

MANUFACTURING SOLUTIONS FOR THE NEXT MILLENNIUM

NCCS at Autofact:

New Version of VX to be Introduced

NCCS will be displaying the latest release of its VARIMETRIX (VX 5.0) 3D solid modeling software in its booth at the upcoming Autofact show being held in Detroit, November 12-14, 1996 (booth 1140). VARIMETRIX (VX) is a powerful full-function parametric solid and surface modeler which includes robust IGES, DXF and STL data translators. Among the nearly 300 enhancement are a number of significant solid and surface modeling tools, sophisticated machining functions, several direct translators as well as support for Hewlett Packard 9000 series workstations.

VX includes associative drafting, assembly modeling and NC manufacturing. Fast 3D dynamic rotation of shaded solid models and powerful inquiry functions allow quick analysis of imported data. Models can be numerically machined using VX or read directly into *NCL*, for 4 and 5 axis machining applications.

Continued on page 3



NCCS new booth was a hit at the recent IMTS show in Chicago.

NCCS at Autofact:

NCL Just keeps Getting Better

In addition to displaying the latest release of its VARIMETRIX 3D solid modeling software NCCS will be showing the latest enhancements to its *NCL* multi-axis NC software.

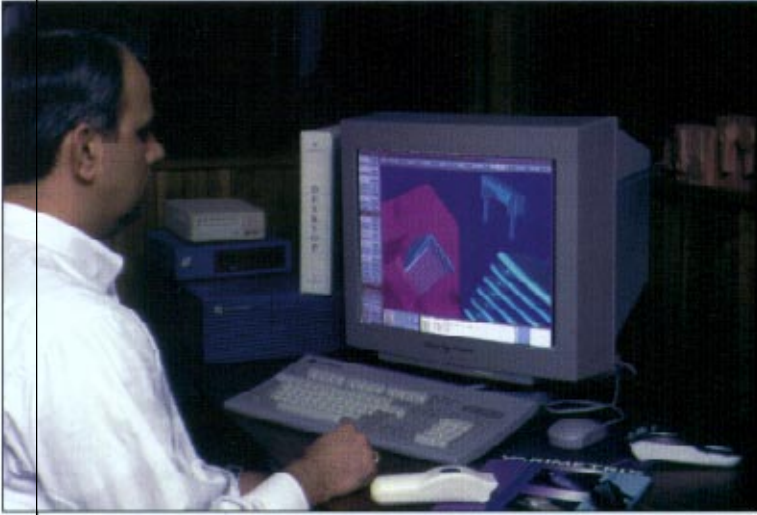
NCL has been developed specifically for multi-axis machining applications. *NCL* is a powerful Computer-Aided Manufacturing system which generates simultaneous 2 through 5-axis NC tool paths and provides parametric 3-D modeling. *NCL* is ideally suited for environments where design changes are frequent. All geometric modeling and tool path functions are fully associative. A change to the model results in an immediate change to corresponding tool paths. *NCL* will also automate the manufacturing of part families. Full parametric programming allows design and manufacturing data to be represented as variables which are easily modified to produce new designs and NC programs. *NCL* excels in a production

Continued on page 4



Shown is a virtual reality helmet modeled in VX 5.0

VX - A Solid Design for Quality Mold



Don LaCourse
Applications Engineer
Quality Mold Shop, Inc.
McMinnville, Tennessee

More and more automobile parts are being made of plastic. This holds true for a variety of other consumer products, and Quality Mold is expanding as a result. Quality Mold designs and builds injection molds for first and second tier automotive industry component suppliers and consumer food processing products.

In the injection molding industry, CAD and CNC have become synonymous with the manufacture of good molds. The advantages are quite obvious; precision, repeatability, and speed. The business is very competitive and time to market is critical. Manufacturers want to give their product designs, either in a drawing format or CAD file, to a mold manufacturer; and in return receive in the shortest possible time, molds of the highest quality and reliability.

