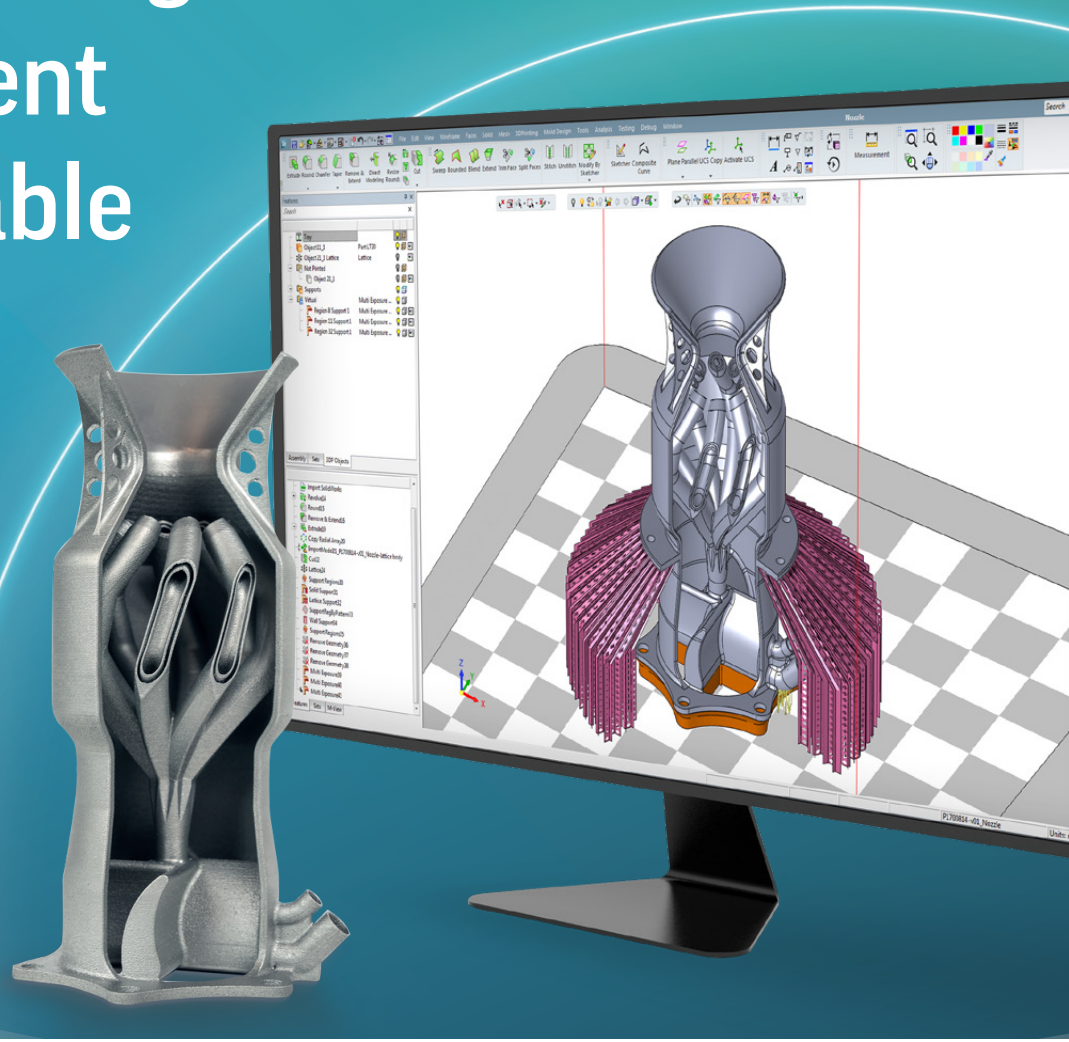
eBook

Metal Additive Manufacturing Software: A Critical Element for Successful and Profitable Metal 3D Printing



3D SYSTEMS
Additive Manufacturing Solutions

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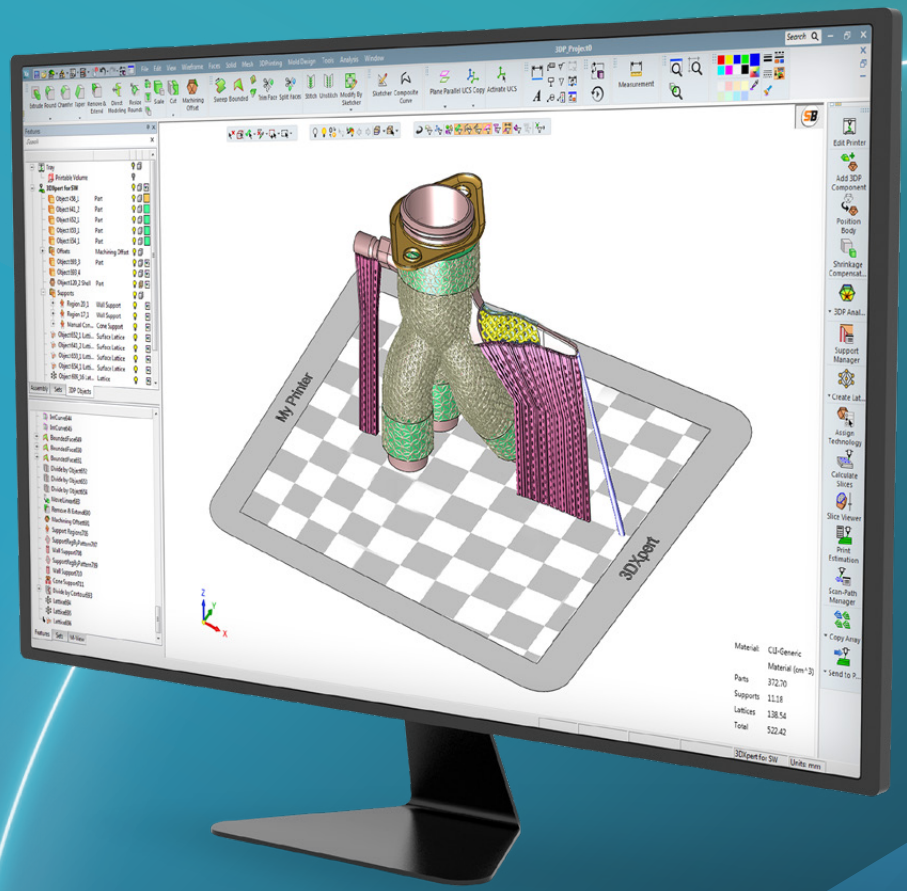


