

Mixing it up for multi-plant flexibility

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▶ Issue:

Process excellence

▶ Approach:

BMW plans to introduce a mixed system in its plants for the production of its automobiles.

▶ Results:

Development time slashed in half

Faster factory ramp-up times

Simultaneous manufacturing planning for several plants

Multi-purpose “body-in-white” manufacturing lines

Enormous savings in costs and time

BMW

- ▶ Working closely with UGS Tecnomatix™, BMW has developed a digital manufacturing strategy that has already helped cut production times in half.

Mixed doubles

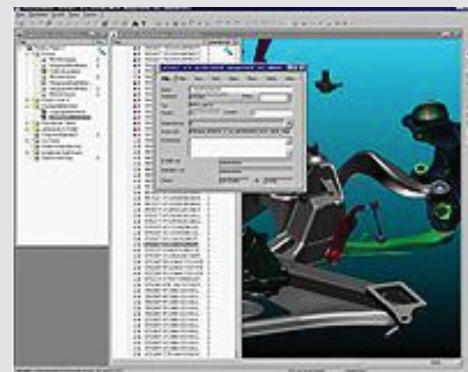
By introducing a highly flexible manufacturing planning and production system, automotive manufacturer BMW plans to utilize its plants throughout the world to their full capacity.

“BMW has continued its goal of breaking even in 2002,” said Group CEO Milberg. At that time, an initiative which enjoys top priority in the BMW Group and is known internally as “DMF” took effect.

The letters stand for “digital manufacturing.” Behind this is a strategy, with which the Group plans to reduce overall costs in product development as well as on the manufacturing side of the business. But above all, DMF is seen as a means to considerably increase flexibility throughout the whole BMW Group. The objective, says the company, is to end the brand-to-plant relationship that has been prevalent in the industry so far. This would mean that different brands, types and models can be assembled in a mixed system, depending on requirements. Theoretically, it would be possible for any production series to be manufactured in any plant.

The advantage of this strategy, which BMW developed and implemented using UGS Tecnomatix in a large-scale project, is obvious: maximum capacity utilization in all plants. “This concept is designed in such a way that the plants will be unaffected by fluctuations in demand for the various brands and models,” confirmed Joachim Wiesmueller, General Manager Process-IT Manufacturing and Operational Material Planning at BMW in Munich, and also the man responsible for the implementation of this complex concept.

Flashback: This project, which is so important from a strategic point of view, is part of the “digital car” strategy, a large-scale process offensive throughout the Group that began more than three years ago. The goals of this initiative are to bring about a drastic reduction in development time from approximately 60 months to about 30 months and to lower non-recurrent expenditures, which include time-reducing and cost-consuming prototypes – so-called



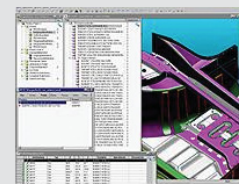
hardware assemblies. Investments of around DM 250 million alone for new computers, special software and modern communications technology, which will enable simultaneous engineering, are slated for the following years in order to support these goals.

Today, three years after the start of this process offensive, first results are beginning to take effect: at about 36 months, development times have been slashed almost in half. Thanks to the massive use of computers and procedures such as computer simulation and digital mockups, the new X5 Sports Activity Vehicle, which is being manufactured in the US, needs just one hardware assembly. In addition to this, according to industry insiders, the new X5 off-road sedan has shown a previously unknown takeoff quality and an unusually quick ramp-up in the factory.

Now BMW wants to go one step further with DMF. While, according to Wiesmueller, product development is "well equipped with digital technology and processes," a large gap still exists in process and manufacturing planning. Here, too, the goal is to simulate and optimize processes, production lines and individual assembly operations in computers and to analyze the results particularly from a cost and feasibility point of view.

"We are in the process of developing a system that will allow us to do manufacturing planning for a product simultaneously in several plants and which will also be able to store, manage and communicate production processes and methods," says Wiesmueller. In order for BMW to manufacture different car types in a mixed system, the various models, such as the 3 and 5 series, must have very similar cycle times. "One of our goals is to achieve a multi-purpose body-in-white line." When a new model is being introduced, the robots and fixtures should remain in place, only the control programs will be changed. The result of this will be highly flexible plants, but also enormous savings in costs and time, which will pay dividends in the development of new automobiles. In the next five years, the BMW Group plans to invest a total of approximately DM 30 billion in development and production.

However, there is a lot more behind this enormous project, which today is showing its full effects within the BMW Group: it puts all previous working operations and processes under the microscope. For example, development time can only be cut in half when production is planned at the same time as product development. BMW plans to achieve this goal by using standardized planning methods and a wide-ranging modular concept of verified and standardized processes and manufacturing procedures, which are stored in an object-oriented database.



In addition, this powerful software tool, which is being created in a joint project involving BMW and UGS, is to be used to simulate production operations, detect assembly bottlenecks and optimize costs. Movements of robots, for example, will be transferred directly to the PLC through offline programming. Already users can automatically create the links between product/part information, resources and operations through drag-and-drop technology. Tree structures support the work, branching out according to car type and model, operation and process, resources or manufacturing equipment.

Solutions/Services

Tecnomatix

Client's primary business

Automotive industry
www.bmw.com

Client location

Munich
 Germany

“With these new tools we receive an enormous amount of information that we didn’t have before,” says Wiesmueller. Structures, products, processes, technologies and results are to be documented and then analyzed according to time, cost and quality criteria. “This gives us a framework against which we can continuously compare newly developed products during their design stages and see whether they conform with the stored manufacturing processes.

Those keeping a close eye on industry developments already believe that DMF positions BMW at the forefront of technological progress in the area of product development and flexible manufacturing in the automotive industry.

(2001 case study)



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