

Factory of the Future: A New Look at Manufacturing

Josh Angel, Vice President, Digital Transformation Industries and Real Estate, Siemens Advanta
Ivan Madera, CEO, Morf3D

KEY TAKEAWAYS

- Industrialized and additive manufacturing enables firms to reinvent products, processes, and their businesses.
- Morf3D has partnered with Siemens Advanta to construct a future-proof factory.
- To increase manufacturing flexibility, Morf3D is certifying and qualifying its production system, rather than parts.
- When deploying an additive manufacturing strategy, digital twins can play a central role.
- Successful additive manufacturing implementations require a personalized approach and a focus on change management.
- Looking ahead, partnerships and ecosystems will be crucial for scaling additive manufacturing.

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OVERVIEW

It is a critical time for manufacturers to strengthen their operations and support the economy. With today's labor shortages and supply chain issues, many manufacturers are accelerating adoption of emerging technologies to reach their business goals. Additive manufacturing (AM) has become an important digital, ecological, and increasingly cost-competitive alternative to traditional production technologies.

To deploy a scalable, sustainable, and future-proof additive manufacturing capability, leading manufacturers are partnering with experts like Siemens Advanta to provide best-in-breed expertise. An ecosystem approach is essential for long-term success.

CONTEXT

Josh Angel and Ivan Madera discussed different manufacturing approaches—including additive manufacturing—that support product innovation, reduce inventory, avoid downtime, and cut waste.

KEY TAKEAWAYS

Industrialized and additive manufacturing enables firms to reinvent products, processes, and their businesses.

To realize the full potential of industrial manufacturing and emerging technologies, companies must think about three domains:

1. **Reimagining products.** Digital twins enable manufacturers to create innovative forms using conventional manufacturing methods.
2. **Reinventing manufacturing processes.** This is possible using a digital twin of production and performance.
3. **Rethinking business.** Additive manufacturing supports flexible, fast, efficient production. It is ideal for custom batch production ranging from a single unit to thousands of units.

Additive manufacturing delivers ROI in several ways. Opportunities exist to reduce costs and improve process productivity up to 80%. Process steps can be reduced by upward of 80%, leading to shorter development time and faster time to market. Many companies experience a 50% reduction in lead times due to optimized material and information flows. Another benefit of additive manufacturing is improved sustainability. With this technology, manufacturers can reduce greenhouse gas emissions by up to 30% by eliminating transport and reducing product weight.

Morf3D has partnered with Siemens Advanta to construct a future-proof factory.

Based on 20 years of consulting experience in supply chain and manufacturing, Ivan Madera founded Morf3D to take advantage of additive manufacturing technologies and to enable an industry. The company creates flight hardware and parts for critical applications that couldn't be easily manufactured in the past.

Morf3D has an existing factory in El Segundo, California, and it wanted to build a new digital manufacturing center in Long Beach that would support additive manufacturing technologies. This new location represents the future of their business, so in early 2021 Morf3D decided to partner with Siemens Advanta to address the challenges of designing a future-proof factory.

Key questions that Siemens Advanta has helped to answer include optimal material flows, the ideal factory layout, how digital twins can validate investment in 3D manufacturing, and more.

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Morf3D is leveraging advanced design and simulation software from Siemens Digital Industries to develop, scale, and identify bottlenecks in advance of production. In addition, Siemens has helped Morf3D think about efficiently relocating from one facility to the next, while reducing relocation risks.

We engaged with Morf3D in a holistic way that took into consideration the digital factory planning process. We looked at logistics, process, and cost efficiencies, and designed around environmental health and safety requirements that the company faced.

Josh Angel, Siemens Advanta

To increase manufacturing flexibility, Morf3D is certifying and qualifying its production system, rather than parts.

Morf3D's customers have highly variable requirements. Their parts have different levels of complexity, are made of different materials, and are in different stages of the production life cycle. As a result, Morf3D's manufacturing footprint must be flexible enough to accommodate these conditions.

To future-proof its new facility, Morf3D has decided to certify and qualify the production system, rather than certifying and qualifying parts. The company transformed part production through deployment of high-productivity work cells that can produce many different geometries. In addition, Morf3D engineered a new one-to-four powder management solution, so one powder container can be used with four different cells. It is also looking at shared modules for automation, so one machine or work cell can generate the highest levels of output.

To scale this approach, Morf3D is working with Siemens Advanta to create a digital twin of the factory. As Morf3D collects data, it gains insight into the constraints of the operation and of certain processes. By running simulations, it can see the impact of varying constraints. Currently, Morf3D is tackling a project that is scaling from a couple hundred parts this year to 1,000 parts next year and 2,000 the year after that.

