

# OMNI3D

PRINT LARGE FUNCTIONAL PARTS

## RAILWAY APPLICATIONS

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## EN 45545-2 Certified Materials

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[www.omni3d.com](http://www.omni3d.com)



ISO 9001:2015 Certified  
(Quality Management)



European Union  
European Regional  
Development Fund



## 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 maintaining 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 Part 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:

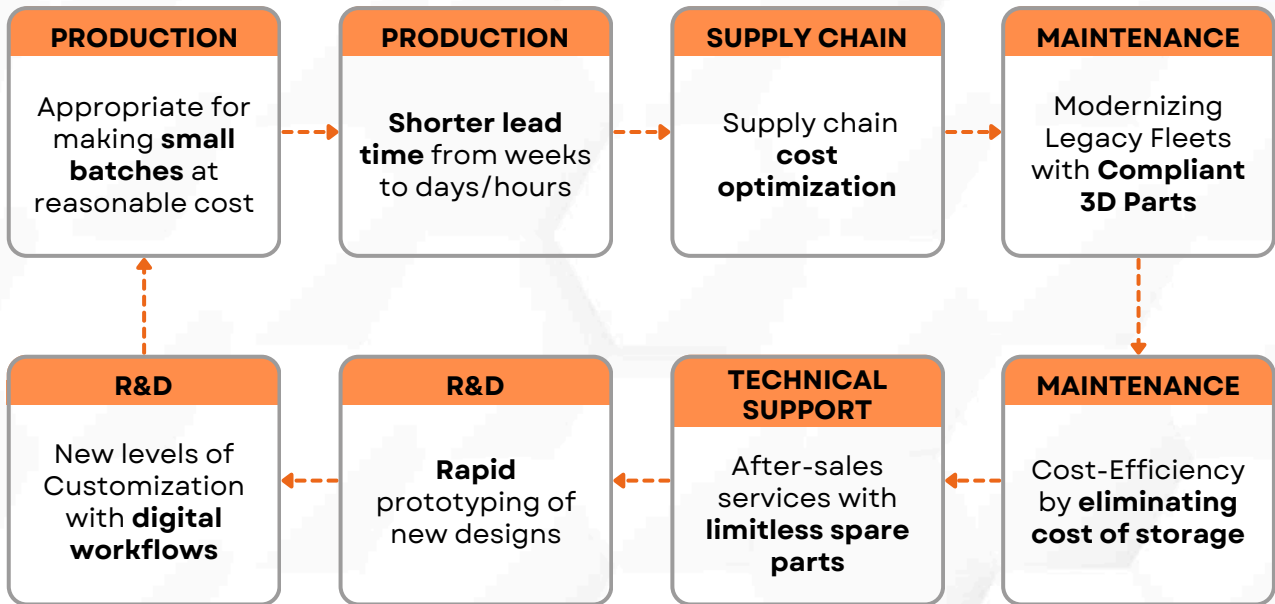
Ensure your trains operate smoothly and **reliably** with readily available replacements.



#### 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

**N** Normal Vehicles  
**A** Automatic Train  
**D** Double Decks  
**S** 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
<b>OC 1</b>	 No tunnel operation	<b>HL1</b>	<b>HL1</b>	<b>HL1</b>	<b>HL2</b>
<b>OC 2</b>	 Tunnel max. 5km	<b>HL2</b>	<b>HL2</b>	<b>HL2</b>	<b>HL2</b>
<b>OC 3</b>	 Tunnel > 5km	<b>HL2</b>	<b>HL2</b>	<b>HL2</b>	<b>HL3</b>
<b>OC 4</b>	 No lateral evacuation	<b>HL3</b>	<b>HL3</b>	<b>HL3</b>	<b>HL3</b>

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.



