

OMNI3D

PRINT LARGE FUNCTIONAL PARTS

RAILWAY APPLICATIONS

EN 45545-2 Certified Materials

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www.omni3d.com



ISO 9001:2015 Certified
(Quality Management)



NCAGE CODE: 9BT1H

European Union
European Regional
Development Fund



PARTNER WITH OMNI3D: YOUR ADDITIVE MANUFACTURING EXPERT FOR COMPLIANT RAILWAY SOLUTIONS

At Omni3D, we understand the critical role of safety and compliance in the railway industry. That's why we offer a comprehensive solution for engineers:

» **EN-45545 Expertise:** our team possesses in-depth knowledge of material selection and printing processes that meet the stringent fire safety standards of EN-45545.

»

Material Advantage: we provide a range of certified materials specifically engineered for railway applications, ensuring optimal performance and regulatory compliance.

»

Collaborative Approach: we work closely with railway companies to understand your unique needs and develop compliant 3D printing solutions that integrate seamlessly into your existing workflows including our vast expertise in adhesives and post-processing techniques.

ABOUT OMNI3D

Omni3D is a leading innovator in industrial-grade material extrusion 3D printing solutions. We empower businesses in critical sectors like railway and aerospace to unlock new possibilities in efficiency, performance, and safety.

Uncompromising Quality for Your Success.

Our unwavering commitment to rigorous quality control and material certification ensures that our technology consistently meets the stringent requirements of highly regulated industries.



EU STANDARDS COMPLIANCE MATERIALS, ADHESIVES AND PAINTS

Leveraging our extensive experience in the railway industry, including expertise in EN 45545-compliant materials, adhesives, and post-processing techniques, Omni3D provides comprehensive solutions for your railway applications.

**MATERIALS****ADHESIVE****PAINT****ISOLATING**

OMNI3D CERTIFICATIONS

Leveraging our extensive experience in the railway industry, including expertise in EN 45545-compliant materials, adhesives, and post-processing



TRAINS ON TIME: HOW 3D PRINTING REVOLUTIONIZES RAILWAY MAINTENANCE

Omni3D's industrial-grade, large-format 3D printers empower railway actors to overcome traditional maintenance challenges and quickly achieve enhanced efficiency. Omni3D solutions help maintain the train fleet's safety and efficiency at the forefront by adhering to evolving regulations and embracing innovative solutions.

OMNI3D ADVANCED TECHNOLOGY ENABLES:



On-demand Parts Production

Eliminate reliance on external suppliers and dependence on discontinued parts by **digitally manufacturing** replacements in-house.



Cost Savings:

Minimize the need for expensive stockpiling of spare parts thanks to **virtual inventory** and production in place.



Reduced Lead Times and Downtime:

Streamline maintenance processes with rapid prototyping and production of critical components, **minimizing downtime**.



Increased Fleet Reliability:

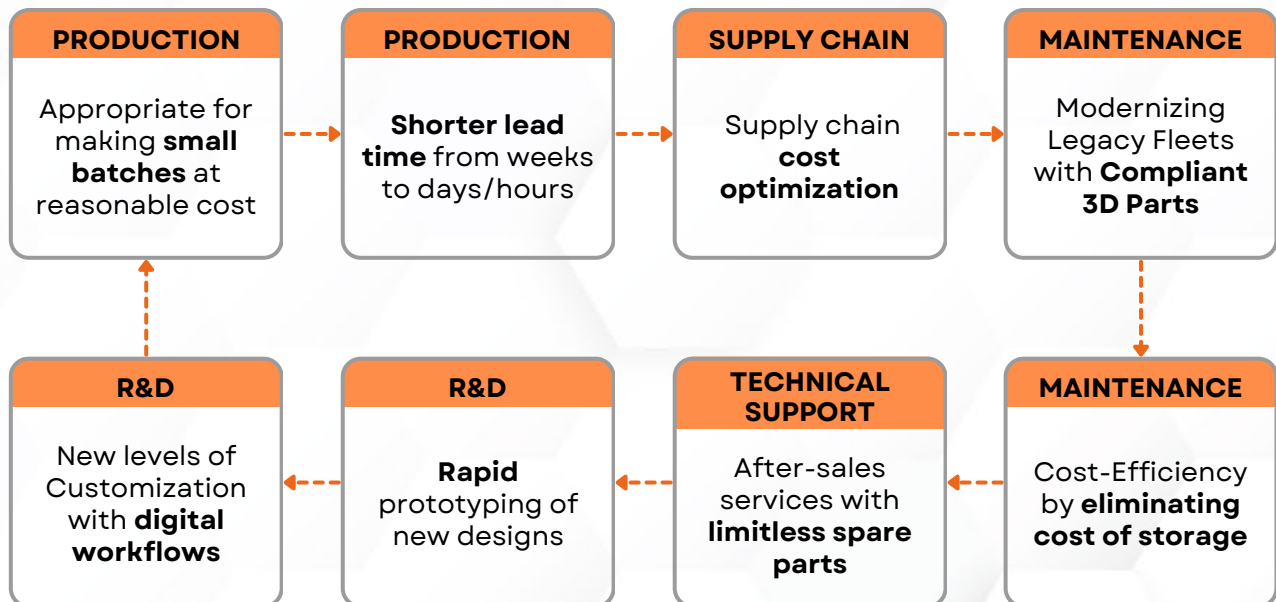
Ensure your trains operate smoothly and **reliably** with readily available replacements.



Enhanced Performance:

Upgrade the train fleet with state-of-the-art components using certified materials specifically engineered for railway applications. This ensures durability and **compliance with stringent regulations** and up-to-date fire safety standards like EN-45545 for railway applications.

