SIEMENS
Ingenuity for life

Industrial machinery

RONCHI MARIO

A major Italy-based industrial machinery manufacturer chose Simcenter Amesim to boost its performance

Product

Simcenter

Business challenges

Design customized machine for each customer

Improve filling efficiency

Cut the number of prototypes

Keys to success

Evaluate machine's parameters to determine the best design and ensure filling quality

Determine the pressure loss and filling behavior during the filling dynamics

Simulate the machine process to adapt filling valves design

Results

Reduced number of prototypes by more than 20 percent

Increased design accuracy

Saved weeks in maintenance

RONCHI MARIO uses Simcenter Amesim to optimize its filling machines performance

Customized solutions for packaging industry operators

Packaging industry operators' success is influenced by consumer society and various market needs. Across industries, to meet market demands, firms must customize their containers to differentiate their products from their competitors. This diversity leads to intense competition, pushing packaging industry operators to continually innovate in designing and delivering high-quality customized machines. At the same time, these industrial operators must deal with a very competitive context and reach their own objectives in terms of productivity and production speed.

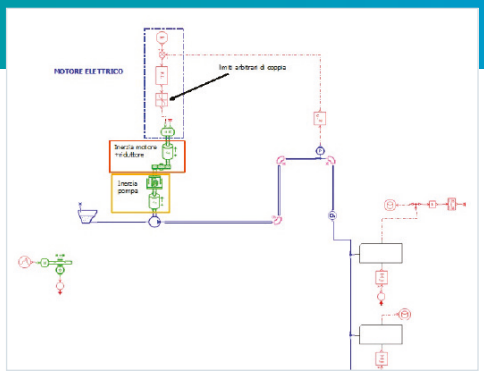
RONCHI MARIO specializes in finding the specific solutions for solving any packaging industry operators' requirement and building customized and reliable packaging equipment for chemical, cosmetic and food industries. RONCHI MARIO is a major Italian industrial machinery manufacturer, building around 85 machines a year and supplying packaging industry operators across a global market. Its core businesses are both bottle filling and capping for liquid and high-viscous products such as shampoo and dishwasher detergent.

RONCHI MARIO filling machine.

Research and development (R&D) have always been at the heart of RONCHI MARIO's strategy. The RONCHI MARIO R&D department focuses on delivering the best customized solution for its customers to meet every specific requirement. Machines built by RONCHI MARIO have very high production regimes (number of filled containers per minute); the filling speed is high and must be precise in terms of the quantity of fluid injected in the containers.

"If you are interested in the global parameters of the system, a 1D simulation tool, such as Simcenter Amesim, is the best option, because it is fast, reliable and easy-to-use."

Gabriele Pastrello
R&D Engineering
RONCHI MARIO



Simcenter Amesim model of a filling machine, with valves modeled as "supercomponents" (just two valves visible).

"The main concern is to ensure the performance of this filling process without any pressure disturbance; when the machine pressure remains stable, the filling is good," explains Gabriele Pastrello, R&D engineer at RONCHI MARIO.

From an experimental process to a numerical approach to enhance pressure stability

"The bottle filling circuit is over-pressure; the pressure is higher than the atmosphere pressure," notes Pastrello. So, defining how to maintain this pressure as constant as possible is fundamental for RONCHI MARIO to deliver the best industrial machines to its customers. "Before, we always tried to solve our problems by an experimental process without any direction. We tried to test a number of random choices before finding the correct one." This trial-and-error system was not precise enough to render results in an efficient manner, thereby costing the firm time and money. In addition, if an industrial client had technical issues, someone from RONCHI MARIO used to go directly to the client's location to make modifications on the machine.

To stabilize the pressure, the RONCHI MARIO R&D department needed to simulate the entire hydraulic system, which is composed of a tank, a pump, many meters of piping through which the fluid is pumped and several dosing valves that inject the fluid inside the containers that need to be filled. The R&D team sought a solution that would enable a specific pressure and flow rate of fluid through the piping in order to maintain a constant stream of fluid to the filling valves. After a thorough selection process, RONCHI MARIO chose Simcenter™ Amesim software.

"We have to handle any product and every machine is different from the previous one we developed, so we need to accurately

"Already, we have reduced the number of prototypes by 20 percent."