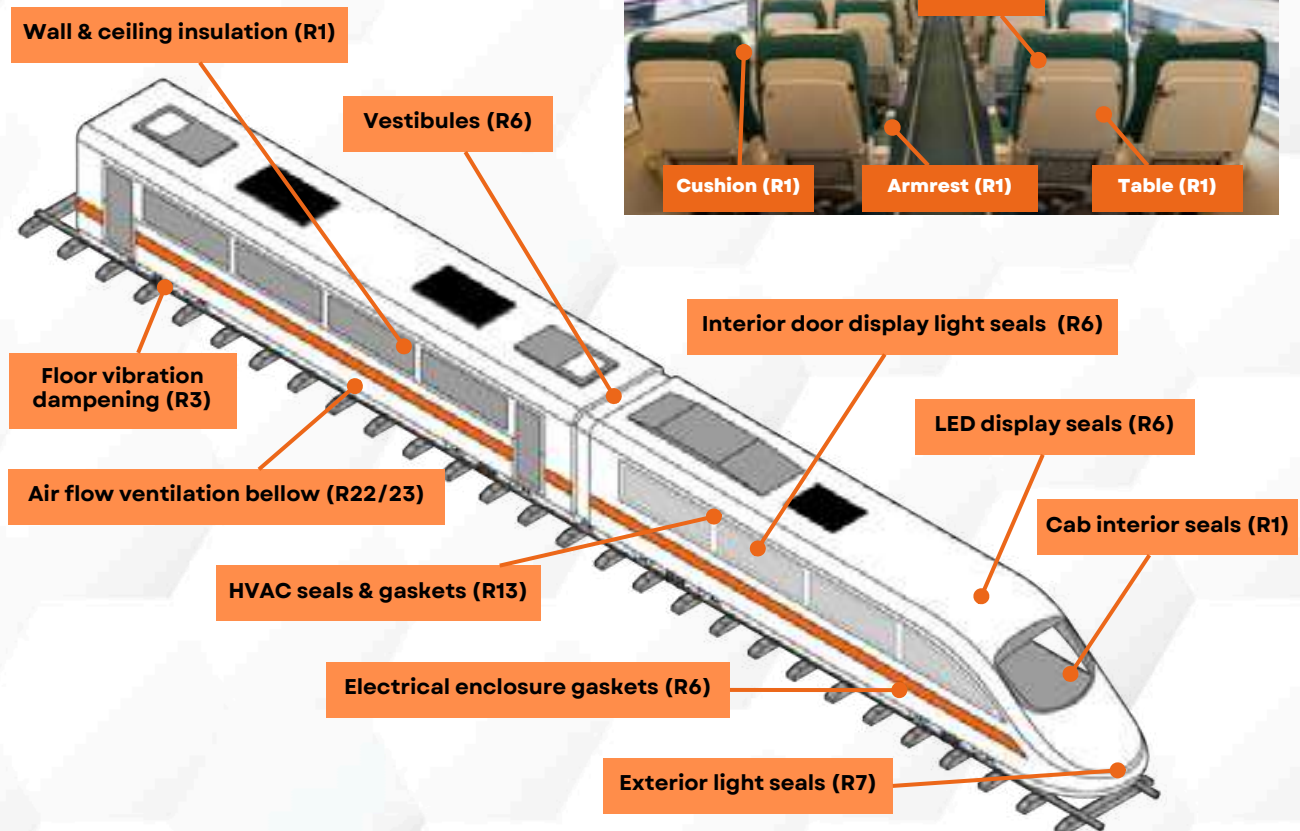
## REQUIREMENT CLASSES (R)

**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 



OMNiPROHT

### 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.



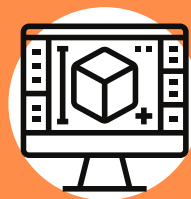
### MANUFACTURING

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



### MAINTENANCE

Renew obsolete  
fleet with on-  
demand parts.



### PROTOTYPING

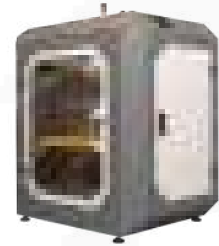
Building & testing  
prototypes for  
efficiency



