

Industrial machinery and heavy equipment

Comau (Shanghai)

Digital manufacturing tools support rapid growth

Product

Tecnomatix

Business challenges

Acquire both domestic and foreign automotive manufacturing customers

Support accelerated growth

Expand to new areas such as aerospace

Keys to success

Use Tecnomatix process planning and simulation tools to validate production lines

Leverage global knowledge and engineering methodologies

Use Process Designer and Process Simulate to generate quotations

Results

Tremendous growth – an average of 50 percent annually in a span of ten years

One of the biggest and most talented 3D simulation teams in China

Comau (Shanghai) simulates more production scenarios in less time using Tecnomatix

Expanding innovative automation solutions to China

Comau (Shanghai) Engineering Co., Ltd. [Comau (Shanghai)] is a wholly owned subsidiary of the Italian-based company Comau S.p.A, a Fiat Group affiliate. Comau (Shanghai) was established in 1997 as Comau (Shanghai) Automotive Equipment Co. Ltd. but after 15 years in operation, the company is no longer confined to the automotive industry. Having expanded its advanced automation technology into other areas of industrial manufacturing, the company officially changed its name to Comau (Shanghai) Engineering Co., Ltd. in 2010.

Comau (Shanghai) employs more than 900 people at several facilities in China. In the Chinese auto market, Comau (Shanghai) is a major supplier of body welding and powertrain assembly and machining equipment. The company started manufacturing robots in 2011 and has developed a well-balanced portfolio of customers, including joint ventures of global brands. The company's five business units are Body Welding, Powertrain Systems, Robotics, Aerospace, and Adaptive Solutions.

Strategic decision to use the best

In building production lines for automotive original equipment manufacturers (OEMs),



Comau (Shanghai) technicians setting up a production line in its Shanghai facility.

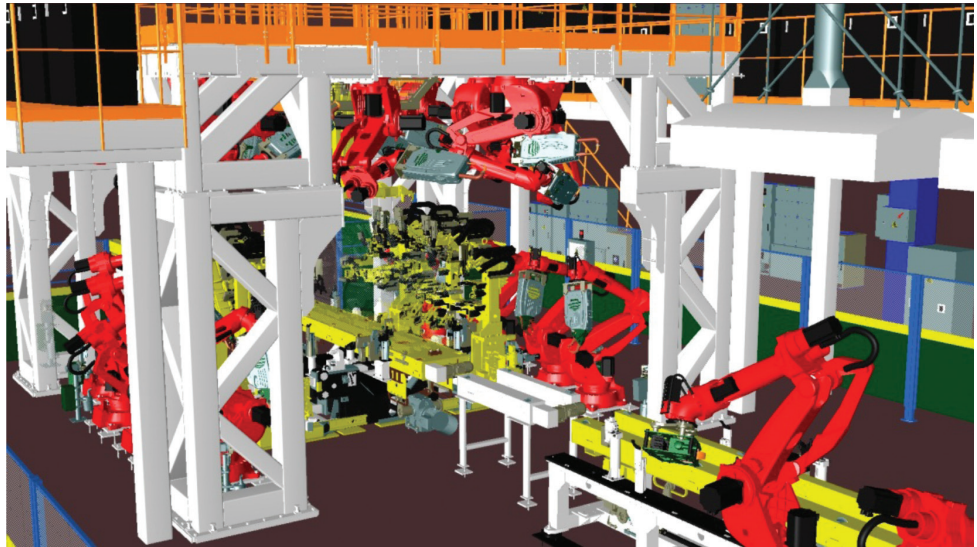
Comau (Shanghai) is often required by customers to deliver line and workcell simulations. For simplicity, the company typically uses the same planning and simulation system used by its customers.

Results *(continued)*

Delivered complete turnkey automotive body welding lines to leading automotive OEMs

