

courtesy of



case STUDY

The best compromise between stress and weight

Optimization time dropped from 20 to 4 days,
with a 44% safety improvement

SACMI is a global OEM (Original - Equipment - Manufacturer), market leader in the production of machines and complete plants for the Ceramics, Packaging (Beverage and Closures&Containers), Food and Plastics industries.

CHALLENGE

Among other machines, the SACMI packaging division manufactures the Compression Molding Machine (CCM) able to **transform plastic resin pellets into semi-finished caps**. During the injection phase, a pneumatic piston allows for the melted pellet to be injected inside the mold. The piston is subject to a high acceleration rate and continuous collisions which call for a compromise between stress and weight, in order to limit the risk of failure.



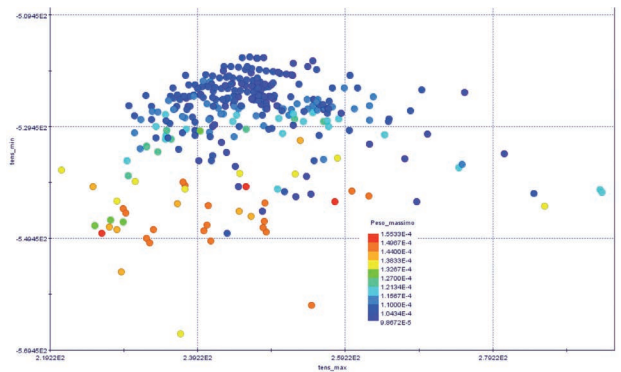
At SACMI automating optimization with modeFRONTIER conveyed dramatic enhancements to pneumatic piston.



BENEFITS

modeFRONTIER enabled the CAE expert to exploit his original inspiration - which led to an improved piston geometry - by **evaluating a higher number of configurations (+240%) in less time** and by further enhancing the safety performances. The time for the optimization process dropped from 20 to 4 days, 3 of which were required for manual setup and 1 for automated evaluation.

"I wasn't an experienced modeFRONTIER user - says **Andrea Minardi**, CAE specialist at **SACMI Packaging Division** - so I found the Optimization Wizard very useful: it supported the choice of the number of designs, of the algorithm and of the number of iterations according to the time available for the whole analysis." The automation of the design optimization process allowed to consider a wider range of possibilities and to analyse in depth the influence between the design parameters and the objectives.



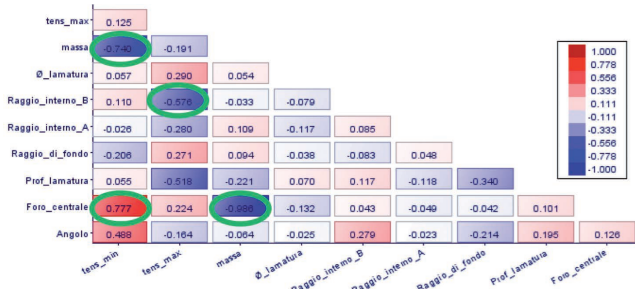
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Bubble Chart showing target designs on the Pareto Frontier.

ABOUT SACMI

SACMI is an international group manufacturing machines and complete plants for the Ceramics, Packaging (including Beverage and Closures&Containers), Food and Plastics industries - markets in which it is recognized as world leader.

Its strength lies in the application of innovative technologies, the outstanding position it occupies on international markets, commitment to research and development and top product and service quality provided to the customers. www.sacmi.com



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Parameters and objectives correlation.

SOLUTION

The goal of the analysis was to find a light but strong piston geometry in order to improve the Compression Molding Machine performance in terms of tensile and yield strength. The first optimization study was carried out manually for a 12mm piston, while the second study on a 16mm piston took advantage of **modeFRONTIER optimization platform by capturing the piston model**, previously created in Solidworks and analyzed in Ansys Workbench, and improving the geometry and performance. Piston geometry modifications led to a 33% safety index increase in the case of manual analysis and **44% in the case of the model optimized with modeFRONTIER**.

	"manual" optimization (12mm piston)	optimization with modeFRONTIER (16mm piston)
Number of design evaluations	≈30	800
Safety improvement obtained	+30%	+44%
Total time employed (days)	20	4

ABOUT ESTECO

ESTECO is an independent software provider, highly specialized in numerical optimization and simulation data management with a sound scientific foundation and a flexible approach to customer needs. With 20 years' experience, the company supports leading organizations in designing the products of the future, today. esteco.com

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