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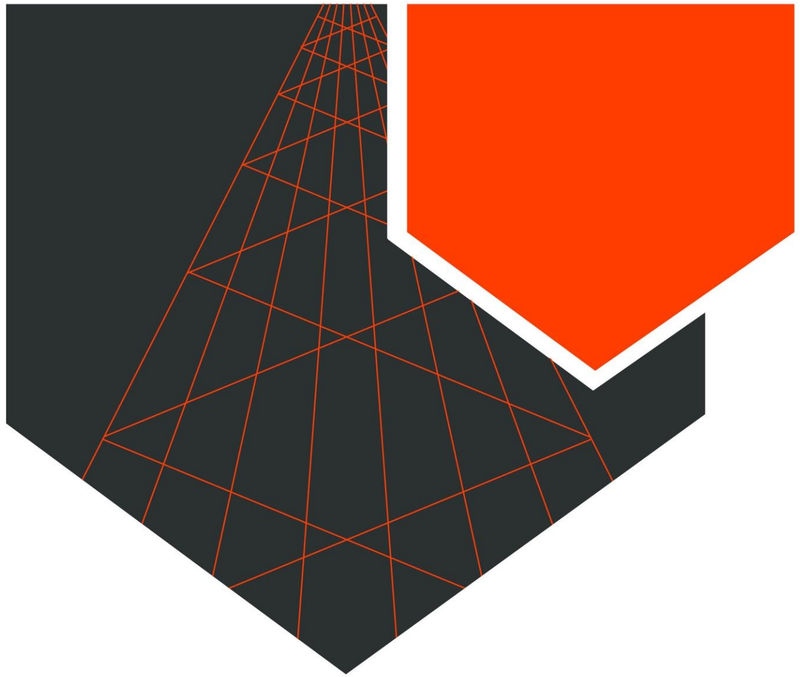


THE TECHNOLOGY FOR MANUFACTURING OF THE NEW GENERATION OF COMPOSITE MATERIAL PARTS

2X STRONGER
2X LIGHTER

ALUMINUM

anisoprint.com↗

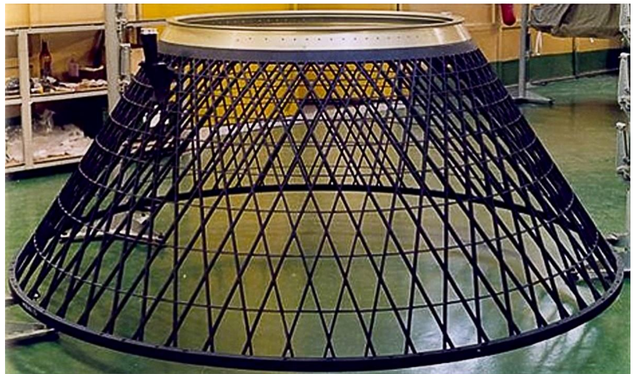
Composite structures should be designed and manufactured in a special way – the fibers should follow the load, and the best composite is unidirectional composite.

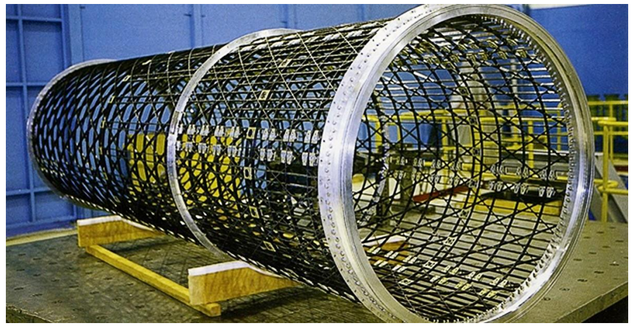
Composite 3D-printing combined with fiber steering concept and topology optimization, can result in a new generation lattice composite structures with improved performance.

ANISOPRINTING PHILOSOPHY

ANISOPRINT PHILOSOPHY

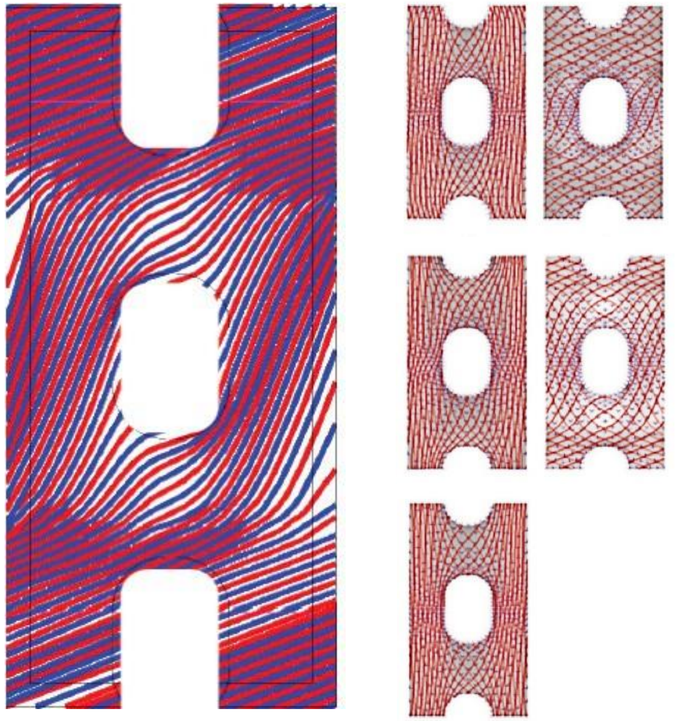
LATTICE STRUCTURE /





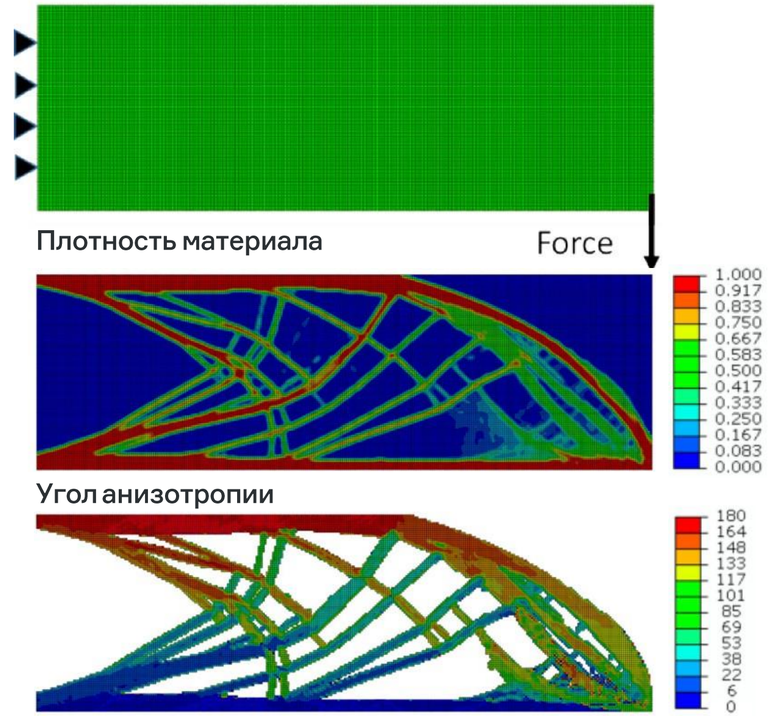
Anisogrid payload adapter
and spacecraft body

FIBER STEERING /



Composite fuselage panel with
complex fiber layup

TOPOLOGY OPTIMIZATION /



Topology optimization of anisotropic
cantilever beam

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ANISOPRINTING TECHNOLOGY

20 TIMES STRONGER than plastic
2 TIMES STRONGER AND LIGHTER than aluminum
7 TIMES LIGHTER then steel

- ↘ Internal structure and shape optimization
- ↘ Does not require special tools or molds
- ↘ Does not require curing or post processing
- ↘ Single-stage process fully automated process

