

DEPLOYING LARGE-FORMAT 3D PRINTING FOR BATTLEFIELD ADVANTAGE



FAST RESPONSES | DEPLOY ANYWHERE | VIRTUAL INVENTORY



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The battlefield is a dynamic and ever-changing landscape. Military forces must be adaptable, capable of **responding swiftly** to unforeseen circumstances and logistical disruptions. Even more, in today's global climate, traditional supply chains are hindered by geopolitical complexities, where ensuring a steady flow of critical parts and equipment presents a significant challenge all across NATO.

In wartime, any emergencies on the field or tactical action demand immediate effective solutions. From surveillance drones to customized MOLLE equipment accessories, or when a frontline vehicle suffers a critical component failure: solutions need to be immediate in order to guaranty personnel safety. This is where **large-format material extrusion 3D printing** emerges as a game-changer, offering a solution for on-demand manufacturing that empowers rapid response and streamlines battlefield logistics.

THE CHALLENGE: SELF-RELIANCE VS. COMPLEX SUPPLY CHAINS

Modern military forces rely on a vast array of equipment sourced from diverse suppliers, depending on complex and often fragile supply chains. These intricate networks are weakened during geopolitical tensions, natural disasters, or unforeseen events, hindering the timely supply of critical parts and compromising operational readiness.

Historically, the ability to rapidly repair battle-damaged equipment has proven pivotal in the outcome of conflicts. From aircraft and tanks to smaller weapon systems, the need for swift repairs is paramount.

Additionally, the need for adequate storage spaces and conditions, minimum order quantities, extended lead times, and time-consuming logistics, further exacerbate the problem, hindering operational readiness and potentially compromising mission success and personnel safety.

Successful military operations demand **rapid response and self-sufficiency**.

THE SOLUTION: FAST RESPONSE WITH ADDITIVE MANUFACTURING ON THE BATTLEFIELD

3D printing technology offers unbeatable faster responses and a revolutionary approach to battlefield critical situations, empowering military forces with the ability to **produce essential parts on-demand**. This eliminates the need to rely on external suppliers, storage, logistics, and minimizes the impact of disrupted supply chains.

This can be quickly achieved by setting up with forward-deployed production units equipped with **3D printers and a digital library of critical parts**. A damages or malfunctioning component can be quickly scanned, and a replacement part printed directly on-site, ensuring rapid repairs and minimizing downtime. This level of agility translates to a significant battlefield advantage, allowing forces to maintain operational readiness and respond effectively to evolving situations.



GEOPOLITICAL TENSIONS & BATTLEFIELD CHALLENGES

Military forces rely on extensive equipment fleet. These aging and legacy systems are dependable, but their effectiveness hinges on a steady flow of spare parts.

Furthermore, the current geopolitical climate has frozen military components and arms sales, jeopardizing access to critical parts and creating a logistical bottleneck.

This scenario presents **three** major challenges:

TACTICAL CHALLENGES: DELAYS AND VULNERABILITIES

Imagine a scenario where a military force captures a significant number of armored vehicles, tanks, and combat vehicles from an opposing force. While integrating these captured assets can bolster their arsenal, a significant challenge arises - maintaining these captured systems without access to their original manufacturers or established supply chains.

Obtaining replacement parts through traditional methods would likely involve **lengthy bureaucratic processes**, potentially requiring international procurement and approval from the original equipment manufacturers. This delay **could leave the captured vehicles inoperable for weeks**, hindering their ability to be integrated effectively and jeopardizing their potential contribution to ongoing operations.



OPERATIONAL CHALLENGES: DOWNTIME AND REDUCED READINESS

The **extended downtime** associated with traditional procurement methods directly impacts operational readiness. A vital weapon, tank or armored vehicle becomes unavailable for deployment, potentially **weakening a defensive line** or hindering offensive maneuvers. This domino effect can have serious consequences, jeopardizing the safety of personnel and potentially impacting the overall success of military operations.



FINANCIAL CHALLENGES: MINIMUM ORDERS AND HIDDEN COSTS

Even when replacement parts are eventually sourced, traditional procurement methods often impose minimum order quantities. For a single malfunctioning component, the military is forced to **purchase and properly store a surplus of parts**, leading to unnecessary financial burden and wasted resources. Furthermore, the difficulties and cost of warehousing, expedited shipping, and potential import fees can significantly inflate the overall expense of acquiring a single spare part.





**THE 3D PRINTING ADVANTAGE:
RAPID RESPONSE IN CRITICAL
SCENARIOS**

Additive manufacturing technology offers a solution that addresses all the aforementioned challenges. By creating a **digital library of critical spare parts**, military forces can leverage 3D printers deployed in the field to produce replacements on-demand, thus reducing physical storage space for on-demand printable parts, logistic coordination, and costs.

After a field technician has scanned a damaged component with a portable scanner, the digital file is uploaded to the 3D printer and, within a matter of hours, a functional replacement part is produced. This rapid response eliminates reliance on external suppliers ETDs, minimizes downtime, and ensures operational readiness.

**CASE IN POINT:
REAL-WORLD EXAMPLES**

Real field applications prove the effectiveness of 3D printing in addressing part procurement not only for legacy equipment. Military forces are successfully utilizing 3D printing to produce parts for various platforms, ranging from drone components to specific vehicle parts. The following examples highlight the undergoing real-world transformative potential of 3D printing to empower forces with greater operational independence and a more agile response to battlefield needs.

ON-DEMAND SPARE PARTS



ON-DEMAND PARTS AND INNOVATION

Military Services are pursuing extrusion material manufacturing and decentralized procurement because of its ability to improve support to the warfighter by providing replacement or innovative parts when and where the warfighter needs them.