There are many aspects of mold design that are quite complex, such as draft angles, shrinkage, etc. that are obtained only through years of experience. And the key to a quality injection mold starts with a good design, especially one that employs a solids based software such as VARIMETRIX.

Injection Mold Design Process

Most of the molds designed by Quality are under 20 by 20 inches in size, however, the company does repair work on molds that are much larger. With 50 plus employees, there are four full time staff designers and two designers that work off-site. VARIMETRIX is used for the bulk of the complex CAD designs and AutoCAD for simpler designs. In the shop

machining involves wire EDM, turning and machining centers.

VARIMETRIX is used for complex molds as it enables us to perform 3D solid and surface modeling and its proprietary Unified Parametric Geometry Engine (UPG) allows simultaneous modeling using solids, surfaces, and wireframes. It also enables us to import CAD data from customers' programs through IGES, DXF and native CATIA files. Imported models can quickly be measured, shaded and rotated, thereby providing us an excellent data analysis tool.

Our first step in developing a mold design is to analyze data from a customer, whether it be blueprints or CAD files. Of course we require specific molding information, such as press data and how many cavities are required. If the mold is complex, the data goes straight to VARIMETRIX. If not, we use AutoCAD.

The next step is to model the part in VARIMETRIX to determine moldability as well as its orientation in the mold set. At this stage we also determine if the model will require modifications in order for it to be moldable. With all of this information we can determine the economics of the mold and present a quotation for the customer.

"One of the world's best solid and surface modeling systems just got better," according to industry expert Don LaCourse, editor-in-chief of *The Handbook of Solid Modeling* published by McGraw-Hill. Mr. LaCourse worked extensively with the Beta test version of VX 5.0. "VX has always been a very comprehensive system, but 5.0 adds some powerful new tools, particularly for surfacing. The new smoothing and blending functions make it easy to create extremely high quality geometry, even for very difficult shapes."

The following steps involve designing the mold itself. We determine the parting line and check for shrinkage and draft. Once the model is determined to be moldable, we design the heart of the mold ... the cavity and cores. With VARIMETRIX we bring in a total environment in 3D. This is necessary as we will want to show relationships with the cavity runners,

inserts, etc. VARIMETRIX allows us to determine the geometric representation (solid, surface, or wireframe) best suited for the application. Additionally, VARIMETRIX offers nonrestrictive methods for creating parametric, associative relationships between individual geometric elements as well as entire processes, such as drafting (which comes in handy when exporting data to AutoCAD).

An important benefit in working in solids is that we don't have to use drawings or dimensioning details. If drawings are involved, they only get in the way as it means checking them against CAD data. This fact alone may save as much as a week in the design stage. When using CAD, data transfer is much easier as we use E-mail, etc. to import and export files. The end result is that with CAD, customer model data is much easier to evaluate and avoids the possibility of errors creeping into the design.

Another benefit is that all geometric entities created in VARIMETRIX are Nurbs-based and are represented in the exact analytical form, providing data of sufficient order for developing CNC tool paths. Although a debug is seldom required, it is much easier and less frequent than another 3D program we occasionally use to import customer data.

A particularly important feature we found with VARIMETRIX is its *undo* and *redo* functions. These will, if necessary, take the user backward and forward through every design change that is made. This even extends beyond current work sessions. A user can go back and undo commands made weeks ago, because when a design is saved, the whole evolutionary history of that design is saved as well.

Summary

For designing molds, the CAD program should work for the designer. We have found VARIMETRIX to be that kind of software. Modeling in three dimensions is as simple as can be. VARIMETRIX seamlessly switches between solids, surfaces, or lines, depending upon what functions the user requires. Shaded images are produced so quickly that it is possible to model directly in a rendered environment. This speed is especially important when showing or changing designs directly to a customer.