Additive Manufacturing (AM) Software - The 3D X-Factor

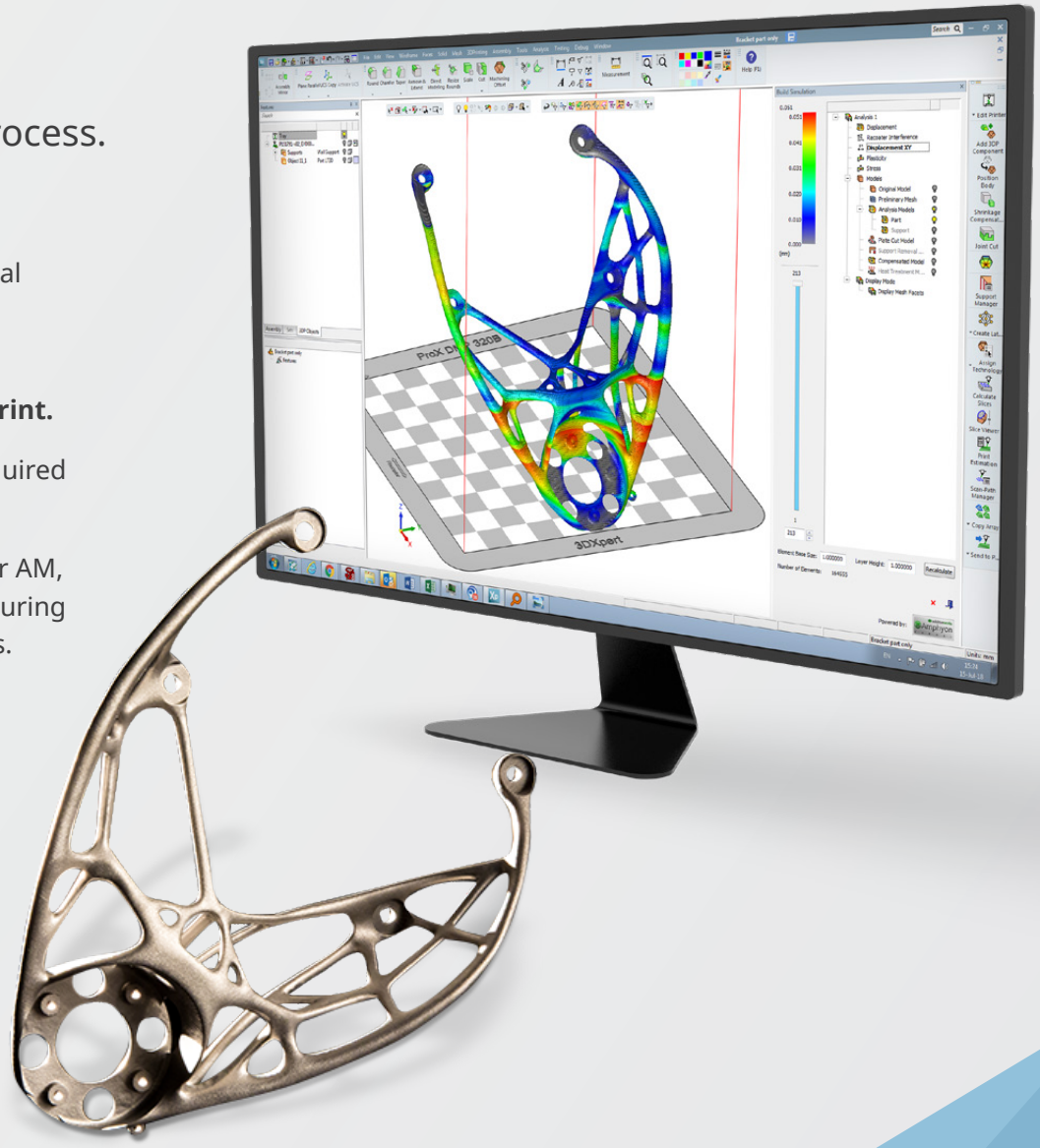
Metal 3D printing is revolutionizing the manufacturing process.

Complex shapes, enhanced functional properties and lightweighting are some of the unique benefits delivered by additive manufacturing (AM). While there is plenty of information about printing techniques, materials and hardware, a critical element is rarely mentioned: the need for an integrated software solution for metal additive manufacturing.

It takes more than a 3D CAD model and a good printer to get a successful print.

Metal AM software handles all preparation and optimization actions that are required for a printed part to meet the desired CAD model specifications.

This ebook provides an overview of the preparation and optimization process for AM, explains the importance of software to the profitability of any additive manufacturing business and suggests what to look for when researching AM software solutions.



