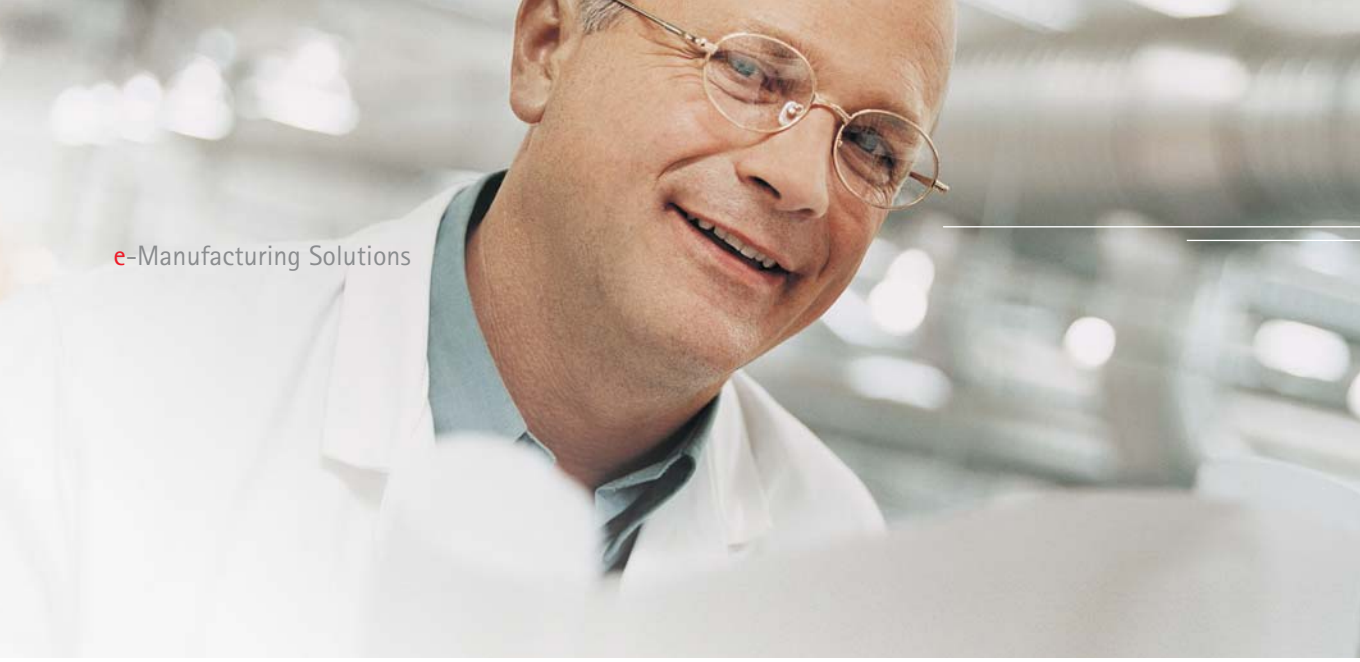
e-Manufacturing Solutions

Any shape · Anytime · Anywhere



Process and Benefits

Process

Laser-sintering is a generative layer manufacturing technology. Any three-dimensional geometry can be built effectively and flexibly, without any tools or laborious milling path programming. As a prerequisite, 3D CAD geometry data has to be available. During production, the 3D CAD model is sliced up into layers. EOS's innovative laser-sintering technology then builds the required geometry layer by layer. The energy of a laser solidifies powder-based materials, for example plastic, metal or foundry sand. The laser-sintering process allows for the production of several different parts in one single build job.

Benefits

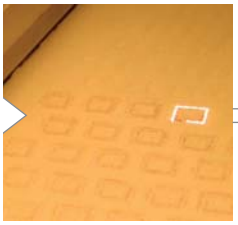
Laser-sintering enables a rethinking in product development and production. It is a departure from tool-based, inflexible technologies in favour of generative, flexible methods. Laser-sintering is a production method particularly for industries that no longer need to produce a large volume of identical parts. With laser-sintering, you can react flexibly to market requirements in product development as well as in production. You can create individualized products or implement a decentralized manufacturing strategy. This helps you reacting quickly and locally to customer demands.