NEW MATERIALS AND PROCESSES

Patented technology:

COMPOSITE FIBER COEXTRUSION

Patented materials:

REINFORCING COMPOSITE FIBER

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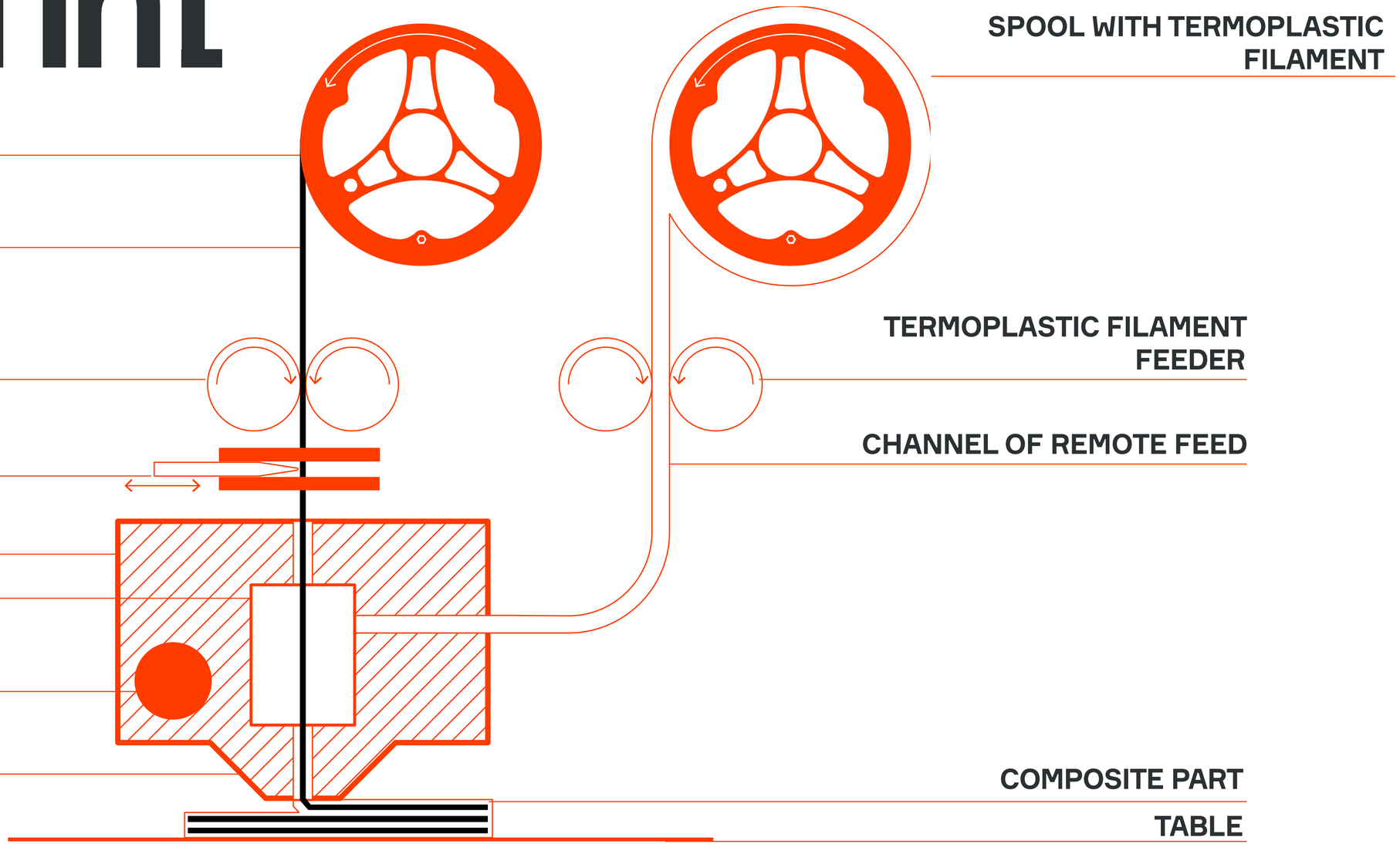

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3D PRINTING MATERIALS & TECHNOLOGIES

Solution combines low equipment price typical for FDM printers and capability of producing high performance structural elements

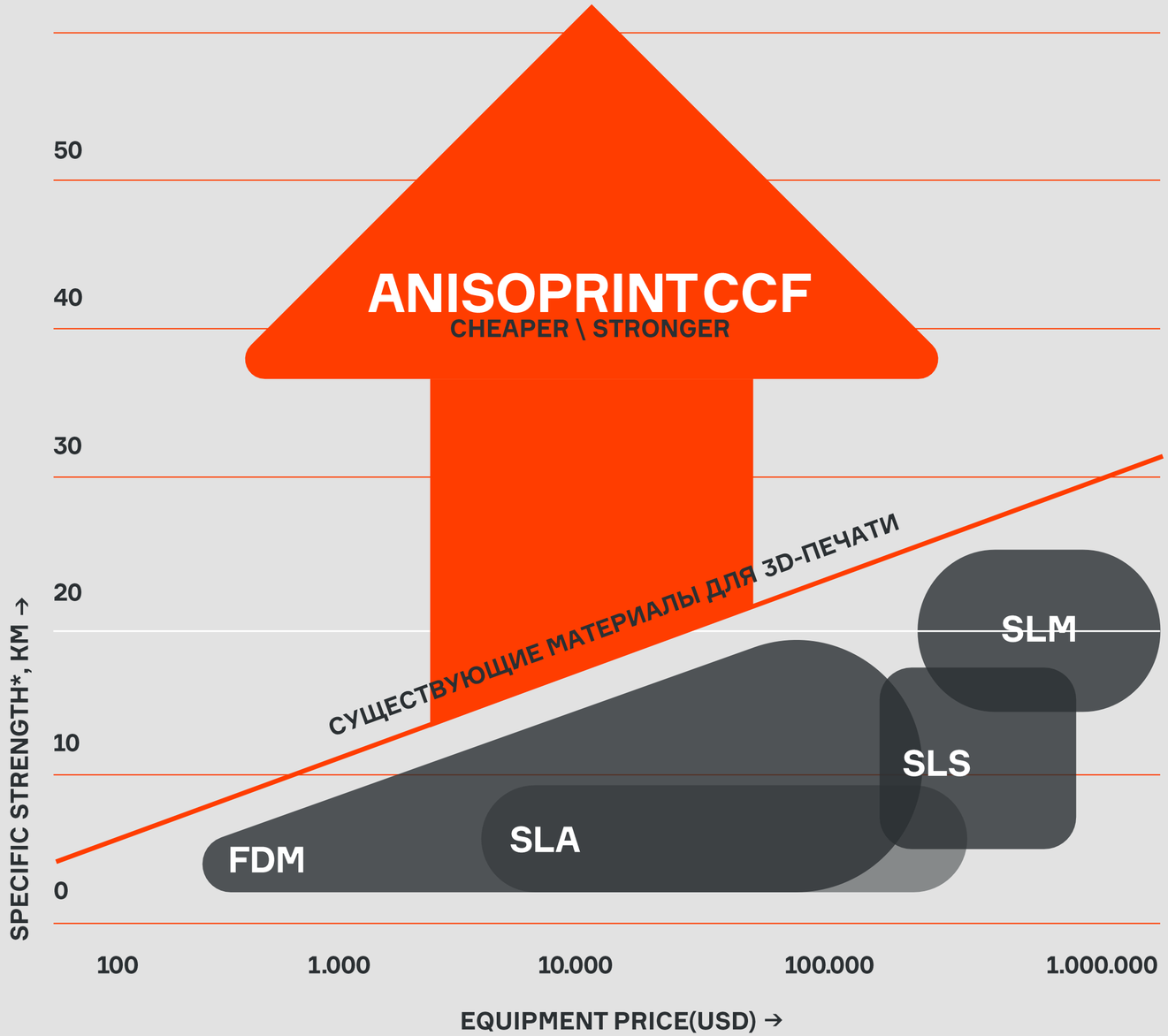
CCF – composite fiber co-extrusion

SLM – selective laser melting

SLS – selective laser sintering

SLA – stereolitography

FDM – fused deposition modeling



* Specific strength - is a measure of strength equivalent to the yield strength divided by the material density