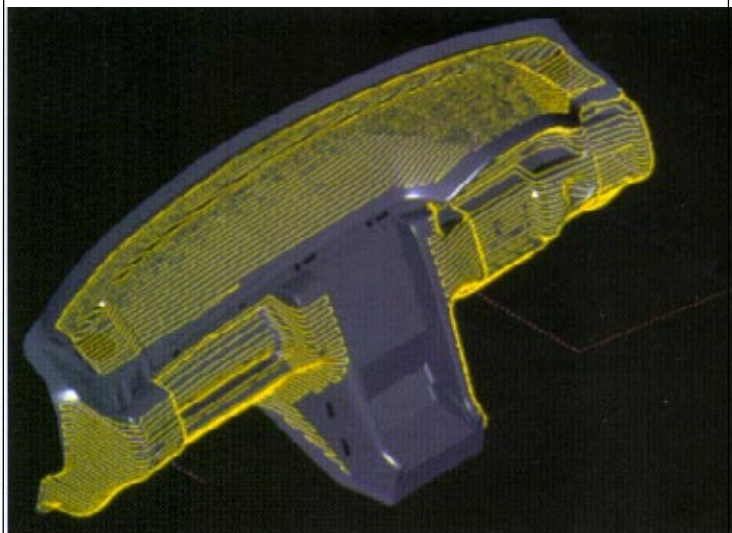
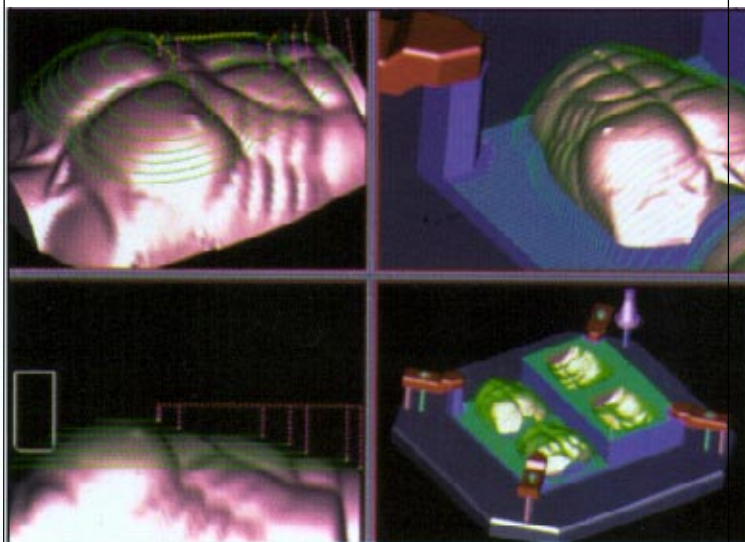
Equally important is the security the system provides. While we don't expect or experience frequent system crashes, it is comforting to know that if the system does go down, when it comes back up you will be able to pick up right where you left off. ❖

VX 5.0 at Autofact

Continued from page 1

VX 5.0 incorporates a new function that will automatically identify and machine regions of a part unmachined by a larger cutter. Also new is enhanced waterline roughing and finishing. Highlights of this improved functionality include full gouge checking for tapered, teardrop, and torus cutter shapes and automatic pilot hole generation.

VARIMETRIX has often been praised for its ability to easily and accurately import and manipulate nonnative data. The task is now even easier with the announcement of direct translators for CATIA and CADDs. Also new for VX 5.0 are VDA import and export, improved stereolithography file generation and a direct solid interface with ElectroGIG for high-end rendering and animation. ❖



(Top) Waterline machining on a complex solid model using VX 5.0. (Bottom) VX 5.0 offers Parametric modeling or complex solids and surfaces.

