

ASTRA RAIL INDUSTRIES

OPTIMIZING RAIL CARS WITH SOLIDWORKS DESIGN AND SIMULATION SOLUTIONS



Astra Rail relies on SOLIDWORKS design and FEA analysis tools to accelerate development and improve the performance of its tank rail cars, freight wagons, and bogies, including the liquefied petroleum gas (LPG) tanker shown here.

Challenge:

Accelerate the development of rail cars, freight wagons, and bogies to support greater throughput while simultaneously reducing costs, improving quality, and increasing payload carrying capacity.

Solution:

Implement SOLIDWORKS design, SOLIDWORKS Simulation Premium analysis, and SOLIDWORKS PDM Professional product data management software solutions.

Benefits:

- Cut development time by 30 to 35 percent
- Reduced prototyping/testing cycles by 30 to 40 percent
- Decreased product weight by 10 to 20 percent
- Increased payloads by one to two tons

Astra Rail Industries is a leading manufacturer of tank rail cars, freight wagons, and bogies. Headquartered in Arad, Romania, the company operates three factories with the capacity to manufacture 2,500 to 3,500 wagons, in a wide variety of designs, each year. The rail car manufacturer draws upon the competence of its two design subsidiaries to support its business, including ICPV SA, a prestigious engineering office in Arad, Romania, and the Astra Rail Project, a sister company based in Poprad, Slovakia. The engineering expertise of these subsidiaries benefits Astra Rail Industries and a number of other high-profile companies in the European rail industry.

The ICPV design office specializes in the design and testing of rolling stock and bogies. The group used the combination of AutoCAD® 2D design tools and MSC/NASTRAN® finite element analysis (FEA) software to develop its products until 2005, when company management decided to move to a 3D design platform to accelerate development, increase throughput, and improve quality, according to ICPV Managing Director Cornel Raicov.

“Before migrating to 3D, we would have to remodel designs created in 2D in order to conduct design analyses to ensure product safety and performance,” Raicov recalls. “We realized that designing in 3D would provide dramatic improvements in design and engineering capabilities, as well as our overall productivity. Our sister company in Slovakia had already standardized on the SOLIDWORKS® 3D development platform, so we decided to add SOLIDWORKS to our evaluation of 3D design solutions.”

After evaluating 3D design packages—including SOLIDWORKS, Solid Edge®, Unigraphics®, and Pro/ENGINEER® software—ICPV chose to implement SOLIDWORKS design and SOLIDWORKS Simulation Premium FEA analysis software, and later added the SOLIDWORKS PDM Professional product data management system. The company chose SOLIDWORKS solutions because they are easy to use, provide access to integrated 3D design and analysis capabilities, and made ICPV data fully compatible with all Astra Rail Industries’ operations.

“SOLIDWORKS provided the best value in terms of its price, range of capabilities, and effectiveness,” Raicov notes. “The software also gives us company wide data compatibility, which makes it easier to share design information and collaborate with colleagues at other locations.”

FASTER DESIGN, IMPROVED QUALITY

With SOLIDWORKS software, ICPV has revamped its development processes, instituting a more flexible, modular design approach and leveraging a growing library of 3D components and subassemblies. This has resulted in shorter design cycles, which have been cut by 30 to 35 percent. And, with the ability to utilize SOLIDWORKS dynamic motion and interference- and collision-detection tools during assembly design, ICPV engineers have minimized design errors and improved product quality.

“When we transitioned to the SOLIDWORKS platform, we initially had to develop our parts and assembly libraries, and modify the sequence of our development processes,” Raicov explains. “Once we had built our library and established our new workflows, we not only became much more efficient, but also eliminated defects and interferences from our designs.”



“We strive to produce the lightest, most effective conveyances for efficiently and safely transporting the greatest payloads. Using SOLIDWORKS Simulation Premium tools, we have been able to reduce the weight of our structures by 10 to 20 percent while at the same time increasing payload capacity by one to two tons.”

— Cornel Raicov, Managing Director

REDUCING PROTOTYPING/TESTING REQUIREMENTS

ICPV engineers use integrated SOLIDWORKS Simulation Premium tools during initial design and to validate final design performance from within the SOLIDWORKS design environment, without having to import, export, or rebuild models. This approach enables them to use FEA studies more frequently and leading to fewer prototyping and testing cycles. "With SOLIDWORKS Simulation Premium FEA software, we can complete different types of structural analyses, such as linear static stress, material nonlinearities, natural frequency, buckling, dynamic, and spectral analyses," Raicov says.

"Because we've compared SOLIDWORKS Simulation Premium findings with actual testing results on a 1:1 scale prototype wagon and bogie, and have found a close correlation between the two, we have great confidence in the accuracy of our simulations," Raicov continues. "Recently, more of our clients are willing to approve designs based on FEA validations. With SOLIDWORKS Simulation Premium software, we've reduced the time required for prototyping and testing by 30 to 40 percent."

OPTIMIZING DESIGNS TO REDUCE WEIGHT, INCREASE PAYLOAD

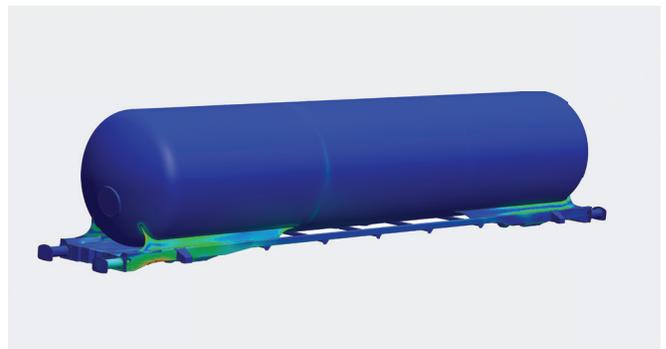
ICPV also uses SOLIDWORKS Simulation Premium to optimize rail car, freight wagon, and bogie designs for weight—to both reduce the weight of the carrier and increase its carrying capacity—resulting in material savings and adding value for customers. "SOLIDWORKS Simulation Premium software is a powerful tool for optimizing the design of our structures and staying on top in our market," Raicov stresses.

"We strive to produce the lightest, most effective conveyances for efficiently and safely transporting the greatest payloads," Raicov adds. "Using SOLIDWORKS Simulation Premium tools, we have been able to reduce the weight of our structures by 10 to 20 percent while at the same time increasing payload capacity by one to two tons."

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Astra Rail leverages SOLIDWORKS Simulation Premium software to reduce prototyping and testing cycles and optimize designs to reduce weight and increase carrying capacity, and SOLIDWORKS visualization tools to create compelling imagery of new designs.

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