

Automotive and transportation

Maruti Suzuki

3D factory modeling and simulation reduces errors, costs and project lead times

Product

Tecnomatix

Business challenges

Growing demand requiring expanded manufacturing capacity

Design and construct of plant to meet startup schedule

Inability to validate 2D-based plant layouts

On-site factory installation modifications increasing cost and lead time

Keys to success

3D plant modeling with FactoryCAD

Plant validation and interference checking with FactoryCAD

Better factory visualization supported by Teamcenter

Results

Significantly reduced rework costs

Overall utility length reduction, thus saving cost

On-time construction without operational hindrances

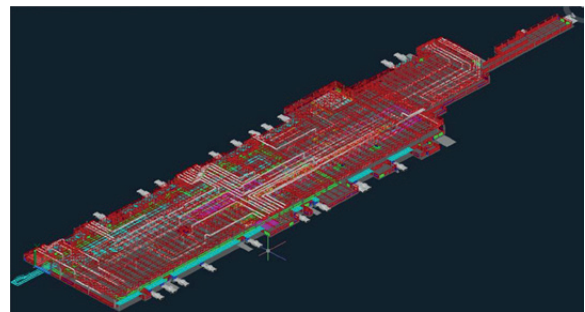
Reduced energy through better natural lighting

Leading automotive OEM in India validates plant designs digitally using FactoryCAD in the Tecnomatix portfolio

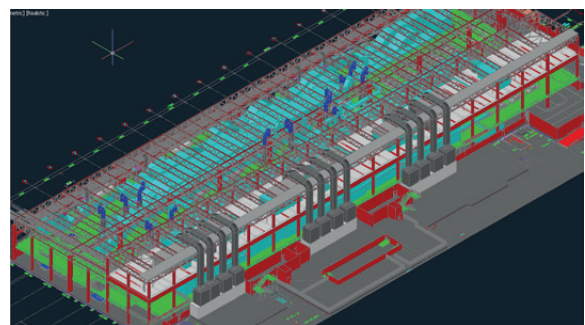
Maruti Suzuki India Limited (MSIL), a subsidiary of Suzuki Motor Corporation of Japan, is India's largest passenger car company. Producing 1.2 million cars every year, Maruti Suzuki accounts for around 43 percent of the car market in India. The company offers 14 brands and more than 150 variants of these brands. Its product line extends from practical to powerful, and from hatchback to SUV. Maruti maintains its corporate office in New Delhi and 16 regional offices across India, employs more than 12,500 employees, and operates production facilities in Gurgaon and Manesar.

For more than three decades, the company has won the hearts of customers through high-quality products and services. Customers vouch for the quality and low cost of ownership of its products, as evidenced in independent studies like the J. D. Power Asia Pacific Customer Satisfaction Index, which has ranked Maruti Suzuki as No. 1 for the last fifteen years in a row. This unique achievement is unparalleled, across industries, as nowhere else in the world is the market leader also the leader in customer satisfaction.

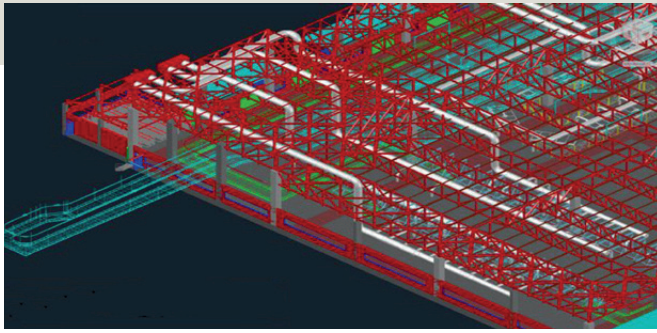
To sustain its leadership in India, Maruti has introduced new models at a rapid pace, requiring expansion of its manufacturing facilities. The company planned a new plant at Manesar alongside its other two plants there. The key challenge facing the company was to design and build the plant in time for the schedule given by management for startup of the new facility.



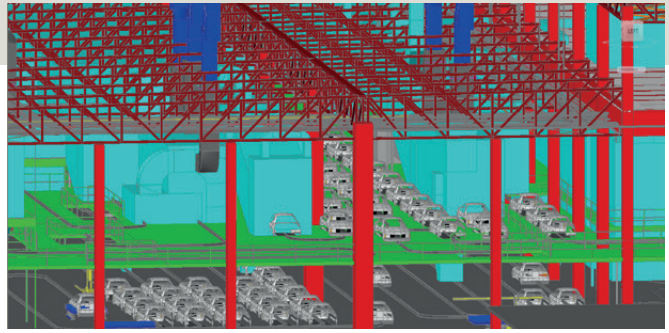
Overall 3D view of assembly shop.



