



Impossible
Objects®



*Increase Fleet Readiness Levels
and Reduce Costs of Ownership*

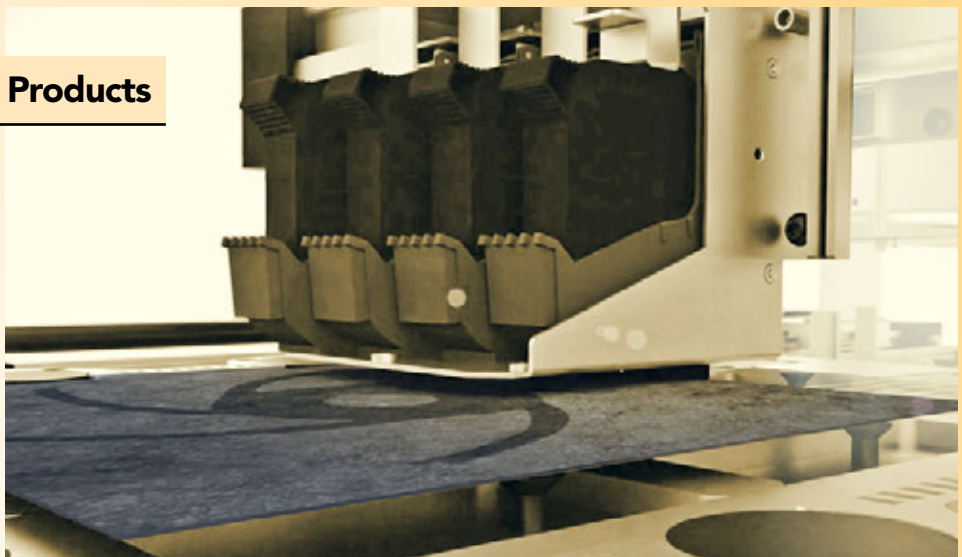
Take Back the Supply Chain

The military supply chain is complex and requires agile solutions that are reliable and effective. Technologies such as composite based additive manufacturing (CBAM), enable defense agencies and contractors to produce parts, fixtures, and tooling on-demand, without sacrificing speed or quality.

Impossible Object's CBAM technology combines the production rate of conventional manufacturing with the design flexibility of 3D printing to create high-performance materials at break-neck speeds. These advanced composite materials are lightweight, strong and ideal for aluminum replacement parts on legacy systems. By removing the barriers, we've unlocked new opportunities to reshape and **rethink manufacturing**.



CBAM Printed Thermoplastic Products



Carbon Fiber (CF) PEEK

Metric	Specification
Tensile Strength	140 MPa
Elongation %	1.04%
Flexural Strength	176.7 MPa
Flex Modulus	12.4 GPa
Heat Deflection Temperature	>300°C



High Strength
140 MPa



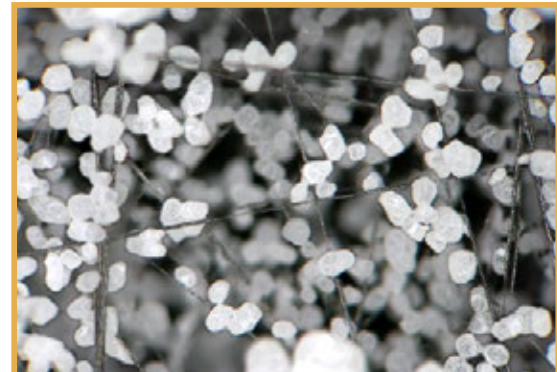
High Heat Performance
>300 Degree C



ESD Safe



High Chemical
Resistance



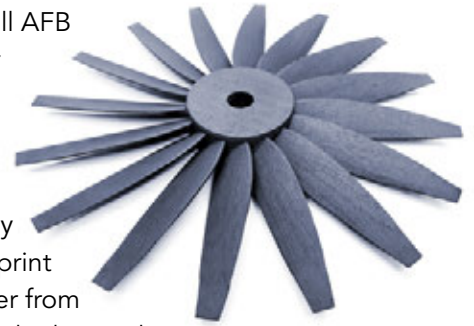
Carbon Fiber PEEK Microstructure View



Hill Air Force Base USAF, Ogden Utah

Unmanned Air Vehicle Reconfigurability and Sustainment at Hill AFB

Hill Air Force Base is a major USAF base located in northern Utah. Hill AFB is the home of the Air Force Materiel Command's (AFMC) Ogden Air Logistics Complex (OO-ALC) which is the worldwide component manager for a wide range of aircraft, engines, missiles, software, accessories, and avionics assets.