Improved proposal writing

More efficient resource utilization

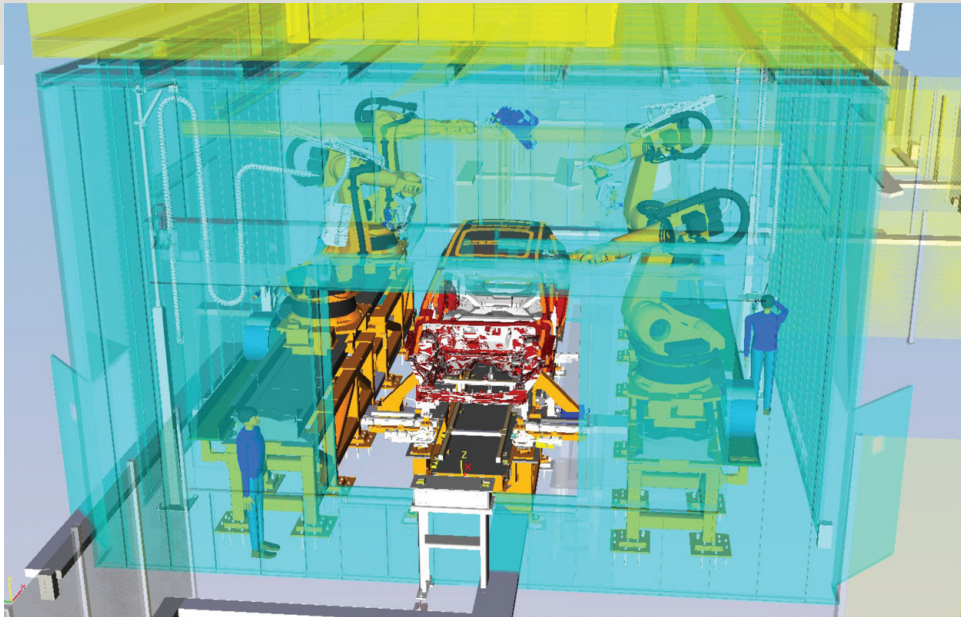


A physical, commissioned welding station delivered to Fiat, and the virtual workcell simulated using Tecnomatix.

"Most of our customers require us to use tools in the Tecnomatix portfolio, such as Robcad, Process Designer and Process Simulate," explains Riccardo Piegaia, process engineering manager in the Comau (Shanghai) Mechanical Engineering Department. "But even for those few customers who use other tools, we have taken the strategic decision to use only the Tecnomatix tool set. Why? Because we believe Tecnomatix is the best tool set for the 3D simulation of robotized workcells.

"Using the Tecnomatix tools, we are able to simulate more production scenarios in less time."

Piegaia, who relocated from Italy, brought to China his experience using the Tecnomatix® portfolio from Siemens PLM Software. When he started with Comau (Shanghai), he was the only person using 3D simulation, but as the company was awarded more and more projects, he trained other engineers and significantly increased the size of the team.



A car roof laser welding station simulated using Tecnomatix.

"This team must deliver value," notes Piegaia. "For example, in 2011, our biggest project was a complete body-in-white (BiW) line for Fiat China, which included around 250 Comau robots. Twenty engineers worked on this project, using Tecnomatix tools for nearly half a year, and delivered state-of-the-art simulations that supported the production line, which is now in operation. This project proved our ability to collaborate across continents, as we used some welding guns that were designed in Italy. Now, we are about to simulate and commission the second phase of this project, which almost doubles the line throughput by means of a cycle-time reduction and multiplication of the robotized stations."

The simulation work in China is performed according to the customer's requirements and in collaboration with car component design. The main goal of the simulation is to plan and validate the production line.

In some cases, the simulation shows that the design of a specific part should be slightly changed due to the need to use specific welding tools.

"We simulate all the BiW workcells, starting from spot welding, and continuing with more advanced technologies, such as stud welding and laser welding," Piegaia explains. "Laser welding, though being much more expensive than spot welding, is more appealing in those areas of the car that are visible once the car is manufactured. Using Robcad™ simulation, we delivered a roof welding workstation to one of our customers, in which two robots do spot welding and two robots do laser welding."

Smooth transition from Robcad to Process Simulate

Comau (Shanghai) recently started using the Process Designer and Process Simulate solutions, both in the Tecnomatix portfolio, to deliver the 3D robotic simulation work it previously created using Robcad software, also in the Tecnomatix portfolio. The first project executed with these tools was a framing zone on a new production line for one of the European OEMs. Process Designer and Process Simulate data were among the initial deliverables submitted to the OEM.

"The Tecnomatix tools not only help us provide best-in-class production lines to our customers, but also eliminate waste within our organization by saving engineering time and helping minimize re-work on the shop floor."