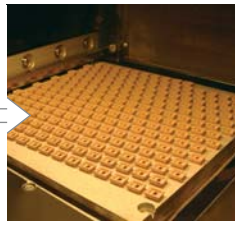
EOS

The name EOS is synonymous with e-Manufacturing – the fast, flexible and cost-effective production directly from electronic data. This concept can help your company increase its competitive advantage – in all phases of the product life cycle.

- **Product concept: Think the impossible. You can get it.**
- **Product development: Reduce time and expense.**
- **Production: Produce whatever the customer requires, as often as he wants it.**
- **Business model: Offer individual products in decentralized production facilities.**

Laser-sintering produces directly from 3D CAD data – fast, flexibly and cost-effectively.





e-Manufacturing Solutions

EOS offers you application-optimized solutions with which you can successfully implement e-Manufacturing with laser-sintering. EOSINT systems are able to process different materials, for example on the basis of polymers, metals, or foundry sand. They offer a broad spectrum of applications.

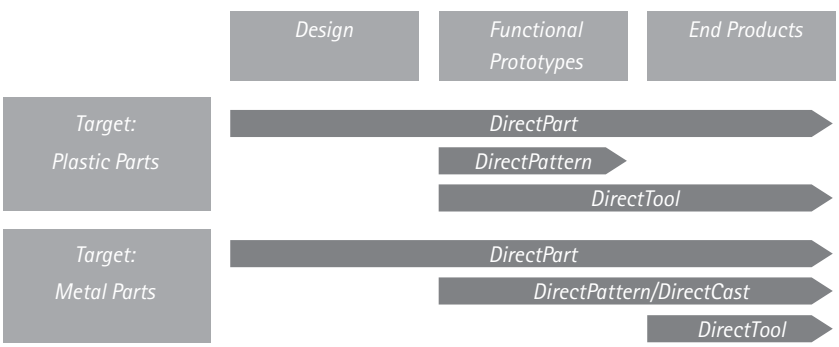
The technologies enable economical solutions in every phase of the product life cycle. EOSINT systems distinguish themselves by ergonomic peripheral devices and a high degree of automation. Thus, they ensure maximum user friendliness, optimal utilization of machine capacity, and excellent integration into any industrial environment.

Depending on the machine and application, EOS offers Integrated Process Chain Management (IPCM) for optimization of the process flow. The concept includes automatic powder conveying, the unpacking and sieving station with exchangeable frame docking system, and powder recycling.

Furthermore, EOS offers different software packages for the preparation of 3D CAD data. They include EOSPACE, which automatically places parts in a space-saving way in the build envelope.

Consequently, the software guarantees maximum utilization of the machine's capacity. At the same time, it minimizes the required building height. Thus, laser-sintering becomes an economical production method for your series production.

Manufacturing Targets: Plastic Parts and Metal Parts



Air ducts in plastic for the aerospace industry with DirectPart.

Target: Plastic Parts

DirectPart

DirectPart describes the direct production of parts by laser-sintering. Within a very short time, EOSINT P systems can build fully functional parts in plastics. The components offer excellent long-term stability and series suitability. These systems can generate mechanically loadable plastic parts using different polyamide-based materials – fast and flexibly. Even permanently moveable parts can be integrated. Furthermore, living hinges can be produced. The parts distinguish themselves by very good surface quality and high accuracy. If required, they undergo automatic post-processing to meet even stricter design requirements.
They are therefore not only suitable as functional prototypes, but can also be used as end products.
The economic efficiency of the technology becomes obvious when you compare the tooling costs of conventional technologies with the costs for laser-sintering. Especially with small series, high tooling costs often cannot be justified. Laser-sintering is not only more flexible, but also more cost-efficient. The integration of functions saves additional expense. Thus, you can optimize your product design and reduce additional assembly costs.
Customer-specific features, be they special functions, the name, a customer or serial numbering, can be individually integrated into each product. This makes laser-sintering the ideal manufacturing method for end products – from one-offs to series products.