The USAF has legacy parts availability issues. The logistics and supply communities have voiced an overwhelming desire to employ AM to print on demand and eliminate supply availability issues. The CBAM printer from Impossible Objects was selected based on the production speeds and advanced material portfolio. Countless applications have been identified where CBAM CF PEEK parts exceeded the thermal and mechanical requirements needed for part sustainment. The system has since been upgraded and is installed at Weber State in Utah.

CBAM Applications

Lightweight Solutions For Improved Efficiency

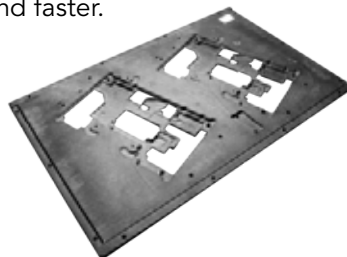
The United States Air Force is engaged with CBAM technology on several projects, most notably the development of lighter weight drones made of stronger, more durable materials. Design, prototyping and production is all accomplished using the CBAM flagship material, CF PEEK. Which is a high-strength, chemical resistant material that is ESD safe and an excellent option for drone chassis, components, spares or repairs.



Drone Chassis	
Print Time	240 minutes
Dimensions	10 x 8 x 1 inches
Material	CF PEEK
Characteristics	Engineered undercuts not possible with injection molding

Tooling & Fixtures For Faster Turnarounds

Keeping equipment operational in the field or production facility requires versatile manufacturing methods. CBAM enables the production of quick tools and complex fixtures at lower costs compared to CNC machining or milling. Instead of waiting days or weeks for parts to be made, fixtures can be designed and printed in less than 24 hours and installed immediately. Bridge-tooling with CBAM offers a fast and effective alternative that gets parts in hand faster.



Electronic Tooling	
Print Time	100 minutes
Dimensions	15 x 10 x .25 inches
Material	CF PEEK
Characteristics	ESD Safe

Subsystem Part Repair & Replacement for B-1B Aircraft

Through collaboration with the Utah Advanced Materials & Manufacturing Initiative (UAMMI) and Tinker Air Force base, Impossible Objects 3D printed and installed a key subsystem component for the B-1B aircraft. The original tooling data was no longer available so a new CAD design was created from 2D drawings. CF PEEK restraining strap was printed in less than 3 hours and installed immediately.



B-1B Strap Replacement	
Print Time	130 minutes
Dimensions	3.5 x 10 x .5 inches
Material	CF PEEK
Characteristic	Zero Tooling solution, faster parts in hand

Understanding Composite Based Additive Manufacturing

Next generation manufacturing begins with innovation. Composite based additive manufacturing (CBAM) from Impossible Objects produces strong, lightweight materials needed for prototyping, production, and quick tooling solutions. The combination of carbon fiber, glass filled, nylon 12 and PEEK materials creates a matrix of highly capable parts needed for a variety of applications.



Material

CF PEEK

CF Nylon12

Glass Filled PEEK

Glass Filled Nylon12

Application

Aluminum replacement material for high strength, chemical resistance requirements

Excellent thermal properties and good chemical resistance

High strength and excellent temperature performance (MP 343C)

Low cost, good strength and abrasion resistance

"Impossible Objects was always below or within budget at all times, even suggested ways to streamline and cut costs, amazing! IO consistently meets milestone completion times and never missed a deadline."

- Shawn Nesmith, America Makes Project Manager



America Makes

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