Some key factors of significant influence:

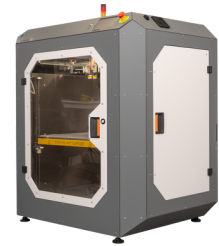
1. **Dimensional Size:** each system implies a 'build volume' limitation, dictating the maximum size of a printable part. The legacy part's physical dimensions must fit within the chosen system's build volume.
2. **Material Composition:** Ideally, the 3D-printed part should match the material of the existing legacy part. However, size and material are just the beginning.
3. **Broad Polymer Selection:** Open-system material extrusion offers a wider selection of materials for specific military applications, such as:

- Elasticity (TPU)
- Heat or Chemical Resistance (PA, PC, PEEK)
- Mechanical Strength for high-stress parts (ABS, PC, PEEK)
- Lightweight Materials for enhanced mobility (PA, TPU)
- Composite polymers reinforced with carbon or glass fibers (ABS, PC, PEEK, PEKK) for additional part strength
- Super Polymers as metal replacements (PEEK, PEKK, PEI)



Bracket for signal amplifier printed in PEEK

**ON-DEMAND
SPARE PARTS**



APPLICATION

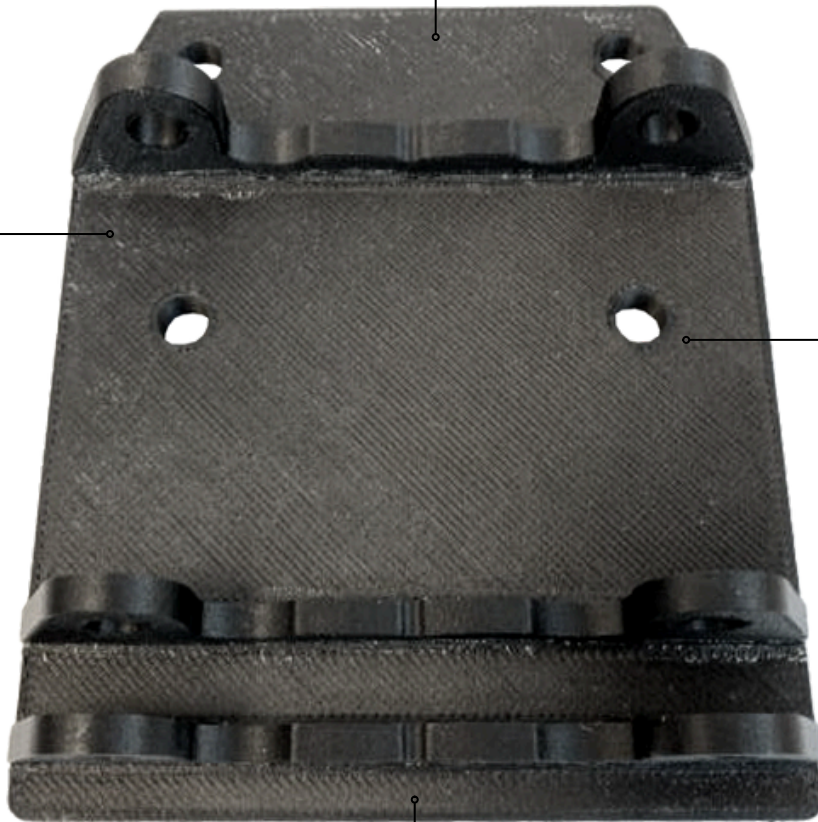
Replacement of
the original part

MATERIAL

CF PA-12

DIMENSIONS

172 x 148 mm



WEIGHT

216g

APPLICATION CASE - **OMNI TECH**

**JELCZ 442.32
air conditioner
bracket**



 **ON-DEMAND
SPARE PARTS****FOCUS ON BMP-1 MAINTENANCE WITH OMNI3D LARGE FORMAT 3D PRINTER**

Maintaining a fleet of BMP-1 vehicles, a mainstay of many NATO militaries is a logistical challenge, even more in wartime. Sourcing replacement parts for these legacy systems is time-consuming and expensive.

Here is where Omni3D's large-format 3D printing technology steps in. Our **robust material extrusion solutions** have proved to be ideal for producing high-strength, functional parts for BMP-1 tanks.

With a digital library of BMP-1 parts and a deployable Omni3D printer, NATO military forces can overcome these challenges. On-demand 3D printing eliminates dependence on external suppliers and minimizes downtime, ensuring your BMP-1 remain operational and ready for action.



