

Industrial machinery

Meccanotecnica Umbra

Opcenter and Teamcenter help reduce root cause identification from weeks to hours

Products

Opcenter, Teamcenter

Business challenges

Compete internationally
Centrally control engineering and production worldwide
Combine tradition and innovation

Keys to success

Invest in digital infrastructure
Implement Opcenter MES and quality solutions
Focus on product, service and quality
Integrate PLM, MES, ERP and quality systems

Results

Reduced root cause identification from three weeks to hours
Realized the paperless factory
Improved production efficiency and traceability
Reduced production costs

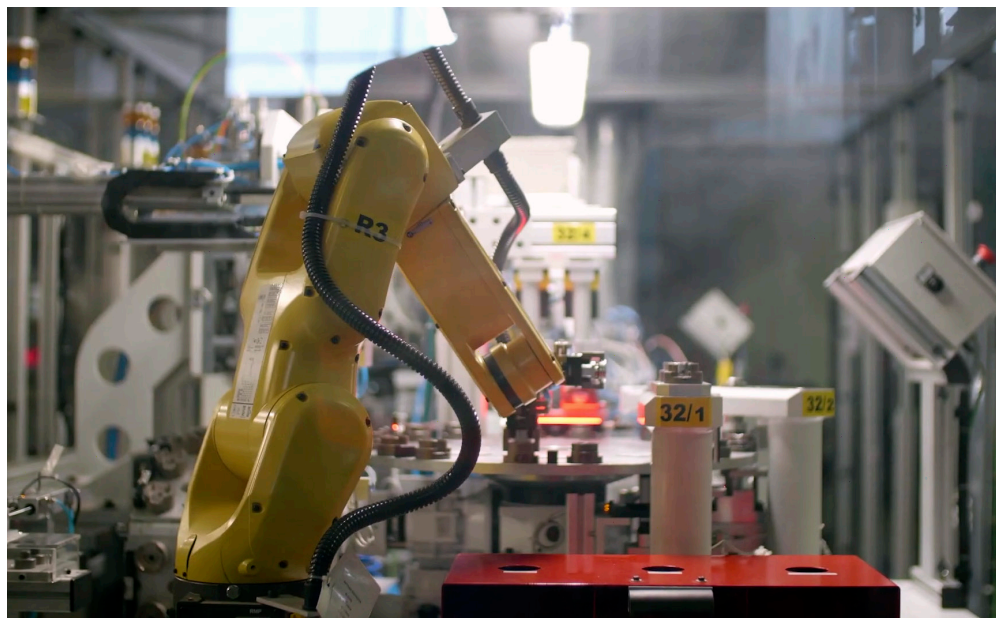
Siemens solutions enable seal manufacturer to improve production quality and efficiency, reduce costs

A world leader in mechanical seals

Meccanotecnica Umbra (MTU) was founded in 1966 and through more than half a century of innovation has become a world leader in the field of mechanical seals. MTU designs, produces and markets sealing systems for rotating shafts, with applications in automotive, household appliances and other industries including chemical, oil, mining, food and renewable energies. From the company's headquarters in

Campello sul Clitunno, Perugia, in the heart of Umbria, MTU has over the last 20 years transferred its "Made in Italy" passion and values to the company's facilities in Brazil, China, the United States, Mexico, India, Sweden, Canada, Germany and Turkey integrating fully with the local cultures.

With its entrepreneurial approach to continuous growth, MTU is meeting the challenges of growing international competition, diversifying into specific niches and progressively increasing its market share. As a result, MTU has cultivated a very rich background, experientially and culturally, which enables the company to evolve with the relentless pace of globalization.



"This path will allow us to move from data to information with less effort and will allow us to focus the company even more on product, service and quality."

Mario Savonelli
Industry 4.0 Coordinator
Meccanotecnica Umbra



MTU produces mechanical seals and rings in silicon carbide, carbon and polytetrafluoroethylene (PTFE) composite materials, all with high tribological characteristics (friction, lubrication, wear) capable of increasing the performance of engines and machines.