BENEFITS FOR ALL AND EACH TEAM INVOLVED



EUROPEAN railways use approximately **65,000 locomotives** and **65,000 train wagons**.



NORTH AMERICAN railroads operate **1,471,736 freight cars** and **31,875 locomotives** in service.



INDIAN railways operate over **13,000 trains** daily with a fleet of over **14,800 locomotives**.

EN 45545-2**EUROPEAN RAILWAY STANDARD FOR FIRE SAFETY**

All materials used in rail vehicles must follow the EN 45545-2 standard.

(R)

The Requirement Class (R) specifies the necessary tests to ensure a material's fire safety in its designated application.

(HL)

The EN 45545-2 standard plays a vital role, dictating the assessment of hazard levels (HL) for railway vehicles.

This standard takes a two-pronged approach, depending on:

- » the **design category** (based on factors like passenger capacity and number of storeys) and
- » the **operational category** (considering the environment the vehicle operates in, like tunnels).

NADS**Design Category**

Normal Vehicles
Automatic Train
Double Decks
Sleeping Vehicles

(OC)**Operation Category (OC)**

- 1** - On infrastructure (No Tunnel)
- 2** - Underground Tunnel <5km
- 3** - Underground Tunnel >5km
- 4** - No side evacuation

OPERATION CATEGORY		DESIGN CATEGORY			
		N Standard	A Automatic trains without personnel	D Double-decker vehicles	S Sleeping and slumber cars
OC 1	 No tunnel operation	HL1	HL1	HL1	HL2
OC 2	 Tunnel max. 5km	HL2	HL2	HL2	HL2
OC 3	 Tunnel > 5km	HL2	HL2	HL2	HL3
OC 4	 No lateral evacuation	HL3	HL3	HL3	HL3

With a complete ecosystem, Omni3D offers ready-to-implement solutions with novel, high-performance equipment and certified filaments designed to achieve the highest Hazard Level (HL3) for demanding applications requiring R1, R6, R22, and R23 compliance.



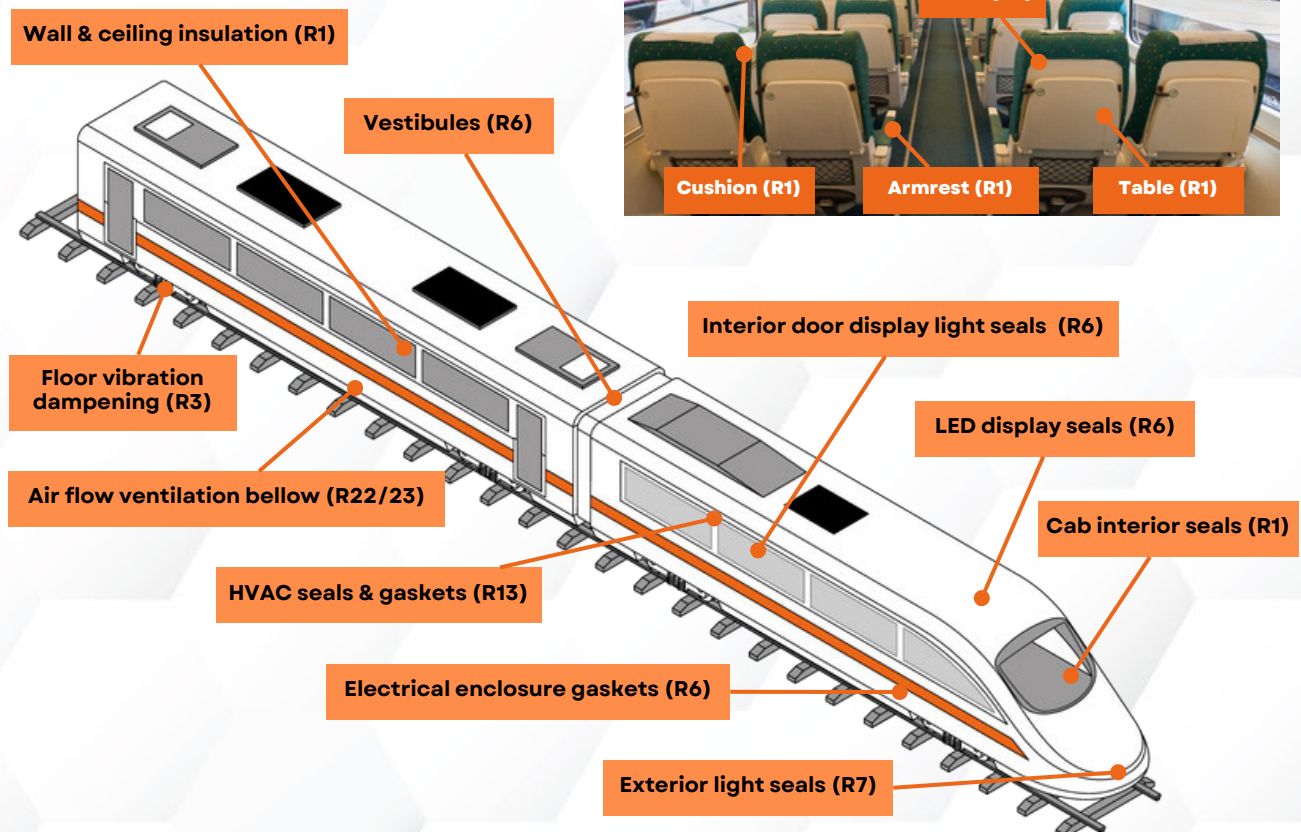
REQUIREMENT CLASSES (R)

R1 requirements for horizontal / vertical interior surfaces, e.g. cladding, ceiling and walls, window frames or display screens.

