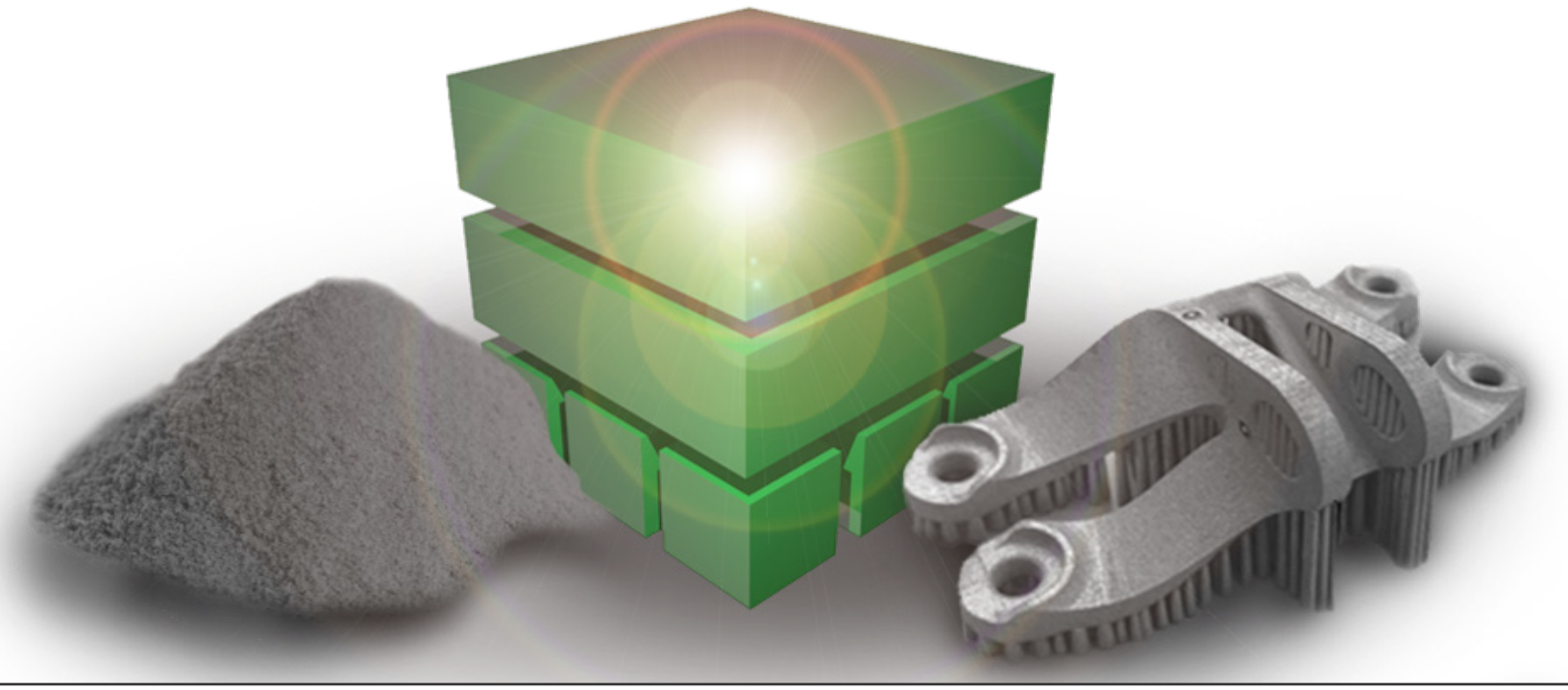

Altair
Partner Alliance
Additive Works
PARTNER SPOTLIGHT



Partner Spotlight: Additive Works

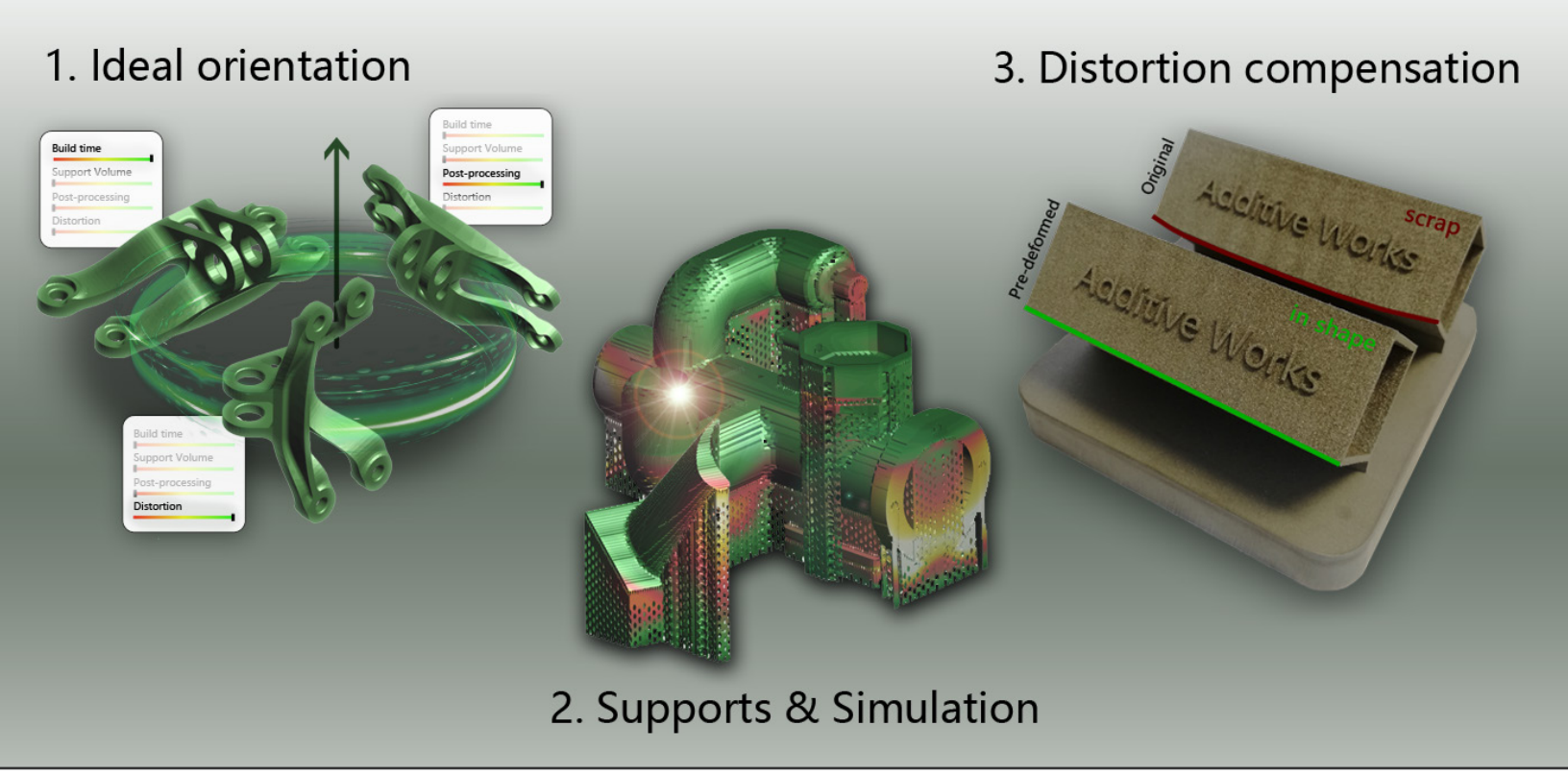
Dr. Nils Keller, CEO, discusses additive manufacturing software, Amphyon, available through the Altair Partner Alliance.

APA: What prompted the development of your software? What problem is Amphyon meant to solve?

Nils: Amphyon was created as a simulation based pre-processing tool for Laser Beam Melting (LBM) processes to close the existing gaps in the pre-processing chain. Since LBM is a very complex micro welding process, the right definition of design, build-up orientation and additional support structures require high expertise in engineering and thermo-mechanics. Amphyon connects these issues with high-end computing to achieve a first-time-right LBM process based on numerical analysis. Because of a lack of simulation tools for the simulation of entire parts, Amphyon is based on a new Finite-Element-Method solver technology that was developed with focus on computation speed for regular workstation hardware.

APA: What are the benefits of using Amphyon for additive manufacturing?

Nils: Amphyon helps the user to find the ideal build-up orientation of an AM-part within a few seconds of manual interaction based on application dependent criteria. In the next step, (with the upcoming Support module) the needed support structures will be optimized and automatically generated for reduced welding distortion and ensured process stability. Afterwards, a fast build-up simulation can be conducted to compensate residual distortions by the adjustment of the CAD data. The simulation applies an easy experimental calibration to generate quantitative results that are in accordance with the reality.