Mind the Gap

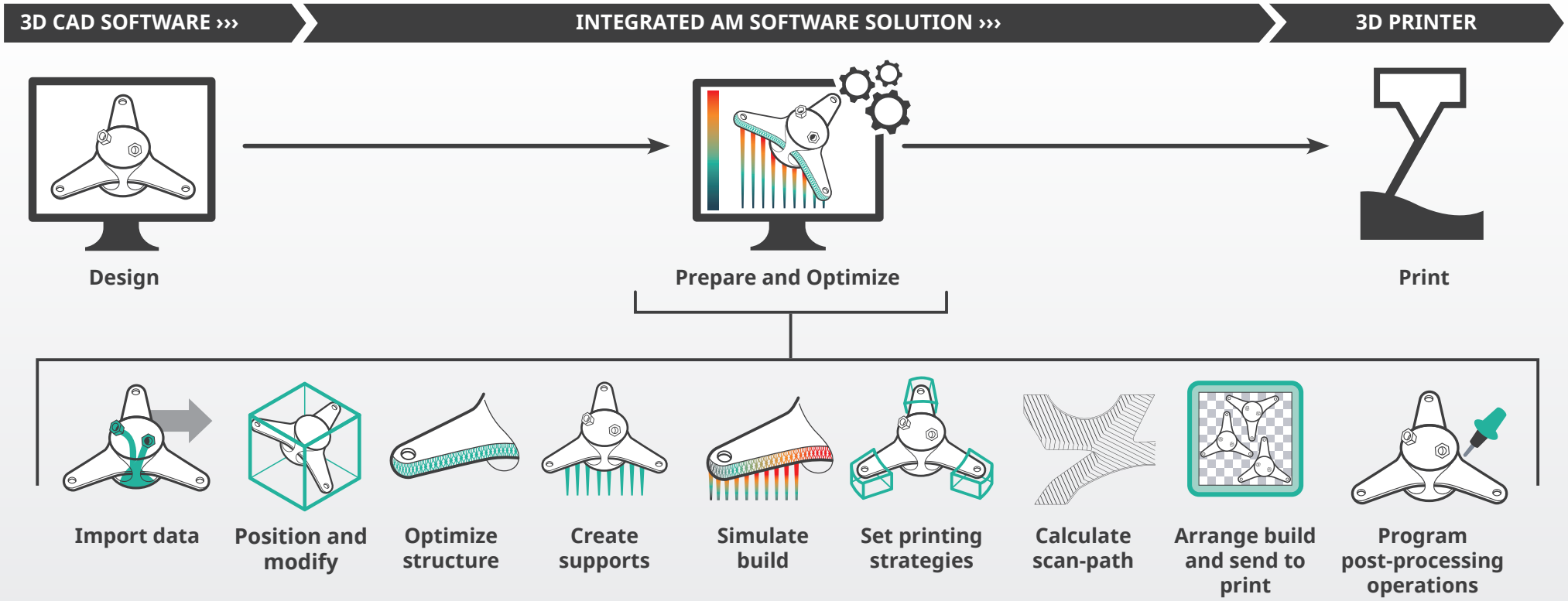
A gap exists between the 3D CAD model in design software and AM ready data that will result with successful 3D print.

CAD solutions do not include the proper tools for a file to be ready for additive manufacturing. Therefore, sending a CAD file directly to print will usually fail.

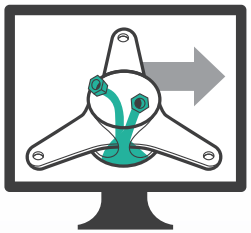
To be consistently successful with metal 3D printing, a set of preparation activities using dedicated tools is required. Without proper preparation, getting a good metal print, even with a good metal printer, can be challenging if not impossible.

AM Software – Bridging the Gap

In order to close the gap, there is a need to use dedicated Additive Manufacturing (AM) software that will optimize the model and prepare the build for print.

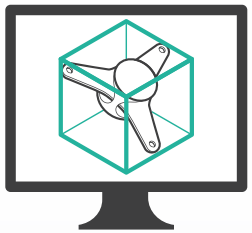


The AM Workflow – Prepare and Optimize



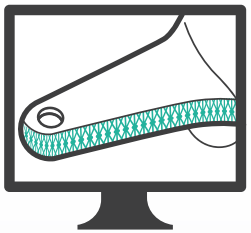
IMPORT

Use the 3D CAD model either as mesh or solid and perform printability checks. If needed, the model can be adjusted or healed to make it printable.



POSITION & MODIFY

Orient the part on the print tray for best results based on criteria like printing time, surface quality, material consumption and more. Modifications required for the manufacturing process such as adding material for post printing machinery operations can be applied to the model.

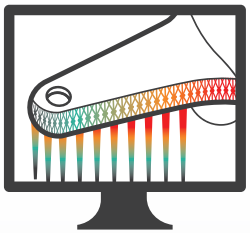


OPTIMIZE STRUCTURE

Add volume and surface lattice to reduce weight or to enhance the functional properties of the part.

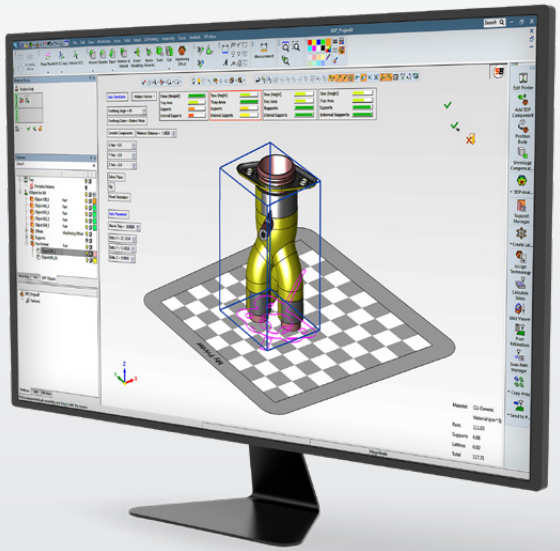
SUPPORTS

Set support structures required to eliminate deformation and build failures.