In the automotive industry, MTU is one of the three world players approved by the major car manufacturers. MTU mechanical seals are used by 35 percent of the world automotive market and 50 percent of the world household appliance market. In addition, MTU's research and development (R&D) department creates customized products based on specific customer requests, such as mechanical seals for hybrid vehicles with hollow shaft cooling system, battery cooling system and oil mechanical seals for gearbox. MTU's customer base ranges from

major international companies to many niche customers with specific requests.

Attention to detail and technological innovation

The tradition and culture of MTU – which has always made reliability its signature trademark – blend harmoniously with the constant pursuit of innovation. In this spirit, the company began its technological and cultural journey to Industry 4.0 a few years ago, with the goal of becoming one of the first Italian digital companies in its industry.

This goal embodies the company's response to demands for timely and cost-competitive fulfillment of customer requests. Only with adequate digital infrastructures and a fully integrated design and production management system can factories meet these demands with the necessary flexibility.

"One of MTU's goals has been to integrate all processes, from design to production to quality control, and to eliminate all manual steps between processes."

Gianluca Paoli
Corporate Head of ICT
Meccanotecnica Umbra



The primary objective of the company is to provide products of the highest quality, regardless of their production sites, leveraging the standardization and centralization of its quality management and quality control systems.

To meet this quality challenge, Meccanotecnica Umbra relies on the skills and integrated manufacturing solutions from Siemens Digital Industries Software. MTU selected Opcenter™ software for manufacturing operations management (MOM) Opcenter Execution for their manufacturing execution system (MES) and Opcenter Quality for closed-loop quality management. The company also uses Teamcenter® software for product lifecycle management (PLM). The Opcenter and Teamcenter solutions are part of the comprehensive Xcelerator™ portfolio of integrated solutions and services from Siemens Digital Industries Software.

MTU had several objectives for the Siemens solutions. First, the company sought to attain full traceability of production, associating each component with its batches of raw materials and production resources. MTU also aimed to manage production orders through integration with the enterprise resource planning (ERP) system and Teamcenter to support operators in assembly activities, by displaying operating instructions in real time.

MTU also wanted to reduce process costs and manage defects through failure mode and effects analysis (FMEA) and to digitalize the problem-solving process to mitigate issues and achieve continuous improvement using inspection plan management (IPM). The company also aimed to perform qualitative analysis of finished products using statistical process control (SPC) and sought to drastically reduce the use of paper through digital management of operations and data collection.

Expanding use of Siemens solutions worldwide

MTU initially implemented the Siemens solutions on its assembly line for automotive mechanical seals, and based on the



The “evolution of the species” in mechanical seals for automotive cooling systems

excellent results, expects to extend the solution to other production lines, both at the Umbrian headquarters and in production plants worldwide.

Opcenter Execution Discrete and Opcenter Quality are integrated with MTU's Teamcenter and ERP systems and assembly machines. The Opcenter solutions are also integrated with an IBM Maximo system that manages preventive maintenance of machines. In real time, the Teamcenter system provides production with up-to-date drawings, a bill-of-process (BOP) and process instructions for each mechanical seal.

Teamcenter is also the repository of all production quality documents. In the near future, quality documents will be automatically accessible by operators during assembly to enable real-time completion. Because orders from the ERP system are imported into the MES system, each operator has immediate and complete visibility into all production orders and related processing phases in real time.

During the production phase, the system automatically rejects components with evident defects and tracks the number of good and rejected pieces. The machines perform

a series of automatic checks, enabling contextualization of production quality for each order that is recorded in the MES system.

The MES system also allows complete traceability for each production order of the materials used, the lot to which they belong and the related quantity, enabling real-time tracing of which materials have been used for each seal.

End-to-end quality

The integrated MES and quality system enables quality managers to detect in real time any nonconformities that occur during a production phase and to add or adjust controls in the system. As soon as the information is fed into Opcenter Quality, the corresponding action for the operator is directly released into production.

