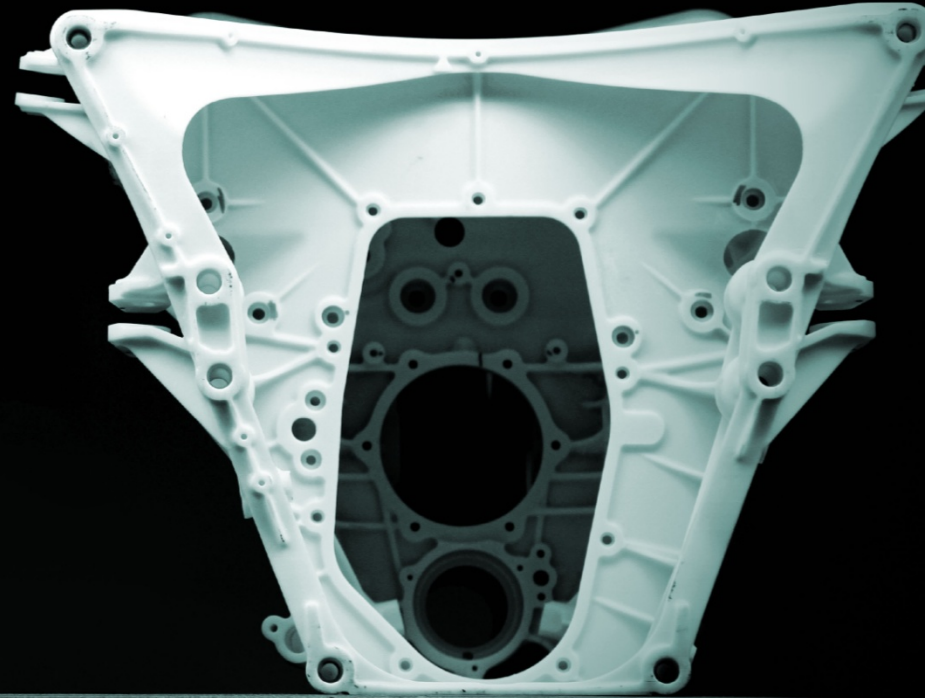
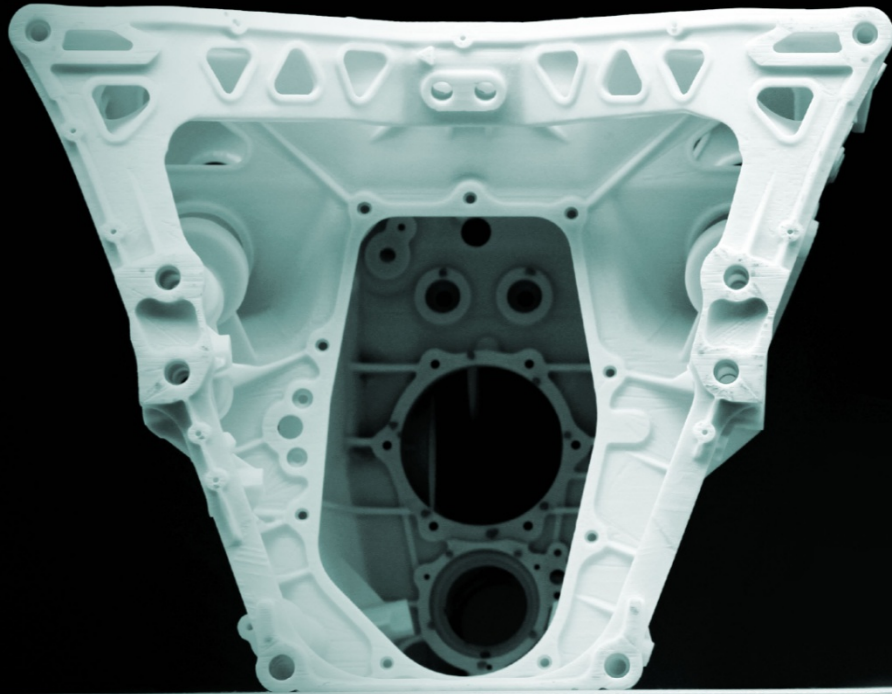


TOYOTA MOTORSPORT GmbH



ADDITIVE MANUFACTURING



FAST, ACCURATE AND VERSATILE MANUFACTURING SOLUTIONS
FOR THE 21ST CENTURY



EXPERTS AT ADDITIVE MANUFACTURING

TMG HAS ONE OF THE LARGEST ADDITIVE MANUFACTURING FACILITIES IN EUROPE, WITH MORE THAN A DECADE OF EXPERIENCE.

Our experience with SLA and SLS technology - optimised using lean processes in TMG's F1 era, means we have the hardware and knowledge to react quickly, reliably and efficiently.