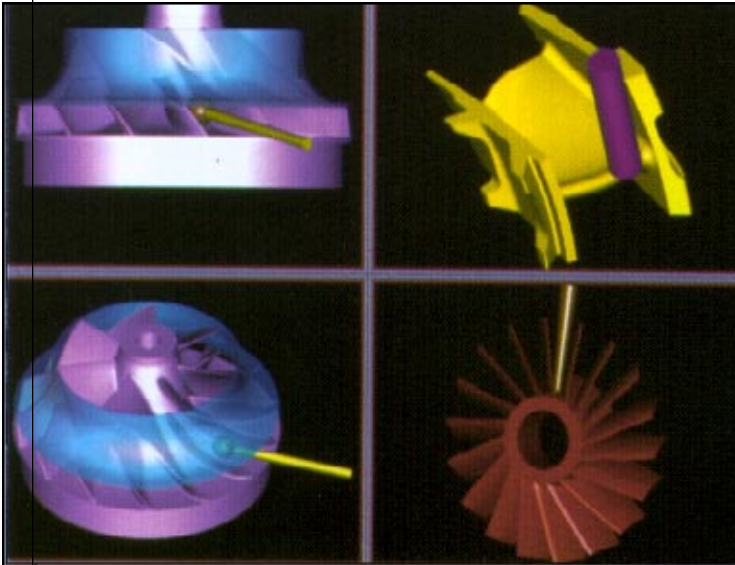
NCL at Autofact

Continued from page 1

environment where machine time is critical. Customized manufacturing methods can be saved and applied to future projects providing efficient and consistent results. *NCL* is used extensively in the aerospace, turbo-machinery, power generation, and composite industries.

Unsurpassed Multi-Axis Capability

NCL boasts over 20 four and five-axis control modes, many of which are found in no other system. A sampling of tool axis control modes includes: automatic fanning from one surface to the next during flank milling operations; multi-surface lead and slew angle machining with gouge avoidance; and tool axis passing through a fixed point or 3-D curve. Other features include automatic feedrate slowdown in corners, 5-axis corner filleting, and the ability to make opposite hand parts.



NCL is ideally suited for part family applications such as turbo machinery products

Integrated NC Verification

NCLIPV is a fully integrated NC verification module that can be accessed immediately as tool paths are being created. No intermediate file conversions or exiting your application. With *NCLIPV*, NC verification becomes an integral part of the tool path development process. Simply 'click' and begin verifying. *NCLIPV* simulates, verifies, and displays the metal removal process. The current model can be viewed from any orientation, cross sectioned, inspected, and compared to an existing solid model.

Solid Modeling and Multi-Axis Machining

VX/NCL combines the awesome modeling and data translation capability of *VARIMETRIX* with

the powerful tool path generation capabilities of *NCL* — in a fully integrated package. Models originating in *VX* are immediately available for multi-axis machining in *NCL*. And of course the models and tool paths are fully associative. A change to the *VX* model results in a change to *NCL* generated tool paths. Never before has such a powerful combination of modeling and manufacturing been available in a single package.

PostWorks To Be Demonstrated

PostWorks is a universal 2 through 10-axis post-processor and postprocessor generator. *PostWorks* converts output from most major CAM systems into NC data files which can be used to run virtually any NC device including mills, lathes, EDMs, and CMMs. A simple Motif-style interface enables the user to easily establish machine configurations, control unit features, and output file formats. To verify your new postprocessor, *PostWorks* automatically creates a solid model of the machine and dynamically simulates the machine's movement. *PostWorks* also provides a comprehensive macro language for easy customization. *PostWorks* is proven technology used across the manufacturing spectrum and is a cost-effective replacement to existing mainframe-based postprocessors.

Best Solutions Possible

According to Mr. Donald Schultz, President of NCCS, "VARIMETRIX Corp. and NCCS are sharing technology and sales and marketing activities in order to offer the industry's best solution for product design and manufacturing affordable to any company." ❖



CAD/CAM/CAE Software

2600 Michelson Drive, 17th Fl.

Irvine, CA 92612

1-800-934-3889

Ph: 714-553-1077

Fax: 714-553-1911

AUTOFACT
Rapid Design & Manufacturing

Booth # 1140