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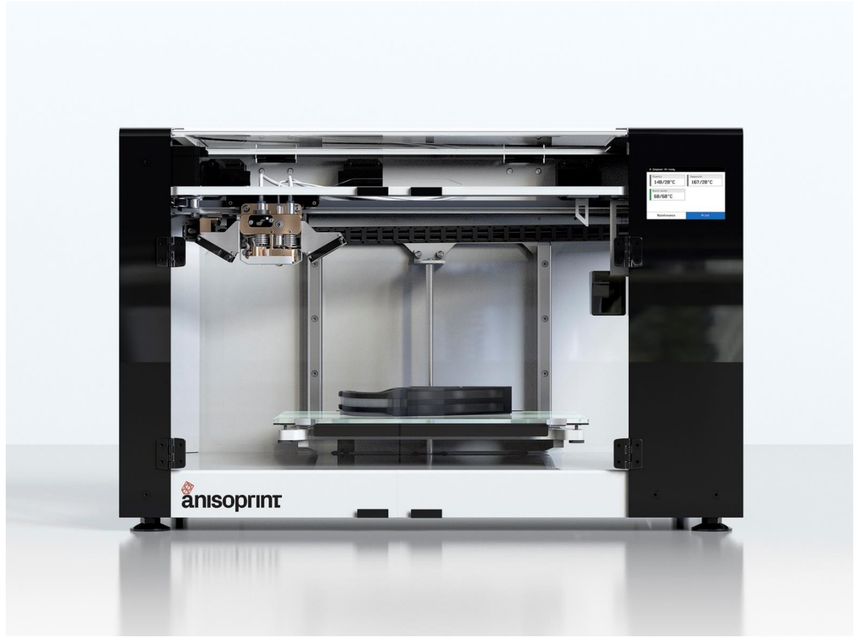
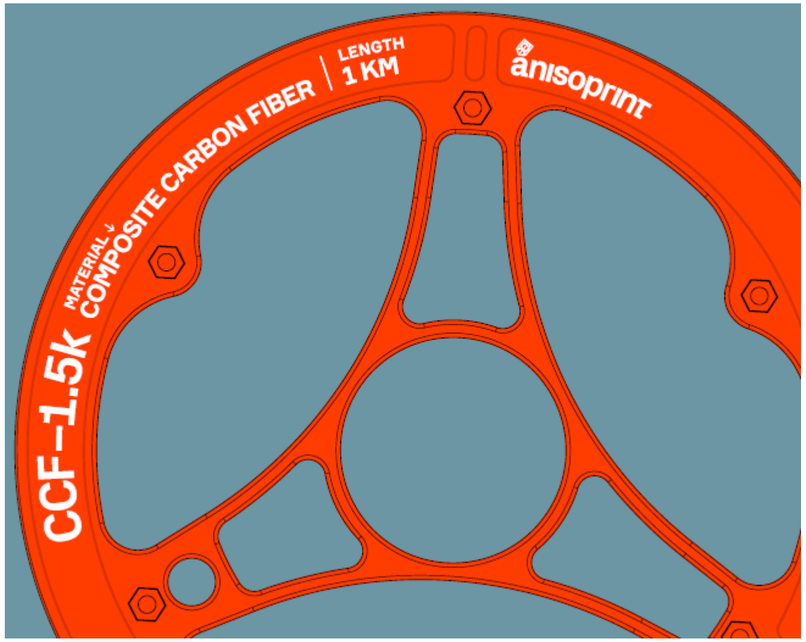
THREE PRODUCTS
ONE SOLUTION

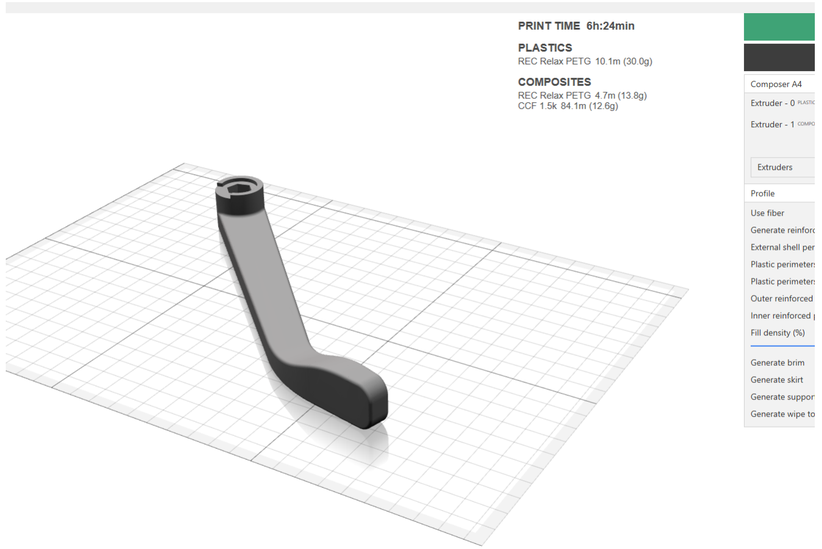
HARDWARE
ANISOPRINT COMPOSER A4



MATERIAL
COMPOSITE CARBON FIBER ANISORPINT CCF-1.5K



SLICER-SOFTWARE
ANISOPRINT AURA



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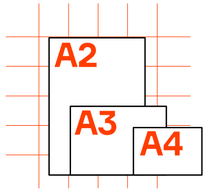
DESKTOP SYSTEM: ANISOPRINT COMPOSER

TWO SEPARATE NOZZLES / HEATED BED / ENCLOSED CHAMBER / LIGHTWEIGHT ALUMINUM FRAME / OPEN MATERIALS SYSTEM / DEDICATED SLICER SOFTWARE /

A4 297X210X147MM
A3 420X297X210MM
A2 594X420X297MM



1. Prints with dual nozzle print head;
2. Heats build plate (up to 120 °C bed temperature, removable glass surface, enclosed chamber).
3. Creates incredibly strong and lightweight parts (X20 stronger than plastic, X7 stronger that plastic compounds, X4 lighter than titanium).

