



# DIGITAL TWINS BOOST BARISTA BUSINESS

## ALTAIR® HELPS GRUPPO CIMBALI SPEED UP INNOVATION AND GO-TO MARKET

### Background Information

As a key to growth in the coffee machine industry, innovation has always been a core pillar of Gruppo Cimbali's company philosophy. Investing in the research and development of high-performance machines is a strategic decision, and Gruppo Cimbali is proud to be recognized as one of the first companies in the sector to expand into telemetry, Internet of Things (IoT), and Wi-Fi connected machines. To continue to deliver on its innovation promise, the company now applies digital twins - utilizing Altair Activate® - to their development processes enabling it to design better products, shorten development times, and increase energy efficiency.

### About the Customer

Gruppo Cimbali is a leader in the design and production of professional machines for espresso, fresh-milk drinks, and coffee as well as catering equipment. Comprising the brands La Cimbali, Faema, Slayer, and Casadio, the organization has three production facilities in Italy and one in Seattle, USA with an R&D department made up of 60 operators and employing about 700 people. Driven by its vision to provide the "highest quality in cup," Gruppo Cimbali fully embraces digital transformation to drive innovation and enhance the user experience of its machines. As innovation also means responsibility and sustainability for the company, Gruppo Cimbali manufactures its machines using only recyclable and eco-compatible materials, thus saving a lot of energy as it strives for a more sustainable future.

### Their Challenge

Used every day for long hours under harsh conditions in coffee bars or restaurants, professional coffee machines are high-tech, complex systems consisting of a large number of connected components,

**20% ▼**  
LESS ENERGY LOSS

**30% ▲**  
TIME SAVED WITHIN THE DEVELOPMENT CYCLE



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which may influence each other's performance. Mechanics, fluid dynamics, and thermodynamics all influence the system and its performance and control the processes which, through the diverse subsystems of the machine, allow coffee extraction. Designing these technologically advanced coffee machines, bringing them quickly to market, and studying all the physics involved is a challenging task that involves countless time-consuming physical tests. To reduce the number of physical tests and prototypes while simultaneously being increasingly innovative, Gruppo Cimbali engineers have to evolve the way they develop their products and embrace the digital transformation in the development process. The R&D engineers at Cimbali needed a solution to help create a virtual model – also known as a digital twin – that would reproduce every aspect of an existing or new product virtually. Using this digital twin, the engineers wanted to study, control, and optimize the system and thus boost innovation and the development of better and more sustainable coffee machines.

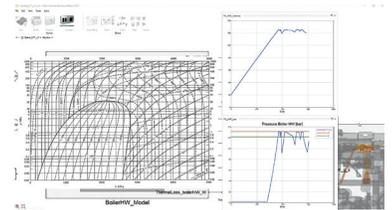
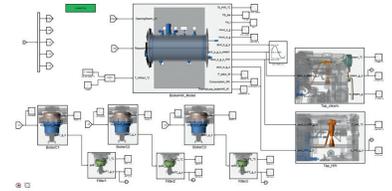
### Our Solution

Gruppo Cimbali applied Altair Activate and jointly with Altair's product development engineers created a digital twin of their baseline coffee machine. This model now represents a valid archetype from which the team is deriving the digital twins for the new coffee machines, in addition to those already developed by the company. Enabling the engineers to study and optimize the machine's behavior, including all related physics, digital twins are now essential in both the design of new products as well as in the daily problem solving and optimization of existing machines. When first designing a new product, the engineers create various alternatives inside the digital twin to explore the expected performances for different physics. This approach allows Gruppo Cimbali to test more options and identify the best technological solutions for each area faster. In addition to making easy and educated decisions on the best sizing and other physics, the digital twin also provides answers very quickly without the need for physical testing. As a result, physical testing is only used subsequently to validate the solution. When it comes to optimizing machines that are already on the market, the digital twin allows engineers to identify possible inefficiencies in existing machines, which helps to elevate the know-how and boost best and superior technological products.

### Results

Implementing digital twins in the design process enables Gruppo Cimbali engineers to predict machine behaviour, and optimize the machines' energy efficiency, thermal sizing, and other physics before doing physical tests. As a result, the company reduced the energy loss by ~20 percent in one of its latest products when compared to the previous model. The application of a digital twin also ensures that the company provides consistent, superior products. Furthermore, Gruppo Cimbali has cut down prototypes, development time, and costs involved with physical testing, while exploring more design variants. For new platforms, the company estimates average time savings of 30 percent in the development cycle. Gruppo Cimbali can also perform more accurate market analyses. "To me, the Altair solutions mean flexibility and fast answers, even when we have to answer very complex questions," said Luca Gatti, energy and sustainability expert, Gruppo Cimbali. "Without the digital twin it would be impossible to have this kind of flexibility and time savings when designing products."

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**TOP:** The Faema coffee machine E71e was developed by using a digital twin, converging process data and simulation for optimized product performance and increased efficiency. **MIDDLE:** Detailed system modelling with Altair Activate allows subsystem optimization. **BOTTOM:** The digital twin representing the full thermo dynamic behavior of all parts of the coffee machine allowed for a realistic representation, parameter studies and optimization of the entire system.