REVOLUTIONIZING READINESS

A white paper outlining the value of hybrid manufacturing in remote operations and available product solutions

Abstract

The availability of repair or replacement parts for equipment remains a critical need for remote operations in military and defense, mining, oil and gas, and other industrial markets. Traditional supply chain and logistics methods are unreliable and leave operators and troops in potentially dangerous situations.

An alternate solution to jumping through the global supply chain hoops comes in the form of 3D printing, or additive manufacturing. Formerly considered a novelty hobby for tech-savvy individuals at home, additive manufacturing capabilities have advanced quickly, showcasing their potential to revolutionize the supply chain and logistics on a global scale.

This paper attempts to detail the benefits and value that hybrid manufacturing platforms — those that offer both additive manufacturing (3D printing) and subtractive manufacturing (milling, routing, and finishing) — can bring to almost any operation in any industry, especially in remote locations that are most impacted by supply chain shortcomings.

Introduction

COVID-19, Geo-Political Unrest, and the Supply Chain Crisis

The COVID-19 pandemic and the succeeding lockdown initiated what we now know as the Supply Chain Crisis. As the world responded, product demand, labor availability, and logistics operations shifted, causing massive disruptions in manufacturing and distribution. Geopolitical unrest contributed to this cycle, even as the world 'reopened' after the lockdown.

As the global supply chain, shipping, and raw materials markets struggle to find a foothold in current conditions, defense and industrial operations are left vulnerable to mission downtime and security breaches when they can't efficiently repair or replace parts of important machinery and units. Long delays, wrong or missing parts, and inconsistency of material availability leave critical systems down or in need of repair, potentially weakening perimeters and leaving troops and operators in dangerous situations. In addition, the costs that arise from failed equipment and operation downtime are excessive and potentially non-recoverable from a business standpoint.

Additive Manufacturing and Hybrid Manufacturing

Additive manufacturing, also known as 3D printing, has been gaining traction across a range of industries and applications. Once seen as a novelty to produce small, plastic parts, additive manufacturing capabilities have quickly advanced to include metal and large format production. Entities such as the United States Air Force have openly adopted this type of manufacturing to improve efficiencies, noting the USS Essex as the first American Navy Warship to be installed with a metal 3D printer and milling head. However, the capability continues to be underutilized and overlooked across most industries.

Hybrid manufacturing is defined as having both an additive manufacturing system (3D printer) and subtractive manufacturing CNC capabilities (milling or routing head) to finish the produced parts. This type of system is even more beneficial as it is an end-to-end operation, producing complete, ready-to-use components in an on-demand format.

The Benefits of Additive or Hybrid Manufacturing in Remote Locations

Additive and hybrid manufacturing bring capabilities to remote locations to help support supply chains and operations. Unless being used by an original equipment manufacturer to produce parts, additive manufacturing should be seen as an interim option to get systems or machines up and running, while waiting for OEM parts to arrive. The benefits of having this solution available are numerous.

On-Demand Parts Production

Additive manufacturing gives users the ability to produce what they need when they need it, decreasing extended delays to get machines and systems operating again. For example, if a cog in an aging gun turret loses a tooth, hybrid manufacturing can provide an interim solution. Instead of waiting weeks or months to receive a new cog, operators can print and mill a cog for immediate replacement either onsite or from a nearby location that houses an AM system.

Production of Complex Parts

The days of printing plastic cubes are far behind us, as additive manufacturing systems (coupled with subtractive manufacturing capabilities) can produce complex, intricate parts in plastic, composite, and metal materials. The ability to produce metal components opened the way for AM to play a part in the military and defense, oil and gas, and mining industries.

Mitigates the Need for Onsite Parts Inventory

The ability to produce on-demand parts reduces the need to maintain a large inventory onsite or in transport. This is ideal for teams in contested environments, forward operating bases, and expeditionary forces.

Reduced Downtime

Maintenance, repair, and replacement of parts for machines and systems is supported by an onsite manufacturing center. When downtime isn't an option, additive manufacturing is the solution.

Improves Self-Sufficiency

Self-sufficiency is attainable in remote operations when additive manufacturing is a part of the setup. Long delays, wrong or missing parts, and inconsistency of material availability are not as devastating when there is a means to produce interim parts onsite.