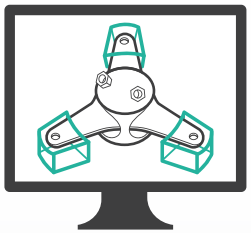


SIMULATE

Analyze the entire build process to predict failures and minimize the number of print try-outs.

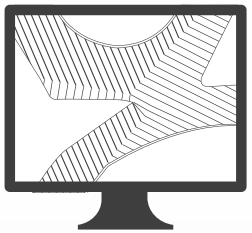


The AM Workflow – Manufacture



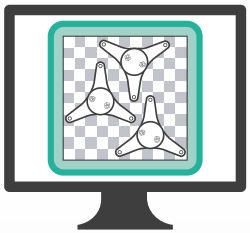
SET PRINTING STRATEGIES

Optimize printing time while maintaining desired quality by setting different printing strategies to different areas of the part.



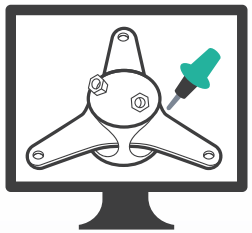
CALCULATE SCAN PATH

Divide the part to virtual slices and calculate the exact path of the printing heads for each slice to ensure quality and repeatability.



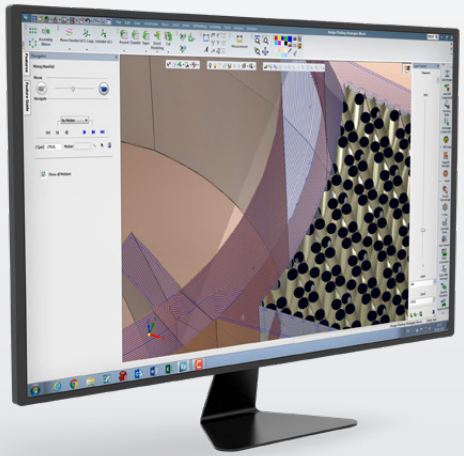
ARRANGE BUILD PLATE

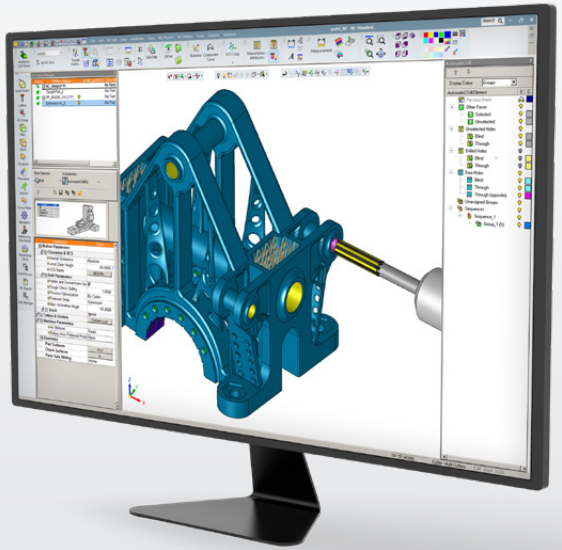
Position multiple parts on the tray for best utilization of printer resources and send to print.



POST PROCESSING

Finalize part manufacturing: remove supports, machine high-quality surface areas and drill, tap or ream holes.



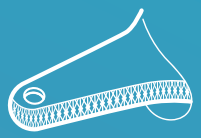


AM Software Objectives

AM software has four main objectives with regard to the additive manufacturing process:

ENABLE SUCCESSFUL PRINTS

Perform all required preparation work for additive manufacturing, e.g. set correct orientation, modify for printability, create supports



OPTIMIZE DESIGN

Get the most out of additive manufacturing, e.g. reduce weight, enhance functional properties and more

MINIMIZE DESIGN TO MANUFACTURING LEAD-TIME

Streamline preparation and optimization workflow

REDUCE TOTAL COST OF OPERATIONS

Minimize printing time, material consumption and post-processing labor

Not All AM Software Solutions are Equal

AM software solutions in the market today fall into two main categories: **independent AM software solutions** and **integrated AM software solutions**.