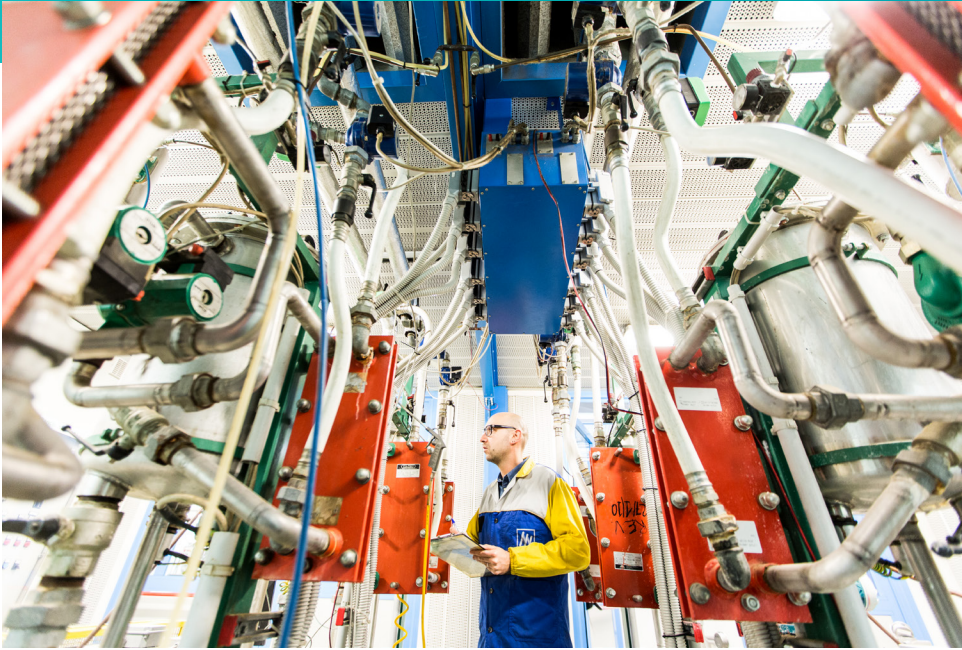
When production orders are started, operators simultaneously receive both the production plan and the checklist of quality controls to be carried out on-line, which are managed centrally. This fully integrated management reduces response times, increasing production efficiency and effectiveness.

"Meccanotecnica Umbra has been transformed over the years from a small company to a multinational company capable of withstanding the challenges of the global market also thanks to an increasingly digital infrastructure. We are confident that Siemens is the most competent and reliable partner for what has been achieved until now and for the journey still to come"

Gianluca Paoli
Corporate Head of ICT
Meccanotecnica Umbra

"Through the PLM system...we are able to control both the engineering of products and all our production in the various facilities located around the world."

Alessandro Ventura
Corporate Technical Director
Meccanotecnica Umbra



A paperless factory

"One of MTU's goals has been to integrate all processes, from design to production to quality control, and to eliminate all manual steps between processes," says Gianluca Paoli, corporate head of information and communications technology (ICT) at MTU. "Today MTU is a completely paperless factory – information is captured digitally and the transfer of information from one phase to the next is completely transparent and automatic."

"Before bringing the integrated digital solution from Siemens on board, MTU had installed different computer systems that were disconnected from each other," Paoli explains. "Management was almost completely on paper: MTU communicated order sequences to operators, traced lots and materials and recorded quality control results in hardcopy."

Full traceability

Reliance on a paper-based, disjointed process also consumed a lot of time. All of the hardcopy information limited analysis of the data. The company could perform back-analysis of the data for periods of seven to 10 days, but it was expensive. When the time range for analyses was expanded to

the last three to six months of production, it was virtually impossible to analyze the data and back-trace materials usage. Since implementing Opcenter, all of this information can be tracked in real time.

Production controls were also managed with paper forms completed by quality control staff, then manually entered into the digital quality system – a standalone system based on Excel spreadsheet software and disconnected from all the other systems that made up the factory information technology (IT). Today, all the data collected using quality control is digital, available for real-time reporting and integrated with production data.

Data collection and analysis

Data collection is a fundamental element of production and business analytics systems that supports every process of continuous improvement – an objective that MTU has pursued since its foundation and which today is effectively and efficiently supported by the Opcenter solutions. Previously, MTU manually performed many activities and collected the results on paper. With manual, hardcopy data collection, it was impossible to cross-reference or correlate the data with algorithms to extract information for analysis

of production effectiveness and efficiency. "There is only one data center in Italy and from here we serve all our foreign factories," says Alessandro Ventura, corporate technical director of MTU. "Through the PLM system installed on the servers of the parent company in Italy, we are able to control both the engineering of products and all our production in the various facilities located around the world."

