

e-Manufacturing Solutions
Medical



e-Manufacturing Solutions

Profile

EOS was founded in 1989 and is today the world-wide market leader in laser-sintering systems and materials. EOS offers you application-optimized solutions adapted to successfully implementing e-Manufacturing with laser-sintering.

Vision

Every one is different, which results in a wide variety of tailor-made implants, devices and instruments needed for the medical market. Patient-specific products, an increased number of parts precisely tailored to the individual anatomy and reduced development costs are just a few of the advantages you can achieve with EOS e-Manufacturing solutions.

The Medical Market of EOS		
Medical Devices	Orthopedic Implants	Dental Industry
<ul style="list-style-type: none"> • Machine Devices • Instruments • Endoscopes • etc. 	<ul style="list-style-type: none"> • Hip, Knee • Shoulder • Ankle • Spine • Trauma 	<ul style="list-style-type: none"> • Copings • Bridges • Implants • Instruments

Materials

Metal Materials

EOS offers a wide range of materials for DMLS (Direct Metal Laser-Sintering). Particularly for the medical device industry there are materials available such as stainless steel, titanium and superalloys like cobalt chrome.

Plastic Materials

EOS offers you a variety of plastic materials for use in EOS laser-sintering systems. These materials are based on PA 12. Polyamide is resistant to most chemicals, and the material itself is biocompatible. Material variants exist in terms of filling, such as aluminium, glass beads or carbon fibres.

EOS PEEK

EOS PEEK is the first PEEK material that can be processed on the high-temperature system EOSINT P 800. PEEK is considered to be one of the highest performing thermoplastic polymers and as such is seen as a promising material for the future. The material is especially suitable for the medical industry because of its excellent properties, such as flame retardancy, biocompatibility and sterilizability.

Quality Assurance in e-Manufacturing

Particularly when it comes to applications in the medical sector, proof must often be provided of the origins and composition of the material used. As such, a seamless traceability and documentation is very important when using e-manufacturing via laser-sintering in this sector. The Integrated Quality Management Systems (IQMS) provided by EOS guarantee this. With the Integrated Process Chain Management (IPCM) the IQMS offers a coordinated powder cycle. The IPCM concept enables an optimized process control, including automatic powder conveying, an unpacking and sieving station with exchangeable frame docking system and powder recycling. As a result, the IPCM offers a complete set of ergonomic peripherals which lead to a high level of automation, minimal downtimes and an increased productivity. Another important module of the IQMS is the EOSTATE database reporting system, offering a traceable and complete chronological history of all actions and messages occurring during the entire laser-sintering process. As such, the quality of the parts as well as the entire lasersintering process can be enhanced. If necessary, EOS can even provide a quality certificate covering the following factors involved in the laser-sintering production process: material batch, laser-sintering system and 3D Data.

Athlete Wins Gold Medal at Paralympics with Laser-Sintered Orthosis

Partner

Numerous sportsmen and -women have again shown amazing achievements in Beijing despite their physical impairments. At the same time they carry the hopes of, and are an example to a much greater number of viewers worldwide who have to struggle with similar disabilities. One such person, who has excelled himself in recent years even though the medical prognosis had prescribed him a wheelchair, is German professional racing cyclist Michael Teuber. He asserted himself in the 24-kilometre individual road time trial at Ming Tom Reservoir and won a gold medal in the Paralympics 2008 in Beijing. A key to his success was the laser-sintered orthosis he wore during the race.

Challenge

Prostheses and orthoses should be build in such a way as to compensate the patient's handicap exactly. In the case of the professional racing cyclist Michael Teuber, who has regained control of two-thirds of his upper thigh muscles after years of training, an orthosis is required which not only matches the shape of his leg and foot precisely, but which also fulfils his special cycle racing requirements with regard to stability, weight and aeration.



Orthosis made from polyamide, tailor made for Michael Teuber.

A cooperation between ORTEMA, Junior & Tacke and EOS



Solution

During the development of this orthosis, the orthopedic technology company Ortema and the engineering consultants Junior & Tacke employed the laser-sintering technology from EOS. They subsequently established a technological milestone: using EOS technology and CAD data, it was possible to produce an orthosis made of polyamide for Michael Teuber. Compared to his existing leg brace, the orthosis provides numerous advantages. Not only is the new orthosis lighter, more robust and more durable. It is also tailored exactly to Teuber's anatomy, and thus can serve both as a support for his lower leg and as a shoe. The laser-sintering process makes it possible to create a perfect fit. Due to the inner structure of the orthosis, the ventilation of the leg and foot is optimized.