↘ reinforce material— composite material Anisoprint CCF
↘ works with any 3D-printable plastic: PLA, ABS,Nylon, PETG, etc

EU Sales: November 2018

MRSP: € 12,000 NET

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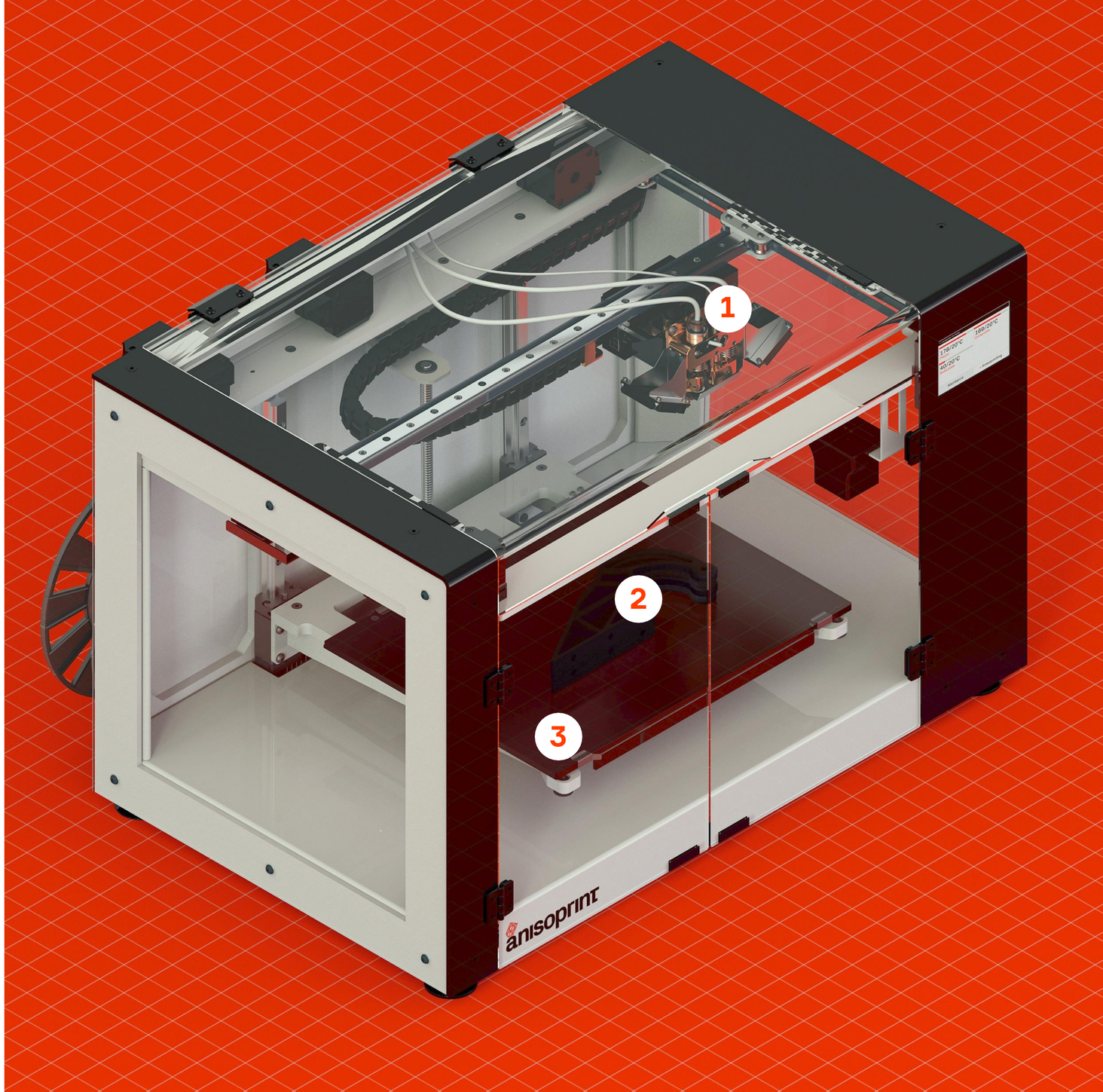


INDUSTRIAL SYSTEMS: ANISOPRINT PROM

PROM-PT

6 axial robotic cell
Up to 1100x1100 mm build area

Sales: 2020

PROM-IS

3 axial gantry
Heated chamber

Up to 500x500 mm build area
High temperature plastics: PEI, PS, PEEK

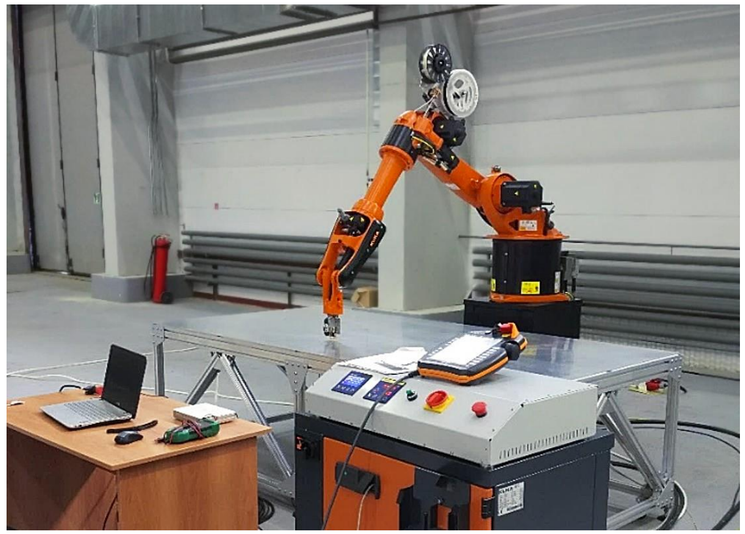
Sales: 2021

PROM-IS

6 axial gantry
Heated chamber

Up to 800x800 mm build area
High temperature plastics: PEI, PS, PEEK

Sales: 2022



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COMPOSITE MATERIAL
ANISOPRINT CCF

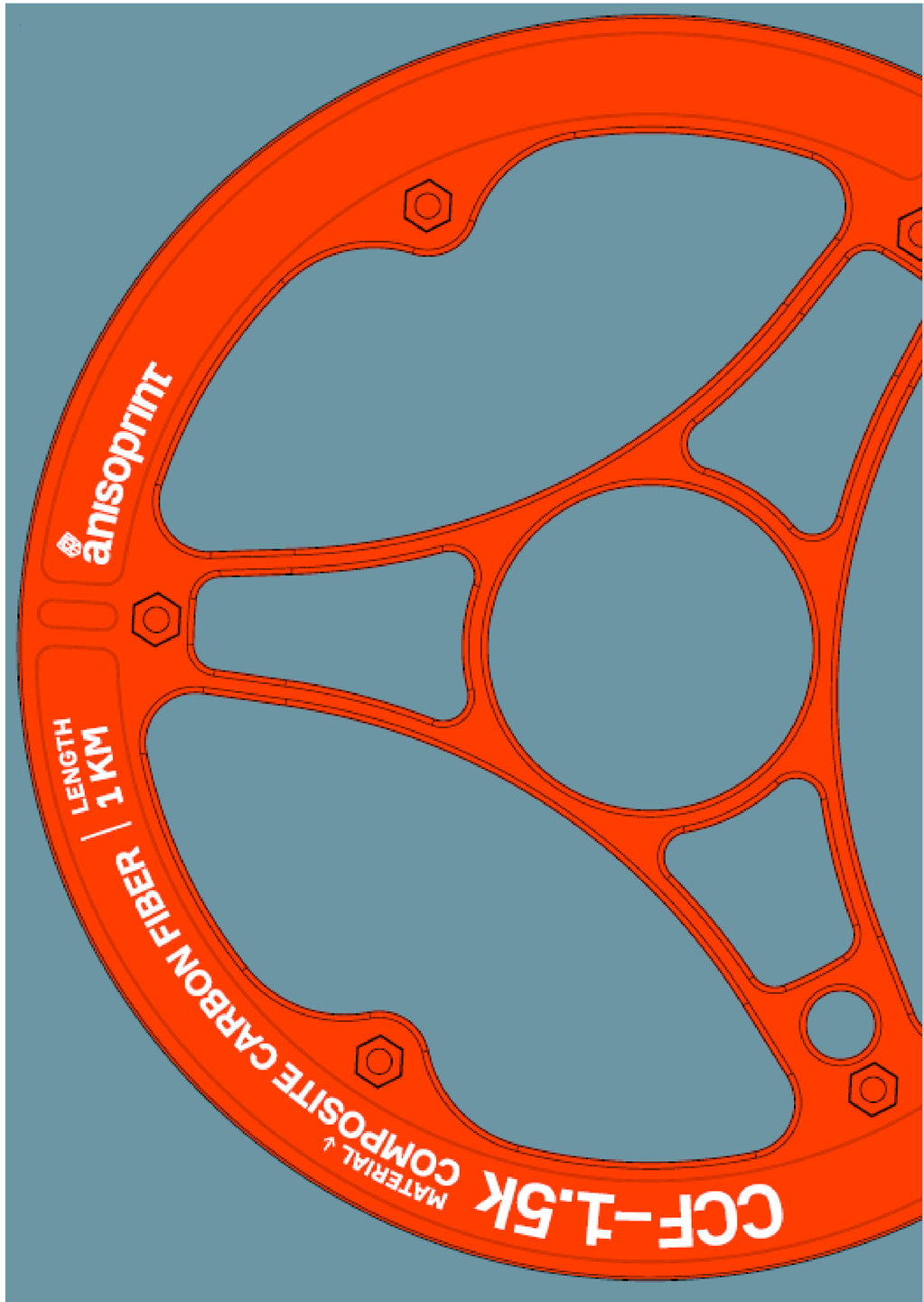
The resulting material is dual-matrix material, comprising a thermoset impregnated CCF reinforcing fiber and a thermoplastic binder matrix. The thermoset matrix ensures good quality impregnation of a reinforcing fiber tow and good adhesion to different types of thermoplastic materials. Different thermoplastic binder materials can be used to achieve certain physical properties, thermal, chemical, environmental resistance or other properties. The material is formed in a process of co-extrusion of the CCF reinforcing fiber and thermoplastic filament for in-situ consolidation.