### TOOLING

Producing lighter  
jigs & fixtures on  
demand

## MANUFACTURING



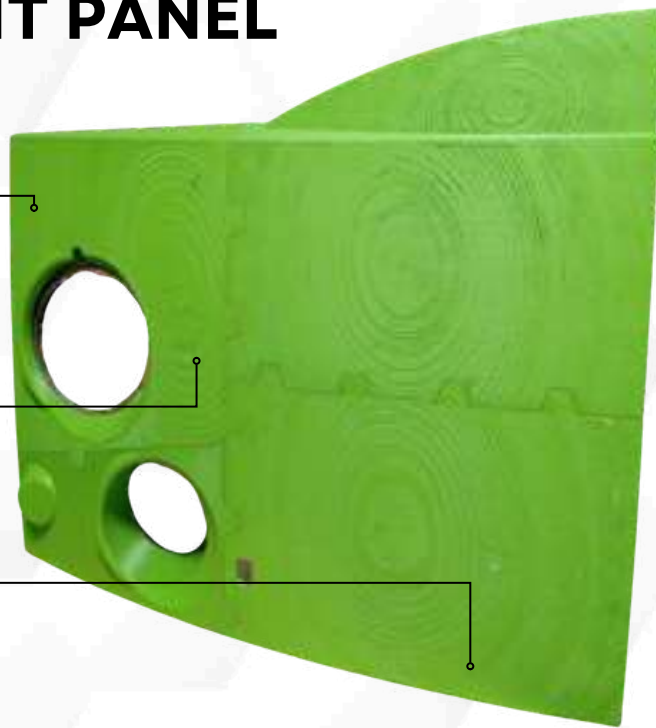
SMALL SERIES PRODUCTION

## TRAMCAR FRONT PANEL

**APPLICATION**  
Front Panel

**MATERIAL**  
ABS EN45545

**WEIGHT**  
4400 g



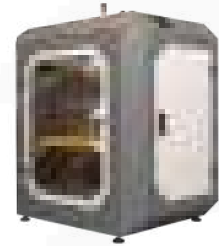
Omni3D delivered a cost-effective solution for producing 1-200 streetcar front covers, eliminating the need for costly injection molds.

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.