VS

INDEPENDENT AM SOFTWARE SOLUTIONS

INTEGRATED AM SOFTWARE SOLUTIONS

Independent AM Software Solutions

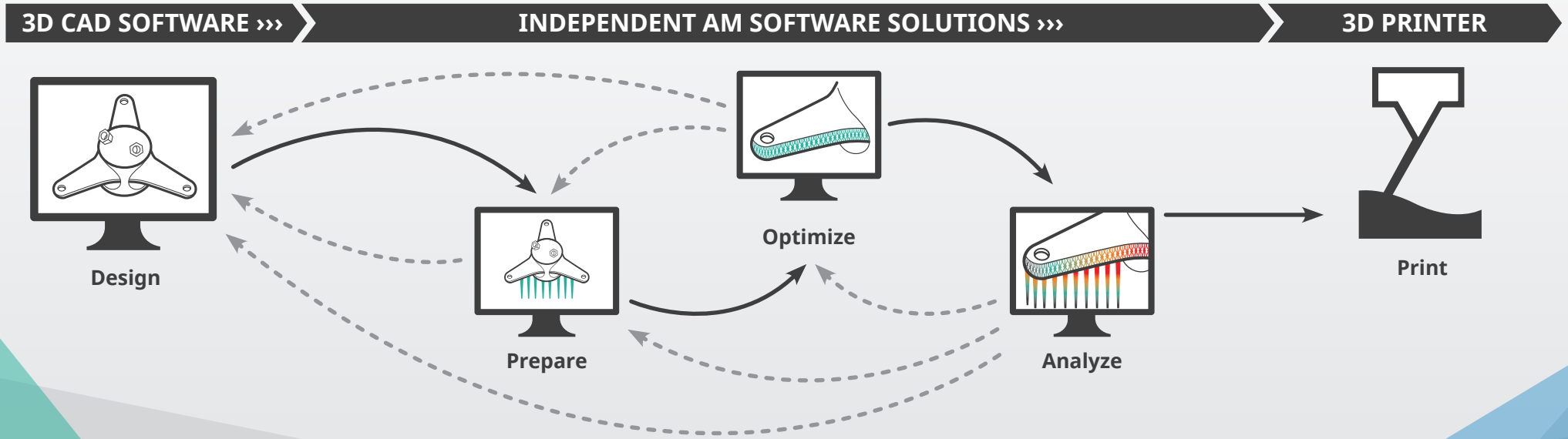
Preparation and optimization for the AM process is a set of separate steps. Independent AM software solutions describe products that each handle a different part of the AM process and require the use of additional products for a complete workflow.

The AM workflow is not unidirectional. In addition to modifications applied during the early stages of design, it may be necessary to go back and alter some settings to make the model printable at a later stage in the process.

For example, simulation results may indicate a build failure which requires a change of support structure or orientation, which in turn may affect the lattice structure. Beyond changes related to printing considerations, the customer may at any point initiate an Engineering Change Order (ECO) which requires smoothly integrating a geometric change throughout the existing design.

Therefore, a good AM solution should handle not only all the various steps but also efficiently handle the interaction between them. When using independent AM software solutions, this interaction is anything but efficient. The cumbersome, iterative process involving multiple software solutions, different environments and file formats, is time-intensive and error prone, due to multiple data transfers and conversions.

While using multiple software may be acceptable at the early stages of prototyping or experimenting with additive manufacturing, this approach does not enable the use of additive manufacturing as a mainstream manufacturing technique.



Integrated AM Software Solutions

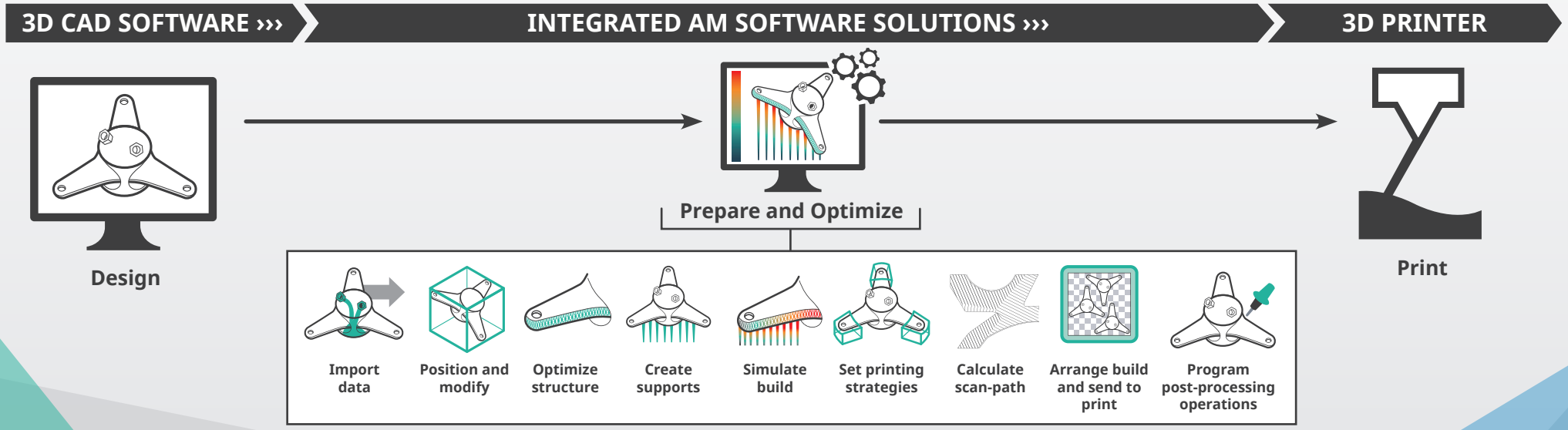
An integrated AM software solution is a single software solution handling the entire AM workflow with smooth interaction between each function of the process.

A streamlined workflow provided by an integrated AM software plays a key role in optimizing the Total Cost of Operations (TCO) for AM and is therefore critical to manufacturers' profitability.

As changes to the CAD model can be required at any stage during the AM process, ease of interaction between each function of the workflow is critical.

The following examples highlight the importance of an integrated solution:

- Having analysis and simulation as part of the design environment allows for easy identification of problems and offers the chance to make required changes to the model, optimizing an otherwise time consuming process.
- Changing a hole diameter or part orientation and having lattice structures adjusted automatically.
- A customer initiated change order that requires the system to update all design processes accordingly. Smooth integration of a geometric change is made easy by a parametric history based system.