**ON-DEMAND
SPARE PARTS**



APPLICATION

Replacement of
the original part

DIMENSIONS

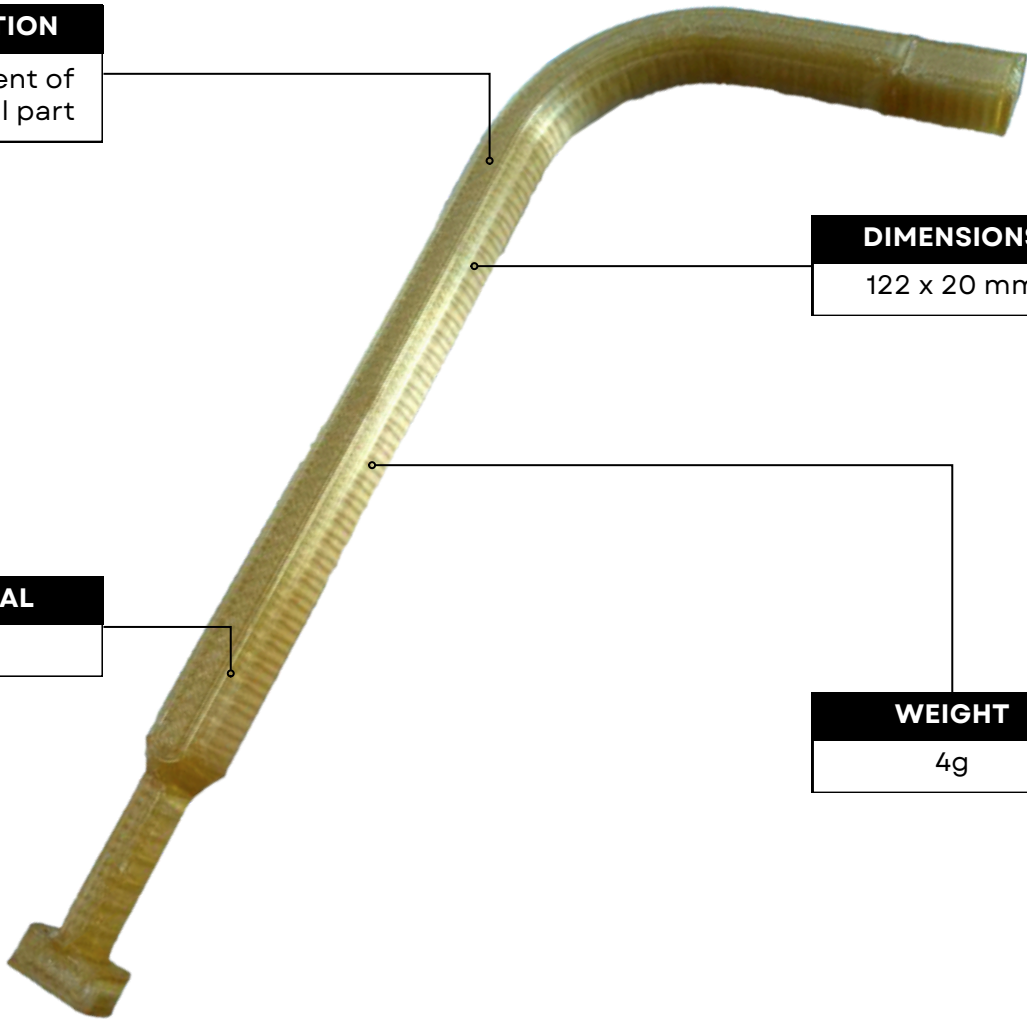
122 x 20 mm

MATERIAL

PEKK

WEIGHT

4g

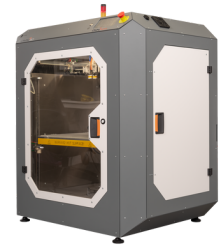


APPLICATION CASE - **OMNI PRO**

**BMP-1
Manhole key**



**ON-DEMAND
SPARE PARTS**



APPLICATION

Vehicle bearing replacement

DIMENSIONS

172 x 21 mm



MATERIAL

TPU

WEIGHT

96g

APPLICATION CASE - **OMNI TECH**

**BMP-1
Bearing**



**FUNCTIONAL
END-USE PARTS**



FROM OVERSIZED COVERS TO MISSION-SPECIFIC TOOLS

Large-format systems enable the printing of larger and more complex parts, entailing compatibility with a broader range of critical components. For example, large-format 3D printers are used to produce oversized protective covers for sensitive equipment, such as communication systems or surveillance devices, or specialized tools and equipment tailored to specific mission requirements, such as custom brackets and mounts.

- Increased weight in transport vehicles, planes, and ships can decrease fuel efficiency and reduce maneuverability and speed. As a result, the military is developing ways to lower weight without sacrificing performance.
- Additive manufacturing fosters tactical self-sufficiency. The U.S. Navy and Naval Sea Systems Command (NAVSEA) has adopted extrusion material technology to design, print, approve, and install critical or obsolete parts on vessels even after undocking. Its growing database of printable parts is effectively reducing repair times and production costs.

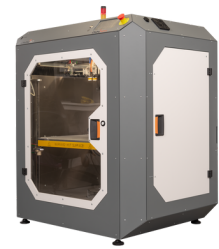


M203 Stand-alone buttstock module

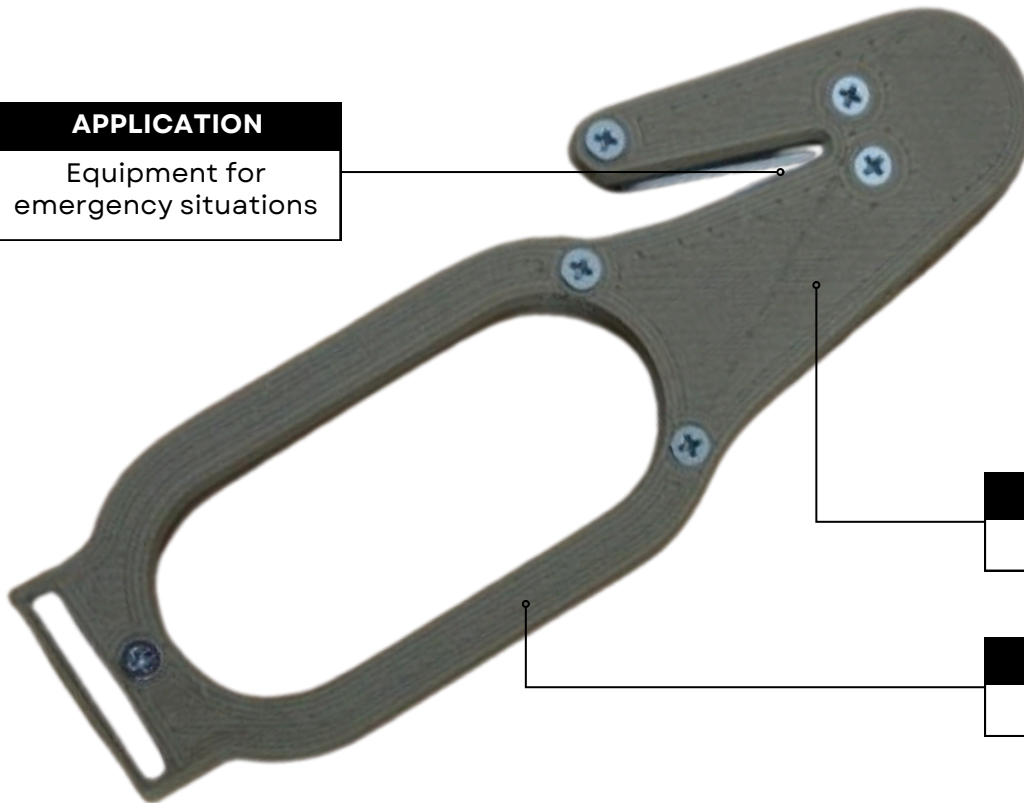


RKG-3EM Anti-tank grenades fin stabilizers UAVs operated

**FUNCTIONAL
END-USE PARTS**



APPLICATION
Equipment for emergency situations



MATERIAL
ABS

WEIGHT
14g

APPLICATION CASE - **OMNI TECH**

Parachute Safety Knife

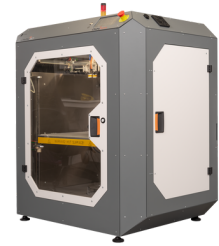
The development of our 3D printed parachute knife prioritized user safety and operational efficiency. Thanks to a rigorous design process, Omni3D team focused on ergonomics and functionality, ensuring optimal performance under the most demanding conditions.