## MANUFACTURING



## SMALL SERIES PRODUCTION **TRAIN COMPONENTS**



### APPLICATION

Locomotive head light

### MATERIAL

ABS EN45545

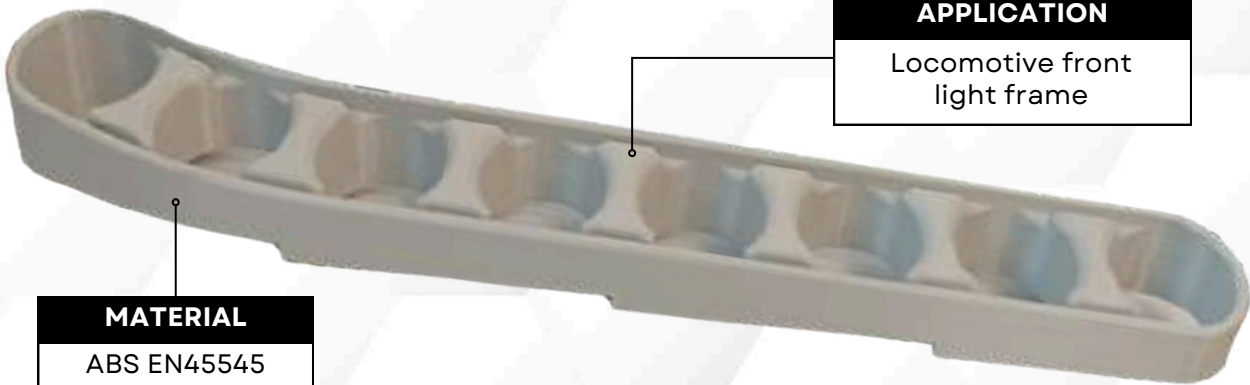


### APPLICATION

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

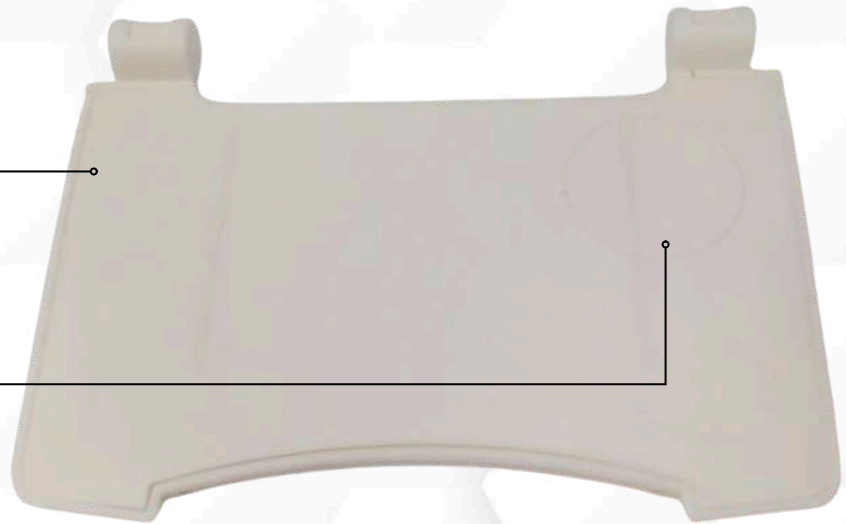
## FOLDING TABLE - R1

#### 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.

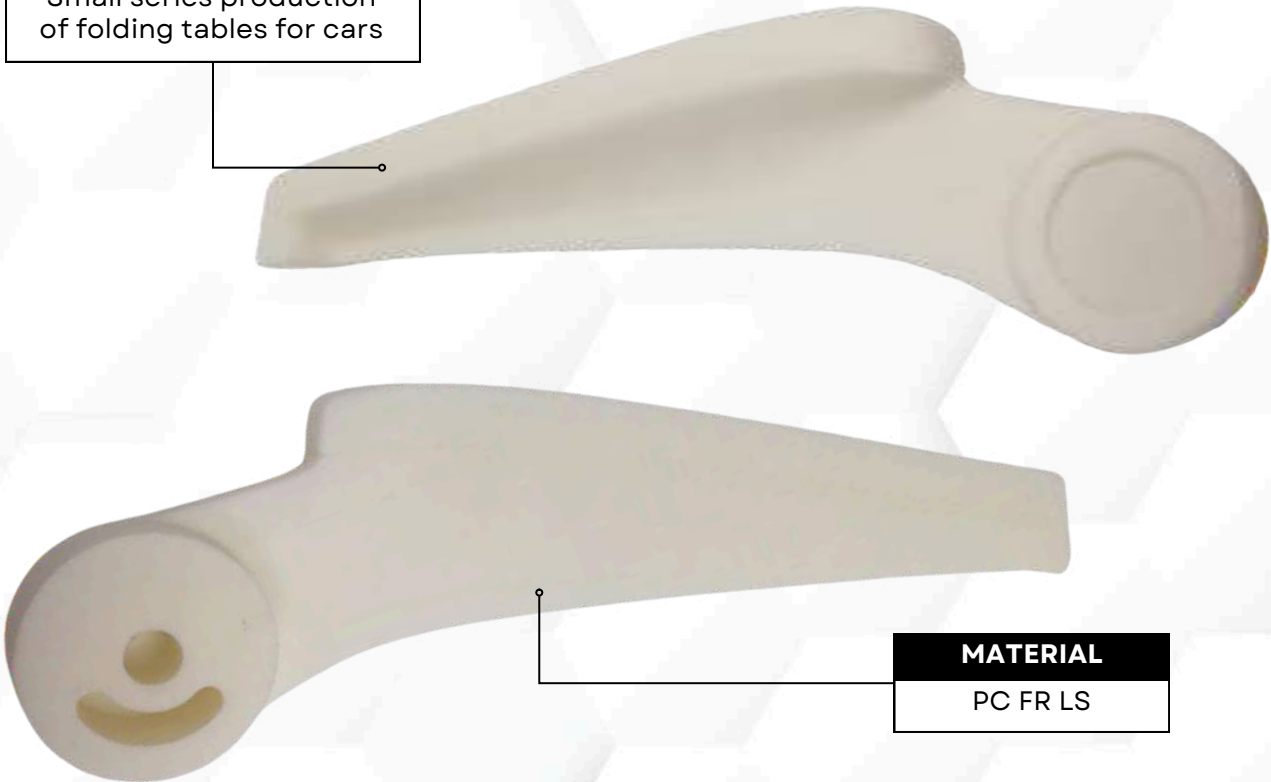
	CNC	3D PRINTED	SAVE
TIME	8 WEEKS	1 WEEK	87.5% (7 WEEKS)
COST	€900 *MOQ: 9 UNITS	€300 *MOQ: 9 UNITS	66% (€600)



## SEAT ARMREST - R1

### APPLICATION

Small series production  
of folding tables 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



**MATERIAL**  
PC FR LS

**DIMENSIONS**  
75x60 mm

**WEIGHT**  
10 kg

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)



MAINTENANCE



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.