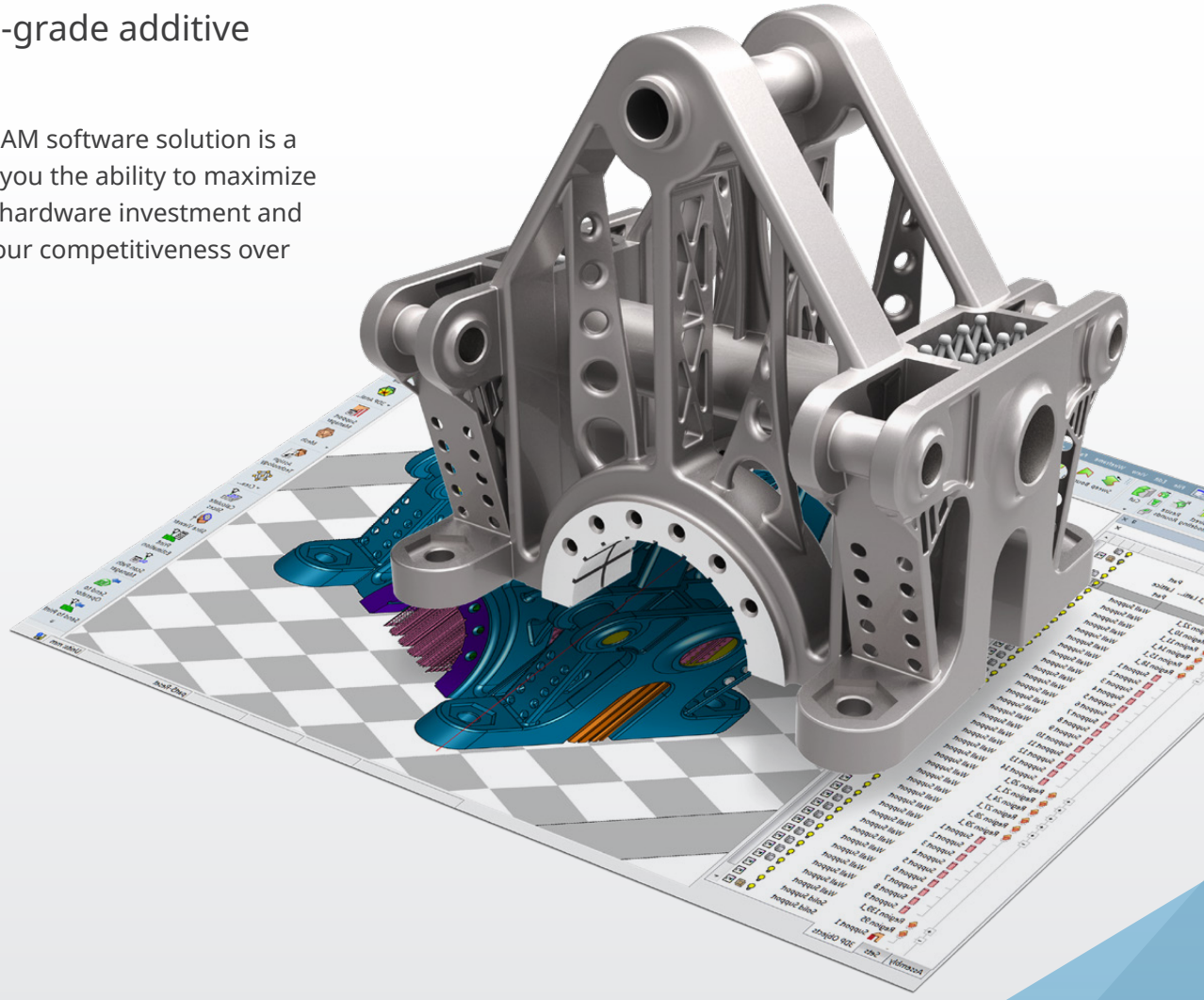
Discover Your Competitive Edge

A streamlined AM workflow shortens design-to-manufacturing lead-time and allows you to integrate production-grade additive manufacturing in your business.

Discovering and maintaining a competitive edge in a tough marketplace is key to long-term profitability. Adopting a streamlined AM workflow can make the difference between keeping your edge and losing out to your competition.

Productivity is the critical factor in achieving a fast return on your additive manufacturing investment and improving business profitability. A streamlined AM process will help you reduce your lead-time, so you can meet the most demanding customer deadlines, and win new customers. Errors due to multiple data transfer operations can be avoided, therefore reducing your bottom line costs such as operational expenses, printing time and material consumption, while faster time to market will improve your top line revenues.

Choosing the right AM software solution is a decision that gives you the ability to maximize return on your AM hardware investment and positively impact your competitiveness over the long-term.



