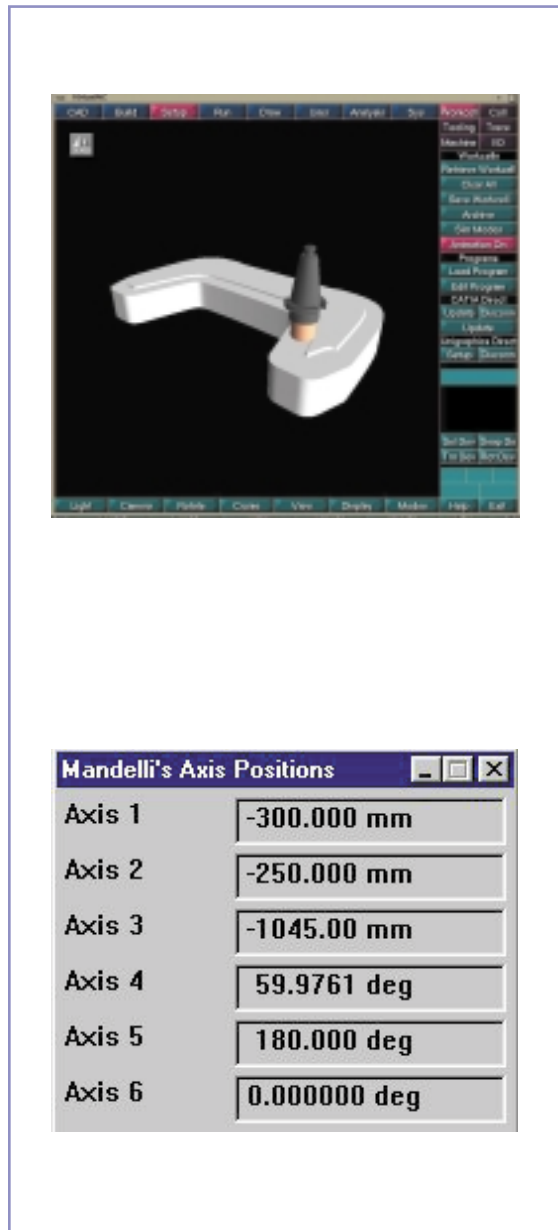
Virtual NC has been successfully used to train machine operators on new machines or new processes. Through the use of a virtual machine, machine operators have an opportunity to experiment with new techniques, setups, processes or program modifications in a safe environment.

Seamless Integration

Virtual NC is part of the DELMIA solution for Digital Manufacturing. DELMIA's core infrastructure enables a seamless environment to exchange data between various solutions such as process planning, robotics, assembly, inspection, process flow analysis, human modeling and others. Data from other DELMIA workcells and human models can be easily incorporated into Virtual NC, and Virtual NC data is easily linked to process planning and incorporated into process flow analysis solutions for a complete digital factory solution.

Instant Part Verification

For instant part verification, use DELMIA's Zip Mill, an extremely fast part verification solution perfect for 3-axis milling in the mold and die industry. Using Zip Mill, the user can apply part verification tools, e.g., finished part, design part comparison, gouge/undercut detection, and collision detection, on hundreds of thousands lines of code in a few seconds.



MACHINING

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