We need the utmost levels of flexibility. As we move forward, future-proofing requires a whole different view of the world. In collaboration with Siemens and other partners, we're tackling the challenge at the root and identifying ways where we can integrate seamlessly and scale.

Ivan Madera, Morf3D

When deploying an additive manufacturing strategy, digital twins can play a central role.

When developing an additive manufacturing approach, four considerations are very important: strategy, design, the factory, and finance. Digital twins are important for both the design and the factory.

From a design perspective, digital twins can be used to identify the most promising candidates for additive manufacturing and to maximize their impact to the business. It is possible to simulate changes with the digital twin and then implement processes for manufacturability.

The factory piece is where companies leverage digital twins to exploit the full potential of the digitalization plan. The digital twin can be used in conjunction with performance KPIs, like reducing lead times, design costs, and planning costs.

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For Morf3D's digital twins, Siemens Advanta worked closely with the team to collaboratively plan and design the digital layout in the software and then simulate material flows and actual processes. The closed loop nature of digital twins is very important, since continuous feedback is critical to success.

Successful additive manufacturing implementations require a personalized approach and a focus on change management.

Every manufacturer is unique, so the journey to additive manufacturing requires a personalized approach. Siemens Advanta uses a structured process that identifies where additive can deliver impact to the business. With its advanced manufacturing network and extensive expertise, Siemens Advanta creates unique solutions for different clients that meet each organization's specific needs and utilize best-of-breed capabilities from the network.

Outside of technology, change management is perhaps the most important pillar in a journey to additive manufacturing. By focusing heavily on change management, Siemens Advanta helps customers create quick wins, prove the value of additive manufacturing, and ensure success.

Additive manufacturing has great benefits, but it also has great challenges. Adding machines and capabilities alone won't solve the problems. We have to fundamentally look at things very differently.

Ivan Madera, Morf3D

A holistic approach to additive manufacturing including change management is critical to realizing the full potential of these technologies for companies like Morf3D. As Ivan Madera noted, human capital is an area that organizations often ignore when they scale. Operators need training, for example, to support repeatable processes.

Looking ahead, partnerships and ecosystems will be crucial for scaling additive manufacturing.

In the coming years, manufacturers must be prepared with facilities or plans that will enable the future of additive manufacturing. Partnerships will be key. Morf3D's Applied Digital Manufacturing Center, for example, is a consortium of partners with one focus: industrializing additive manufacturing. It brings together the best minds in the industry, including Siemens Advanta and equipment and process manufacturers. With everyone at the table, it will be possible to transform the industry.

In additive, we're accelerating around the idea of an ecosystem to solve challenges together. Siemens' Charlotte Advanced Technology Collaboration Hub is an important piece of that. We are looking toward the ecosystem to partner and bring the best of breed.

Josh Angel, Siemens Advanta

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BIOGRAPHIES

Josh Angel

Vice President, Digital Transformation Industries and Real Estate, Siemens Advanta

Josh graduated from Azusa Pacific University in 2005 with a BS in Marketing and Management. He has since spent more than 13 years managing profit and loss, business development, account management, strategy, and sales operations. Having launched his career at Siemens in 2008, Josh has served in Channel Management, Product Management, Sales Operations, Business Development and Sales, Business Unit Leadership and most recently Head of Strategy.

Ivan Madera

CEO, Morf3D

A change-maker in the Additive Manufacturing industry, Ivan Madera's experience as an entrepreneur and executive leads him to invest in innovation. As the founder and CEO of Morf3D Inc – a thriving AM start-up within the fast-paced aerospace industry created in 2015– Ivan's vision extends beyond Morf3D's increasing footprint in Los Angeles. His company's products have landed on the moon, orbited the earth, and strengthened the designs of customers like Boeing, Raytheon, Northrup Grumman and Collins Aerospace. Their unrivaled value begins with skilled engineering design and expert production then ends with strong, dependable customer communication.

Morf3D's success originates with Ivan's core values developed over his more than 20 years of experience as a management consulting executive. He believes in empowerment, consistency, strategic visioning, and leading leaders in complex endeavors. Ivan has a keen ability to convey complex ideas in beautifully simple ways, exceling at laying out a vision, and creating purposeful and meaningful partnerships that deliver win-win outcomes.

Just as additive parts are built layer-by-layer, transforming from nothing into effective and impressive structures, Ivan's career has been shaped by his desire for growth. Ivan's raised the bar for himself and his colleagues time and again, passionate about leaving a legacy of dynamic improvement.