Constructed from durable ABS material, the knife is engineered to withstand the rigors of emergency situations. This choice guarantees resistance to corrosion and mechanical damage, ensuring reliability when it matters most.

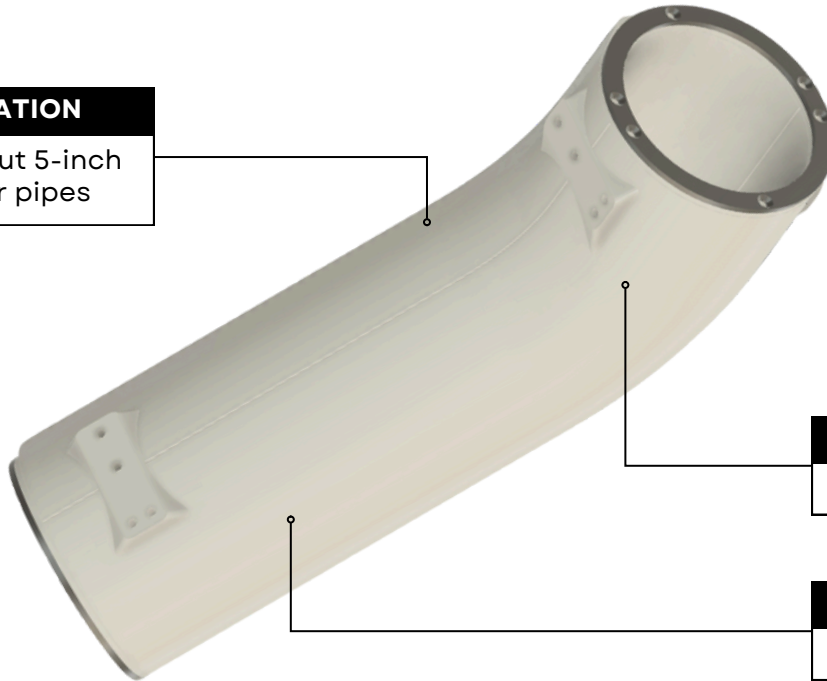
Beyond its core function, the parachute knife incorporates additional features to enhance user safety. Ergonomic design and carefully placed hooks and handles facilitate secure and intuitive operation, even in adverse weather conditions.

This 3D printed tool represents a significant advancement in parachute safety, combining precision engineering with practical functionality.

**FUNCTIONAL
END-USE PARTS**



APPLICATION
Precisely cut 5-inch diameter pipes



MATERIAL
ABS

WEIGHT
481g

APPLICATION CASE - **OMNI TECH**

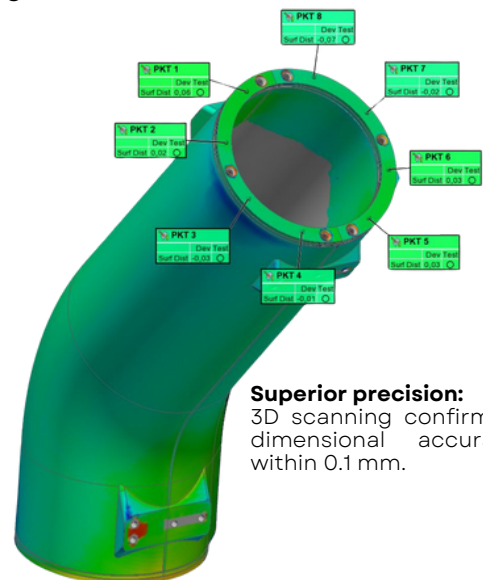
**Collins Aerospace
Precision Cutting Jig**



Collins Aerospace is a leader in technologically advanced and intelligent solutions for the global aerospace and defense industry. CA was facing the challenge to ensuring precision and repeatability when cutting aircraft fuel pipes. Traditional heavy, bent metal jigs weren't ideal.

Omni3D's technology delivered an innovative solution: a lightweight (2kg) housing jig with metal end caps, 3D printed with unmatched precision and repeatability.

- » **Increased efficiency:** quicker delivery compared to metal fabrication.
- » **Improved portability:** lightweight ergonomic design eliminated need for transport aids and simplified operations.
- » **Reduced costs:** ~80% lower production costs compared to traditional methods.



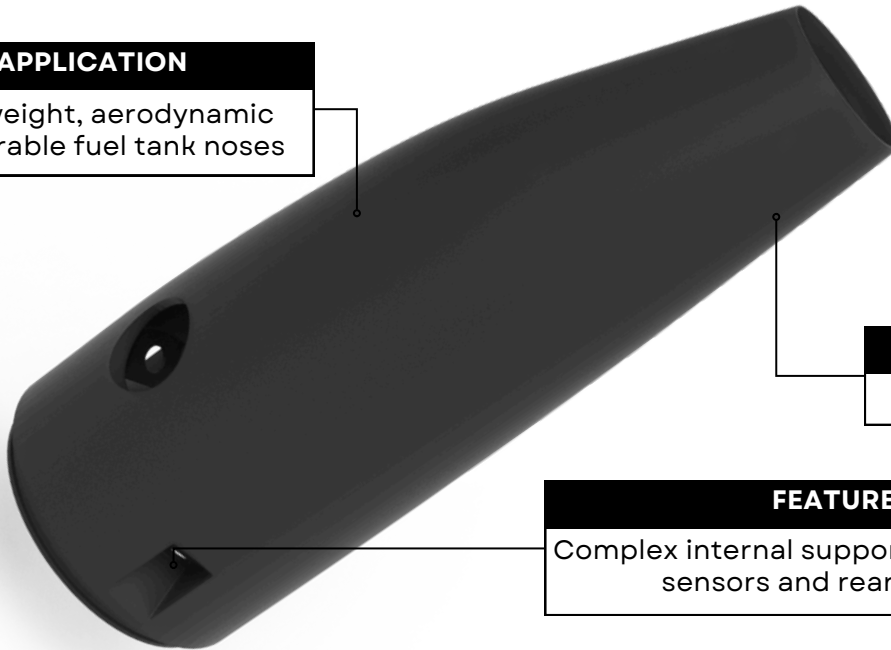
Superior precision:
3D scanning confirmed dimensional accuracy within 0.1 mm.