APA: Are there any unique applications that Amphyon works for that your competition cannot?

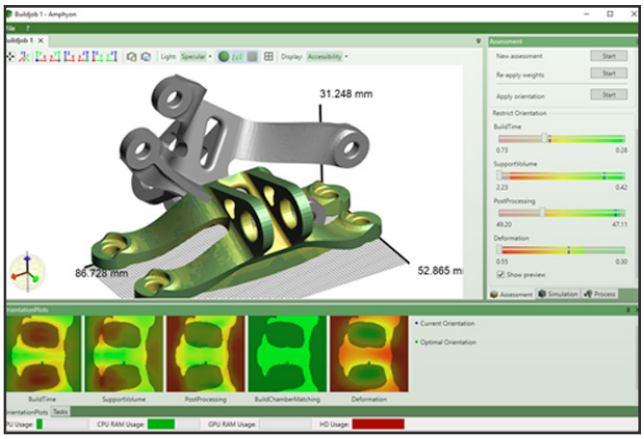
Nils: The Amphyon "Examiner" module considers and assesses all possible build-up orientations including criteria like distortion that allows the user to determine the ideal alignment depending on the user's needs. This makes it as easy as possible for find the ideal build-up orientation without any knowledge. Furthermore, the simulation module was designed to achieve computation times that are lower than the process time itself and also can be used without any background in FEM simulation. All calculations can be done on a typical CAD workstation system thanks to the usage of massive GPU parallelization. There's no extensive hardware required. Furthermore, the upcoming support module is a unique combination of automatic support-generation and physics-based optimization of this structure.

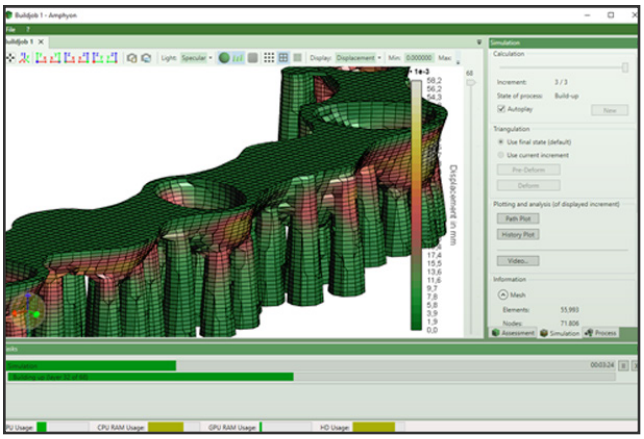
APA: How much time does it take to learn and start using your software?

Nils: The software is really easy to use and can be learned within minutes since the graphical user interface is extremely lean and there are only a few buttons to press in a regular workflow. Backgrounds of numerical models, parameters and preferences can be studied deeply by using the documentation and for that an engineering background is helpful. However, the software was designed in a way that expertise in FEM simulation as well as expertise in preparing build jobs for Laser Beam Melting is not required.

APA: What are the biggest challenges or problems that customers in your target market face and how do you address their needs?

Nils: In Laser Beam Melting it's not possible to avoid the thermal contraction and stress formation during the process. Since state-of-the-art approaches do not consider process physics but only the geometry of the part, failures during the build-up often lead to scrap parts. Thus, parts often have to be built multiple times until the result is acceptable.





With Amphyon, a pre-processing based on physics is targeted to avoid these iterations and achieve a first-time right manufacturing while increasing dimensional accuracy. This will reduce lead times as well as lower development times and costs per part significantly.

APA: Describe a typical workflow of Amphyon.

Nils: The user always starts with creating a build job and selects the machine and the material that is used. Next, parts can be imported and added to the build plate. Then, the ideal build up orientation can be calculated for each part in the "Examiner" module. In the next step, supports will be created based on a mathematical optimization together with a process simulation. Here, the stability of the process will be ensured by making sure that critical values will not be exceeded. After the definition of the build job, the process simulation will be started instead of the process itself. Based on the simulation result, the shape of the model is adapted to compensate the residual deformations. The oriented, supported and distortion compensated STL can then be exported from Amphyon and sent to the printer.

APA: What's next for Amphyon... what can we look forward to?

Nils: We're currently working on the support module and a thermal simulation module as well as many enhancements of the existing simulation.

Case Study: Automated First-time-right Support Generation for Laser Beam Melting with Additive Works' Amphyon

For more information about Amphyon, visit the solution page.