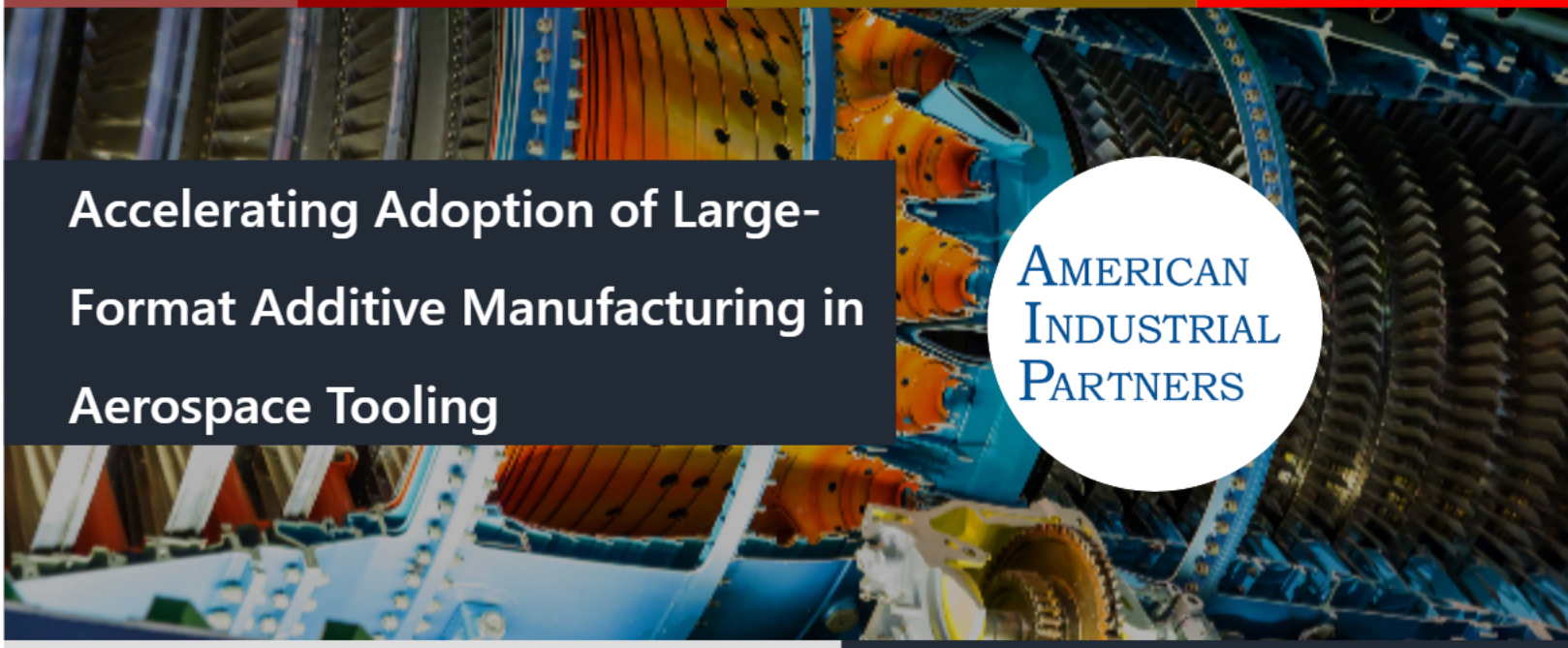
Operations | Aerospace and defense | Product design and testing | Linear / Non-Linear



Accelerating Adoption of Large-Format Additive Manufacturing in Aerospace Tooling

American Industrial Partners

BUSINESS PROBLEM

A recent investment by Ascent Aerospace in Large-Format Additive Manufacturing (LFAM) is faced with a deteriorating commercial aerospace tooling market exacerbated by the COVID-19 pandemic. The company must grow its internal knowledgebase and address the customer education gap regarding 3d-printed technology in order to make additively manufactured tools a viable product line for the business.

APPROACH

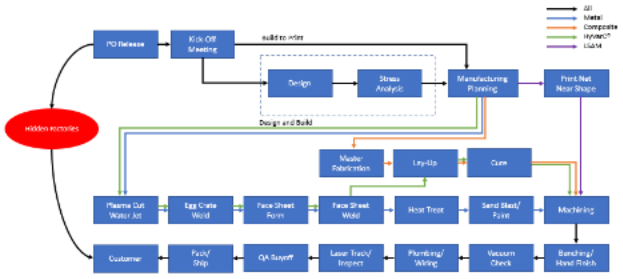
Work with the stress engineering team to build out a Finite Element Model (FEM) procedure to better characterize the thermal response of anisotropic printed materials that will expand the product offering that the machine can serve. Additionally, map the process flow and revamp the "design for additive" guidelines to ensure our processes are repeatable and robust.

DATA SOURCES

Data sources include past sales data from an internally developed quoting database, design guidelines created by the LSAM team and design engineers, and process flow maps developed by Ascent. Data was generated from testing and modeling internally as well.

Data Types and Format

Tables. Photos. PowerPoint slides.



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IMPACT

Successful implementation of the aforementioned approaches would raise the Overall Equipment Effectiveness (OEE) through increased capacitization of the machine. Additively manufactured tools take many hours—days, even—to print, so it is important that a steady stream of workflow is available to feed the Large-Scale Additive Manufacturing Machine (LSAM). When the commercial aerospace tooling market bounces back from its trough, having a wide "menu" of materials available and streamlined procedures will make the LSAM more competitive in securing revenue-generating work for Ascent.

DRIVERS	**Customer barriers to new technology adoption in the industry and the need to increase sales to justify the significant upfront investment cost were the driving forces of this project.**
BARRIERS	**Barriers included a lack of industry-wide knowledge for this nascent technology and competing business priorities.**
ENABLERS	**The immediate team is aligned with the intended outcome of this project.**
ACTIONS	**FEM techniques were used alongside physical validation tests to compare the models' predictive power against measured results. An alternate build process was also ideated and compared against historical production data to show forward-looking savings on tools built with the alternate build process.**
INNOVATION	**FEM and hybrid tooling structures are known, time-tested solutions, but applying them to large fused deposition modeling printed parts is a novel concept for the company and aerospace tooling.**
IMPROVEMENT	**The FEM techniques outlined make printed parts a compelling solution for autoclaved cure tools and the alternate build process can reduce the cost profile of printed parts by roughly 20%.**
BEST PRACTICES	**Use existing FEM methods available in software platforms to account for anisotropy in 3d printed thermoplastics.**
OTHER APPLICATIONS	**The FEM techniques and build process outlined in the solution are applicable to other tooling market segments including automotive, wind energy, and marine markets.**