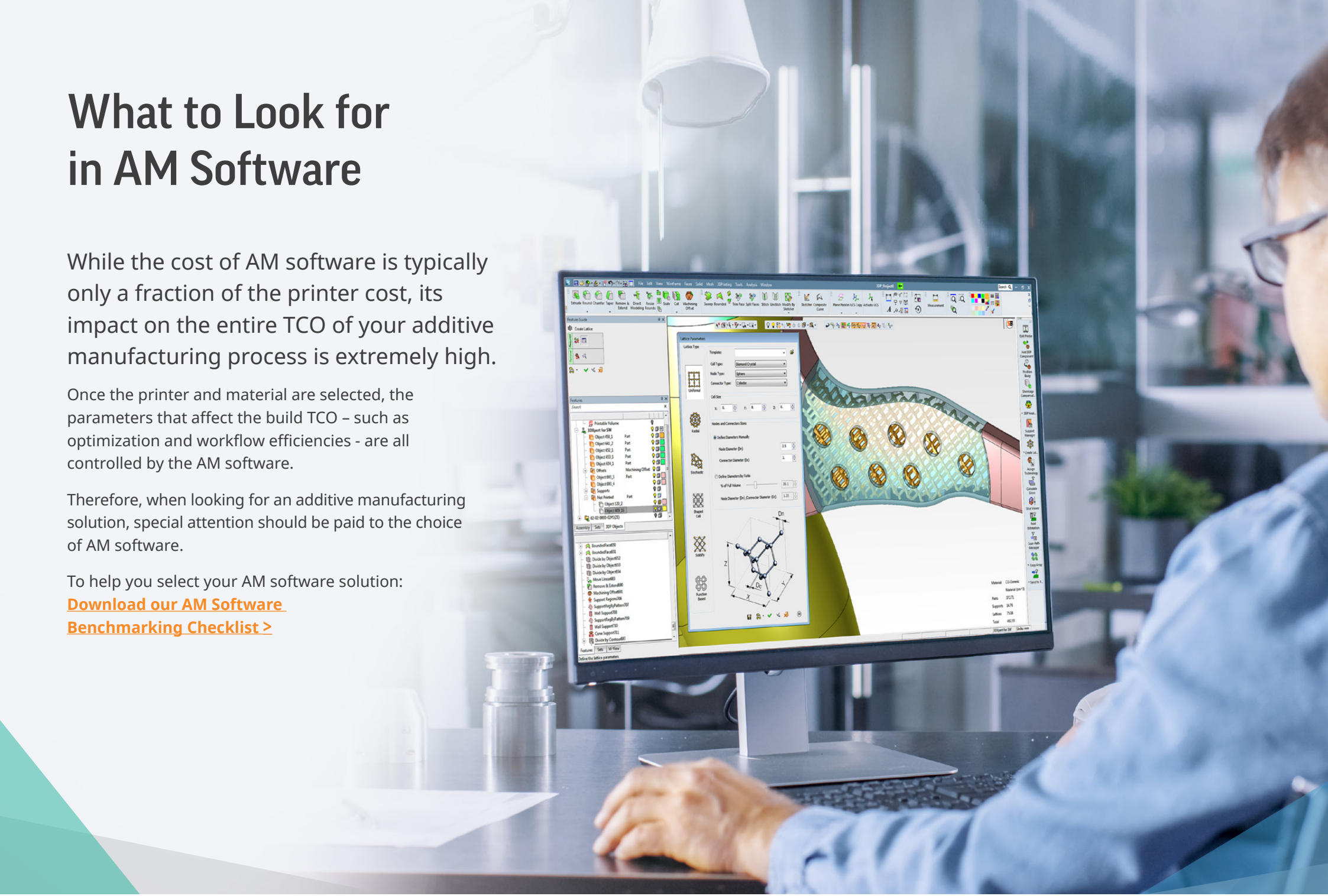
What to Look for in AM Software

While the cost of AM software is typically only a fraction of the printer cost, its impact on the entire TCO of your additive manufacturing process is extremely high.

Once the printer and material are selected, the parameters that affect the build TCO – such as optimization and workflow efficiencies - are all controlled by the AM software.

Therefore, when looking for an additive manufacturing solution, special attention should be paid to the choice of AM software.

To help you select your AM software solution:
Download our AM Software Benchmarking Checklist >



What to Look for in an AM Software Vendor

One word: expertise.

An AM software solution has to incorporate deep know-how in multiple disciplines like CAD, analysis, printing and post-processing. There is a clear advantage to AM software developed and supported by vendors who have in-house expertise in all aspects of 3D printing, including daily practical experience of providing design and printing services to customers as well as manufacturing the printers themselves.

While there are unique advantages to using an AM software and printer from the same vendor, it is not necessary that the two be packaged together. An integrated software solution that is compatible across printers can be highly beneficial.

