

Impressive life-size model of the Vertimaster VMG 1.28 with CNC-controlled functionality

All pictures: Fraunhofer Institut für Fabrikbetrieb und -automatisierung (IFF), Magdeburg



■ Schiess GmbH, Germany

Manufacturing Using Laser Beam

New visualization and projection procedures make for particularly realistic presentations of machines using computers, video projectors and CNC.

The Shenyang Machine Tool Corporation Ltd. (SMTCL) is the largest manufacturer of cutting machine tools in China. Schiess GmbH, Aschersleben, has been part of the SMTCL Group since 2004. Schiess manufactures modern, modular horizontal and vertical machining centers. By introducing first-class machines from Schiess, the SMTCL Group has significantly expanded and profiled its product range. In this respect, the holding company is keen to have the latest developments displayed early at Chinese trade fairs.

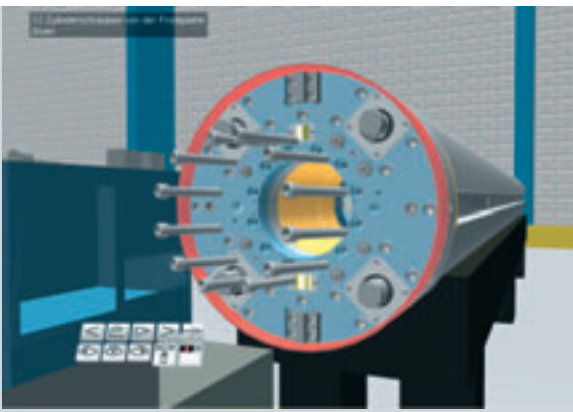
The Virtual Development and Training Center – part of the Fraunhofer Institut für Fabrikbetrieb und

-automatisierung IFF (Fraunhofer Institute for Factory Operation and Automation) – was called upon to demonstrate near complete operation of large machines on a global scale.

Complete Machine Functionality

The Fraunhofer IFF was able to make use of its “Virtual Development and Training” (VDT) platform to visualize the machine, allowing interactive training for complex, technical processes in the virtual world.

In order for the VDT platform to be used as a presentation system, however, a suitable means had to



There is a whole range of value-adding applications with the VDT platform for models generated during the engineering process, as shown here

Virtual tool change, actual control



be found to control the actions of the exhibited 3D machine model using a CNC. However, the CNC and its application programs are dependent on the mechanical feedback (signals and data). As a result, the control needs a model of the machine kinematics, actuating elements and sensor technology with which it can interact.

The Sinumerik machine simulator proved itself to be the most suitable tool to simulate machine hardware in relation to the CNC. To this end, the CNC is connected to the host PC's machine simulator via Profibus, and controls the machine model that has been emulated via the same signal and data interface as the "parent machine."

Thanks to the machine simulator, a great deal of modeling can take place automatically. The machine's signal and data interface is taken over directly from Project Manager Step 7. This takes place with the help of graphically linked ramp and logic components. These are prepared by the simulator.

Partial Modeling

The machine simulator realizes real-time simulation of all electrical signals and machine data, allowing complete verification of user programs and HMI interfaces through to model pre-commissioning. Schiess didn't need to go to this expense for the trade fair. The signals and data, which must react in real-time in order to control the model visualized using the VDT platform, have been identified by the devel-

opers and simulated using the machine simulator. All that was required for the remaining signals and data was to set default values on the simulator. 3D data from bought-in parts – e.g. tool heads – provides the finishing touches to the visual model.

Big Impact at Reduced Costs

This is what makes it possible to give a near complete presentation of the machine. The real CNC hardware, including user and control panel, is linked up to the VDT platform via Profibus and the machine simulator's OPC server. The VDT platform visualizes the machine's movement according to the stored kinematic model. The virtual machine can be operated in exactly the same way as the real one.

The performance and operation of the Vertimaster VMG 1.28 was demonstrated at the CIMT 2007 trade fair in Beijing without the associated transportation and setup costs. A realistic display of the actual dimensions of the machine became possible by using a worldwide unique Jenoptik 360-degree laser projection system with its light-intense projection of 16 meters in diameter. Particularly helpful for the presentation of the machine is the opportunity to demonstrate processes that cannot normally be seen – for example in parts of the machine that are difficult to access, behind safety guards or covers. The concise representation of macroscopic process coherences is also possible.

Sustained Impact on Engineering

The machine simulator from Schiess is currently also being used to achieve greater efficiency in the field of electrical engineering. This helps speed up engineering work significantly as there is no need to wait for hardware components or entire function groups to become available. For the presentation of large machines, the combination of machine simulator and VDT platform used by Schiess has proved its worth. In addition to the presentation itself, it will soon also be possible to combine new, customer-specific function models from library elements. As a result, the modeling expenses are significantly reduced. ■

Advantages of the machine simulators

- ▶ Real-time simulation of all signals and data
- ▶ Direct model commissioning
- ▶ Actual operability via original user interfaces
- ▶ 360-degree projection (height 6.8 m, Ø 16 m)
- ▶ Life-size machine model
- ▶ Can be used anywhere

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