R6 requirements for Seats

R22 requirement for Sealings & hoses – interior

R23 requirements for Sealings & hoses - exterior



SOME EN 45545-2 COMPLIANT MATERIALS

MATERIAL	CLASSIFICATION ACCORDING TO EN 45545-2 ON PRINTED PARTS				OMNi3D PRINTER
	R1	R6	R22	R23	
ABS EN 45545			HL3	HL3	OMNi TECH 
PC ABS FR LS			HL3 (1.5mm)	HL3 (1.5mm)	OMNi PRO 
PC FR LS	HL3 (3mm)	HL3 (3mm)			
Iglidur® RW370				HL1 (4mm)	
PEI (ULTEM™) 9085		HL3			OMNi PRO HT 



OMNi PRO HT

PEI 9085: THE HIGH-PERFORMANCE POLYMER FOR DEMANDING RAILWAY APPLICATIONS

PEI (ULTEM™) 9085 resin offers exceptional mechanical properties, including resistance to chemicals, wear, fatigue, creep, and high temperatures. Its **inherent flame resistance** and dielectric properties make it a prime choice for critical railway components.

However, realizing PEI's full potential demands precise processing conditions. **Omni PRO HT's** heated build chamber, **uniformly operating above 200°C**, is crucial. This controlled thermal environment prevents warping, ensuring optimal part quality and maximizing PEI's inherent strengths. Omni3D's advanced technology delivers the precision and control required for **successful PEI 3D printing**. Our systems are engineered to handle the specific challenges of high-performance polymers, guaranteeing exceptional part quality and reliability.

 CASE IN POINT:
REAL-WORLD EXAMPLES

The railway industry is undergoing a transformative shift, driven by the need for efficiency, cost-effectiveness, and operational resilience. 3D printing emerges as a powerful tool for addressing these challenges. Beyond rapid prototyping, this technology is now delivering tangible solutions for **manufacturing, maintenance, and tooling** within the railway sector.

From producing replacement parts for legacy equipment to creating innovative components for high-speed trains, 3D printing is proving its value in real-world applications. By offering on-demand production, reduced lead times, and the ability to create complex geometries, this technology is reshaping the future of railway operations:

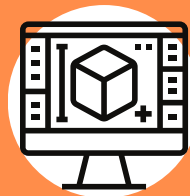
- » **On-Demand Spare Parts:** Overcome supply chain challenges by manufacturing replacement parts directly on-site, minimizing downtime and ensuring operational readiness.
- » **Lightweight and High-Strength Components:** Produce lightweight yet robust parts to optimize train performance and reduce fuel consumption.
- » **Compliance and Safety:** Adhere to stringent industry regulations, such as EN 45545, with our advanced materials and printing processes.

**MANUFACTURING**

Steering covers,
seat handles,
headrest, etc...

**MAINTENANCE**

Renew obsolete
fleet with on-
demand parts.

**PROTOTYPING**

Building & testing
prototypes for
efficiency

**TOOLING**

Producing lighter
jigs & fixtures on
demand



SMALL SERIES PRODUCTION

TRAMCAR FRONT PANEL

APPLICATION

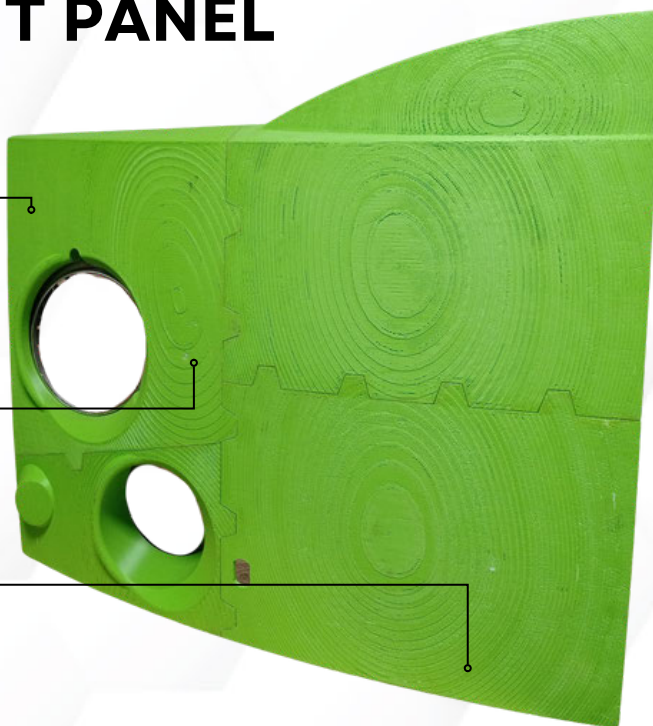
Front Panel

MATERIAL

ABS EN45545

WEIGHT

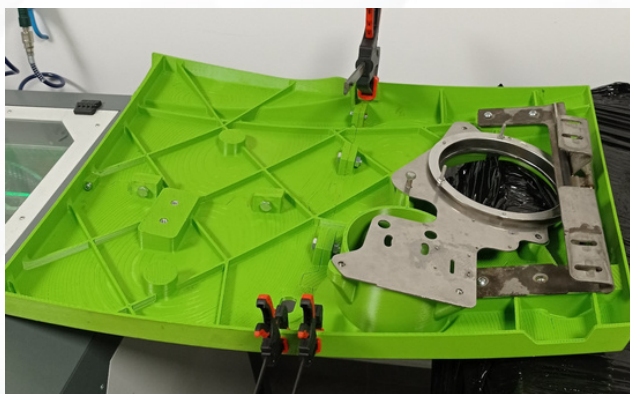
4400 g



Omni3D delivered a cost-effective solution for producing 1-200 streetcar front covers, eliminating the need for costly injection molds.