Benefits

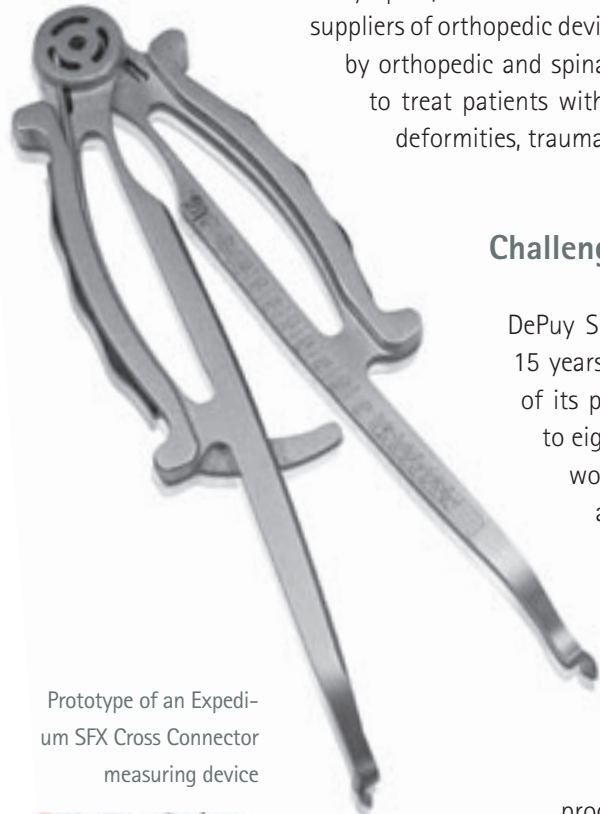
- Light, robust and durable orthoses
- Precisely tailored to the individual anatomy
- Perfect fit, optimal aeration via the inner structure

„I am really impressed by how, in just one day and using electronic data, a complex product can be made which fits the shape of my leg exactly to the millimetre and integrates all the functions that I need to rigidly support my lower leg“, said the professional racing cyclist. (Paralympic road time trial champion Michael Teuber)

DePuy Spine Reduces Product Development Lead Time with EOS Technology

Partner

DePuy Spine, Inc. is one of the world's leading designers, manufacturers and suppliers of orthopedic devices and supplies. The company's products are used by orthopedic and spinal surgeons in surgical and nonsurgical therapies to treat patients with conditions resulting from degenerative-disease deformities, trauma, and sports-related injuries.



Prototype of an Expedium SFX Cross Connector measuring device



Challenge

DePuy Spine has been involved in rapid prototyping for 15 years. However, the average lead time to make many of its prototype implants and instruments has been six to eight weeks. There is no guarantee that the part will work as intended when received, and modifications are part of the development process.

Solution

The company contacted EOS during its search for a direct metal laser-sintering (DMLS) system that had the capability to produce 17-4 stainless steel parts. DePuy purchased an EOSINT M 270 metal laser-sintering system that has been used in a large number of projects producing more than a thousand parts to date. An early success was an instrument that was in development. The engineer was looking for some metal samples. By using the EOSINT M 270 it was possible to build a working prototype in a little more than a week and at reasonable cost.

Benefits

- Reduces product development lead time
- Reduces development costs
- Greater flexibility
- Functional integration

Design-Driven Manufacturing at Hettich: Reducing Part Complexity with Laser-Sintering

Partner

Today, Hettich is one of the leading manufacturers of laboratory centrifuges worldwide. Hettich equipment is highly valued because it lasts, is functionally well designed and sophisticated. Their centrifuges have stood the test of time for over 100 years.

Challenge

The conventional manufacturing of centrifuge boxes is cost-intensive and time consuming. Several tools are necessary for the production of the single parts as well as time-consuming assembly. For example, the conventional production of a washing rotor needs several tools and 32 individual parts in total. In addition, a special steel injection pipe has to be deburred, which in itself is a costly process.



Solution

EOS laser-sintering is a real economic alternative production method. Hettich has realized this and applies laser-sintering consistently. Functional integration has made it possible to reduce the number of components from 32 to 3. Production with laser-sintered parts needs no tooling, only 2 laser-sintered parts are necessary and additionally 1 steel ring and the costly deburring of special steel pipes can be omitted and the operation improved.

Hettich washing rotor with inner structures, manufactured with laser-sintering



Benefits

- Customized products
- Series manufacturing (down to one-offs)
- Increased number of varieties offered
- Functional integration

DEKA Enhances Quality of Life with EOS Technology

Partner

DEKA Research & Development Corporation is a growing company, focused on the development of radical new technologies that span a diverse set of applications. The people at DEKA focus on designing advanced medical products which are easier to use, more accurate, and more functional than the products they are replacing.

Challenge

DEKA focuses on technologies that enhance quality of life. In many cases that means developing medical devices and products that aid the people who need them most. Some of these allow healthcare professionals to deliver better care, while some enable people to live better lives, with more mobility, more freedom, and less discomfort.