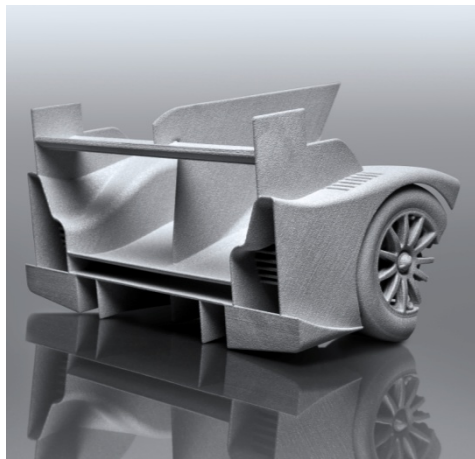
TMG's diverse portfolio includes six different materials and all our additive manufacturing machines are serviced regularly to ensure reliability.

No matter where you are in the world, our production team can begin on your item at TMG within just a few hours – simply deliver your CAD or preferably STL file and

we will quickly turn your innovation into reality.

TMG's unique combination of experience and technology has drawn customers from various markets. F1 wind tunnel model components, parts for racing cars, prototype automotive light clusters, dentistry test equipment and plastic prototype kitchen utensils have all been realised at TMG.

But the possibilities do not end there and we are keen to share our knowledge, capability and capacity to companies from any sector.





VARIOUS MACHINES AND MATERIALS

SLA AND SLS TECHNOLOGY USE THE LATEST ADDITIVE PRODUCTS FOR A SUPERB RESULT EVERY TIME

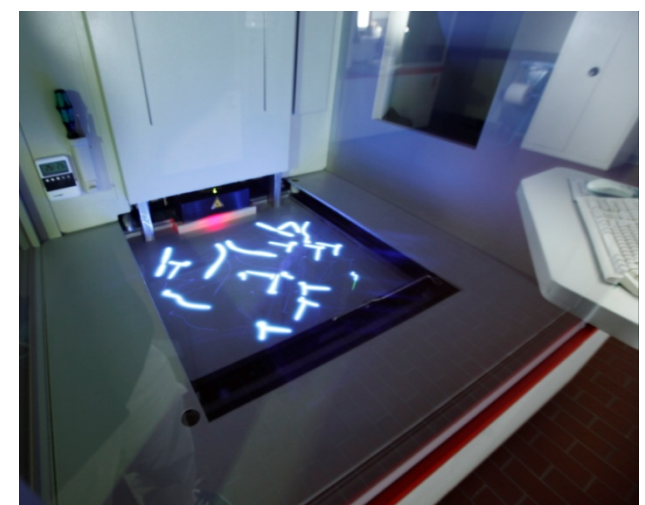
TMG's high-capacity stereolithography (SLA) suite includes eight SLA5000 machines from 3D Systems, providing flexible, fast and reliable service.

All machines use DSM Somos PerFORM while one is set-up to use alternatives such as DSM WaterShed and DSM NeXt.

The SLA5000 build volume is 500 x 500 x 580mm while the SLA7000 is larger at 500 x 500 x 580mm. All are prepared and set to build with 0.1mm layers.

sinter machines (SLS) are part of the EOSINT range by EOS and we have one example each of the P700 and P380 range. The adaptable P380 can work with EOS Alumide, EOS CarbonMide and EOS PA 3200 GF material while the P700 functions with EOS Alumide only.

These two machines offer a range of size options; the P700's build volume is 700 x 380 x 560mm while the P380's is 340 x 340 x 620mm. Both machines are prepared and set to build with 0.15mm layers.





ADDITIVE MANUFACTURING MATERIAL PROPERTIES

Method	Name	Type	Colour	Min. Resolution (mm)	Min. Wall Thickness (mm)	D638M Tensile Modulus (MPa)	D790M Flexural Modulus (Mpa)	D648 HDT@ 66 psi (°C)	D648 HDT@ 264 psi (°C)
SLA	DSM PerFORM (uv postcure)	Epoxy & Filler	White	0,4	1	10,5	10		
	DSM Next (UV post cure)	Epoxy	White	0.4	1	2.37 - 2.49	2.415 - 2.525	55 - 57	48 - 51
	DSM WaterShed (UV post cure)	Epoxy / acrylic blend	Optically clear, near colourless	0.4	1		2.04 - 2.37	45.9 - 54.5	49 - 49.7
SLS	EOS Alumide	PA12 (Nylon 12) + aluminium flakes	Grey, metallic	0.8	1	3800	3600	175	144
	EOS CarbonMide	PA12 (Nylon 12) + carbon fibres	Black	0.8	1	6100			
	EOS PA 3200 GF	PA12 (Nylon 12) + glass spheres	White	0.8	1	3200	2900	157	96