Our EN45545 certified (HL1, HL2, HL3) ABS filament, printed on the Omni TECH, ensured a robust part capable of withstanding harsh environmental conditions. ABS EN45545 can be treated with certified varnishes and paints.

By combining rapid production, material compliance, and advanced printer features, client's needs were successfully met for both quantity and quality.





SMALL SERIES PRODUCTION

TRAIN COMPONENTS

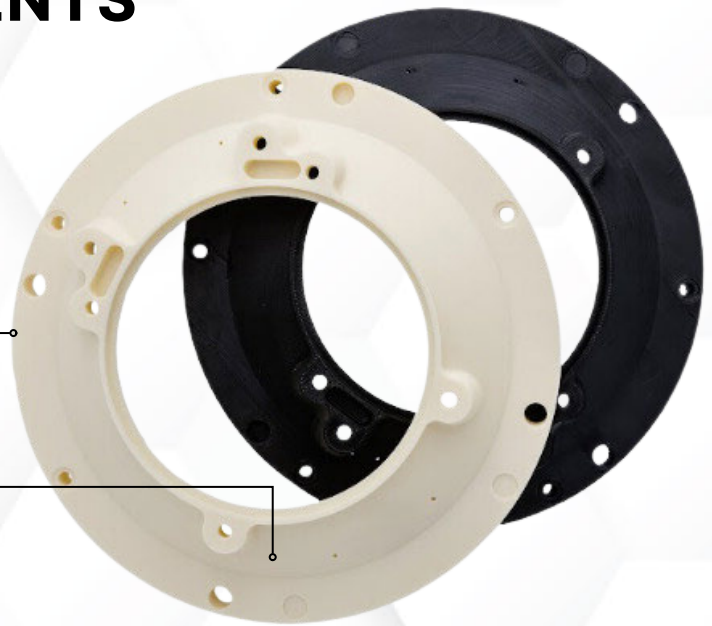


APPLICATION

Locomotive head light

MATERIAL

ABS EN45545

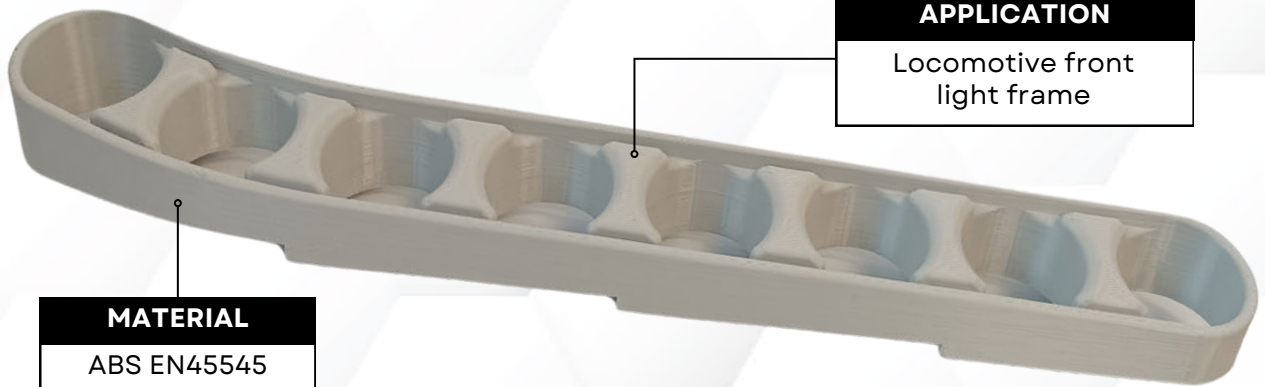


APPLICATION

Locomotive front
light frame

MATERIAL

ABS EN45545



PESA is using large-format Omni3D printers to manufacture parts for train formations. Omni3D solutions allowed PESA to overcome challenges associated with low-quantity parts by printing them in-house, and on-demand. This eliminated the need for extensive stockpiling and minimized costs when outdated components required replacement or upgrades.



MAINTENANCE



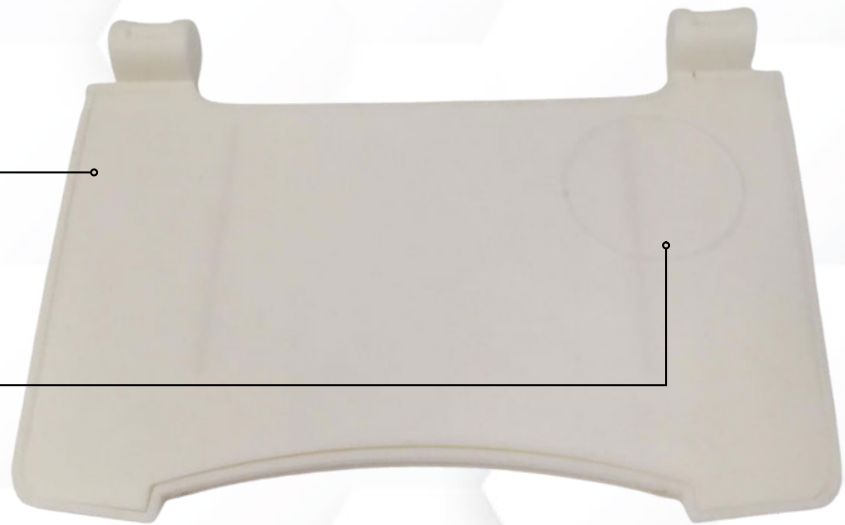
FUNCTIONAL END-USE PARTS

FOLDING TABLE - R1**APPLICATION**

Small series production
of folding tables for cars

MATERIAL

PC FR LS



The folding table for railway cars designed by Omni3D demonstrates a significant leap in innovation.