CCF-1.5K CARBON COMPOSITE FIBER PROPERTIES

EFFECTIVE DIAMETER, MM	VF, %	ELASTIC MODULUS, GPA	TENSILE STRENGTH, MPA
0.35	60	140	1950

CCF-1.5K DUAL-MATRIX COMPOSITE PROPERTIES

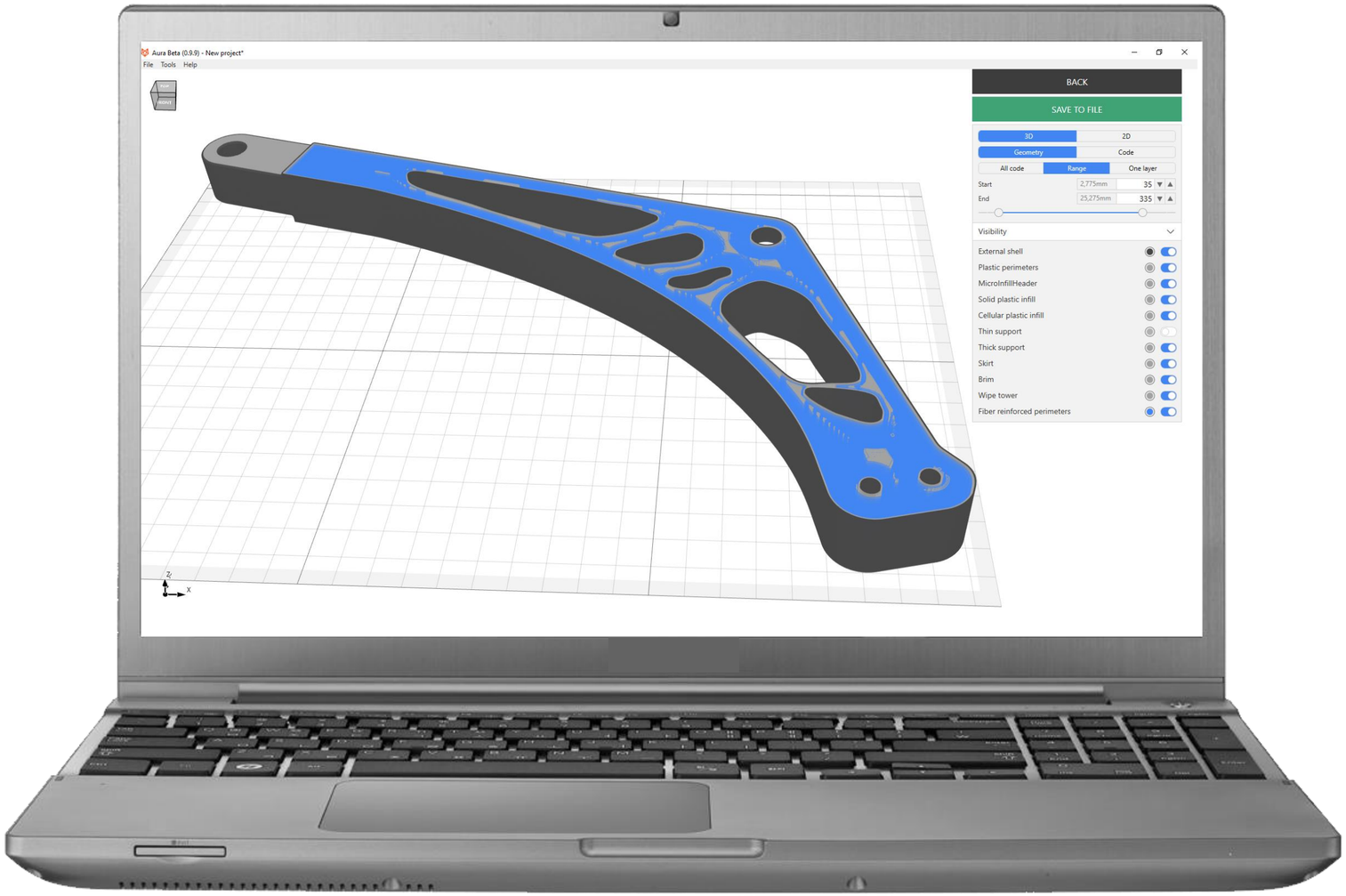
PARAMETER	CCF-1.5K + PETG
Density, g/cm3	1.24
Tensile modulus in fiber direction, GPa	60
Poisson ratio 31	0.20
Tensile ultimate stress in fiber direction, MPa	740
Compressive ultimate stress in fiber direction, MPa	290
Flexural Modulus along axis 1 under bending in plane 1-3, GPa	-
Flexural Strength along axis 1 under bending in plane 1-3, MPa	520
Shear Modulus 13, MPa	430



THE ANISOPRINTING SLICER
ANISOPRINT AURA

The customized software is used to prepare 3D models for manufacturing of parts on the Anisoprint Composer additive device. To obtain lightweight and strong parts Aura prepares a 3D-model and specialized the reinforcement scheme.

Storage, processing, and print run are fully automated and are carried out using a local computer ensuring confidentiality and safety of data of the user’s models.