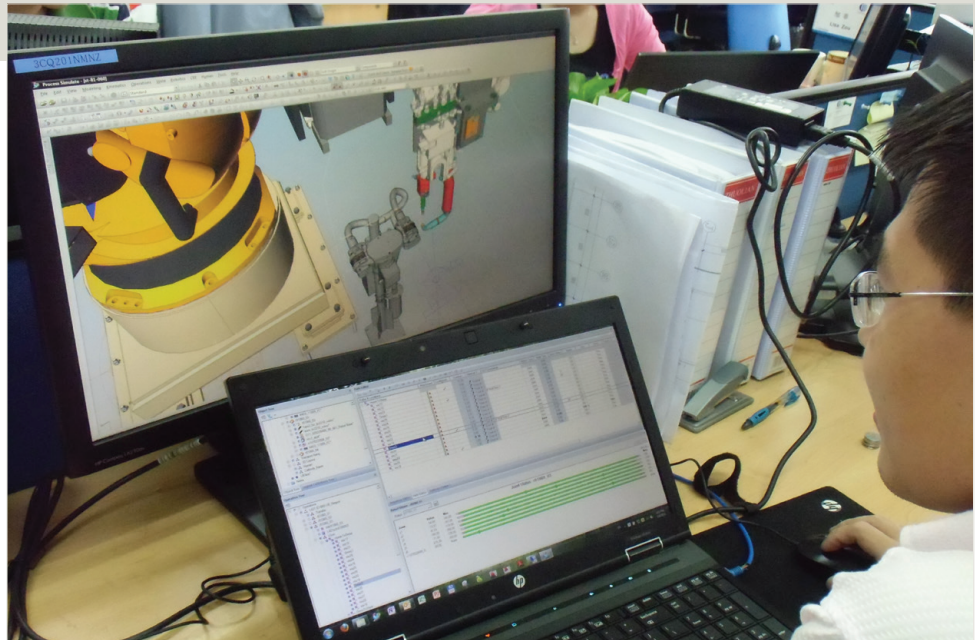
"We currently employ the biggest and best-skilled 3D simulation team in China – dozens of simulation engineers who use Robcad, Process Designer and Process Simulate."

Dr. Stefan Sack
CEO
Comau (Shanghai)

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Riccardo Piegaia
Process Engineering Manager
Mechanical Engineering
Department
Comau (Shanghai)



Congjian (Kaiser) Liu of Comau (Shanghai) simulates a tip dressing operation using Process Simulate.

Piegaia acknowledges the support Comau (Shanghai) received from Siemens PLM Software to get its engineers up to speed with the new tools. He already foresees a great benefit from them. "For a line builder like Comau (Shanghai), the engineering communication framework with the customer is always a challenge – what form of communication to use, which data to share with the customer, and how frequently to do so. Compared to a project done using Robcad, with Process Designer and Process Simulate, I see a clear saving in engineering manpower, since there is no need for a Comau (Shanghai) engineer, who functions as a technical mechanical leader, to be involved in this communication. It is straightforward to communicate directly with the customer based on the Process Designer and Process Simulate data."

"In addition, the engineering work proceeds faster and visualization is improved," notes Congjian (Kaiser) Liu, a process engineer in the Mechanical Engineering Department of Comau (Shanghai). "We can actually visualize the entire production line now. Other important features are the multi-user capabilities, which ensure that no simultaneous

conflicting changes can take place. The new functionality is also of great benefit, for example the Weld Distribution Center application, or the new concept of event-based simulation, which enables a much more realistic simulation. It is used, for example, in a welding gun tip dressing operation, which takes place only every so many cycles."

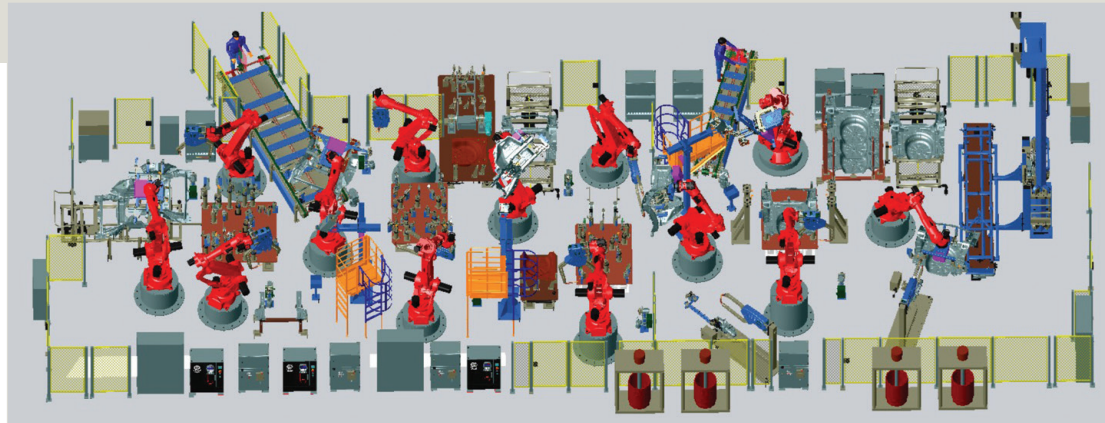
"Process Designer and Process Simulate also provide a good foundation for responding to requests for proposals," says Qian Hawjia, a process engineer in the Proposal Department of Comau (Shanghai). "We have already submitted a few proposals based on these solutions, and we believe that this methodology will grow. The previous method was based on a complex Excel worksheet, but we realized that a quotation process, more and more, includes both engineering and finance aspects. Process Designer/Process Simulate is the platform that supports both."