Utilizing advanced 3D printing technology, these tables are not only cost-effective but also highly functional. The ability to produce these tables on-demand allows for quick replacements and customizations, ensuring that train interiors can be upgraded or repaired with minimal downtime.

Additionally, the lightweight design of these 3D printed tables contributes to overall energy efficiency in train operations.

	CNC	3D PRINTED	SAVE
TIME	8 WEEKS	1 WEEK	87.5% (7 WEEKS)
COST	€900 *MOQ: 9 UNITS	€300 *MOQ: 9 UNITS	66% (€600)



MAINTENANCE

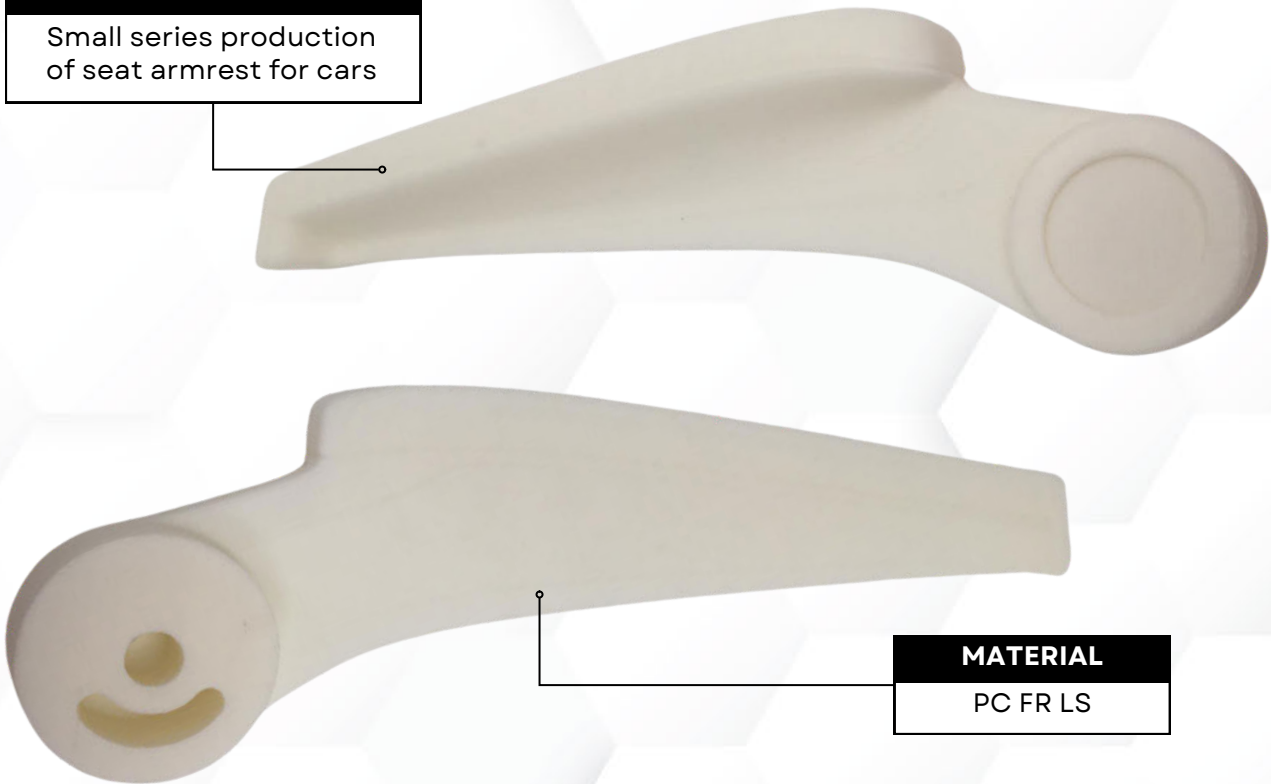


FUNCTIONAL END-USE PARTS

SEAT ARMREST - R1

APPLICATION

Small series production
of seat armrest for cars



MATERIAL

PC FR LS

The railway seats produced using Omni3D's technology exemplify the potential of 3D printing in creating comfortable, durable, and safe seating solutions.

The ability to rapidly prototype and test different designs ensures that the final product meets the highest standards of comfort and safety. Moreover, the materials used comply with stringent fire safety regulations, making them suitable for various railway applications.

The innovative design process not only enhances passenger comfort but also contributes to the aesthetic and functional quality of modern train interiors.



TRAIN SEAT PROTOTYPE - R6

POLGAR



Thanks to Omni3D systems, **POLGAR KFT** achieved significant cost savings. The use of 3D printing enabled testing the train seat design faster and more cost-effectively. The dimensional accuracy of the 3D printed parts enabled a functional prototype before moving forward with production.

Time and cost comparison between technologies:

	INJECTION METHOD	3D PRINTED	SAVINGS
TIME	16 weeks	3 weeks	80% (13 weeks)
COST	€400,000	€30,000	90% (€370,000)



SMALL SERIES PRODUCTION

TOILET SEAT FOR PKP INTERCITY - R1

**MATERIAL**

PC ABS FR LS



PKP is fostering train maintenance by leveraging Omni3D's solutions. PKP is currently producing critical spare parts, like toilet seats, directly on-demand, eliminating the need for extensive stockpiling and long lead times associated with traditional manufacturing.