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ANISOPRINT ADVANTAGES

STRENGTH

X20 stronger than plastic

X7 lighter than steel

X2 stronger than aluminum

ECONOMY

100 times cheaper

X10 times energy savings

X10 times less per volume price

UNIVERSAL

REINFORCING FIBERS: carbon, glass, aramid, basalt

RESINS: PA, PETG, PP, PC, PLA, ABS, PEI, PS, PPSU, PEEK and others

MANUFACTURABILITY

Special tooling is not required

NO special works required

Single-stage process

OPTIMIZATION

Topology optimization

Local reinforcement

Lattice anisogrid structures

AUTOMATION

Fully automated process

Dedicated software

Good tolerance and repeatability

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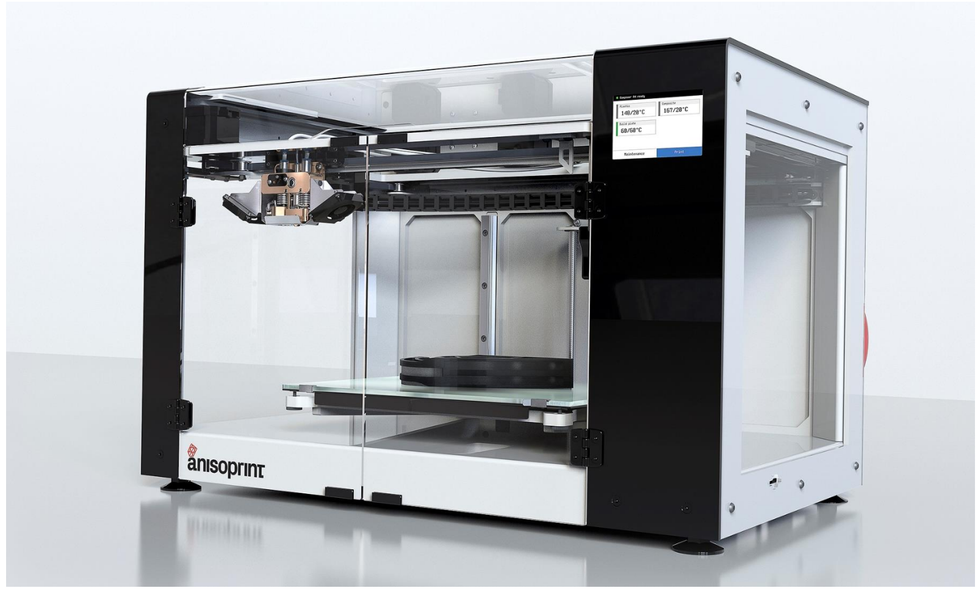
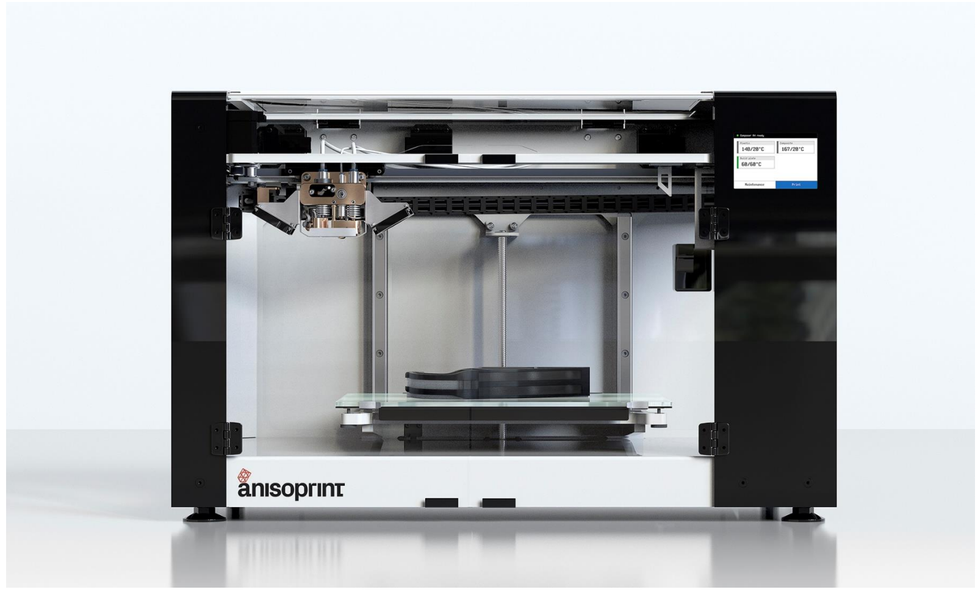
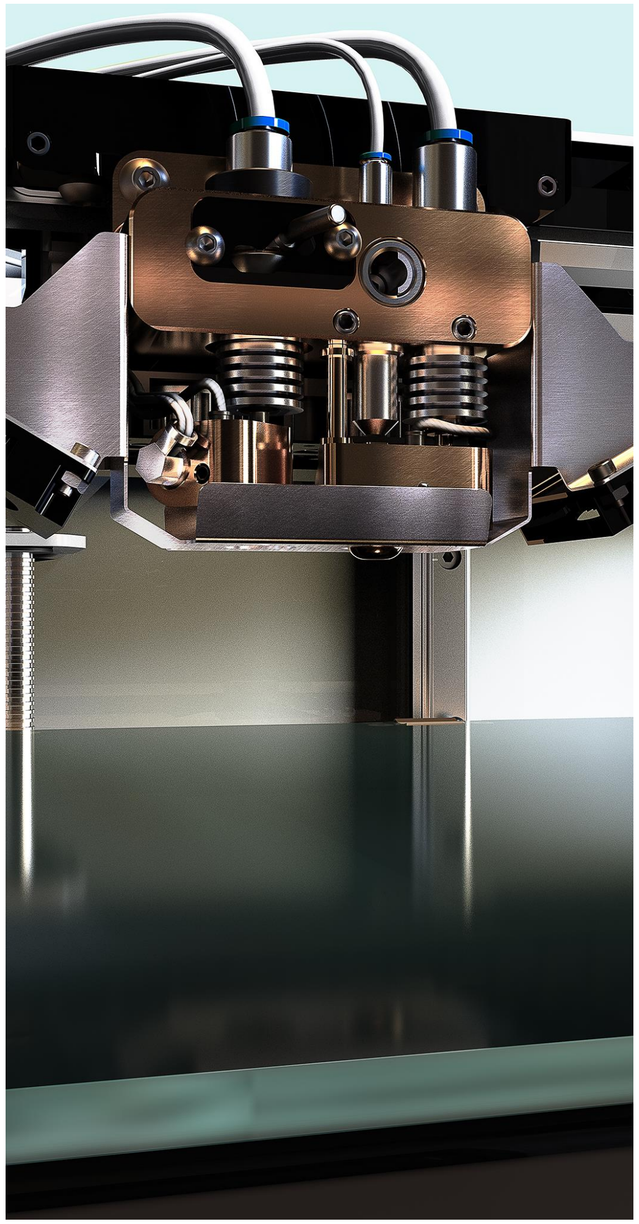
COMPARED TO DEKSTOP ANALOGUE

- → Open material system (use different polymers as matrix)
- → Printing soluble supports
- → Printing reinforced lattice structures
- → Wide range of build volumes
- → 30-50% lower material printing costs
- → Non-cloud software







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STOP METAL THINKING → START ANISOPRINTING

