RIMAC AUTOMOBILI D.O.O.
ADVANCING HIGH-PERFORMANCE ELECTRIC VEHICLE DESIGN WITH SOLIDWORKS SOLUTIONS

Using SOLIDWORKS design and simulation tools, Rimac Automobili accelerated development of the Rimac Concept One, the world's first electric hyper car.

Challenge:
Overcome technical challenges and accelerate development of electric-drives, battery technology, and next-generation vehicles to successfully grab market share in the burgeoning electric automobile and bike markets.

Solution:
Implement SOLIDWORKS Professional design software and SOLIDWORKS Premium design and analysis software solutions.

Benefits:
- Reduced expected development time by 70 percent
- Optimized chassis components for strength and weight
- Eliminated need for prototyping
- Grew company 400 percent in three years

Rimac Automobili d.o.o. develops and produces high-performance electric vehicles, drive trains, and battery systems. The company grew out of founder Mate Rimac's efforts to convert his old BMW automobile into a racing-caliber electric vehicle. As Rimac investigated electric-drive and battery technologies, he sought to improve every part of an electric vehicle, teaming up with experts from various fields in an effort to create the next generation supercar. Rimac's old BMW eventually became the Rimac Automobili e-M3, which was used as a test mule for developing the battery technologies, battery management systems, and propulsion drives that are now part of the Rimac Concept One, the world's first electric hyper car.

When the company began in 2011 as a group of multi-talented designers and engineers working in a facility near Zagreb in Croatia, it needed robust 3D design and analysis tools to support its efforts to make a truly revolutionary electric car. According to Mechanical Engineer Boris Tarnovski, the selection of a 3D design platform for developing the Concept One was obvious: SOLIDWORKS® design software.

"Most mechanical engineers in Croatia know how to use SOLIDWORKS design software because it is very common in our universities and is the most popular software for modeling mechanical parts in Croatia," Tarnovski explains. "We believe that SOLIDWORKS software not only is the easiest 3D system to use but also provides the most cost-effective solution in terms of providing the most complete set of capabilities for the price. We value the integrated stress analysis tools, which we've used to optimize the car's chassis and suspension, as well as the design visualization tools that provide high-quality graphics for presentations."

Rimac Automobili started using SOLIDWORKS Professional design software and SOLIDWORKS Premium design and analysis software during the initial stage of the Concept One development with the expectation that the solutions would help the company overcome technical challenges and accelerate development.

ACCELERATING CONCEPT ONE DEVELOPMENT
Using SOLIDWORKS design solutions, Rimac Automobili completed its first Concept One car in just six months, introducing the first electric supercar at the 2011 Frankfurt Motor Show in Germany, the world's largest automobile show and exhibition. The Concept One will be produced with a total of eight units. Four cars have already been produced, and Rimac Automobili started the development of a completely new model that will be manufactured in larger volumes and premiere in 2017. "SOLIDWORKS tools really enabled us to speed up development, cutting 70 percent from our anticipated design cycle," Tarnovski stresses.

"Most of the development team came to this project having never worked in the automotive industry," Tarnovski continues. "Although we came to electric-car design fresh—with innovative ideas and approaches—we had some nearly impossible deadlines to make. SOLIDWORKS helped us investigate new ideas quickly, sketching out rough proof of concepts, the best of which moved forward. With SOLIDWORKS, we've developed industry-leading technologies and completed development in a fraction of the time we expected."

LIGHTER PARTS, OPTIMIZED PERFORMANCE
Rimac Automobili used SOLIDWORKS Premium structural analysis tools to make components as light as possible while optimizing them for strength, particularly during development of the chassis. These capabilities allowed the car manufacturer to completely forgo time-consuming and costly prototyping cycles.

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"We used SOLIDWORKS stress analysis capabilities on various suspension and chassis components to find ways to make them lighter while still maintaining strength," Tarnovski notes. "For example, to support high performance and long range, we need lots of battery capacity, which adds weight. SOLIDWORKS Simulation tools helped us come up with a spring-loaded bracket to hold the larger battery pack and reduce the initial weight of other parts, as well as distribute the weight as much as possible. This is just one of many cases for which SOLIDWORKS Simulation capabilities let us validate performance while eliminating prototyping, resulting in a lighter, more balanced chassis and car."
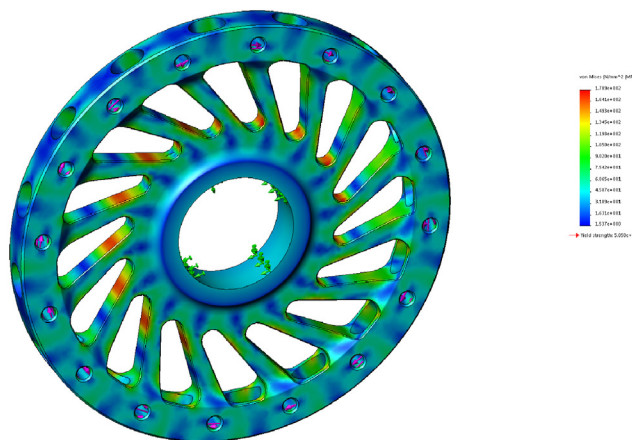
EXPANDING INTO ELECTRIC BIKES

In addition to helping Rimac Automobili create the world's first electric supercar, SOLIDWORKS solutions enabled the company to develop industry-leading technologies that resulted in other business opportunities for the young automobile manufacturer.

"In the beginning, we worked solely on the Concept One," Tarnovski says. "However, the technologies that we developed for that car, such as the use of four motors—one for each wheel—that are each controlled separately, the best car dynamics algorithms, and small power-dense battery packs— led to opportunities to develop other products, such as Greyp electric bicycles. Greyp bikes became a big hit quickly. We have delivered over 60 of them around the world and have our production capacity full for the next six months. We are succeeding—our company has grown 400 percent in three years—partly because of the speed with which we can develop products using SOLIDWORKS software."

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