

Direct Metal Laser Sintering (DMLS)



Nickel Bronze

Stainless Steel GP1

The DMLS additive layer manufacturing process produces metal components direct from a CAD model using a powerful 200w Yb-fibre laser and layers of fine metal Powder. The CAD model is sliced in to 0.02mm layers and effectively reconstructed layer by layer with the laser fusing or melting each layer to the one below. In this way the system can build practically any geometry unlike a 'line-of-sight' material removing process like CNC machining, which would need the support of EDM to achieve the same shapes.

The DMLS process has been successfully used by CRDM Limited for the manufacturing of complicated geometries, including voids, tunnels and undercuts, as the unsintered powder is literally shaken out and reused.

The build envelope measures 250mm x 250mm x 185mm and the tolerance that can be maintained over the whole build platform is +/- 50 microns.

As well as being able to use the 'Traditional' Nickel-Bronze material, the M 270 has the capability of operating the new materials listed below.

Stainless Steel GP1

Stainless Steel GP1 (General Purpose) is a pre-alloyed stainless steel in fine powder form. Its composition corresponds to US classification 17-4 PH and European 1.4542 and fulfils the requirements of AMS 5643 for Mn, Mo, Ni, Si, C, Cr and Cu.

This kind of steel is characterised by having very good corrosion resistance and mechanical properties, excellent ductility in the laser processed state, and is widely used in a variety of engineering applications. GP1 is ideal for many part-building applications such as functional metal prototypes, small series products, individualised products or spare parts.

Laser-sintered parts made from Stainless Steel GP1 can be welded, machined, micro shot-peened, polished and coated if required.

Stainless Steel PH1

Stainless Steel PH1 is a pre-alloyed stainless steel in fine powder form. This kind of steel is characterised by having very good corrosion resistance and excellent mechanical properties, especially in the precipitation hardened state. This type of steel is widely used in variety of medical, aerospace and other engineering applications requiring high hardness, strength and corrosion resistance.

PH1 is a post hardenable material, up to 40-45 Rockwell, and so more durable than the GP1. One potential application is injection moulding tools for processing of corrosive plastics, but also this material is ideal for the direct manufacturing of production components.

Similar to GP1, parts made from Stainless Steel PH1 can be machined, spark-eroded, welded, micro shot-peened, polished and coated if required.



Maraging Steel

Maraging Steel MS1

Maraging Steel MS1 is a pre-alloyed ultra high strength steel in fine powder form. Its composition corresponds to US classification 18% Ni Maraging 300, European 1.2709 and German 3NiCoMoTi 18-9-5. This kind of steel is characterised by having very good mechanical properties, and being easily heat-treatable using a simple thermal age-hardening process to obtain excellent hardness and strength.

This material is ideal for many tooling applications (DirectTool) such as tools for injection moulding, die casting of light metal alloys, punching, extrusion etc., and also for high performance industrial and engineering parts, for example in aerospace and motor racing applications.

Standard processing parameters use full melting of the entire geometry, typically with 40 µm layer thickness, but it is also possible to use Skin & Core building style to increase the build speed.

Parts built from Maraging Steel MS1 are easily machinable after the building process and can be easily post-hardened to more than 50 HRC by age-hardening at 490 °C for 6 hours. In both as-built and age-hardened states the parts can be machined, spark-eroded, welded, micro shot-peened, polished and coated if required.

Cobalt Chrome MP1

Cobalt Chrome MP1 is a fine powder mixture for producing parts in a cobalt-chrome-molybdenum-based material, having excellent mechanical properties (strength, hardness, etc.), corrosion resistance and a temperature resistance up to 1100°C.

Such alloys are commonly used in biomedical applications, such as dental and medical implants, and also for high-temperature engineering applications such as in aero engines.

The chemistry of EOS Cobalt Chrome MP1 conforms to the composition UNS R31538 of high carbon CoCrMo sterilisable and suitable for biomedical applications. The laser-sintered parts are characterised by a fine, uniform crystal grain structure. They fully meet the requirements of ISO 5832-4 and ASTM F75 for cast CoCrMo implant alloys, as well as the requirements of ISO 5832-12 and ASTM F1537 for wrought CoCrMo implant alloys except remaining elongation. The remaining elongation can be increased to fulfill even this standard by hot isostatic pressing (HIP).



EOSINT M 270

Nickel-Bronze DM20

DM20 is a general purpose material at the cheaper end of the scale. This material is generally used by CRDM for Rapid Tooling inserts for plastic injection and wax moulding with characteristics very similar to aluminium, but also provides the perfect medium for a low-cost metal prototyping. At 20 micron layer thickness surface finish is excellent, and tolerances of +/- 50 microns can be maintained. Minimum wall thickness that can be built is 0.8mm.

Available Systems

- 1 x EOS M 250 Xtended
- 1 x EOS M 270

Available Materials

- Stainless Steel GP1
- Stainless Steel PH1
- Maraging Steel MS1
- Cobalt Chrome MP1
- Nickel-Bronze DM20

Please visit our website www.crdm.co.uk for further information.



Cobalt Chrome

Excellence in Rapid Product Development