FUNCTIONAL END-USE PARTS



APPLICATION

Lightweight, aerodynamic and durable fuel tank noses



MATERIAL

PEEK CF

FEATURES

Complex internal support for electronics, sensors and rear cameras

APPLICATION CASE - OMNI PRO HT

ILR-33 Bursztyn suborbital rocket fuel tank noses



The Polish ILR-33 Bursztyn suborbital rocket needed lightweight, aerodynamic and durable fuel tank noses with complex internal support for electronics, sensors and rear cameras. The Institute of Aviation used Omni TECH to design and print a custom fuel tank. The tank was made from a high-strength, lightweight, heat-resistant polymer that could withstand the rigors of launch.

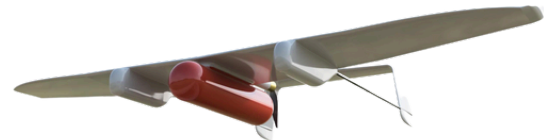
- » **Reduced weight:** the 3D printed tank noses were significantly lighter than a traditional metal tank, which improved the rocket's overall performance and aerodynamics.
- » **Simplified manufacturing:** 3D printing allowed for the creation of a complex fuel tank nose design for electronics casing and support without the need for traditional manufacturing techniques.
- » **Increased efficiency:** 3D printing enabled the rapid production of the fuel tank, which helped accelerate the rocket's development timeline.

ADVANCED DRONE APPLICATIONS



'Mosquito' UAV

'Crow' UAV



'Jay' UAV

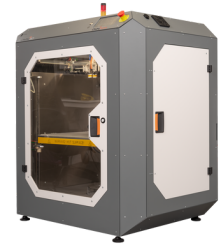
3D PRINTING TAILORED SOLUTIONS FOR MILITARY UAV

3D printing is largely used by Military forces to manufacture Unmanned Aerial Vehicles (UAVs). UAVs are a critical strategic factor in modern warfare. Equipped with advanced sensors, UAVs provide invaluable intelligence and reconnaissance capabilities.

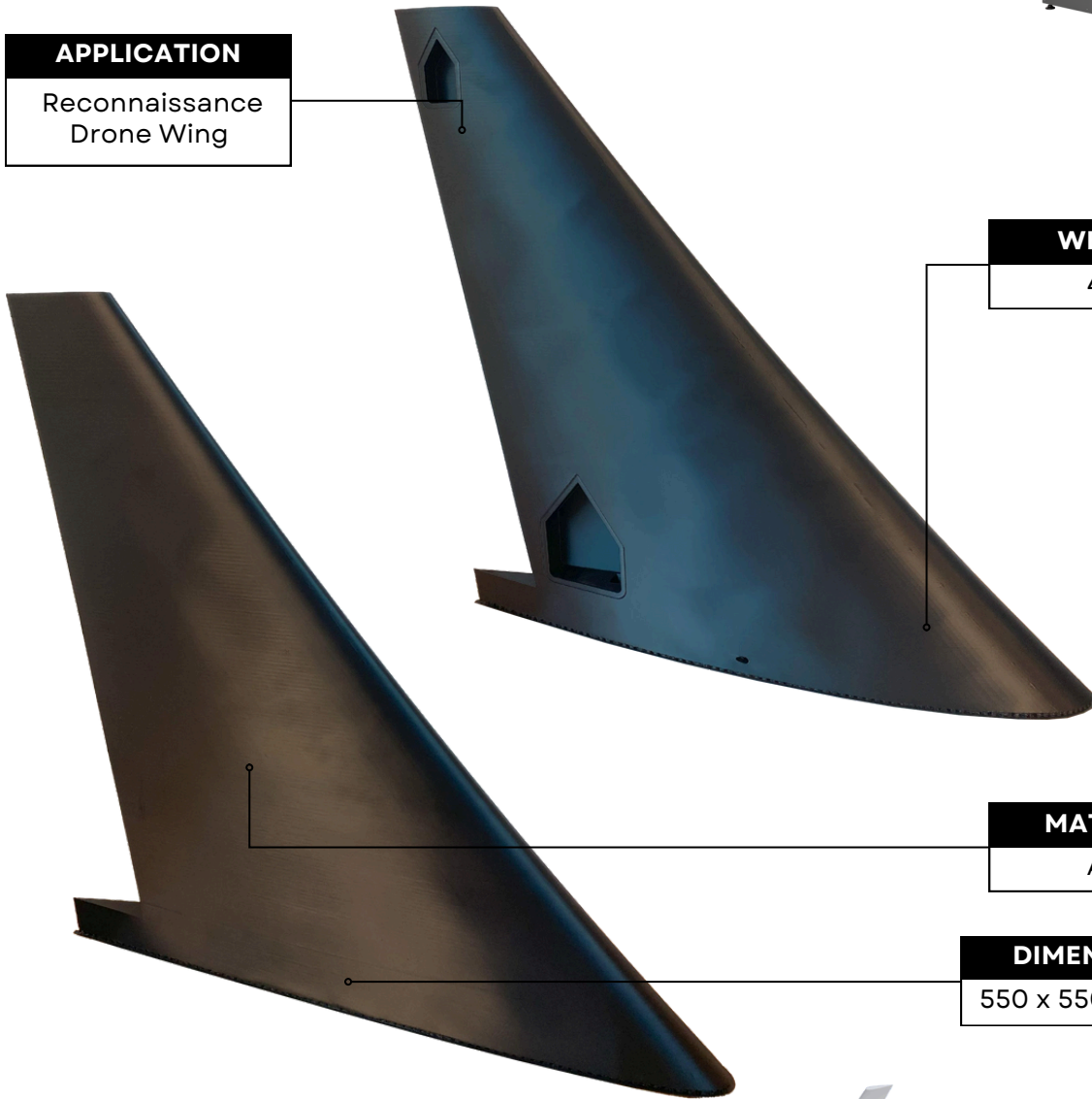
- 3D printing allows for rapid customization of UAV parts, enabling the creation of optimized mission-specific drones tailored for **reconnaissance**, **bomb delivery**, or even small-scale **cargo delivery**. Damaged components can also be quickly replaced in the field, minimizing downtime and ensuring the UAV fleet remains operational.
- 3D printing allows for the use of **advanced lightweight materials** that enhance flight performance. These materials can provide a balance between strength for load-carrying capacities and overall weight reduction for extended flight times and maneuverability.

