Excellence in Rapid Product Development

CRDM Update

Issue 7

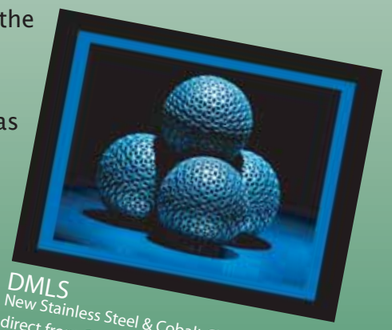
CRDM move to 21st century factory....

From August 2007, CRDM will be operating from a brand new factory in Wycombe Sands. Located three miles from its original premises, the new 22,000sq.ft purpose built facility offers fantastic access, storage and room for projected growth. Destined for the new site are two more SLS machines bringing the total machine count to six in all, including a HiQ style Vanguard. Added to the three existing presses are two new injection moulding machines, including a 250 tonne press, which will give CRDM capacity across a shot weight range from 12g up to 600g. This extra moulding capacity will offer clients greater flexibility for their production and prototype injection moulding requirements.

'With the extra space and equipment, CRDM is able to offer increased capacity and shorter lead-times. The new factory, with purpose built individual production cells, has allowed us to create a more effective production system which is easier to control and monitor, therefore increasing quality and project management levels. Our clients will see significant improvements to an already outstanding service.' says UK Sales Manager Andrew Mitchell.

CRDM is planning an open day event for its customers who will be invited to view the new facility. The date will be announced nearer the time, but should be in November/December 2007.

CRDM will continue to offer all of its metal and plastic sintering, vacuum casting and stereolithography services from the new site, as well as rapid manufacturing, rapid tooling, production tooling and moulding.



DMLS
New Stainless Steel & Cobalt Chrome Parts direct from CAD *(page 3)*

Our new address
CRDM Limited
Wycombe Sands, Lane End Road
High Wycombe, Buckinghamshire HP12 4HH
Telephone: 08450 514900 Fax 08450 514901

SLA Modelling · *Selective Laser Sintering* · *Micro Modelling (Envisiontec)* · *Direct Metal Laser Sintering* · *Rapid Tooling* · *Injection Moulding* · *Vacuum Casting* · *Rapid Cast Metals* · *Thermojet* · *CNC Machining* · *CAD* · *2D-3D Conversion* · *Full Finishing & Graphic Service* · *Technical Support*

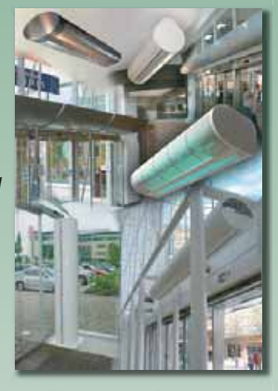
Knowledge Transfer Partnerships 'One of the government's best kept secrets'

Knowledge Transfer Partnerships is one of the oldest and most successful grant schemes in the UK, providing resources and expertise to thriving organisations that wish to innovate, expand or improve performance.

How does it work?

Part-funded by government organisations and led by the Technology Strategy Board, Knowledge Transfer Partnerships involve the forming of partnerships between a company, an academic institution and one or more recently qualified persons. Most companies participating in the scheme are SMEs (small to medium size enterprises with between 5 and 250 employees), but companies of all sizes and from all industries may participate. Each Knowledge Transfer Partnership is tailored to meet individual company needs, has a typical value of £80,000 and takes on average 2 years to complete.

CRDM Ltd has close links with Buckinghamshire Chilterns University College which has a highly successful track record of initiating and helping run KTP projects such as the partnership with Envirotec Limited



Envirotec Limited manufactures door curtain heaters, often referred to as air barriers, which protect the entrances of retail and commercial properties.

Envirotec's larger range of units were fitted with energy efficient electronic control systems which control door curtain functionality and help reduce energy usage.
The control unit was too large to fit to all Envirotec's heater units, so a smaller, more energy efficient controller with communications capability was required.

Additionally, Envirotec required a formal structure to their Research & Development department and an in-house electronic controller design.

The project has been running for 6 months and a formal R&D structure based on ISO 9001 has been implemented. Communications software has been developed and the redesign of the controller has begun, meaning the project is well on schedule.

For more information about KTPs contact:

Gordon Hooker, Knowledge Transfer Manager
Tel: 08450 514900
e-mail:gordon.hooker@bcuc.ac.uk

New High Temp Micro-Modelling Material Available

CRDM has added a new material, Nanocure, to its range of Envisiontec materials which can withstand up to 200°C following post curing. Its 'nanoparticle' filler means that Nanocure successfully meets the requirements of fine electrical connector assemblies where prototype components are subjected to extreme operating temperatures, and demand a high degree of strength. Nanocure accompanies PIC 100 (investment castable wax for fine metal work) E-Shell 200 (biocompatible semi-rigid material) and the popular R-resin (general modelling resin) materials currently available from CRDM.

Building at 0.025mm layers these models require little or no finishing and can maintain accuracy on extremely fine detail. Details of these materials can be found under 'Technical' on our website.

