START-UP SUCCESS WITH SIMULATION

AMPROVE AIMS TO UPGRADE THE HARDWARE WORLD WITH NEW DESIGN PROCESS

About the Customer

amprove, a startup in Stuttgart, Germany, employs a series of cutting-edge simulation techniques to develop high-performance parts tailored towards a variety of manufacturing methods including, but not limited to, additive manufacturing and casting. As a result, amprove generates optimized parts, which enable them to meet the performance and economic needs of customers.

> “The Altair start-up program has proven to be a great fit for amprove. Given the nature of our design process, we have greatly benefited from having an established relationship with Altair.”
>
> Rami Bedewi,
> Co-founder at amprove

LEFT: Optimized brake caliper designed for additive manufacturing, 44% reduced mass and 20% increased stiffness. **RIGHT:** Optimized brake caliper designed for casting, 25% reduced mass and 10% increased stiffness.

Before starting amprove, the three co-founders worked in automotive research and development in the area of simulation and optimization. Having had previous experience with Altair's products, the team decided to collaborate with Altair to determine the best way to reach their goal.

Their Challenge

Since their inception in February 2019, amprove has challenged themselves to provide high quality solutions to modern engineering design problems. Manifesting this goal required a paradigm shift in mentality with respect to the way structural components are designed in industry today. Rather than relying on a CAD-based design process in which marginal improvements are made through a series of manually constructed design iterations, amprove instead found a simulation-based process in which algorithmically-generated solutions are used to achieve a final design close to the mathematical optimum.

Our Solution

In order to reach their goals, amprove needed an optimization solver they could rely on to provide accurate results. Having used Altair OptiStruct™ before, they decided to reach out to Altair to pursue a potential partnership. During this process, the Altair team was pivotal in helping them join the Altair start-up program.

Having access to the Altair Inspire™ suite has also proven helpful in manifesting another key tenant of amprove's design process, which is manufacturability. Through the use of manufacturing simulation software such as Altair Inspire Cast and Altair Inspire Print 3D, amprove has been able to provide more polished solutions for their customers. Utilizing OptiStruct provided the opportunity to attain ideal designs with significant weight reductions, leading to a lower cost for amprove's customers.

With a solid foundation for their design process in place, amprove has been able to further reinvent the conventional design process especially in the area of geometry get-back. They provide a unique solution to this problem which enables them to convert their optimization models in CAD compatible files without manual construction, thus mitigating one of the most time-consuming, and therefore expensive, aspects of the standard design process.

Results

amprove has already succeeded in practical applications. They validated the merit of their design process through an industrial use case, in which they redesigned the brake caliper from a medium-sized sports car. Their process yielded two design variants, one which was optimized for maximum performance and another for high-volume production.

Both solutions, which were designed for additive manufacturing and casting respectively, provided all around increases in performance through reduced mass, increased stiffness, and overall lower stress values compared to the original design. amprove is capable of finding solutions to challenging design problems for customers in many industries.

To learn more, please visit altair.com/optistruct/