This combination of rapid customization and optimized material properties empowers military forces with a versatile and responsive UAV fleet that significantly contributes to battlefield success.

ADVANCED DRONE APPLICATIONS



APPLICATION
Reconnaissance Drone Wing



WEIGHT
448g

MATERIAL
ABS

DIMENSIONS
550 x 550 x 75mm

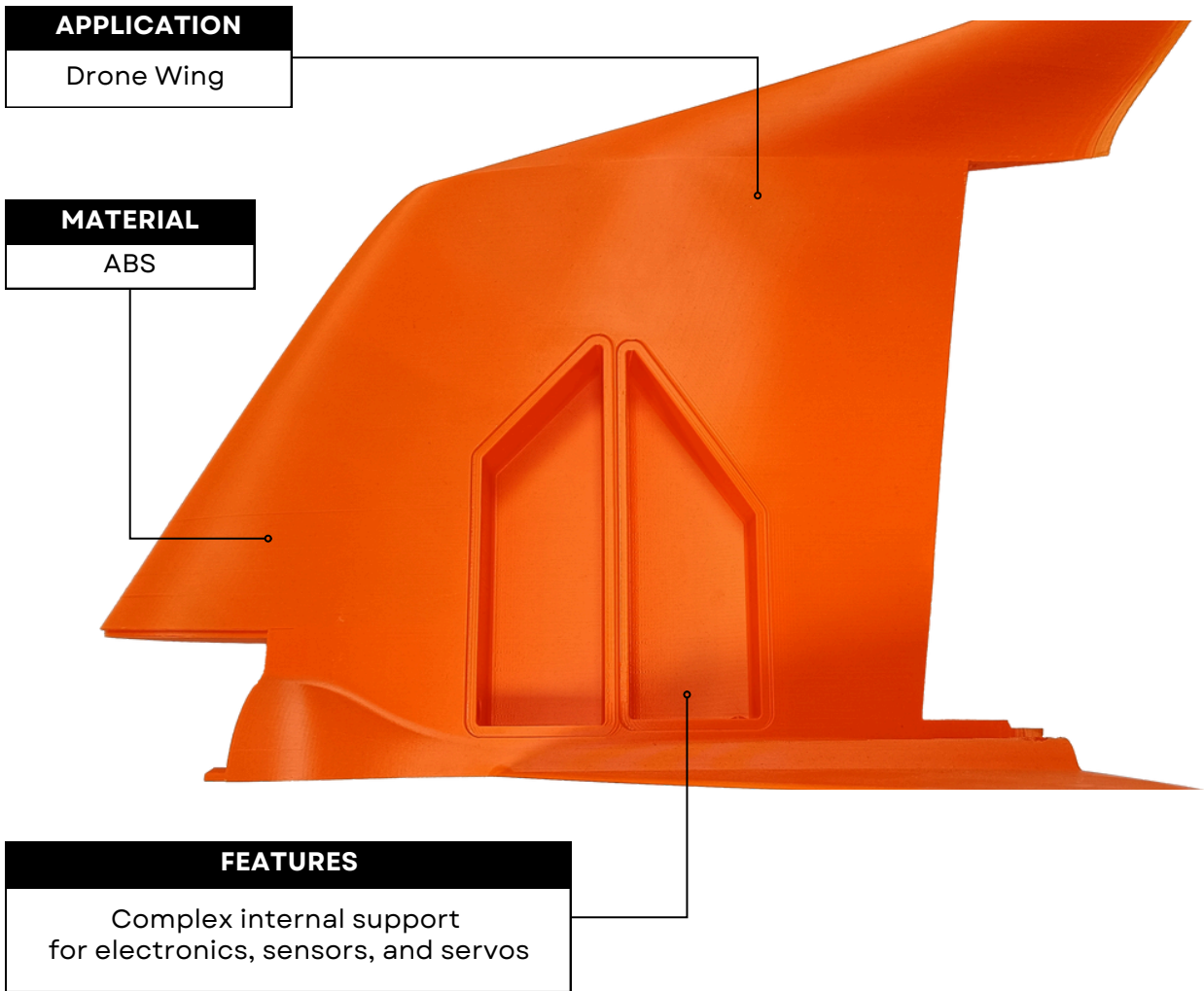
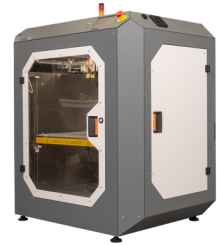
APPLICATION CASE - **OMNI TECH**

CROW UAV Wing



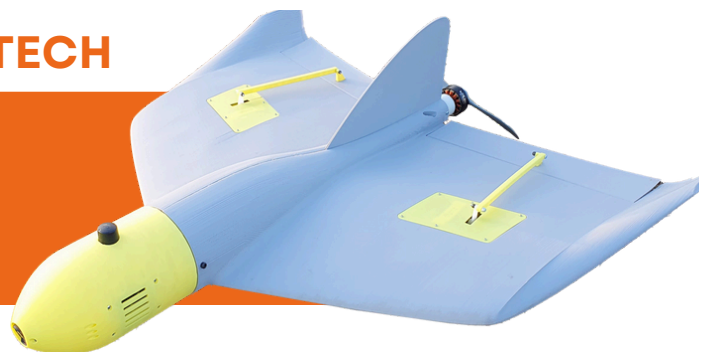
Autonomous air target for anti-drone and air defense systems wingspan 200 cm, electric drive, flight time 45 minutes.

ADVANCED DRONE APPLICATIONS



APPLICATION CASE - OMNI TECH

MOSQUITO UAV Wing



Fast FPV drone for defense and offense.
Wingspan: 60 cm. Speed: over 200 km/h. Warhead: 0.5 kg.