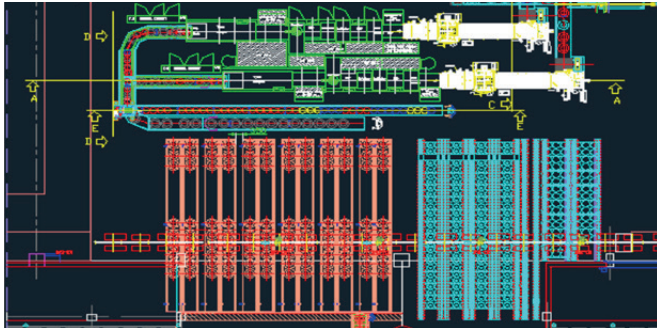
Overall 3D view of paint shop.



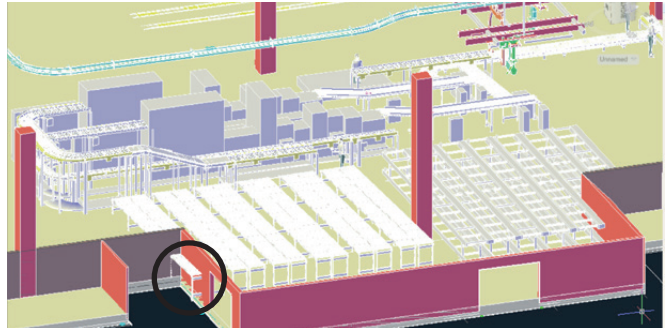
Detailed 3D view of assembly shop.



Detailed 3D view inside paint shop.



2D layout of tire line.



3D model of tire line.

“We wanted to prevent the issues we faced at installation time on previous factory projects. Virtual validation with a 3D plant model would enable us to identify structural and utility interferences with plant facilities like conveyors at an earlier stage. We had to make certain that the problems were resolved before we made the final construction drawings.”

Sudeep Raj
Senior Manager
Production Engineering
Maruti Suzuki

“We plan to re-use the 3D factory data for our future model and plant feasibility checks, thereby reducing rework and achieving better quality from the beginning.”

Nitin Garg
Senior Manager
Production Engineering
Maruti Suzuki

Maruti Suzuki is a long-term, successful customer of product lifecycle management (PLM) specialist Siemens PLM Software. The company had already adopted Siemens PLM Software’s NX™ software, Solid Edge® software, Teamcenter® software and the Tecnomatix® portfolio. These solutions are used for product design, tool design, digital mockup, layout planning, manufacturing process planning and validation.

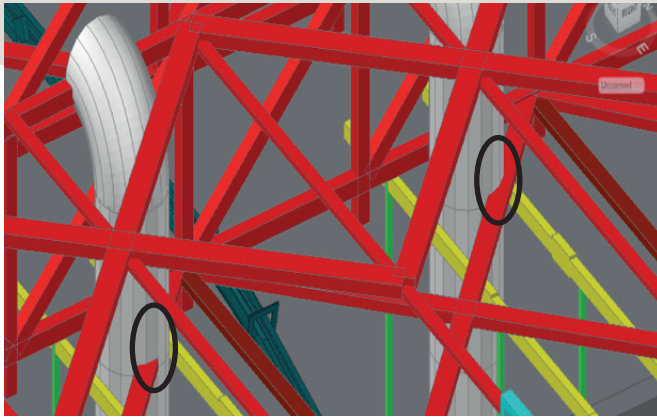
Improving factory design

The engineers wanted to use the knowledge gained from previous plant design and installation experience to take a step forward in their factory design methodology. On a previous factory project, the company had encountered a number of unforeseen issues at the time of construction that required considerable rework. Several modifications were needed to accommodate actual conditions on the site, and these significantly increased the cost and lead time of the project.

