SOLIDWORKS

S.G.A.

SOCIETÀ GOMMA ANTIVIBRANTE SRL (S.G.A.)
SPEEDING TRAM/RAILWAY VIBRATION-DAMPING PRODUCT DEVELOPMENT WITH SIMULIAWORKS
Case Study

Using the cloud-based SIMULIAworks simulation platform, S.G.A. validated the anti-vibration performance of the silent block on the connector arm bushing of the railway carriage for the new Hitachi Rail Italy Rock train car, demonstrating how SIMULIAworks is helping the company save time and money by minimizing the number or prototypes required to define the elastic properties of the elastomers used in its products.

DASSAULT SYSTEMES

Challenge:
Reduce physical prototyping requirements and accelerate product development through the more efficient use of nonlinear large displacement, thermal-induced stress and shrinkage, multiphysics, and pre-compression stress due to steel plasticization simulation tools.

Solution:
Add the cloud-based SIMULIAworks advanced analysis solution on the **3D**EXPERIENCE platform to its existing SOLIDWORKS 3D CAD implementation.

Results:
- Cut lead times between product design and final configuration
- Minimized number of prototypes required
- Reduced production and control equipment change costs
- Realized ability to conduct nonlinear, multiphysics analysis

Founded by engineering and industrial experts from the tram, railway, and subway car industries, Società Gomma Antivibrante SRL (S.G.A.) is a leading Italian manufacturer of anti-vibration components, including pivots (flexible joints), resilient inserts, bushings, bumpers, guiding components, and suspensions. Roughly 96 percent of S.G.A.'s business is in the rail and tram sector—with the remaining products focused on marine and naval applications, specialized vehicles, and industrial machines—and the company's products are found in railway, tram, and subway cars all over Europe and around the world. S.G.A.'s customers include the major international and national rail builders (e.g., Alstom, Ansaldobreda, Bombardier, Hitachi), national and regional Italian and European railways, and the maintenance workshops connected to them.

With a wide range of products developed for multiple and diverse applications, S.G.A. engineers must thoroughly understand the behavior and vibration-damping characteristics of the rubber and elastomers that are used in the company's products, according to Quality System/Test Laboratory Manager Stefano Meli. "Analysis and definition of the overall product dimensions/footprint and laboratory development of the related load-failure diagrams, and subsequent prototype testing, are the most challenging portions of our product development process," Meli explains. "To accelerate time to market, we needed an accurate, efficient solution for conducting nonlinear large displacement analyses and other types of sophisticated simulations."

In the past, S.G.A. engineers used the combination of Autodesk® design software and MSC® finite element analysis (FEA) software in developing the company's products. However, the recent move to SOLIDWORKS® 3D product development solutions prompted the company to reevaluate their engineering processes and leverage more robust and integrated FEA simulation capabilities from within the SOLIDWORKS design environment. This reevaluation took place in September 2018 at the same time SOLIDWORKS was conducting a customer feedback trial of SIMULIAworks®, a new SIMULIA solution on the **3D**EXPERIENCE® platform, which empowers product development in the cloud. S.G.A. joined the program to both guide the development of SIMULIAworks and to assess the impact of this **3D**EXPERIENCE simulation solution on their design processes. SIMULIAworks is a robust nonlinear static FEA application. It incorporates the SIMULIA Abaqus solver, which leverages the inherent advantages of the cloud for meeting validation and collaboration needs. S.G.A. chose to use SIMULIAworks because it is integrated with the SOLIDWORKS CAD system, can accurately solve all of the advanced analysis problems that S.G.A. faces, and supports multistep/multiphysics simulation scenarios.

"While we evaluated other FEA systems, we chose SIMULIAworks because it was the only product that delivered results comparable to those achieved through traditional prototyping techniques," Technical Manager Davide Massa says. "We also value the ability to change the subject geometry inside SOLIDWORKS without having to apply the modifications in SIMULIAworks or create a new mesh for running subsequent analyses."

"The most important thing to us is to produce good, long-lasting, and efficient anti-vibration products, because we feel deeply responsible for the fact that our products are mounted on trains that transport children, including many of our own. SIMULIAworks gives us the full range of tools that we need to ensure that our products provide safe, reliable performance."