Mechanical Properties (Metric)

ASTM Method	Description	NanoCure RC25 Postcure
D638M	Tensile Strength Elongation at Break Modulus of Elasticity	46 MPa 2.5 % 4,890 MPa
D790M	Flexural Strength Flexural Modulus	102 MPa 3,860 MPa
D256A	Izod Impact-Notched	0.16 J/cm
D695-02a	Maximum Compressive Strength Compressive Modulus	127 MPa 4,490 MPa
D1004	Hardness (Shore D)	93.1
D570-98	Water Absorption	0.25 %

Thermal Properties (Metric)

ASTM Method	Description	NanoCure RC25 Postcure (Thermal Cure)
E1545-00	Tg	42°C (70 °C)
D648-98c	HDT @ 0.455 MPa HDT @ 1.82 MPa	67°C (223°C) 53.8°C (102 °C)

Current RP materials available from CRDM

DMLS
Nickel-Bronze (DM20)
Stainless Steel 17-4
Cobalt Chrome MP1
Maraging Steel MS1

SLA
11120 – Waterclear/Water proof
9120 – Polypropylene mimic
14120 – ABS mimic
Bluestone – High temperature/rigid

SLS
Duraform PA – Nylon 12
Duraform GF – Nylon 30% GF
Windform XT – Carbon Strand filled
Alumide – Aluminium filled

Envisiontec (Micro-modelling)
R-Resin – Rigid
E-Shell 200 - Biocompatible
PIC 100 - Wax
Nanocure - High temperature

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New Improved Rapid Tooling & Moulding Service

CRDM's new premises mean the arrival of the long awaited new moulding machines to support our busy rapid tooling operation. The increased floor space and overhead crane system allow for faster and more efficient tooling and the extra storage means that all client delivery requirements will be accommodated.

As well as full finishing, spray painting and Tampa/Screen printing, CRDM offers a complete assembly service, so clients can have ready-to-go products arriving at their doors.

Under-bonnet sensor assembly in Nylon 10% GF from DMLS tooling

CRDM's innovative range of tooling solutions is designed to accommodate all aspects of injection moulding; from prototype to low volume and high volume production of plastic components and assemblies.

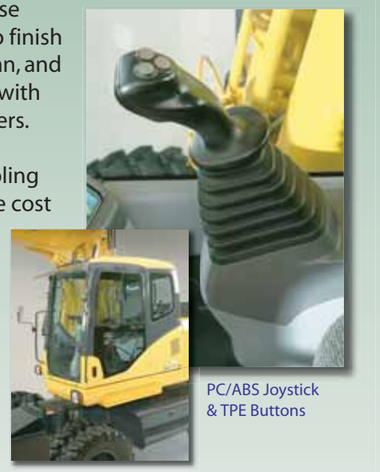
DMLS (Direct Metal Laser Sintering)
Using CRDM's bolster kits to minimise your costs, all inserts are moulded in-house, electronically tagged and stored for future use. All processing details are also stored on computer. The DMLS process does not require any design compromises as it builds any geometry layer-by-layer, reducing unnecessary cost and lead-time. Accurate to ± 50 microns, the DMLS process is perfect for complex components requiring sharp corners and deep ribs that can only be generated by traditional tooling by EDM and inserts.

Typically DMLS tooling delivers up to 5000 components in filled materials and 20-30,000 in unfilled (ABS, PC/ABS). The average lead-time is 2-3 weeks.

Aluminium/P20/Hardened Steel Options
CRDM supports all your development and production requirements with an in-house toolmaking service supported by 3 & 5 axis CNC machining, CNC wire and EDM, plus five in-house moulding presses. This is at a slightly higher cost and longer lead-time compared to the DMLS option but it is capable of producing higher volumes or parts requiring specified surface treatment i.e. graining or texturing. The typical lead-time is 4-5 weeks.

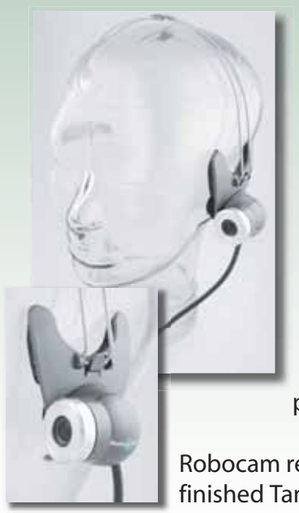
China Option
CRDM's tooling project managers ensure each project is managed under close control from start to finish to a strict timing plan, and are in daily contact with our overseas suppliers.

CRDM's Chinese tooling option offers a more cost effective solution with a lead-time averaging 10-12 weeks. The Chinese tooling option is never offered without the client's full knowledge and consent.



PC/ABS Joystick & TPE Buttons

Quick Route to Production



Robocam Ltd, one of the UK leading security product manufacturer chose CRDM Limited to produce their latest head mounted camera.

A fast time-to-market was required to capitalise on this innovative design, and CRDM made the perfect project support partner.

Robocam required ready-to-go fully finished Tampa printed production components as fast as possible.