REALISTIC MODELS AND MILITARY DECOYS



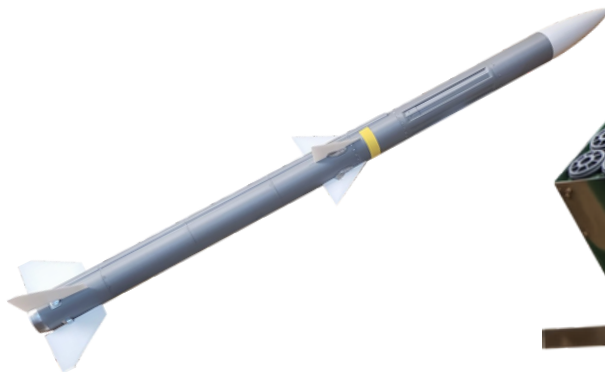
DECEPTION, DIVERSION & TACTICAL TRAINING

While 3D printing excels in producing on-demand parts for the battlefield, its impact extends beyond functionality.

- **Realistic Models** for Enhanced Training enables soldiers to train for complex scenarios in a controlled setting, replicating real-world situations with increased fidelity. 3D printed customized targets replicate specific enemy equipment or structures, providing soldiers with a more targeted practice.
- **Military Decoys** provide Tactical Advantages with 3D printed replicas of military vehicles or equipment to deceive enemy forces, diverting attention or creating false targets. Deceptively realistic 3D printed decoys are lightweight and easily deployable, offering a strategic advantage in the field.



3D printed landmines for military training exercises. These replicas are designed to be affordable and realistic, allowing military personnel to practice detonation and disarmament techniques in a safe and controlled environment.



AIM-120 AMRAAM Missile Replica



BAOBAB-K Mine-Laying System Replica

TACTICAL FABRICATION UNIT (TFU20)

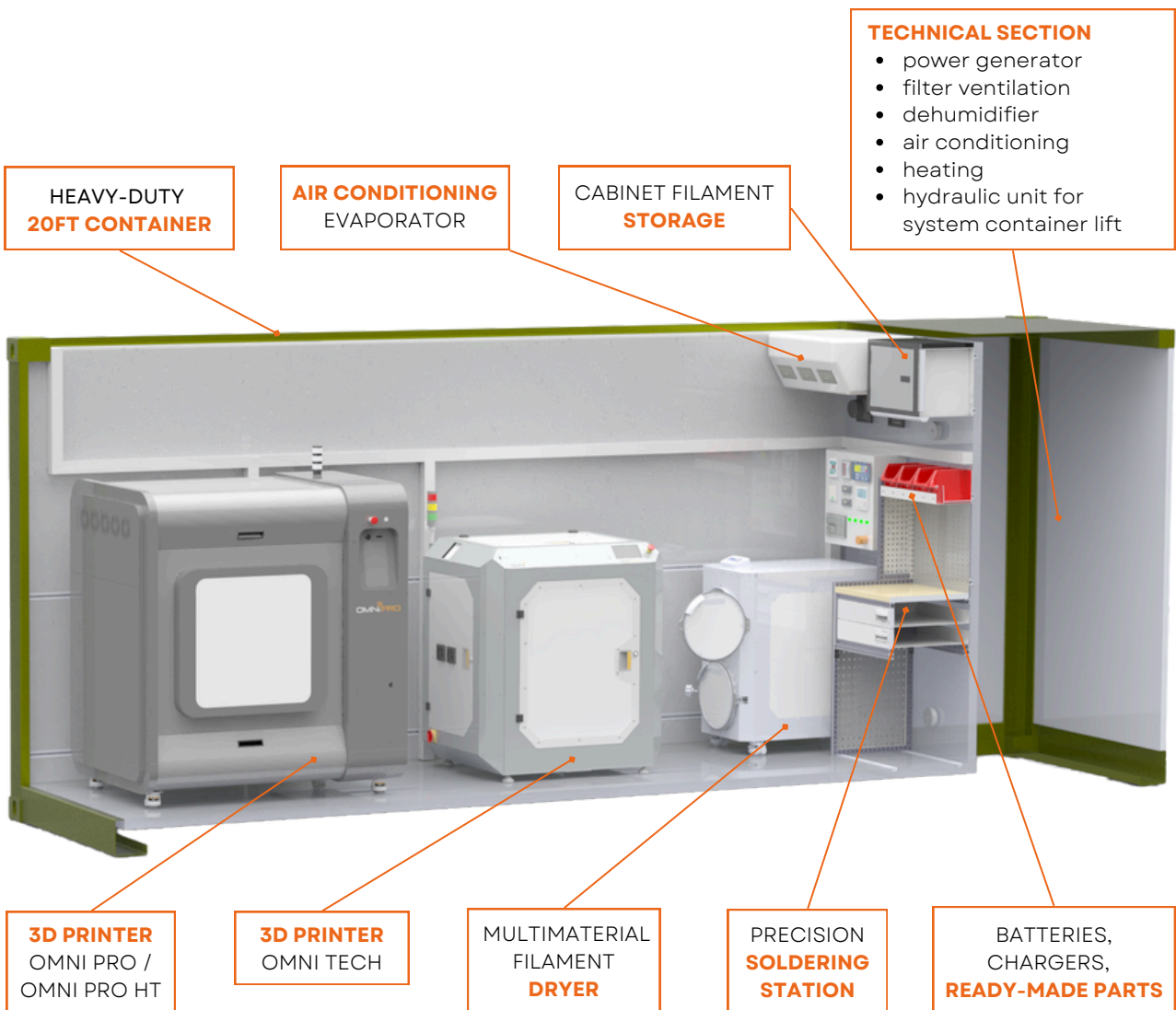


Omni3D's field-deployable 3D printing lab is a portable, ruggedized solution designed for harsh environments. This all-in-one system features all needed components for a fully complete manufacturing hotspot, including Omni3D large-format sturdy industrial 3D printers with an open-source material platform and a material drying system. TFU20 enables military forces to print critical parts and essential tools on demand directly in the field. The lab's compact design and ease of use empower rapid deployment and streamlined operation, ensuring operational flexibility and self-sufficiency wherever needed.