CLUTCH CONTROL HANDLE HARLEY DAVIDSON

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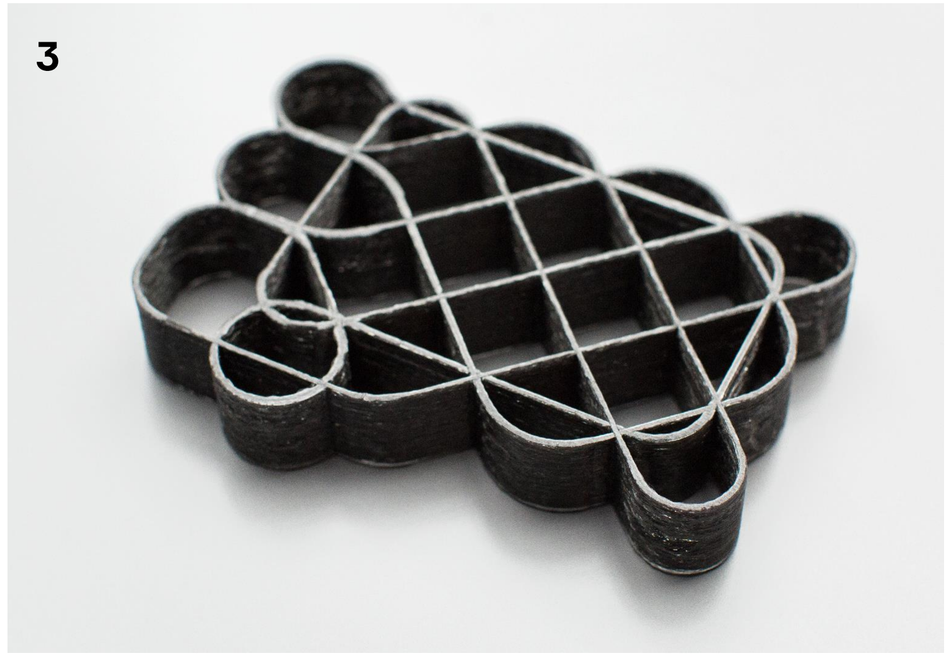
LATTICE FINS FOR MICROSAT LAUNCH VEHICLE

LIN INDUSTRIAL

1. Metal lattice fin – $50-80 per machine hour
2. Composite lattice fin with untrimmed fiber reverse zones (Weight saving 60%) $25 per machine hour, 4 hours
3. «Aniva» launch vehicle



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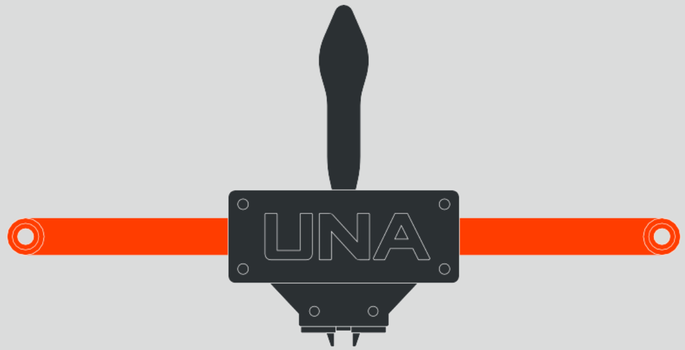
THE PART FOR ELECTRIC WHEELCHAIR DRIVE

	STEEL	ANISOPRINT
WEIGHT	300 grams	41 grams
LEAD TIME	48 hours	4 hours
NUMBER OF FABRICATION STAGES	3 stages	1 stages
UNIT PRICE* *in case of a 1-piece batch	> USD 100	USD 32

“The Composer prints unique parts! 7.3 times lighter while preserving the functions on our prototype part. Ultem failed...”

“...We want to print long parts combined with Nylon”

NIKOLAY YUDIN Founder *of* Supreme Motors



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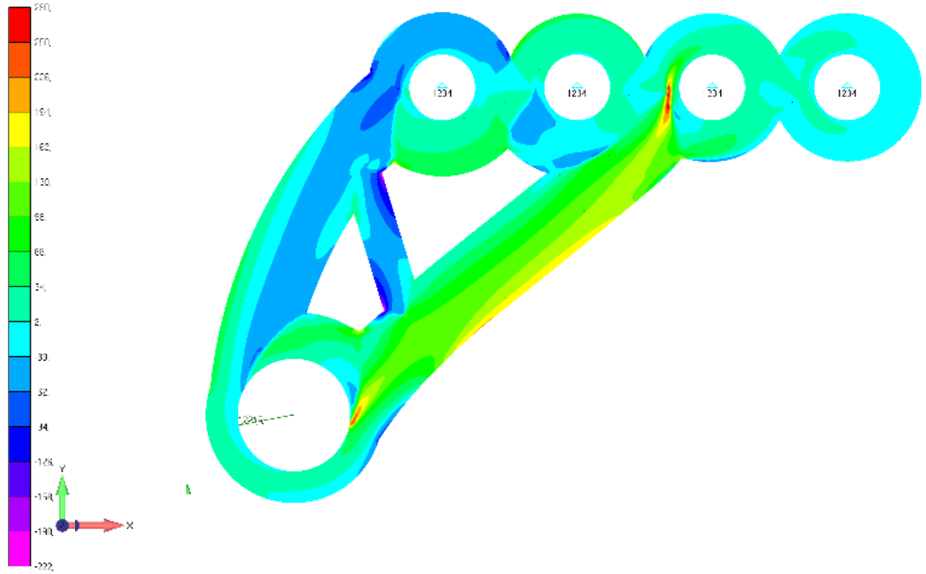
AIRCRAFT INTERIOR BRACKET

WEIGHT SAVINGS IN COMPARISON TO ALUMINUM PROTOTYPE IS ABOUT 50%



AIRBUS

ECAR
ENGINEERING CENTRE
AIRBUS RUSSIA

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AVIATION PASSENGER CHAIR LEG

LOAD OF 1.5 TONS

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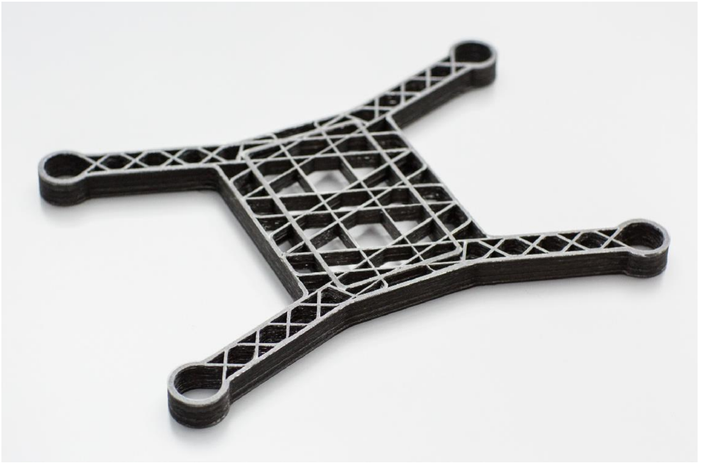
UAV FRAMES

Tsuru Robotics

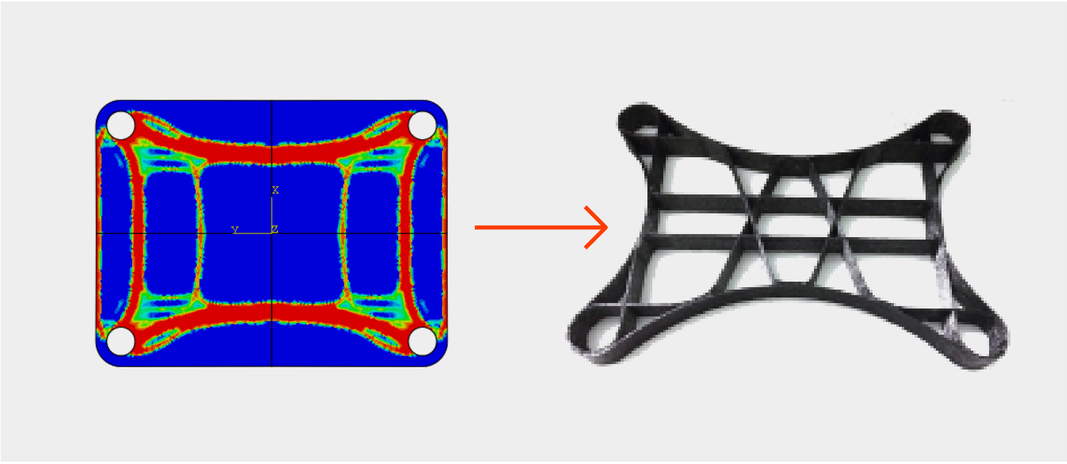
FPV260 — 260MM
NYLON + SHORT GLASS FIBER
130 g