Create Obsolete Parts

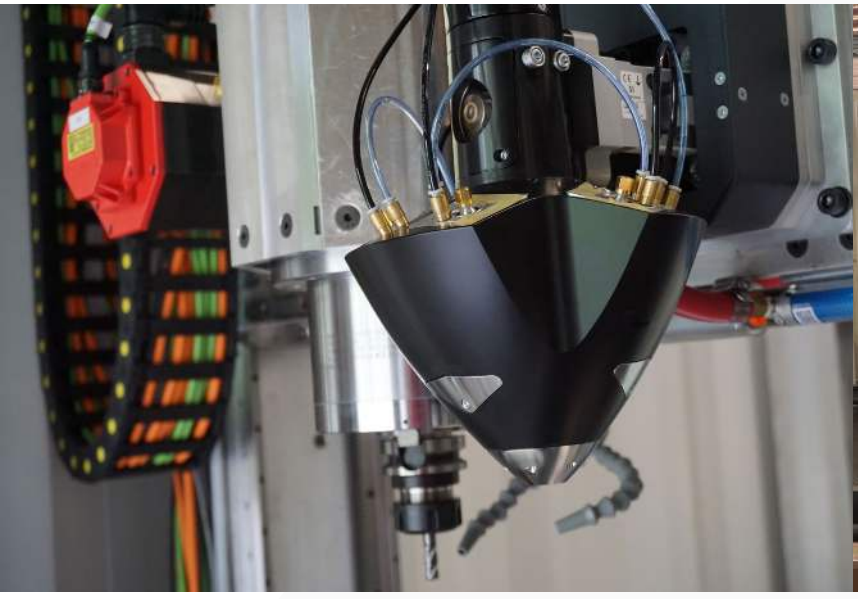
With support from various technologies, obsolete parts can be produced using additive manufacturing. Scanner systems on the market allow for the full scan and transmission of a component into drawings that can be read and printed by corresponding AM platforms. These systems can also be used to quality-check printed parts for compliance.

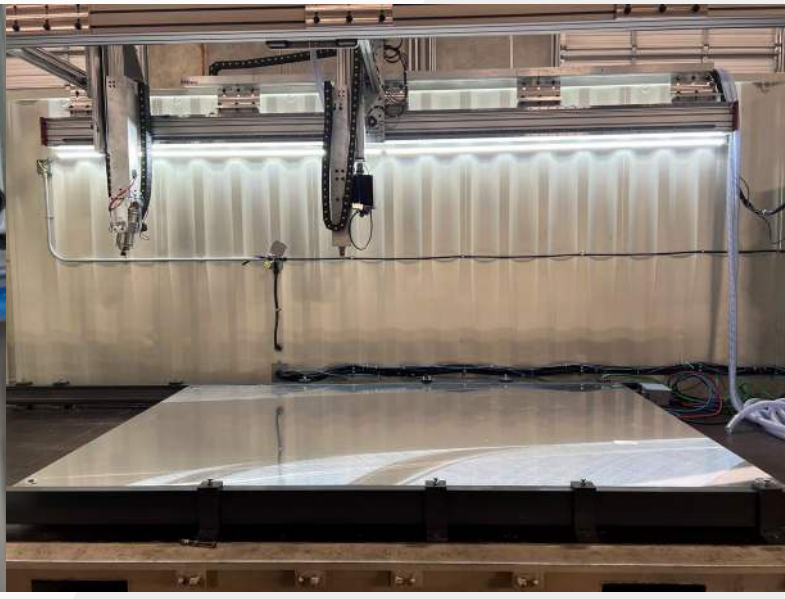
Sizes, Materials, and Production Method
3D printers and hybrid manufacturing systems come in a range of sizes and capabilities. Here is a high-level breakdown of common configurations:

Print Technology
Directed energy disposition manufacturing (DED) systems use laser-engineered net shaping and powder or wire material to create the layers of an object. Cold spray additive manufacturing uses compressed air to deposit material from a nozzle at high temperatures.

Print Size
Additive manufacturing systems can produce products in a range of sizes, from complex, miniature pieces to full-scale rockets and turbines based on the user's requirements.

Print Materials
Initially, 3D printing centered around composite and plastic materials. However, the development of metal printing expanded its use in military and defense, oil and gas, mining, and other industrial markets. Common metal variants include stainless steel, mild steel, carbon steel, titanium, inconel, and copper.





Snowbird Technologies Additive Manufacturing

With a portfolio of additive manufacturing platforms and 3D printers on the market, how does Snowbird Technologies' system set itself apart?

The Snowbird Additive Mobile Manufacturing Technology (SAMM Tech) is different from any other system on the market. Here's why:

PATENTED TECHNOLOGY

SAMM Tech features a patented manufacturing gantry technology built into a mobile container. No one else can produce a system that meets these requirements.

