

COMPANY

Airbus APWORKS GmbH

LOCATION

Taufkirchen, Germany

SOFTWARE

Autodesk® Netfabb®

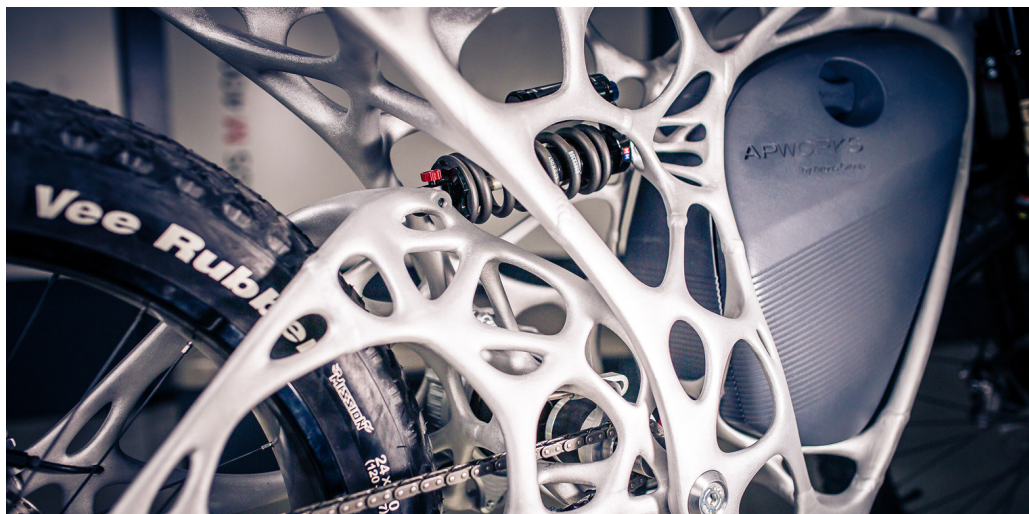
How Simulation Rewrites the Rules of 3D Printing

APWORKS saves costs for customers reducing additive manufacturing print failures with Autodesk Netfabb Simulation software.

“APWORKS was founded to take innovations in applications of additive manufacturing within aerospace to other industries. We apply our expertise end-to-end across the entire process, from design to qualified serial production.”

– Angela Grünewald

Technical Sales
Manager, APWORKS



APWORKS "Light Rider" motorcycle additively manufactured in Scalmalloy. Image © 2018 Airbus APWORKS GmbH

Making Additive Manufacturing Accessible

APWORKS, a subsidiary of Premium AEROTEC, founded in 2013 developed Scalmalloy™, a high-performance material that is as ductile as titanium and as light as aluminum. Scalmalloy was developed specifically for additive manufacturing, or 3D printing.

As a result, APWORKS now works with companies in a variety of industries, including Formula 1 racing, robotics, automotive, medical technologies, and aerospace applications, covering everything from prototyping to fully qualified production of 3D printed parts optimized for additive manufacturing.

The Challenge: Making usable parts every time

Additive manufacturing is extremely valuable to manufacturers because it can reproduce geometries that would be impossible to make any other way. Freedom of design creates opportunities to make high-performing, lightweight products as well as consolidate parts of an assembly into one component, and incorporate design features with unique

functionality. Of course, it also brings new challenges.

“The problem right now is that people want to apply additive manufacturing, but they are unfamiliar with how to create designs that are perfectly optimized for 3D printing,” said Angela Grünewald, technical sales manager for APWORKS. “Our goal is to use our design and process expertise to help them make the most of additive manufacturing.”

One challenge stems from the fact that improper designs, support structures, or process settings can result in build failures that add significant costs very quickly. Additive manufacturing is already more expensive than traditional production techniques on a per-part basis, so it is critical to avoid these failures and keep project budgets under control.

“The value for additive manufacturing is obviously quite high,” Grünewald stated. “But if you don’t find the right design for a part, you will never get something that is economically viable. Of course, this has also been the case when using any new method of production.”



Airbus bionic partition. Image courtesy of APWORKS

“By using simulation, we have minimized build failures to the point where they are extremely rare,” said Grünewald. “Every new part is simulated with Netfabb to ensure the support structures perform as needed and the process parameters will deliver a high-quality product.”

– Angela Grünewald

Technical Sales
Manager, APWORKS

The Solution: Looking to additive manufacturing simulation for insight

Simulation is a proven method of optimizing product design and print performance. It is frequently used to predict how a design will respond to actual process conditions and ensure the print meets production requirements. In the injection molding and casting industries, simulation has been extensively used to help identify potential manufacturing issues prior to investing in tooling. APWORKS is taking a similar approach by simulating the metal additive manufacturing process.

“There is a need to get parts designed for additive manufacturing and simulate whether it works within the process itself,” Grünewald said. “If you realize you’re going to have problems during printing, it’s obviously much better to make those changes up front. Simulation enables us to add a lattice structure or redesign connections to get rid of any issues earlier in the design process.”

For several years, APWORKS has relied on Autodesk Netfabb Simulation to meet these goals. Providing fully predictive analysis of powder-bed fusion processes with unique multi-scale modeling, Netfabb Simulation dramatically reduces the amount of time required to generate results.

Engineers at APWORKS start by identifying areas where there may be significant amounts of distortion, where heat may build up, or where additional supports may be needed. A process parameter (PRM) file records both material properties and machine process parameters. Then a moving heat source is applied to the material on a small-scale analysis. The PRM file stores the mechanical response of the material, which can be extrapolated to a full part.

The insights gained from the simulation then inform changes that engineers can discuss with customers to determine the relative feasibility of the changes.

“When our customers work with us on a project, we need to simulate their parts quite quickly and check where there can be any issues,” Grünewald said. “From there we can come up with support structures and design modifications that prevent such failures.”

The Result: APWORKS simulates their way to success

During the last four years, APWORKS has collaborated on countless projects with companies demanding higher performing parts with additive manufacturing. The engineers turn to Netfabb Simulation for all safety-critical components as well as any parts that are used in a final product for testing or serial production.