- » **Reduced downtime:** quickly print replacement parts in-house, minimizing disruptions to train operations and passenger schedules.
- » **Optimized inventory management:** eliminate the need to store large quantities of low-usage spare parts, freeing up valuable space and reducing costs.
- » **Enhanced part availability:** ensure a readily available supply of spare parts, regardless of production status or obsolescence.

EXPANDING MATERIAL HORIZONS FOR DIVERSE APPLICATIONS WITH OMNI3D

Omni3D printers offer a wide range of material compatibility, ensuring the perfect solution for any specific applications. While our EN 45545 certified materials cater to the stringent requirements for end-use railway parts, the Omni3D material portfolio allows you to explore a broader spectrum of engineering polymers. Discover the extensive selection of CF-reinforced materials, PAs, elastomers and high-performance polymers compatible with our 3D printers.



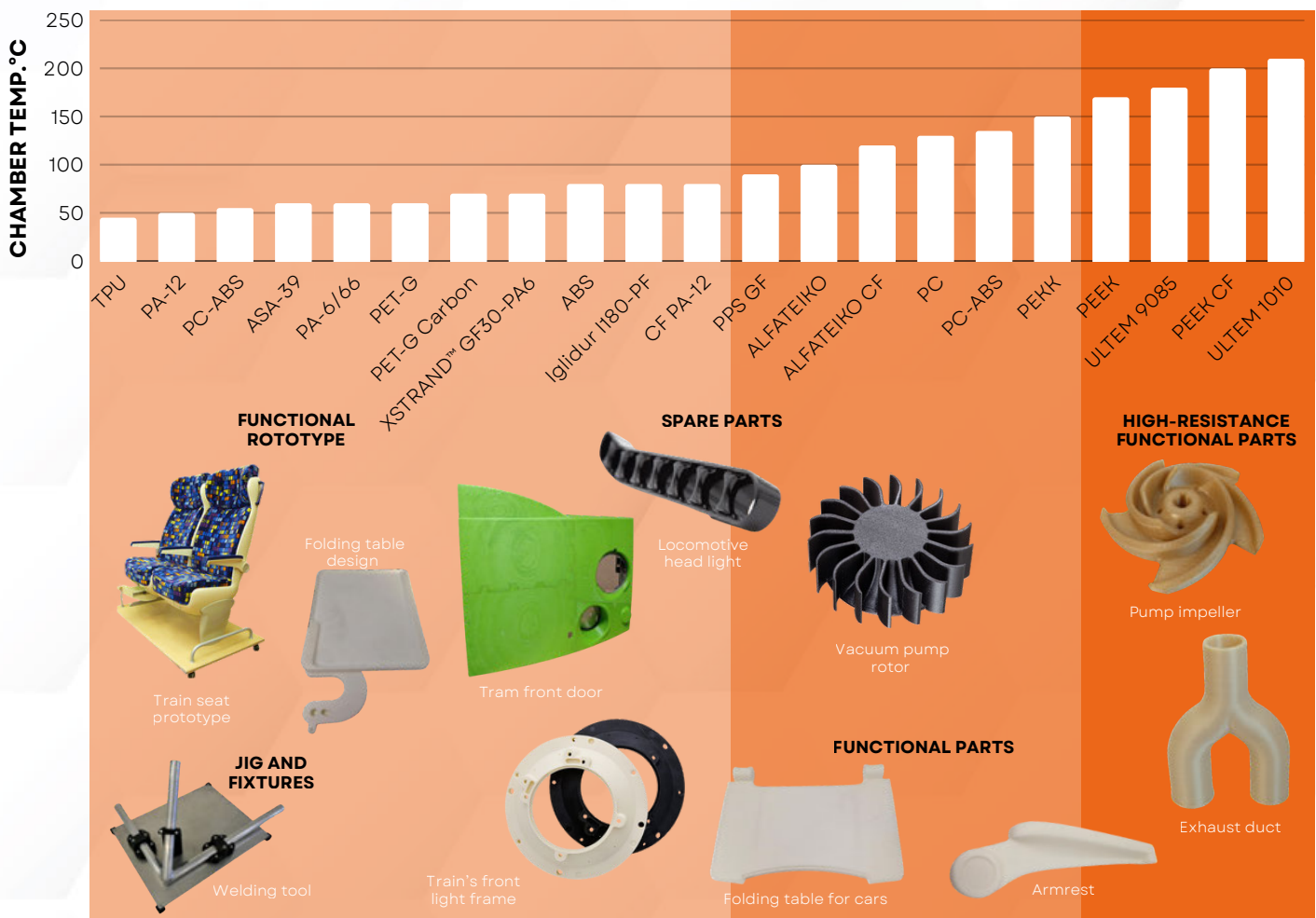
OMNI TECH



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.



MAINTENANCE



LEGACY EQUIPMENT

VACUUM PUMP ROTOR



MATERIAL

CF PA-12



WEIGHT

872g



Omni3D designed and manufactured a 3D-printed pump rotor mount, successfully replacing the existing brass component. This innovative solution proved ideal for **Luk-Plast's** harsh operating environment, continuously exposed to high temperatures, aggressive chemicals, water and gas.



The 3D-printed turbine, boasting resistance to extreme mechanical stress, continues to operate flawlessly at high speeds (up to 1400 rpm) and continuous duty.