Following initial prototypes to assess the design, Direct Metal Laser Sintering (DMLS) was used to produce the DM20 injection mould tooling. The complex geometry of the components meant that the use of traditional toolmaking would require a lot of EDM (Spark Eroding) to achieve the desired geometry. However the DMLS process, being a layer-build system, can build any geometry (i.e. sharp corners, deep ribs etc.) layer by layer; negating the need for costly electrodes and unwanted additional lead-time. The twelve hour build time required to manufacture the DMLS tooling inserts (overnight) plus the post processing operations required, meant that Robocam had PC/ABS injection moulded components in a time frame normally associated with rapid prototyping.

www.robocamuk.com

DMLS Stainless Steel & Cobalt Chrome components - without tooling or machining!

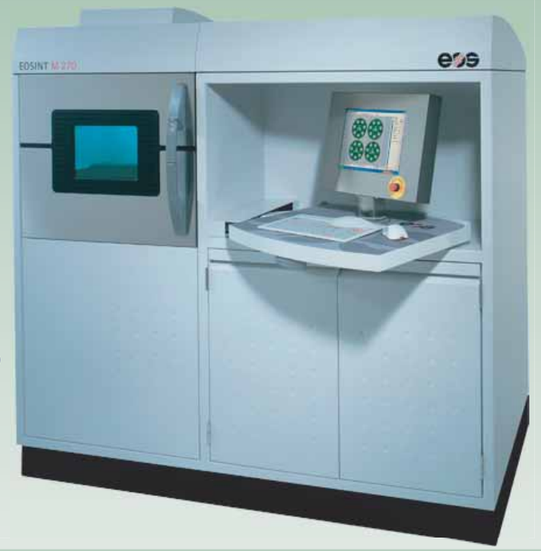
Surgical Implants

CRDM Limited is pleased to announce the delivery of its second Direct Metal Laser Sintering system earlier this year; the new EOSINT M 270. The two systems establish CRDM as one of the UK's leading suppliers of DMLS components and tooling inserts.

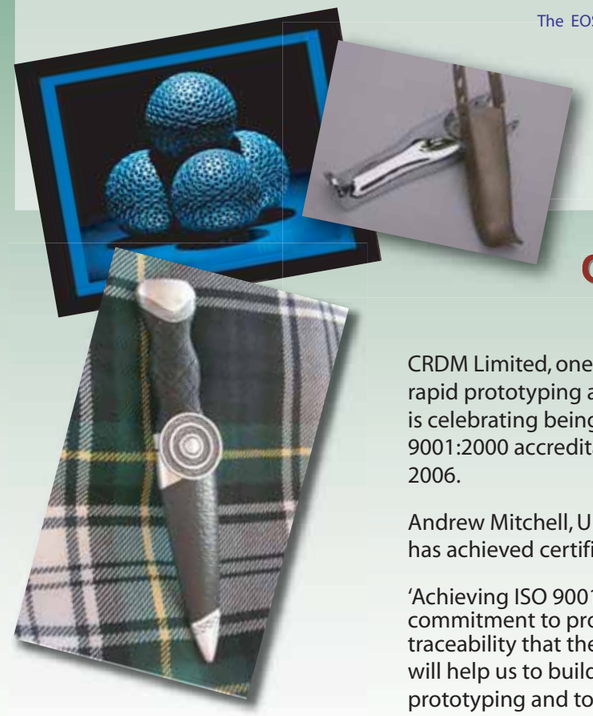
As well as operating with the standard DM 20 (Nickel-Bronze), the M 270 enables CRDM to offer two new materials; Stainless Steel 17-4/1.4542 and the nickel-free Cobalt Chrome MP1 for prototype and production components direct from the CAD model. The data sheets for these materials can be downloaded from our website under Technical/DMLS.

These new 100% dense materials can be sterilised, are corrosion resistant and suitable for use in the medical and food processing sectors. The MP1 fully meets the requirements of ISO 5832-4 and ASTM F75 for cast CoCrMo medical implant alloys, as well as the requirements of ISO 5832-12 and ASTM F1537 for wrought CoCrMo implants, and the 17-4 fulfills the requirements of AMS5643. The MP1 can operate in temperatures up to 1150ºC and shares a typical manufactured ±0.05mm tolerance with all three materials.

The DMLS process has been successfully used by CRDM over the past six years for the manufacture of injection moulding and pressure die-cast tooling, where traditional tool-making methods would be too costly and time consuming to achieve the desired geometry.



The EOSINT M 270



PC/ABS and Pewter Sgian Dubh 'sock knife' worn with traditional Highland Dress.
Developed and manufactured by CRDM for the Sgian Dubh Co in Scotland

CRDM Celebrate Accreditation

CRDM Limited, one of the UK's leading rapid prototyping and tooling companies, is celebrating being awarded ISO 9001:2000 accreditation in December 2006.

Andrew Mitchell, UK Sales Manager at CRDM, is delighted that the company has achieved certification:

'Achieving ISO 9001 accreditation demonstrates CRDM's continuing commitment to providing its customers with the high quality of service and traceability that they have come to expect. We hope that this achievement will help us to build on our reputation as a centre of excellence in rapid prototyping and tooling.'

In 2007 CRDM hope to obtain further success by achieving automotive accreditation status to support its growing share in this market.