— Stefano Meli, Quality System/Test Laboratory Manager

SAVING TIME AND MONEY

S.G.A. first deployed SIMULIAworks during the development of the silent block on the connector arm bushing of the railway carriage for the new Hitachi Caravaggio train car. That experience demonstrated how SIMULIAworks is helping the company save time and money by minimizing the number of prototypes required to define the elastic properties of the elastomers used in its products.

"The biggest savings we've experienced using SIMULIAworks derive from the reduction in lead time between product

design and final configuration and from the reduction in costs related to changes to production and control equipment," Meli stresses. "Because SIMULIAworks enables us to eliminate and/or minimize the number of prototypes required to achieve final product performance, it helps us to reduce lead time from design to final production as well as reduce both prototyping and fine-tuning costs."

COMPLEX SIMULATIONS, ACCURATE RESULTS

Although nonlinear, large displacement analysis represents the majority of simulation scenarios that S.G.A. engineers encounter when developing anti-vibration systems, the company also uses SIMULIAworks to achieve accurate results for a range of other challenging engineering problems. "Besides nonlinear, large displacement analysis, the biggest issues that we face are the simulation of shrinkage/stress due to thermal variations and pre-compression due to steel plasticization," Meli notes.

"With SIMULIAworks, it is very easy to achieve results in line with the real results of a project that we had already finalized," Massa adds. "In other words, we demonstrated the accuracy of the simulation results by validating an existing project with SIMULIAworks."

ENSURING SAFE, RELIABLE PERFORMANCE

Because its products are used on trains, trams, subway cars, and ships—all of which carry passengers—safety is a priority at S.G.A. and another reason why SIMULIAworks is having a positive impact on the company's product development operation. "The most important thing to us is to produce good, long-lasting, and efficient anti-vibration products, because we feel deeply responsible for the fact that our products are mounted on trains that transport children, including many of our own," Meli points out.

"SIMULIAworks gives us the full range of tools that we need to ensure that our products provide safe, reliable performance," Meli continues. "We also value the ability to conduct multistep/multiphysics simulations, such as performing thermal and mechanical analysis within the same project without having to duplicate geometry changes or create a new mesh due to the full integration between the SOLIDWORKS portfolio and SIMULIAworks."

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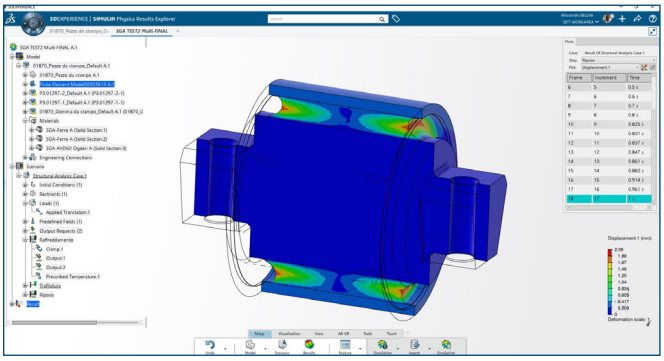

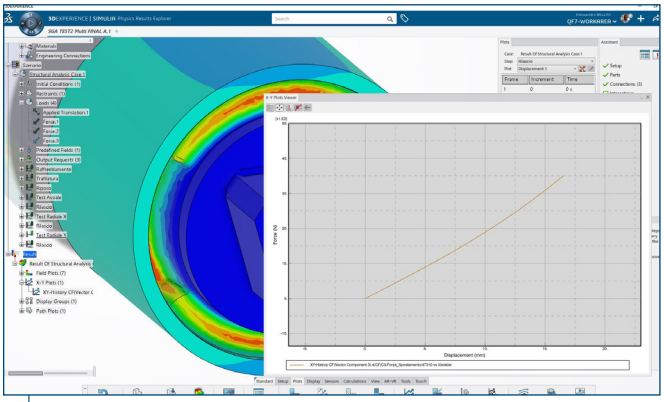

In addition to using SIMULIAworks to conduct nonlinear, large displacement analyses, SGA engineers also can rely on the cloud-based platform to generate accurate results for a range of other challenging engineering problems, such as the simulation of shrinkage and stress due to thermal variations and pre-compression due to steel plasticization.

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