Ansys + 3DPC

"Without the Ansys Startup Program, we wouldn't have taken the steps to explore all the different module offerings from Ansys. Some of them have had unexpected benefits to different parts of our process. So, that broad look into Ansys' offerings helped us discover new ways to add value to our existing business. Some of the best outcomes have been winning new clients when we show them the model results. Decreasing our time to sale by integrating Ansys' results and winning customers we otherwise would not has resulted in a very positive ROI for the business."

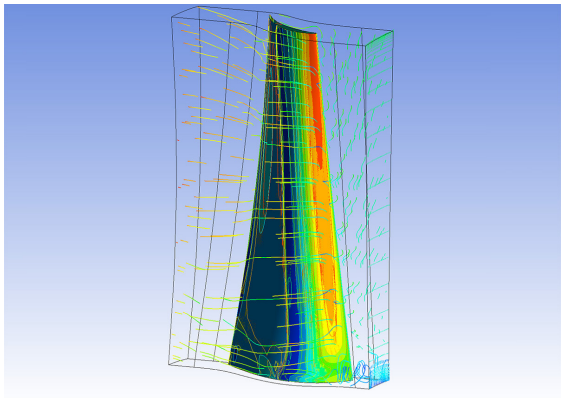
— **Alexander De Vore**
CEO / 3D Printing Corporation, K.K.

CASE STUDY

3D Printing Corporation Optimizes Additive Manufacturing Services Using Ansys' Multiphysics Simulation

3D Printing Corporation, K.K. (3DPC), based in Japan, helps manufacturers develop alternative supply chains by providing a one-stop shop for strategic 3D printing services. Inspired to secure supply chains and prepare manufacturers for unexpected disruptions, 3DPC equips manufacturers with additive manufacturing (AM) parts and services to optimize and digitalize their workflows. 3DPC works with various industries and markets, from toy companies to space stations.

With affordable access to Ansys' multiphysics simulation tools through the Ansys Startup Program, 3DPC ensures the accuracy and durability of 3D printed parts and materials through engineering analyses to predict and verify dynamics, including structural integrity, thermal issues, fluid flow, and impact.



Designers at 3DPC use Ansys Fluent to analyze the fluid flow surrounding a centrifugal airfoil

Challenges

3DPC works with a wide range of materials, including resins, metals, and composites. Predicting deformation is essential in AM to build parts successfully, keep costs down, and avoid mass printing errors. 3DPC uses Ansys' multiphysics simulation tools to analyze and predict thermal deformation in advance and modify parameters. It is also important to balance the strength and weight of parts. Clients seek strong parts, but also require them to be lightweight. 3DPC approaches this using a fused deposition modeling (FDM) method and integrates Ansys' tools to optimize the process and achieve better results.

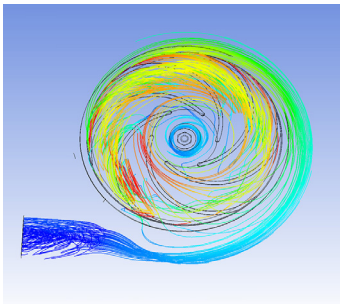
3DPC uses Ansys' simulation tools during additive manufacturing to enhance part quality, such as the 3D printed cushioning in this helmet

Ansys Products Used

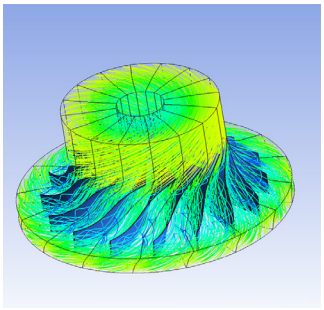
- Ansys Mechanical
- Ansys LS-DYNA
- Ansys Additive Suite
- Ansys Fluent
- Ansys Discovery

Engineering Solution

To improve the strength and weight of existing parts, 3DPC enhances the FDM method by using Ansys Mechanical and applied topology optimization to reduce part weight while maintaining strength. The team evaluates strength considering the anisotropy of the FDM method and applies this to the topology-optimized model. In one example using this approach, 3DPC successfully reduced weight by 20% without reducing strength. The team accomplished this using Ansys' simulation capabilities to repeatedly change settings and parameters such as boundary conditions. For thermal analyses, 3DPC integrates Ansys Fluent to evaluate heat exchange efficiency and Ansys Additive Suite to predict thermal deformation using a powder bed fusion (PBF) method. Additionally, 3DPC evaluates the shock absorption performance of elastomer materials using Ansys LS-DYNA and analyzes mesh data with Ansys Discovery.



Ansys Fluent simulation of the fluid flow around a centrifugal pump



Ansys Fluent simulation of the fluid flow around a centrifugal pump impeller

With critical insights from Ansys simulation, 3DPC can detect possible defects, including porosity in metal, which is often caused when air is trapped during processing

Benefits

- By using Ansys' tools, 3DPC reduces part weight (up to 20% in one example) and reduces material costs by using less material.
- 3DPC produces higher quality parts and services by applying Ansys' multiphysics analyses and critical insights.
- Ansys' fast simulation results enable 3DPC to reduce time of sale, accelerate production processes, and secure new customers, increasing its return on investment (ROI).
- Ansys simulation helps 3DPC quantify the hardness and/or softness of AM parts such as lattice cushions to improve parts and present stronger proposals to clients with the ability to illustrate part characteristics using simulation.

Company Description

Established in 2016, 3D Printing Corporation, K.K. (3DPC) is an American-owned 3D printing solution provider operating from Yokohama, Japan. Driven to help manufacturers digitalize supply chains, 3DPC offers four main services: design engineering, including a wide-range of AM technologies such as PBF and fused filament fabrication (FFF); manufacturing via in-house equipment at 3DPC's Japan factory; hardware integration consulting; and a digital platform where customers can place and track orders electronically.

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