"Another promising area would be Teamcenter Manufacturing Process Planner, integrated with Process Simulate, as it provides the means to overcome organizational and geographical barriers using global libraries and process plans."

Mingzhi Ni
Manager, Mechanical
Engineering Department
Comau (Shanghai)

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Congjian (Kaiser) Liu
Process Engineer
Mechanical Engineering
Department
Comau (Shanghai)



A rear floor welding line simulated using Tecnomatix.

The Process Designer/Process Simulate deployment is supported by a new concept of the virtual machine (VM) developed by the Comau (Shanghai) information technology (IT) department. Richard Yan, Information and Communication Technology manager at Comau (Shanghai) explains, "As the number of customers to which we deliver simulation data increased, we realized that we needed a smarter IT solution to support different data schemes. Therefore, we decided to use the VM environment and set up this innovative configuration with the support of Siemens PLM Software China. This configuration actually saved 60 percent of the hardware cost." Yan notes that if this solution is positively valued, it might be adopted by Comau globally.

Tremendous growth

Comau (Shanghai) has experienced tremendous growth in China – an average of nearly 50 percent annual growth in a span of 10 years starting in 2002. "The Chinese market represents a huge opportunity for Comau (Shanghai)," notes Dr. Stefan Sack, CEO of Comau (Shanghai). "If we take the automotive market, for example, there are only 45 to 50 cars per thousand people in China, which is still significantly lower than the ratio in developed countries, so one can expect a significant growth of this market."

"We are already a market leader in the areas of automotive body welding and powertrain machining and assembly," Sack continues. "We are experiencing a very fast growth due to the excellent engineering skills we have developed, our relentless effort for continuous improvement, and the big value we deliver to our customers. This would not have been possible if we were not using the Tecnomatix tools."

"We currently employ the biggest and best-skilled 3D simulation team in China – dozens of simulation engineers who use Robcad, Process Designer and Process Simulate," Sack adds. "The Tecnomatix tools not only help us provide best-in-class production lines to our customers, but also eliminate waste within our organization by saving engineering time and helping minimize re-work on the shop floor. One of our advantages, as a line builder competing in the Chinese market, is that we are truly a global line builder, or as we say at Comau, 'global strategy, local execution.' Looking forward, I can foresee that our global operations will leverage the excellent knowledge and skills we are developing."

"Comau (Shanghai) is now looking into the next promising manufacturing engineering solutions from Siemens PLM Software. An example of this would be Process Simulate Virtual Commissioning," explains Mingzhi Ni, Mechanical Engineering Department manager at Comau (Shanghai). "The ability to test the virtual workcells with real controllers is a very promising area as it

Solutions/Services

Tecnomatix
Process Designer
Process Simulate
Robcad
www.siemens.com/tecnomatix

Customer's primary business

Comau (Shanghai), a wholly owned subsidiary of the Fiat Group affiliate, Comau S.p.A, supplies welding and powertrain machining and assembly systems, as well as robots, to automakers and other manufacturers in China.
www.comau.com

Customer location

Shanghai
China

"Process Designer and Process Simulate also provide a good foundation for responding to requests for proposals. We realize more and more that a quotation process includes both engineering and finance aspects. Process Designer/Process Simulate is the platform that supports both."

Qian Hawjia
Process Engineer, Proposal
Department
Comau (Shanghai)



Process Simulate Virtual Commissioning is used to troubleshoot cell controller program.

provides a real opportunity to shorten the project duration. It may also involve some organizational changes, as control engineers, who are now part of another department, will have to work closely with the simulation engineer. Another promising

area would be Manufacturing Process Planner in the Teamcenter portfolio, integrated with Process Simulate, as it provides the means to overcome organizational and geographical barriers using global libraries and process plans."

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Dr. Stefan Sack
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