Solution

By using EOS laser-sintering technology and an EOSINT M 270, DEKA was able to develop a complete humeral mount for a fully integrated prosthetic arm. This complex part has been produced quickly, cost-effectively and with high quality.

Benefits

- Quick and cost-effective production
- Single step, fully automatic build process
- Part accuracy and high surface quality



DEKA

Humeral mount for a fully integrated prosthetic arm built in EOS Titanium Ti64 on an EOSINT M 270

Sirona Builds Dental Restorations with DMLS

Partner

Sirona is a company dedicated to creating and producing the finest dental equipment available. Their leading global position arises from their commitment to technological innovation, manufacturing excellence and international sales expertise.

Challenge

About 12 million teeth restorations are required each year in Germany alone. Historically, porcelain fused to metal (PFM) restorations have been manufactured through the traditional lost wax casting process. The recent proliferation of dental CAD CAM systems is having little effect on the PFM manufacturing process because machining metal substructures in popular alloys is inefficient and costly.

Solution

Here, the EOSINT M 270 technology comes into use, processing a biocompatible cobalt-chrome alloy. Furthermore, using laser-sintering technology makes the laboratory significantly more efficient. Usually a dental technician processes about 20 units per working day. With the help of EOS's laser-sintering solution, Sirona speeds up the process considerably: 450 units can be built within one day only. The turnaround times for orders are three working days only from sending the design data to delivery of the frameworks to the laboratory. Furthermore the dental technician can focus on their key competence: the craftsmanship of veneering.

Benefits

- Reduced turnaround times for orders
- Speeding up production processes
- Production of 450 restorations per day
- Focus on key competence veneering

sirona
The Dental Company

One e-Manufacturing system can produce up to 450 dental units directly from CAD data - in one single process - without casting



e-Manufacturing Solutions for the Orthopedic Market by EOS

Current demographic developments show that people will grow older, yet at the same time want to stay flexible and free to move. In addition, the number of younger people needing orthopedic implants e.g. after severe sport injuries, is also growing. In cooperation with universities and clinical partners EOS seeks to develop better solutions for patient-friendly, customized orthopedic implants for future generations.

Challenges

A variety of techniques and materials are already being used very successfully for orthopedic implants in the medical area. Yet with many patients an endoprosthesis can become loose within a period of ten years, consequently leading to pain or inflammation. In a worst case scenario this can make revisionary surgery inevitable with a potential change to the endoprosthesis. This can be challenging with younger patients as for them, revisionary surgery can only be done twice.

Solution

Laser-sintering technology enables the design of implants with special, at times very complex structures. For example, this offers the possibility to reduce the stress shielding effect. Future medical devices produced on the EOSINT M 270 system enable a patient-specific fit and geometries. This leads to a better compatibility and as such reduces the follow-up costs of the treatment.

Benefits

- Less bone and cartilage removal
- Preserves the joint for future surgical options
- Potential for less post-operative pain
- Shorter post-operative recovery time

Prototype replacement knee joint built in EOS CobaltChrome MP1



e-Manufacturing Solutions

EOS offers application-optimized solutions which enable the successful implementation of e-Manufacturing with laser-sintering. EOSINT and FORMIGA systems are able to process different materials on the basis of polymers and metals. These materials are adapted to application-specific requirements.

Plastic Systems

Plastic laser-sintering system for the direct manufacture of functional plastic prototypes, series products and prostheses.

- FORMIGA P 100
- EOSINT P 395
- EOSINT P 760
- EOSINT P 800



EOSINT M 270

Direct Metal Laser-Sintering (DMLS) system for the production of functional prototypes, implants, dental substructures and end products directly in metal.





EOS GmbH
Electro Optical Systems

Corporate Headquarters
Robert-Stirling-Ring 1
D-82152 Krailling/Munich
Phone +49 89 893 36-0
Fax +49 89 893 36-285

EOS of North America, Inc.
28970 Cabot Drive
Novi, MI 48377-2978
Phone +1 248 306 0143
Fax +1 248 306 0298

Further EOS subsidiaries

EOS France, Lyon
Phone +33 (0) 437 49 76 76

EOS India, Chennai
Phone +91 44 2815 8794

EOS Italy, Milan
Phone +39 02 33 40 16 59

EOS Singapore
Phone +65 65 62 78 50

EOS UK, Warwick
Phone +44 19 26 62 31 07

www.eos.info · info@eos.info

Status: 11/2009, Technical data
subject to change without notice.
EOS®, EOSINT®, DMLS® and
e-Manufacturing™ are registered
trademarks of EOS GmbH. EOS is
certified according to ISO 9001.



e-Manufacturing Solutions