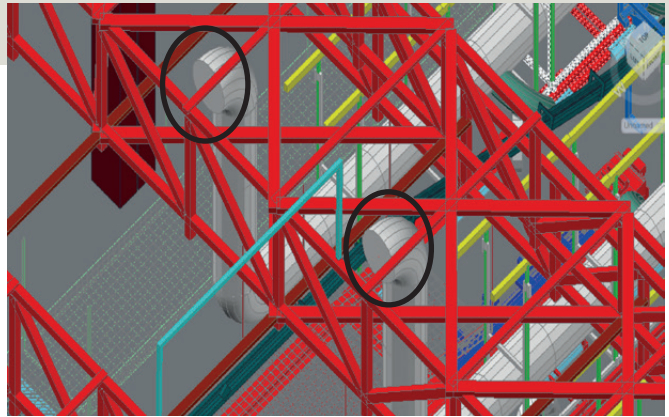
Maruti Suzuki had previously used FactoryCAD™ software in the Tecnomatix portfolio for 3D design of plant structures, but not for utilities. The problems that

surfaced during construction could be attributed to the 2D process used in the utility planning for the plant. All of the ducting, piping, cabling, lighting and structural design for previous plants were accomplished using 2D layouts, which made it difficult or impossible to resolve issues or to optimize the building’s utilities prior to installation. To shorten the lead time for the new factory and meet the project schedule, the company had decided to utilize FactoryCAD, and take advantage of virtual factory models to visualize the interferences among structural and utility elements.

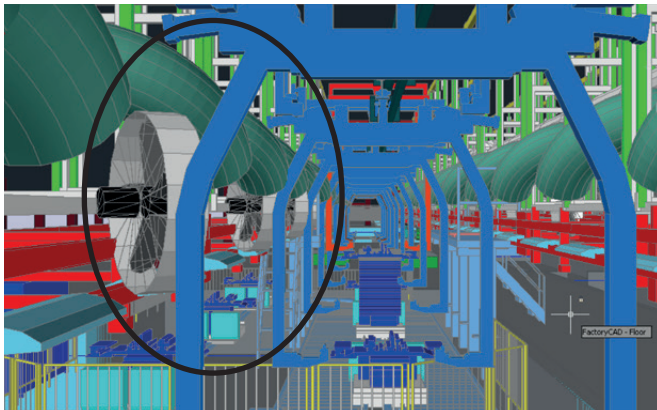
“We wanted to prevent the issues we faced at installation time on previous factory projects,” says Sudeep Raj, senior manager of production engineering, Maruti Suzuki. “Virtual validation with a 3D plant model would enable us to identify structural and utility interferences with plant facilities, like conveyors, at an earlier stage. We had to make certain that the problems were resolved before we made the final construction drawings.”



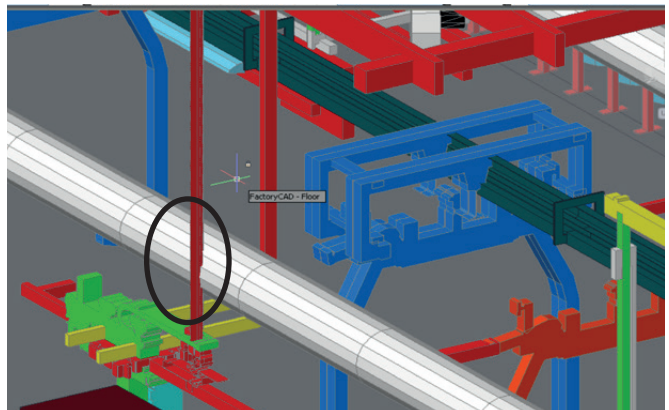
Interference of truss and air duct.



Interference eliminated after modification of layout.



Interference between overhead crane hanger and duct.



Interference between air duct and structure.

Maruti Suzuki's engineers used FactoryCAD to develop virtual 3D models of the new plant, including the press, welding, painting and assembly shops. They used the software's built-in library of intelligent models of factory equipment and resources to accelerate creation of the factory model. "Working from 2D layouts of the building structure, equipment and utilities, our team quickly built a virtual model using the FactoryCAD tools," says Dinesh Babu M, assistant manager. "We were then able to readily visualize and validate the plant in 3D."

The plant design tools of FactoryCAD enabled quick modification of library objects to build the model to full scale. In addition to the extensive collection of pre-defined factory equipment models in the library, FactoryCAD also enables modeling of custom objects that can be saved to the library for future use. These tools enabled Maruti Suzuki to complete the plant model

in significantly less time and with less effort than by drawing the equipment with traditional 2D CAD tools.