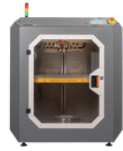


TACTICAL FABRICATION UNIT (TFU20) KEY COMPONENTS

- **20ft Deployable 3D Printing Lab:** produce drones, parts & more on demand on the field with this self-contained unit.
- **Mobile & Field-Ready:** fully mobile for various platforms, with auto-leveling, air conditioning & ventilation for harsh environments.
- **Logistics Solved:** eliminate storage, inventory footprint, & supply chain issues with on-site production.
- **On demand:** on-site parts and combat assets production unit.
- **Customizable:** adapt lab configurations for mission-specific needs.



THE RIGHT LARGE-FORMAT 3D PRINTING TECHNOLOGY FOR EACH BATTLEFIELD APPLICATION



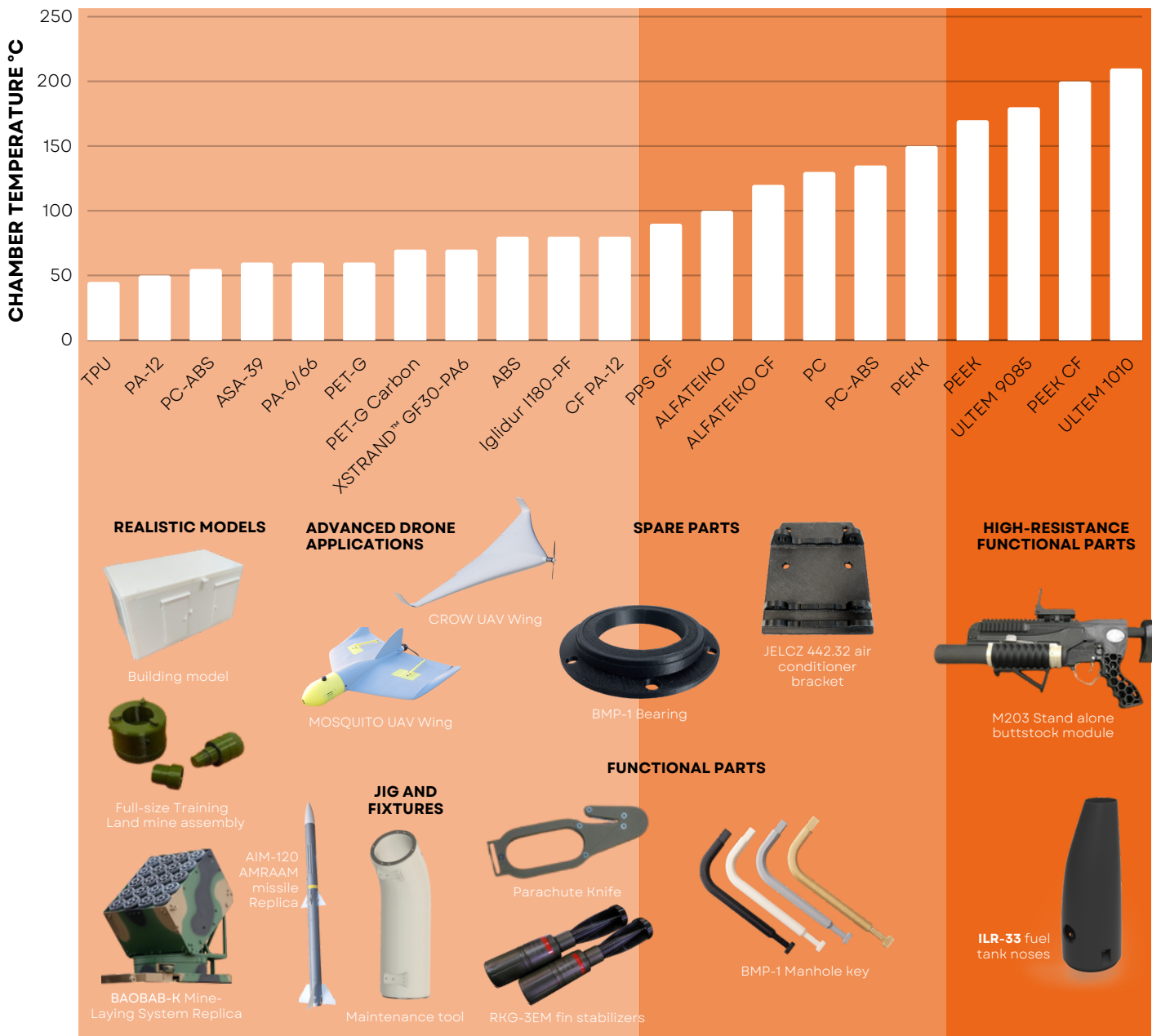
OMNI TECH



OMNI PRO



OMNI PRO HT



***PEEK and ULTEM (PEI):** High-Performance Alternatives to Metal.

PEEK and ULTEM are advanced thermoplastics known for exceptional heat resistance, chemical stability, and mechanical strength. These materials enable the creation of 3D printed parts that can replace metal components in demanding applications, offering advantages in weight, cost, and corrosion resistance.



DOMINATE THE BATTLEFIELD WITH OMNI3D



Trusted by NATO

NCAGE: 9BT1H (NATO Supplier)
Trusted by Industry Leaders: Polish Armaments Group (PGZ), BAE Systems, Naval Group, Leonardo Helicopters, Safran Helicopters, Airbus and others



Made in Europe

NATO-Sourced Components and Manufacturing



Extensive knowledge

10+ year Expertise in advanced polymers with aluminum-like and metallic properties



IT Training Platform

Robust Implementation and Training Ecosystem powered by a proven IT platform.



Comprehensive Support

Omni3D empowers military forces with expert training to maximize system utilization and operational efficiency.

OMNI3D: YOUR TRUSTED PARTNER IN DEFENSE AM

Omni3D is a leading provider of industrial-grade 3D printing solutions with a proven track record in the defense sector. Our commitment to quality, reliability, and security aligns perfectly with the demanding needs of military applications. We offer a comprehensive suite of services, including:



Large-format 3D printers offering a significant build volume, enabling the printing of larger, more complex parts, thus ensuring compatibility with a broader range of critical parts.



A commitment to **open-source materials**, allowing for greater **flexibility and versatile applications**.



NCAGE listing, demonstrating our adherence to the **rigorous quality standards** required by the defense industry.



10+ year Expertise in developing and implementing 3D printing solutions for a **wide range of military applications**.



TRUSTED BY:



Talk with our experts at sales@omni3d.net