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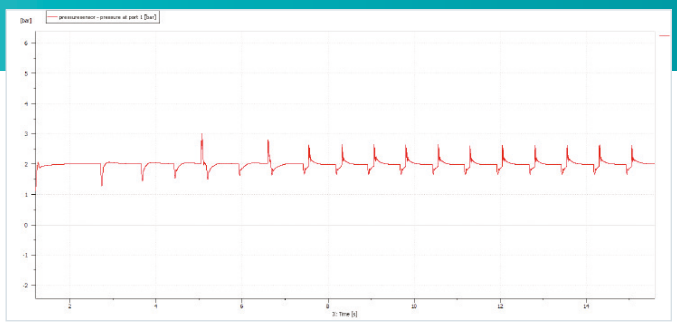
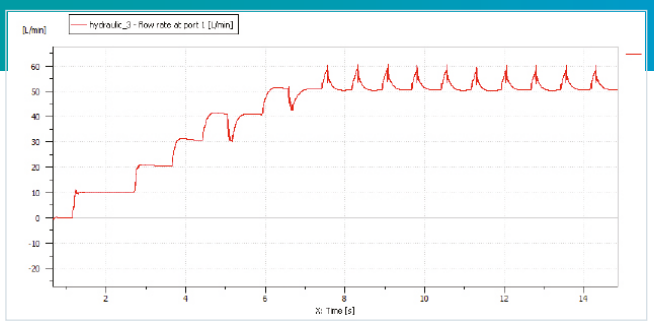


Pressure at the infeed inlet of the filling machine.



Flowrate through the filling machine.

simulate the behavior of each individual filling machine," explains Pastrello. "If you are interested in the global parameters of the system, a 1D simulation tool, such as Simcenter Amesim, is the best option, because it is fast, reliable and easy-to-use." The simulation with Simcenter Amesim validates the machine layout with respect to those requirements, avoiding last-minute adaptations to the finished machine, which cause additional costs and delays. Pastrello notes, "Doing it right the first time means saving a lot of time; I can say weeks."

Simcenter Amesim is used not only for the design of the hydraulic network, but also to determine the control strategy. To maintain the pressure as constant as possible, RONCHI MARIO engineers adjust the speed of the pump to produce the exact quantity of flow required to be delivered by the nozzles. Simcenter Amesim allows digital testing of the impact of the proportional, the integral and the derivative (PID) controller on the delivery pressure, instead of calibrating these parameters on the real equipment. This saves considerable time and money.

The RONCHI MARIO R&D department works in close collaboration with Bsim, a Siemens Digital Industries Software partner, to adapt and get familiar with Simcenter Amesim. "Bsim is really fast and accurate in answering my questions," says Pastrello. "I am very pleased with their contribution."

Time saving and accurate simulation

Due to the highly accurate simulation of Simcenter Amesim, RONCHI MARIO has measurably reduced the number of prototypes it typically produces per project. Simulation enables the team to predict every machine behavior and determine the best design before prototype production. Pastrello measures the value as significant: "Already, we have reduced the number of prototypes by 20 percent."

Another positive result is that RONCHI MARIO's machines perform faster, thanks to pressure stability enabled by the software. This allows RONCHI MARIO's industrial clients to reach their own targets for productivity, performance, stability and production speed.

Go beyond, be innovative

To increase its competitive edge, RONCHI MARIO strives to provide the best equipment to its customers. That means innovation in terms of both process and product. Pastrello explains, "Simulation tools can make the difference between us winning and losing business. I understand that not many of our competitors use such advanced tools; we are truly pioneering the use of simulation to streamline the machine design process and it can make a significant difference competitively."

He adds, "The next step is to integrate the results of Simcenter Amesim with a 3D computational fluids dynamics (CFD) tool. 3D calculations can be helpful in analyzing the flow and behavior inside the valve." With Simcenter Amesim providing the boundary condition evaluation and 3D CFD providing behavior insight, the combination works as an excellent complement to delivering the best analysis.

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Solutions

Simcenter Amesim
siemens.com/
simcenter-amesim

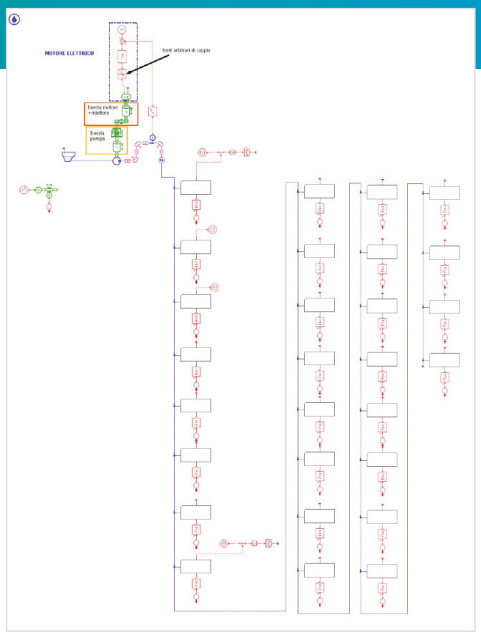
Customer's primary business

RONCHI MARIO focuses its activity on the production of packaging equipment for the liquid chemical, cosmetic and food products industries.
www.ronchipackaging.com

Customer location

Gessate (Milano)
Italy

Pastrello concludes by pointing out that Simcenter Amesim gives industrial machinery manufacturers the opportunity to build performant machines from an accurate and easy-to-use system simulation, particularly noting that a highly adaptable customized machine represents a significant added-value to his customers.



Complete filling-machine system modeled with Simcenter Amesim.

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