FUNCTIONAL END-USE PARTS

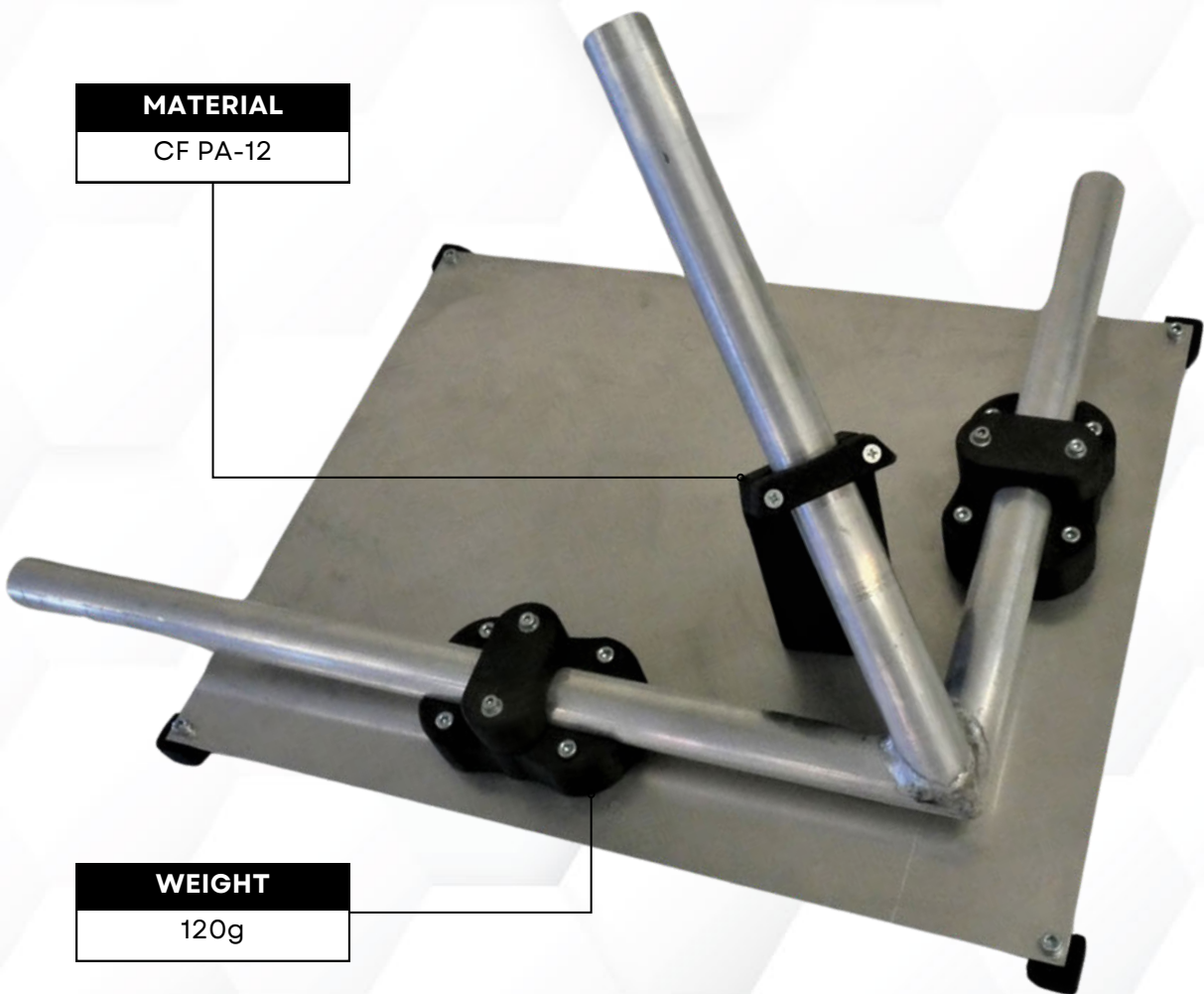
WELDING POSITIONER

MATERIAL

CF PA-12

WEIGHT

120g



Our 3D printed welding tools redefine efficiency and accuracy. Crafted from durable, heat-resistant material, this tool delivered exceptional precision, enhancing welding outcomes. Real-world applications have proven their ability to boost productivity, reduce costs, and provide a clear competitive advantage.



