Maserati and Siemens drive digitalization in the automotive industry

- Maserati automotive production relies on Siemens industry software
- Greater production capacity, more model variety

Maserati buyers expect quality, diversity, and individuality from a sports car manufacturing company with a long tradition. Soulless mass production without any variants would harm the brand. To achieve a shorter time to market without sacrificing quality and to meet these market demands, sports car manufacturer Maserati went digital and worked with holistic manufacturing solutions, choosing a partner who covers the entire industrial value chain: Siemens. The company supports Maserati along the complete product development and production process from product design to production planning, engineering, production execution and services.

Achieving efficient, flexible, customized, cost-effective, and high-quality production – this is the challenge all manufacturers of luxury cars are faced with. On top of that, they need to introduce new models to the market at shorter intervals and control an ever more complex network of suppliers due to increasingly lean production. These challenges can only be overcome if car manufacturers continuously digitalize all functions throughout all levels of their processes.

The Italian car manufacturer married digitization of manufacturing in terms of integration of real and virtual production processes, across the entire value chain; what is happening at the advanced production facility "Giovanni Agnelli Plant" (AGAP) of Grugliasco, near Turin, works as evidence of this marriage. At its AGAP center, Maserati produces the Maserati Ghibli - in addition to its flagship Quattroporte sports sedan - digitalizing all functions throughout all levels of the
processes. From the development of the vehicle components through the software NX (17,500 software developers work worldwide in teams since first launch of NX); to the efficient automation of the production plant through the TIA Portal engineering framework; from the simulation of production processes thanks to Tecnomatix software which can highlight possible cost savings; to the planning, optimization, and simulation of complex processes during the production phase thanks to the MES software Simatic IT.

With Siemens’ product lifecycle management (PLM) software Teamcenter - a supporting structure for the processes of virtual production – Maserati makes use of a “digital twin,” generated by the software itself. This twin played a key role during the development of Maserati’s Ghibli: using PLM software, the company was able to generate a virtual copy in parallel to the physical development of the car – 100% true to the original, down to the last screw. During the development stage, the data of both the real and the virtual models were used simultaneously to optimize processes. As a result, costs and time for the development stage could be drastically reduced (30% less development time).

Take the wind tunnel, for example, which is used to optimize car bodies in aerodynamic terms – an essential physical process to this day. Wind tunnel tests are elaborate and expensive. Using the digital twin, measured data from only a few real tests can be used for quick and inexpensive virtual testing that lead to further developments. Constantly making several small adjustments to the digital twin, developers can find new ways to further optimize the form and components of a car.

Acoustics is another example. A special feature of luxury cars is their very own, unmistakable sound – the motor sound in particular. “The sound is extremely important for a car manufacturer such as Maserati, as customers associate the sound with the brand,” explains Marco Maggi, Siemens sales manager in Italy. To optimize the sound inside the car, developers placed a dummy equipped with microphones in the prototype, recorded the sounds, and used this data for further virtual tests.

The digital twin can also drastically reduce the cost for test-drives. Within the context of what is referred to as reverse engineering, prototypes or even already produced
series vehicles are sent onto the street or test course and data are collected. This allows digital test-drives to be repeated as often as needed on the screen under modified conditions, and new cars can be optimized virtually. “Siemens software helps us minimize the number of expensive prototypes,” says Maserati manager Gian Luca Antinori.

Maserati and Siemens have taken the production facility in Grugliasco well towards Industrie 4.0. One goal of this is to meet a wide variety of customer requirements – to the point of cost-effective production with a batch size of one. The Ghibli is currently already available in 27 version, 13 colors, and 205 configuration options.

Both the Ghibli and the latest version of the Quattroporte luxury sedan, are manufactured at the production facility in Grugliasco. “The challenge was to integrate two new assembly lines into an existing facility,” says Maserati manager FCA Manufacturing Engineering and General Assembly Project Manager Massimo Anfosso, who supervised the installation of the new production lines from the very beginning.

To be able to introduce the new models to the market as quickly as possible, the production experts had to start working on the new lines while the new Maserati models were still in the design phase. Maserati made use of Siemens’ digital manufacturing solution – the Tecnomatix® portfolio – for this parallel development of car and production facilities. “Our design engineers rapidly went through different modification scenarios of the new models over and over again. Accordingly, we had to continuously adjust the production facilities,” Anfosso says. “The Tecnomatix tools helped us analyze how the changes to the car design affected production, in order to adapt the facilities and production processes appropriately.”

As at other facilities of the Fiat Chrysler group, the CArS (Control Architecture Standard) automation system is used in Grugliasco. It is based on the Siemens TIA (Totally Integrated Automation) automation solution, including the Simatic IT manufacturing execution system.

However, the suppliers are also connected to the data stream. Before production starts at Maserati, they receive exact information about which parts are required for
the assembly of each and every customized car. That way, Maserati is able to produce its new Ghibli model in high quantities, with great diversity, and with unsurpassed quality – just like a workshop in the best Italian tradition. Siemens’ integrated solutions for manufacturing helped Maserati obtain a benchmark in the automotive industry, ensuring a reduced time to market of the cars: from 30 months to 16.

**Opportunities of digitalization**

Car manufacturers’ international competitiveness will increasingly depend on the hardware and software they are using. Already today, the control devices, sensors, and software of a premium model represent more than 30% of the vehicle’s total value. Almost all vehicle innovations are already based on software – for instance, adaptive cruise control, automatic emergency call, and driver assistance systems. In 2016, 8 out of 10 new cars will have Internet access, the consulting firm Oliver Wyman predicts. According to estimates by the IT consulting firm Gartner, every fifth car will be online in 2020. That would be about 250 million cars worldwide. These cars produce and receive huge amounts of data and will play a significant role in the development of the Internet of Things. In 2020, components, software, and services around the connected car will have a value of €170 billion – six times more than today. This shows that digitalization also generates great market opportunities for suppliers.

You can find this backgrounder and additional material at www.siemens.com/press/maserati-ghibli

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