

BENCHMARK REPORT



Factory Automation

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3D-Visualization of the Manufacturing process in Real time

The classic process visualization is based on the two-dimensional representation of the machines and plants. 3D-Animation was a future vision, which has now become a reality. The benefits to the user are explained in this report.

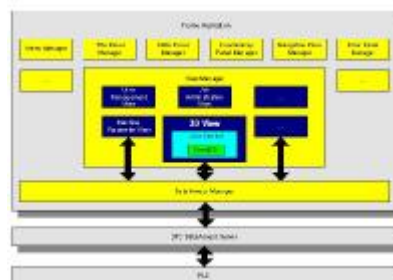
The situation

The M&M Software GmbH secured the order for the development of a Framework, with which Views can be loaded and displayed according to the configuration. The configuration settings can be parameterized. Besides the 2D-View for large plants, the development order was also for a three-dimensional dynamic visualization of the process situation for a new plant-generation, with which the machine operator can operate and monitor the production machine. The animations and representations show the current status of the process and the positions of moving parts. Another task in the order comprised the development of parts of a cut plan view editor. Michael Rombach, M&M-Project Manager Mechanical engineering, explains: "We were looking for a way to keep the use of the 3D-Animation as simple as possible, to avoid long-drawn familiarization. In this respect, we were able to fall back on our experiences with our 2D-Product activeSHAPES."

Solution

M&M provides the 3D-Graphic-Basic component, which was developed independently from specific

application requirements, as .NET-Windows Form User Control. Michael Rombach says: "This component was programmed in C++ because of the necessary performance, whereas the 3D-View of the application, which uses the User Control, is programmed in C#. With the use of Microsoft's DirectX/3D our components can use high performance features of the 3D-Graphic Cards like PC games. The interface of the basic component is so simple, that no in-depth knowledge of the 3D-Graphic-programming (Coordinate transformations, Quaternions, projective geometry, etc.) is required from the user."



Conclusion

The performance spectrum of the 3D-Graphic-Basic component:

- § Visualization and animation of ,complex' objects, that are generated with a 3D-Modeling program.
- § Visualization and animation of ,primitive' objects, that are generated dynamically to the program runtime.
- § Hierarchical organization of the objects in form of a graph.
- § Object picking: The User Control is able to tell the Application, which object the user has selected with the Mouse. This allows, for

example, the separate presentation of comprehensive information about the object.

- § Animation functions for movements, rotations, scaling. The user need not have mathematical knowledge, the entries are limited to the definition of 3D-Positions (x-, y-, z-Coordinates), Angles and Times. The positions between the defined positions are interpolated for the view of a fluent animation.
- § Definition of a light source for the illumination of a scene
- § Definition of a monitoring (camera-) position for the viewing of a scene from different positions.

"The latest technologies like .NET, XML, DirectX or OPC were used for the realization."

Michael Rombach
M&M Software