FUNCTIONAL END-USE PARTS

SIZING JIG

MEYRA®

APPLICATION

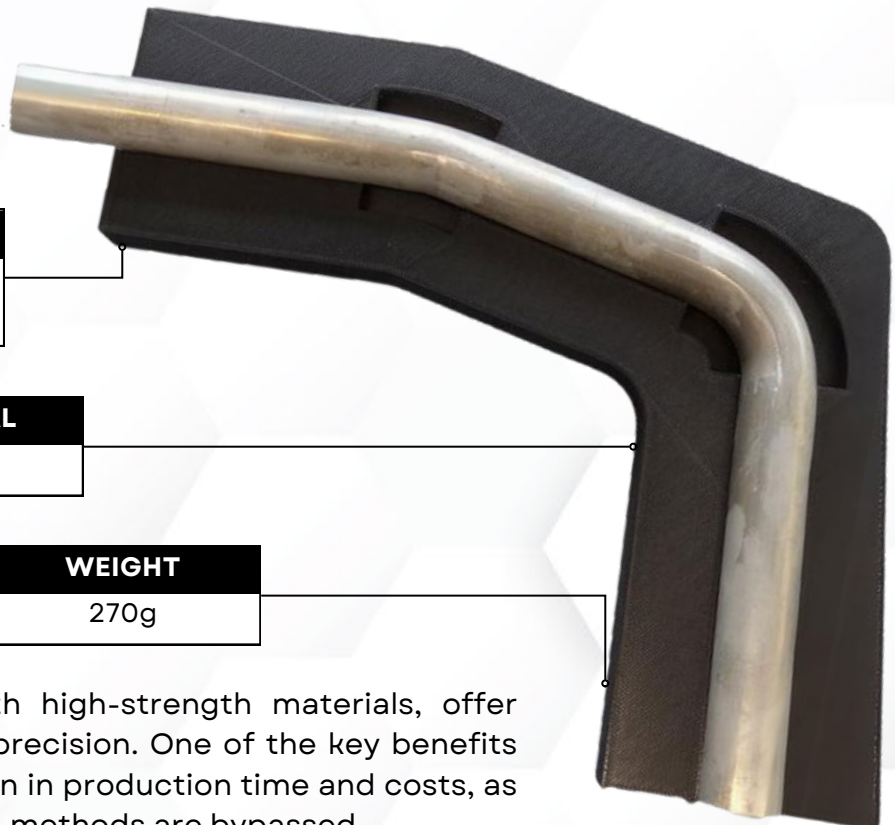
Measuring tool for
production processes

MATERIAL

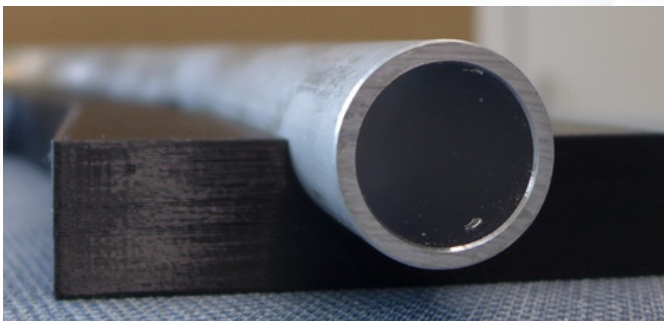
PET-G

WEIGHT

270g



These tools, printed with high-strength materials, offer improved durability and precision. One of the key benefits is the significant reduction in production time and costs, as traditional manufacturing methods are bypassed.



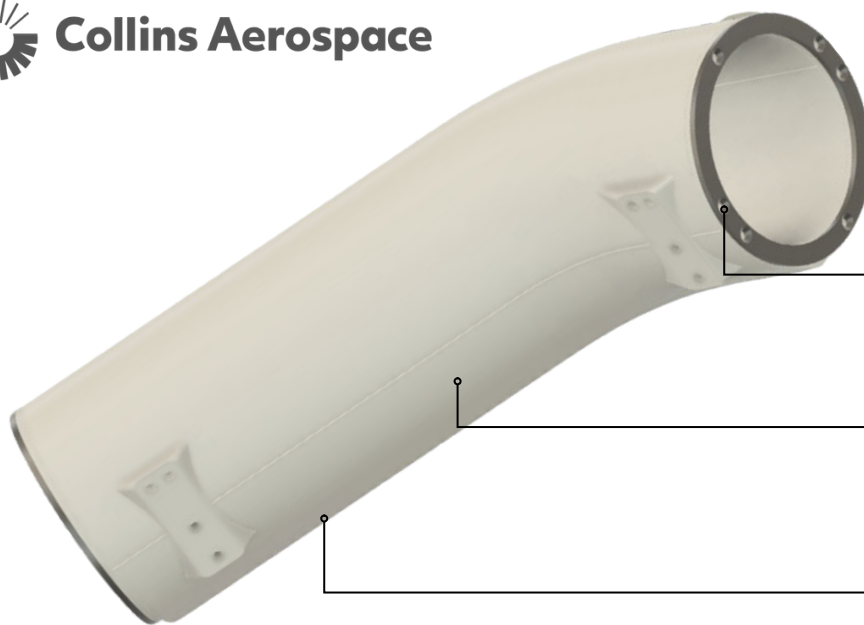
Operators have highlighted the ergonomic improvements, noting that these tools are lighter and easier to handle, which reduces fatigue and increases productivity during maintenance tasks.

	CNC	3D PRINTED	SAVINGS
COST	€150	€15	90% (€135)



FUNCTIONAL END-USE PARTS

PRECISION CUTTING JIG



Precisely cut 5-inch
diameter pipes

MATERIAL

ABS

WEIGHT

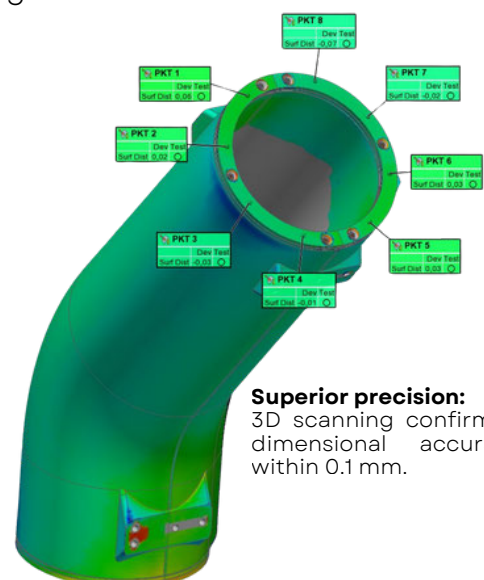
481g

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.

OMNIBD

RAILWAY



TRUSTED BY:



BAE SYSTEMS



**IVECO
BUS**



MAHLE

MEYRA®



OLYMPUS®



SAFRAN
HELICOPTER ENGINES



SKF

SIEMENS



OMNI3D

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