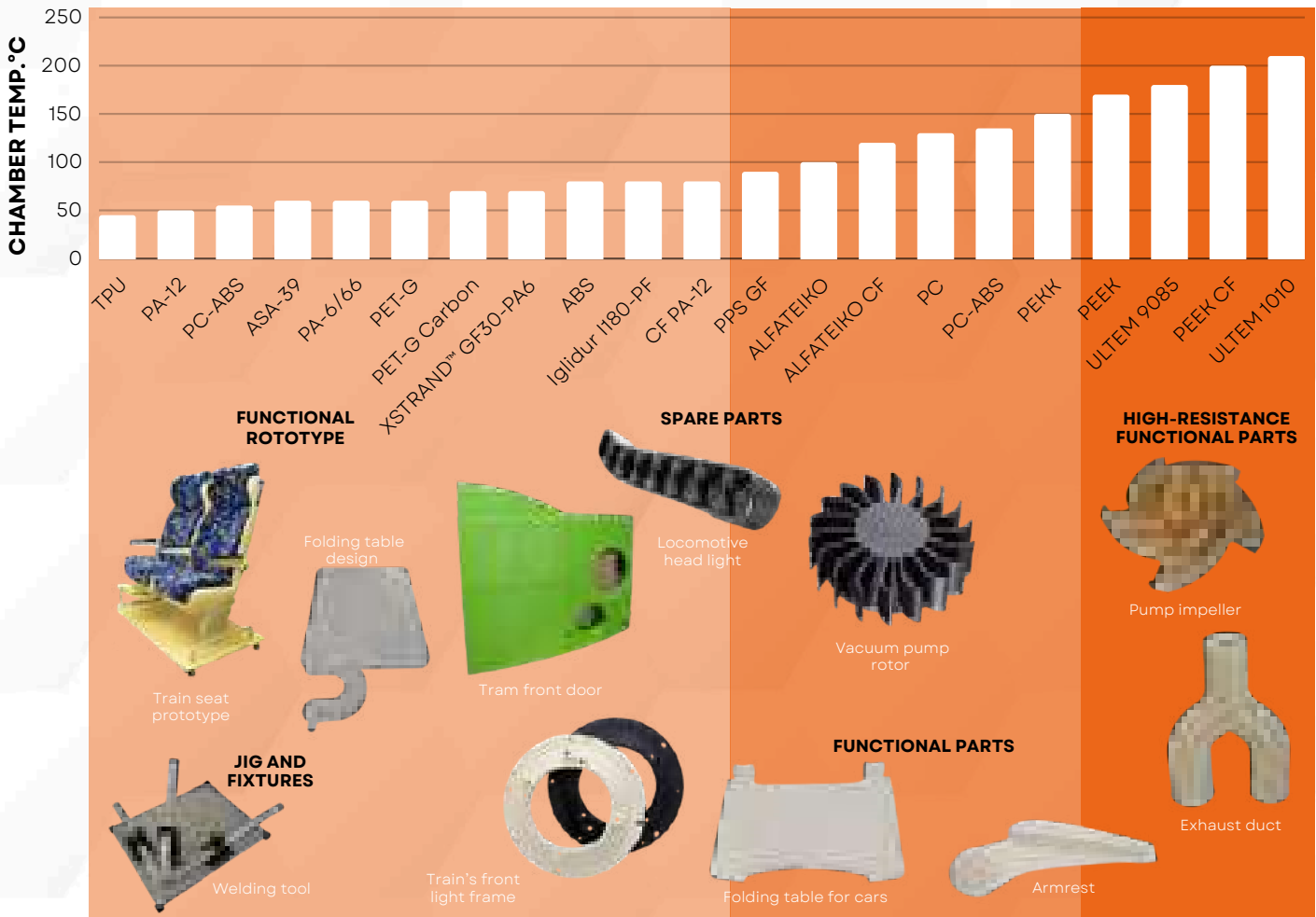
**OMNI TECH**



**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



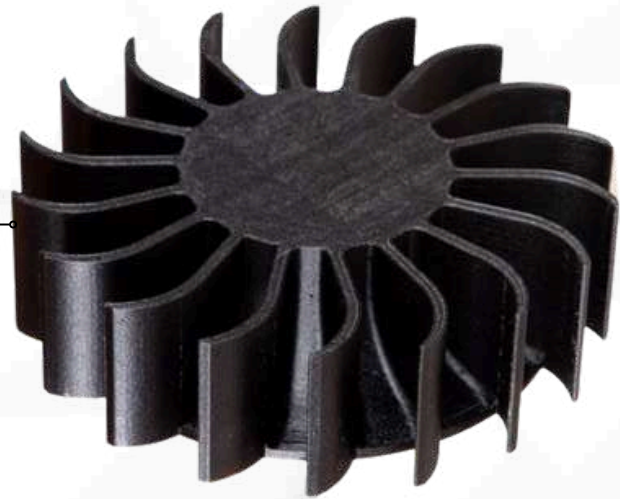
LEGACY EQUIPMENT

## VACUUM PUMP ROTOR



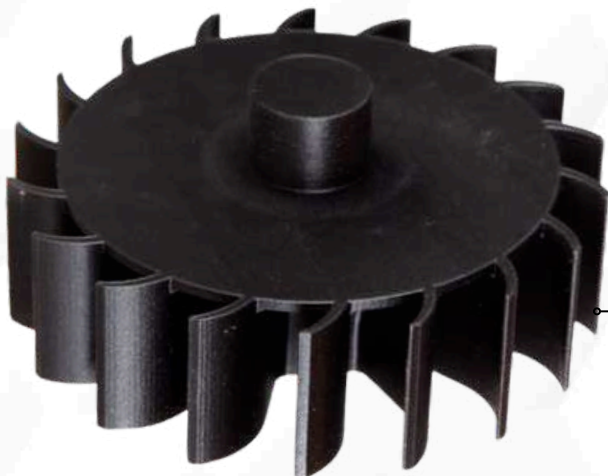
**MATERIAL**

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

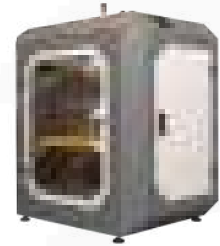
**WEIGHT**

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.