"With the MES system we are collecting data that was not previously collected," says Luigi Renzi, manager of the development of business intelligence and business analytics solutions at MTU. "We are more consistently using the data that was previously collected through non-standard interfaces, from different applications and in a nonintegrated way."

"All this will allow us to integrate ERP data with production and quality data, and therefore to build performance indicators that will lead to a continuous improvement of our processes, providing us with feedback in real-time regarding the levels of efficiency and effectiveness of our processes," Renzi says.

"Compared to the previous situation, MES allows us to have data entered both in the ERP system and in the quality management system," says Paoli. "The MES allows the operator to use all these applications in complete safety by receiving real-time communications from the PLM system. In this way, we have achieved one of the main objectives we wanted to achieve through our digitalization project."

"Using a data-driven approach to support business decisions is not only a technological but a cultural challenge. Thanks to Siemens we have taken the fundamental steps to enable us to win it," Renzi concludes.

In the near future MTU expects to close the loop by sending production data to the ERP system to have real-time feedback on the completion of each order, the number of components produced versus those that are rejected and the quantities of materials used.

Business benefits

In a mature market with rather low margins, technological innovation has a significant impact on MTU's ability to produce new solutions for end customers and also on its profitability. One key benefit is reducing production costs by drastically reducing the time required to trace root causes of defects.

Before the implementation of Opcenter, it could take up to three weeks for MTU to trace problems and their locations. One or more employees were in charge of collecting all the data for analysis long after any quality event occurs, with root cause identification occurring perhaps days later. Today, data collection is integrated and connected to the automatic production machines, and it may take only a few hours to discover the cause of a defect.

Solutions/services

Opcenter Execution Discrete
siemens.com/opcenter

Opcenter Quality
siemens.com/mom/quality

Teamcenter
siemens.com/teamcenter

Customer's primary business

Meccanotecnica Umbra S.p.A. is a world leader in the production of mechanical seals, specializing in the automotive and household appliance industries and in various industrial sectors including chemical, pharmaceutical, food, pulp and paper and mining.
www.meccanotecnicaumbra.com

Customer location

Campello sul Clitunno, Perugia
Italy

The transformation of information transmission from paper to digital has also resulted in improved production efficiency and lower production costs, thanks to the drastic reduction in the number of staff hours dedicated to activities that often had low added value. The reduction of repetitive manual activities also has enabled the company to redirect its human capital toward more specialized skills.

Risk assessment and customer satisfaction

Traceability of individual product information is one of MTU's strengths that helps ensure the quality of its goods: Each mechanical seal is identified with a unique worldwide code that stakeholders can use to access all the information provided by production machines, including images.

"Thanks to the extensive data collection carried out through Opcenter, we are able to identify the parameters and conditions applied during the manufacturing of each single piece. If necessary, seals can be withdrawn with a level of granularity much higher than the production batch," Paoli says. "Because customers can understand our capacity for risk assessment, they have the peace of mind that we closely monitor our product both in manufacturing and when it is necessary to identify seals that are potentially at risk."

"In practical terms, this means that a possible withdrawal of a vehicle engine water pump due to a defective seal can be carried out for each individual vehicle and for each individual code in the car," says Ventura. "We can do this without the

need to implement a complex and expensive recall campaign for the entire fleet of vehicles on which a lot of our mechanical seals has been mounted."

Italian tradition and innovation

MTU's transformation into a digital and intelligent factory is in complete harmony with the company's DNA: an Italian manufacturing effort of the highest quality with specific attention to the human factor and the professional growth of its collaborators. The operator remains central to the digital transformation and the evolving know-how and technical skills of each individual.

"The company mission is fully supported by the tools made available by technology: if the tools are valid, like those of Siemens, and are used correctly, tradition and innovation naturally go hand in hand," Ventura says.

"This path will allow us to move from data to information with less effort," says Mario Savonelli, coordinator of the Industry 4.0 project. "It will allow us to focus the company even more on product, service and quality."

"Meccanotecnica Umbra has been transformed over the years from a small company to a multinational company capable of withstanding the challenges of the global market thanks to an increasingly digital infrastructure," Paoli concludes. "We are confident that Siemens is the most competent and reliable partner with whom to undertake this journey."

Siemens Digital Industries Software

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