AP F290 —290 MM
CARBON-PLA COMPOSITE 3D PRINTING
75 g



AP F290 LITE —290 MM
CARBON-PLA COMPOSITE 3D PRINTING
52 g

Topology optimization
U-OPTI (http://u-opti.ru/)



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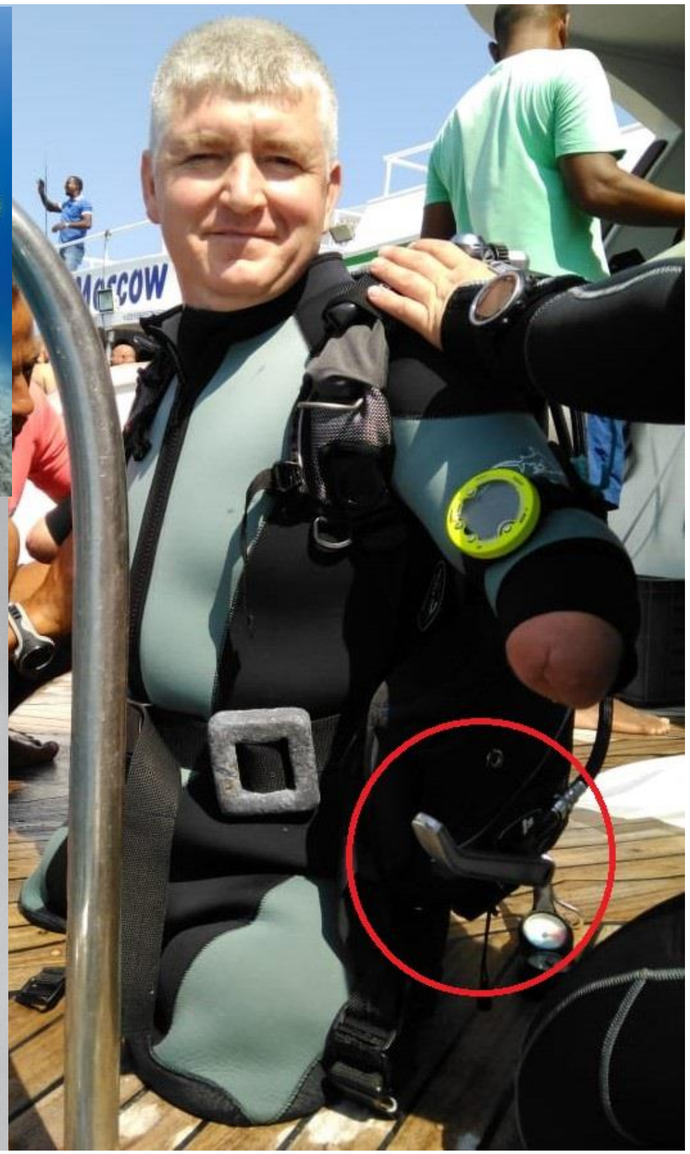
BUOYANCY COMPENSATION LEVER FOR PARA-ATHLETE DIVER

	ABS	SPOON	ANISOPRINT
CONVENIENCE	yes	no	yes
NUMBER OF DIVES, TIMES	<10	14	>100

“The [composite] material makes the component more durable and better developed as it has a printed core. Besides, it is less slippery. Plus it feels like it is more durable and I use it with more confidence. I hope that your lever will serve me much longer. The ABS lever had severe defects as early as after 10 dives. Your lever has not been affected after the same period. In my opinion your part will survive 100 dives.”

DMITRY PAVLENKO
is a para-athlete diver who set a world record in unassisted diving in open water



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UAV FRAME TOPOLOGY OPTIMIZATION

INSPIRE solidThinking

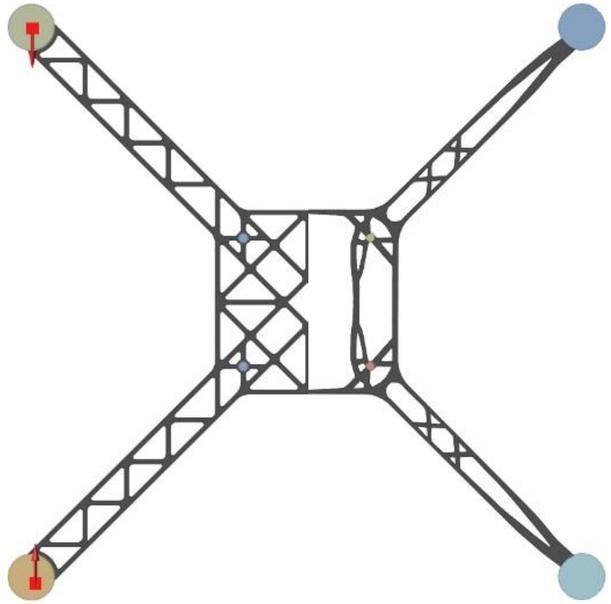
GROUP OF COMPANIES PROGRESSTECH

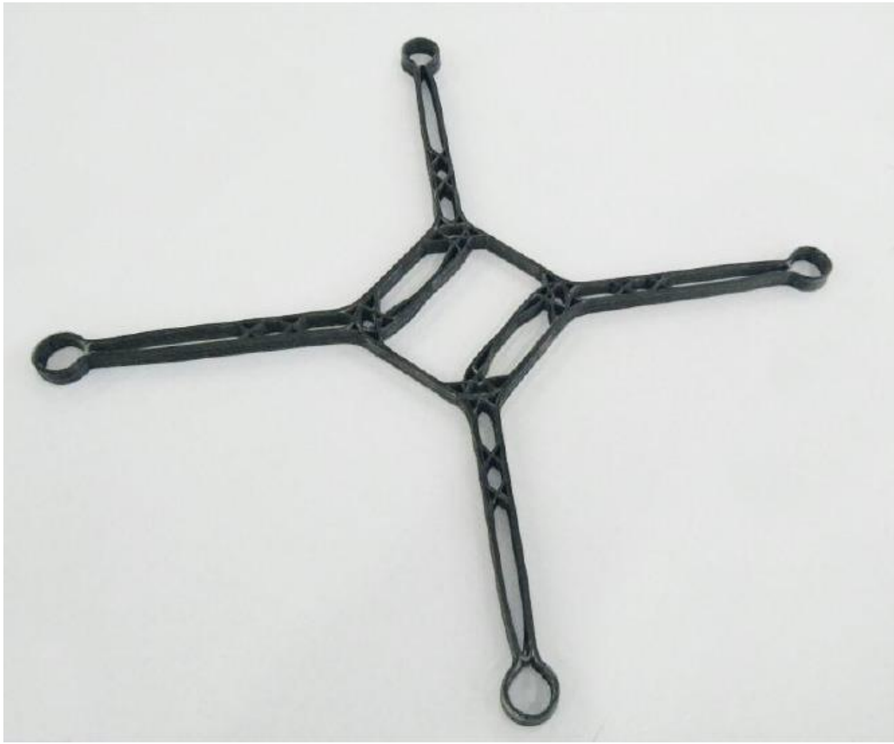
18% WEIGHT EFFICIENCY IN COMPARISON WITH THE ALUMINUM PROTOTYPE

FRAME WEIGHT 95 g (118 g)

WALL THICKNESSES 1.5 – 3 MM

HEIGHT 10 MM*





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