## TOOLING



### FUNCTIONAL END-USE PARTS

## SIZING JIG

**MEYRA**

**APPLICATION**

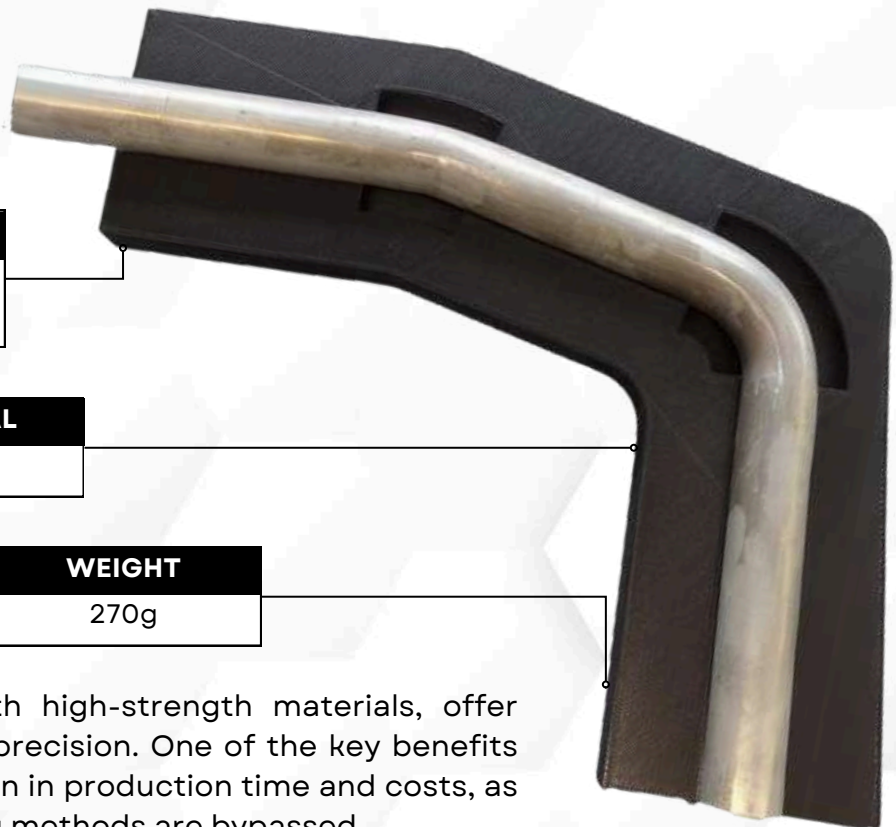
Measuring tool for production processes

**MATERIAL**

PET-G

**WEIGHT**

270g



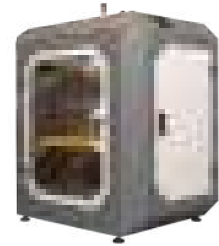
These tools, printed with high-strength materials, offer improved durability and precision. One of the key benefits is the significant reduction in production time and costs, as traditional manufacturing methods are bypassed.



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.

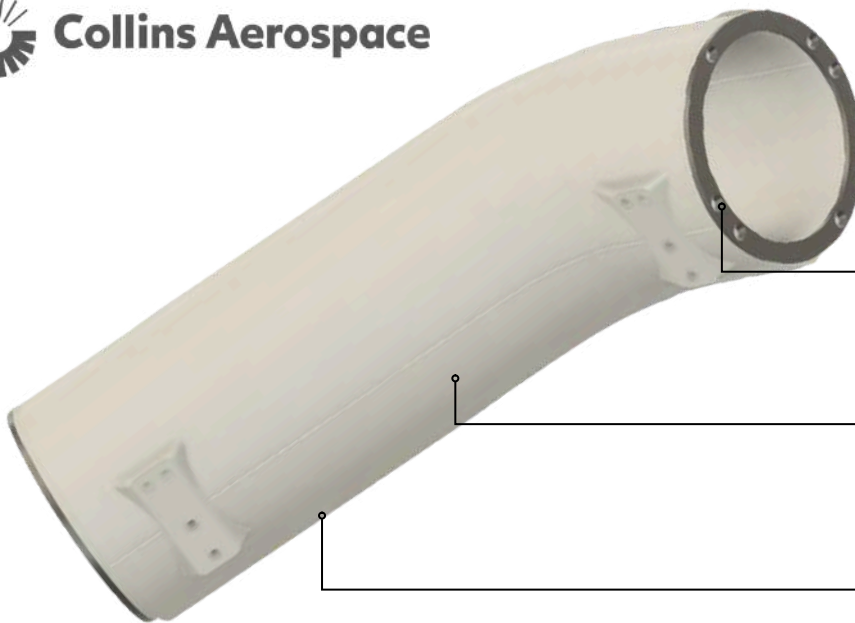
	CNC	3D PRINTED	SAVINGS
COST	€150	€15	90% (€135)

## TOOLING



### FUNCTIONAL END-USE PARTS

# PRECISION CUTTING JIG



Precisely cut 5-inch diameter pipes

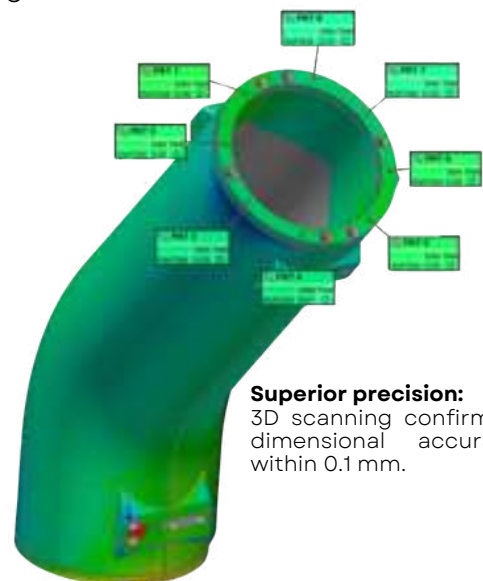
**MATERIAL**  
ABS

**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.

## **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.

## **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.



# OMNi3D

# RAILWAY

## TRUSTED BY:



# OMNI3D

**PRINT LARGE FUNCTIONAL PARTS**

**Get in contact with us:**  
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