Twin coloured key ring, injection moulded with DirectTool.

DirectPattern

In some cases the properties of the materials used for processing on EOSINT P systems are not appropriate. In such cases, laser-sintered patterns are employed for use in secondary processes. In this way, plastic parts can be built for example by vacuum casting. These parts can meet special requirements – such as transparency, to name just one example.

DirectTool

You can also use laser-sintering to produce larger series of plastic parts with conventional technologies. By "Direct Metal Laser-Sintering" (DMLS) the EOSINT M technology processes steel and other metal powders. Within a very short time, laser-sintering can create tools or tool inserts for injection moulding. The result are plastic parts in the original material in larger quantities. For the tool and mouldmaking industry, DMLS is an interesting alternative to classical machining processes. With laser-sintering, tooling becomes fast and flexible. By laser-sintering plastics you can also create tools, for example as cost-efficient moulds for shoe sole pairs of different sizes or even for injection moulded parts.

DirectPart application of metal in the medical device industry – customized knee joint.

Target: Metal Parts

DirectPart

The application spectrum of DMLS ranges from prototypes to series products and end parts. Metal parts of the most complex geometries are built layer by layer, directly from 3D CAD data, fully automatically, in only a few hours and without any tooling. The parts have excellent mechanical properties, high detail resolution and a very good surface quality. The process melts the metal powder entirely, creating a fine, homogeneous structure. DMLS enables the formation of cavities and undercuts which, with conventional methods, can only be produced with great difficulty, if at all. Therefore, the technology is ideal for applications which require maximum individuality – for example when building implants.

DirectPattern

In addition to DMLS, pattern-based casting methods for the generation of metal parts can also be supported. In this case, the laser-sintering system produces a lost pattern, typically in polystyrene. The final product is produced in the subsequent casting process. Laser-sintering thus helps to shorten the entire production time and to reduce costs. Laser-sintered models are suitable for plaster casting, plaster investment casting and ceramic shell casting. By combining laser-sintered models with ceramic shell casting, you can obtain complex, metallic cast parts within only a few days.

DirectCast

DirectCast describes the direct laser-sintering of sand cores and moulds. EOSINT S systems build highly complex and filigree cores and moulds directly from foundry sand. They are used for the production of high-quality castings in series quality. On the one hand, the technology achieves excellent results in light-weight constructions with aluminium and magnesium. On the other hand, new applications for cast iron and steel open up. Laser-sintered cores do not require mould draught angles. This leads to improved properties of the cast parts, especially where hydraulic components are concerned. Laser-sintered cores and conventionally produced moulds, assembled together to a single core package, make DirectCast especially profitable for the production of cast parts in small series.

DirectTool

Tools for die casting of zinc, magnesium or aluminium can also be produced quickly and efficiently with DMLS. This is of particular interest in product development, as conventional die casting tools are very expensive.

Materials

Plastic Materials

EOS offers you a variety of materials for use in EOSINT P laser-sintering systems. These materials are based on PA 12 or polystyrene. Polyamide is resistant to most chemicals, and the material itself is uncritical with regard to environmental and health aspects. There is a wide spectrum of material variants for the special requirements of different applications. These materials can be distinguished, among other things, by the filling, for example with aluminium, glass or carbon fibre.

Metal Materials

DMLS materials from EOS vary from bronze-based alloys to tool steel and stainless steel. Light metals on the basis of titanium and super alloys, for example cobalt-chrome, have already been developed at EOS for use in EOSINT M systems. Such alloys are especially interesting for applications in the medical device industry, as well as in aerospace.

Foundry Sand

The EOSINT S technology processes different moulding materials on the basis of Croning. All of them are commonly used in foundries. Depending on the application and geometry, different grains, base materials and coatings are available.

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, Ste. 700
Novi, MI 48377-2978
Phone +1 248 306 0143
Fax +1 248 306 0298

Further EOS subsidiaries
EOS France, Lyon
EOS Italy, Milan
EOS UK, Warwick

www.eos.info
info@eos.info

Any shape · Anytime · Anywhere