(US Patent No. 10,434,712 B1)

SHIPPING CONTAINER DESIGN

A simple yet impactful decision was to build our platform inside of standard ISO shipping containers. This ensures that SAMM Tech can conveniently ship to anywhere in the world, all while protecting the core of the system. The interior of the container features an operator enclosure with full system controls and monitors as well as a viewing window to the print bed. The print bed and gantry system encompass the remainder of the container.

LARGE FORMAT PARTS PRODUCTION

Unlike any other offering on the market, SAMM Tech is not only mobile, but it can produce both small and large intricate components — up to 250 cubic feet in size!

METAL, COMPOSITE, OR PLASTIC PARTS

SAMM Tech units can produce metal, composite, or plastic components based on user requirements.

CUSTOM-BUILT

Although offered in a standard 20-ft. container model, SAMM Tech units can be custom-built into any size shipping container with a range of options, add-ons, and capabilities.

RUGGED AND DURABLE

SAMM Tech is rugged and durable, built to withstand the harshest climates and terrains, and engineered to MIL-STD-810.

INDUSTRY-TRUSTED VENDOR PARTNERS

Snowbird Technologies partnered with the best designers and manufacturers in additive manufacturing to ensure that only the most innovative, quality components are incorporated into the SAMM Tech system.

SOFTWARE COMPATIBILITY

SAMM Tech is compatible with most industry 3D printing software and scanner systems, allowing flexibility in selecting the right products for user requirements.

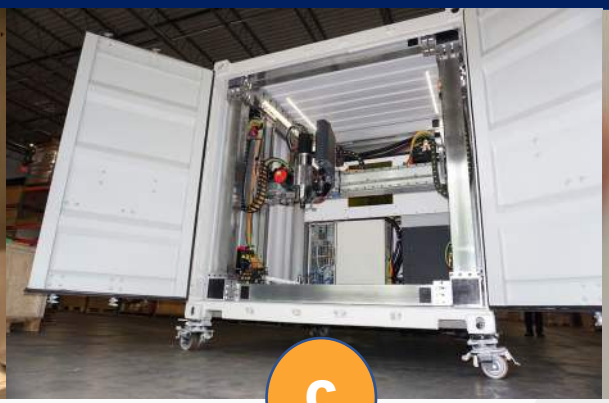
Snowbird Technologies Additive Manufacturing

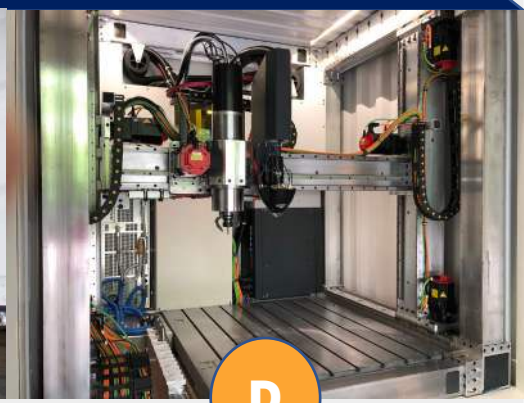
A SAMM Tech Additive Manufacturing platforms are built inside of shipping containers making them readily available, mobile, and durable.

B The operator enclosure features all controls and monitors and a viewing area of the print bed.

C Large doors provide access to the print bed and system for easy maintenance and operation.

D A large print bed can accommodate the production of parts up to 250 cubic feet. The model shown accommodates parts up to 64 cubic feet.





Conclusion

Additive and hybrid manufacturing are gaining traction in military and defense, oil and gas, mining, and other industrial applications. Due to its ability to bridge gaps in the global supply chain and ensure continued operations, additive manufacturing is considered a solution to combat parts obsolescence and improve operational contingency.

The benefits of additive manufacturing are numerous, especially when placed in remote locations such as contested environments, forward operating bases, and contingency sites. These include the ability to produce parts on-site, and on-demand, reduction of an onsite parts inventory, creation of obsolete parts, reduced downtime, and improved self-sufficiency.

With a range of manufacturers building additive manufacturing systems, Snowbird Technologies sets itself apart in several ways. Actively identifying product gaps that directly impact warfighters and operators in the field, SAMM Tech was designed to overcome location and production obstacles.

As the only patented, mobile, containerized, large-format hybrid manufacturing system on the market, SAMM Tech revolutionizes the way that defense forces and industrial operators are sustained and supported. An on-demand supply chain ensures that operations can carry on without significant delays or security breaches, revolutionizing the definition of readiness in the field.

Warfighters and industrial operators face a multitude of challenges and obstacles in the field. Snowbird Technologies is addressing mission readiness and sustainment with a new additive manufacturing platform.

To learn more about Snowbird Technologies and our goal of revolutionizing readiness, contact Jeremy Heerdink at JHeerdink@snowbirdtech.com or (615) 630-0812.