With an accurate 3D plant model, the company had much more information than was available in the 2D drawings, enabling the company's project specialists to better communicate and collaborate on the full factory design. Visualization in 3D assisted in identifying opportunities for improvements. Because FactoryCAD can be used with non-CAD viewers, they were able to share and collaborate with additional team members using the visualization capabilities of Teamcenter.

Throughout the design, the team used clearance checking to validate that the new plant was free of interferences. The plant model could also be engaged directly for material flow analysis using FactoryFlow™ software in the Tecnomatix portfolio.

"We not only avoided the costs and delays of on-site modifications during the plant's installation, but also optimized the utility layouts for additional benefits."

Siddharth Garg
Assistant Manager
Production Engineering
Maruti Suzuki

"Working from 2D layouts of the building structure, equipment and utilities, our team quickly built a virtual model using the FactoryCAD tools. We were then able to readily visualize and validate the plant in 3D."

Dinesh Babu M
Assistant Manager
Production Engineering
Maruti Suzuki

Solutions/Services

Tecnomatix Factory Design and Optimization
www.siemens.com/plm/tecnomatix

Customer's primary business

Maruti Suzuki India Limited, a subsidiary of Suzuki Motor Corporation of Japan, is India's largest passenger car company, accounting for more than 40 percent of its domestic market segment.
www.marutisuzuki.com

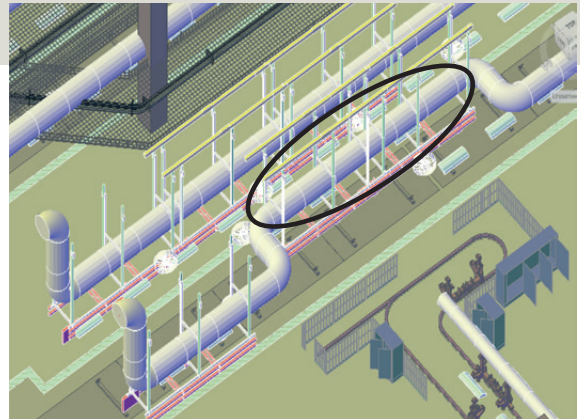
Customer location

Gurgaon
India

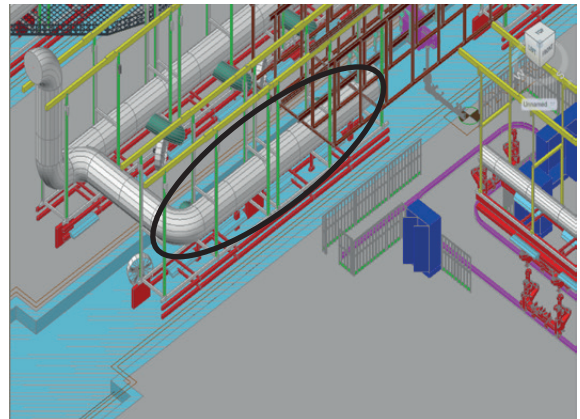
Optimizing factory layout

The use of Tecnomatix for a 3D model-based factory design and planning process helped notably reduce project lead time and costs. "We not only avoided the costs and delays of on-site modifications during the plant's installation, but also optimized the utility layouts for additional benefits," says Siddharth Garg, assistant manager, Maruti Suzuki.

One example is the design of air ducts for the factory. Maruti engineers identified better locations for the ducts, considerably reducing the number of bends as well as the total air duct length. This resulted in substantial cost savings. The optimized design of the ducts also increased natural lighting in the factory, enabling more energy-efficient operation.



Too many bends in subassembly area.



Number of bends reduced after modification of layout.

Maruti Suzuki's engineers used FactoryCAD to develop virtual 3D models of the new plant, including the press, welding, painting and assembly shops. Use of the software helped notably reduce project lead time and costs.

Siemens PLM Software

Americas +1 314 264 8287
Europe +44 (0) 1276 413200
Asia-Pacific +852 2230 3308

www.siemens.com/plm

© Siemens Product Lifecycle Management Software Inc. Siemens and the Siemens logo are registered trademarks of Siemens AG. D-Cubed, Femap, Fibersim, Geolus, GO PLM, I-deas, J T, NX, Parasolid, Solid Edge, Syncrofit, Teamcenter and Tecnomatix are trademarks or registered trademarks of Siemens Product Lifecycle Management Software Inc. or its subsidiaries in the United States and in other countries. All other logos, trademarks, registered trademarks or service marks belong to their respective holders.

44836-Z10 3/15 H