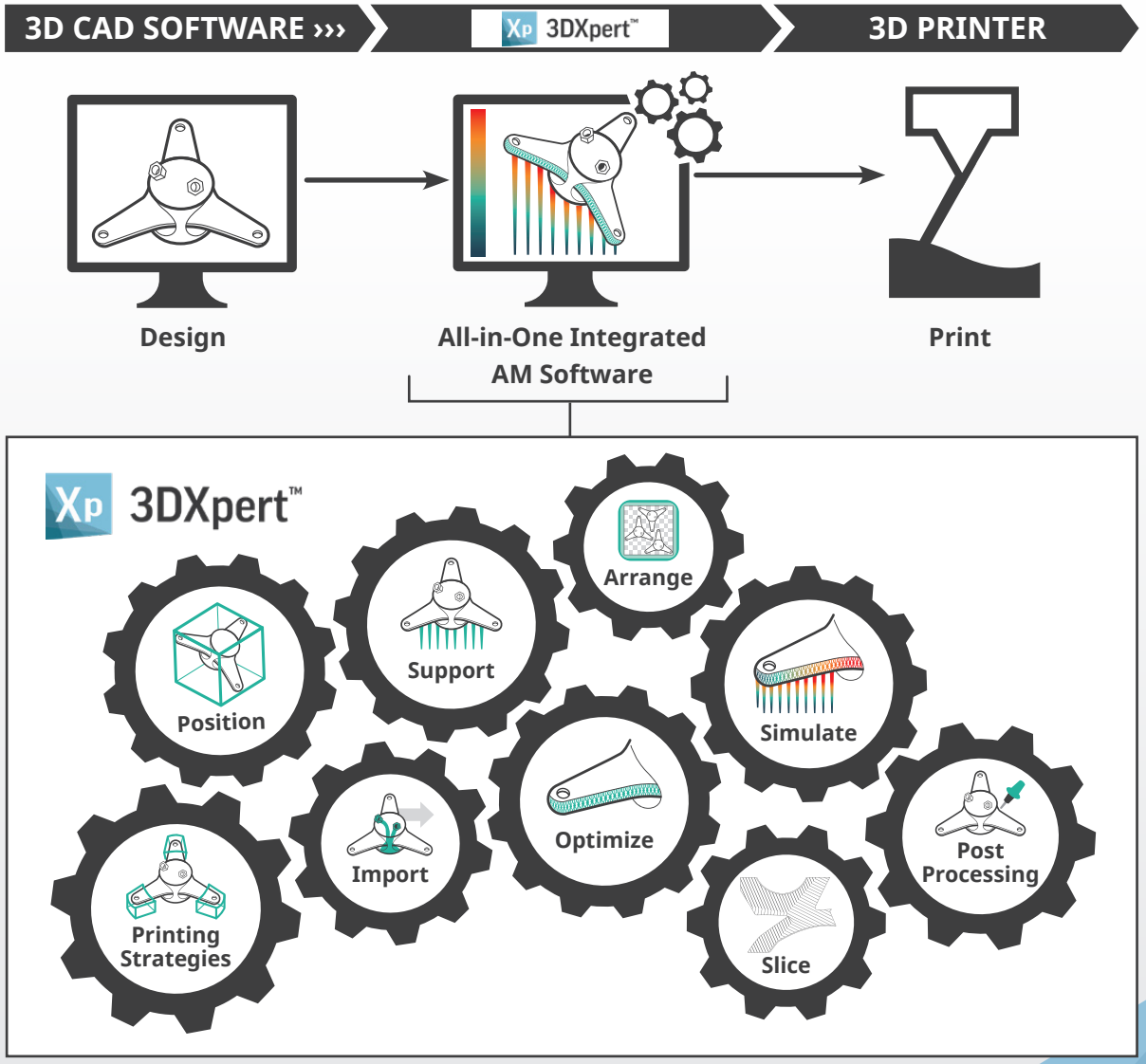
3DXpert™

The all-in-one integrated AM software from 3D Systems.

3DXpert is a single, integrated solution for the entire metal additive manufacturing process from preparing, optimizing and simulating the design before sending to print through to programing post-processing operations after printing.

Moreover, 3DXpert provides a complete solution that is greater than the sum of its parts. Not only does it combine all design, simulation and optimization tools under the same roof, but it provides a fully streamlined workflow by using the same environment throughout the entire process.

Looking at the future of metal additive manufacturing, the streamlined workflow offered by 3DXpert is a key component in successful production-grade metal 3D printing, reducing risk, driving productivity and delivering reductions in TCO for your metal additive production.



CUSTOMER STORY

Metal Technology Inc.

Oregon-based Metal Technology (MTI) has over 40 years of experience in metal manufacturing and has garnered a strong reputation among its clients due to its wide range of capabilities and high quality outputs.

Always looking for a new edge, MTI was eager to incorporate 3DXpert™ software – the industry's first comprehensive solution for metal additive manufacturing.

"We went from using at least three different software systems to get the final product to doing it all with one," said Jason Stitzel, Director of Engineering, MTI. "3DXpert gives us all the tools we need to produce geometries and files that our 3D printers can understand and use in production in a single package."

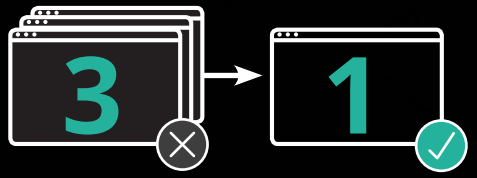
Beyond the efficiency of working with a single software package, 3DXpert's patent pending 3D Zoning capability has enabled MTI to increase productivity by 40%.

3DXpert can reduce file processing time by as much as 75%, which was quick to make a difference at MTI. "Before we used 3DXpert, running a complicated part through a slicing engine took close to 20 hours to process, slice, run the parameters and create a build file. With 3DXpert, we could do the same build in just four hours. Now we can receive files on a Friday and get them started over the weekend rather than delay to the following week. With our previous workflow, that just couldn't happen."

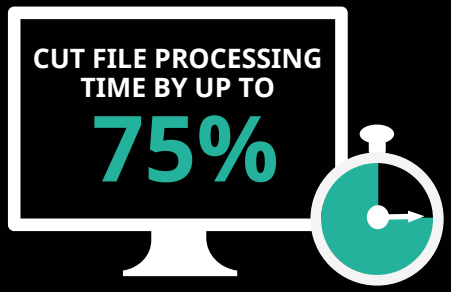
Read the full story here ›

40%

INCREASE IN PRODUCTIVITY



FROM THREE DIFFERENT SOFTWARE SYSTEMS TO ONE



“**3DXpert is a Game Changer!**

It simplifies our workflow and eliminates the need to work with multiple systems. The ability to work on a CAD geometry was one the main benefits we identified immediately. We can now handle large models without the need to convert them to STL and have the freedom to quickly design the supports to meet our specific requirements for additive manufacturing. In addition, having full control over the printing parameters with the ability to develop our own printing strategies will take our productivity to a new level.”

- Mike McLean, 3D Printed Parts, Scarlett Inc.

What's Next?

Interested in learning more about 3DXpert Additive Manufacturing software?

Arrange your free trial today.

Contact us

3D SYSTEMS
Additive Manufacturing Solutions