The Ultimate 3D Manufacturing Solution

Selective Laser Sintering

Expand your manufacturing capabilities with production-grade materials

3D SYSTEMS®

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Selective Laser Sintering

The Ultimate 3D Manufacturing Solution

Selective Laser Sintering is a process that uses high-powered CO_2 lasers to selectively melt and fuse powdered thermoplastics.

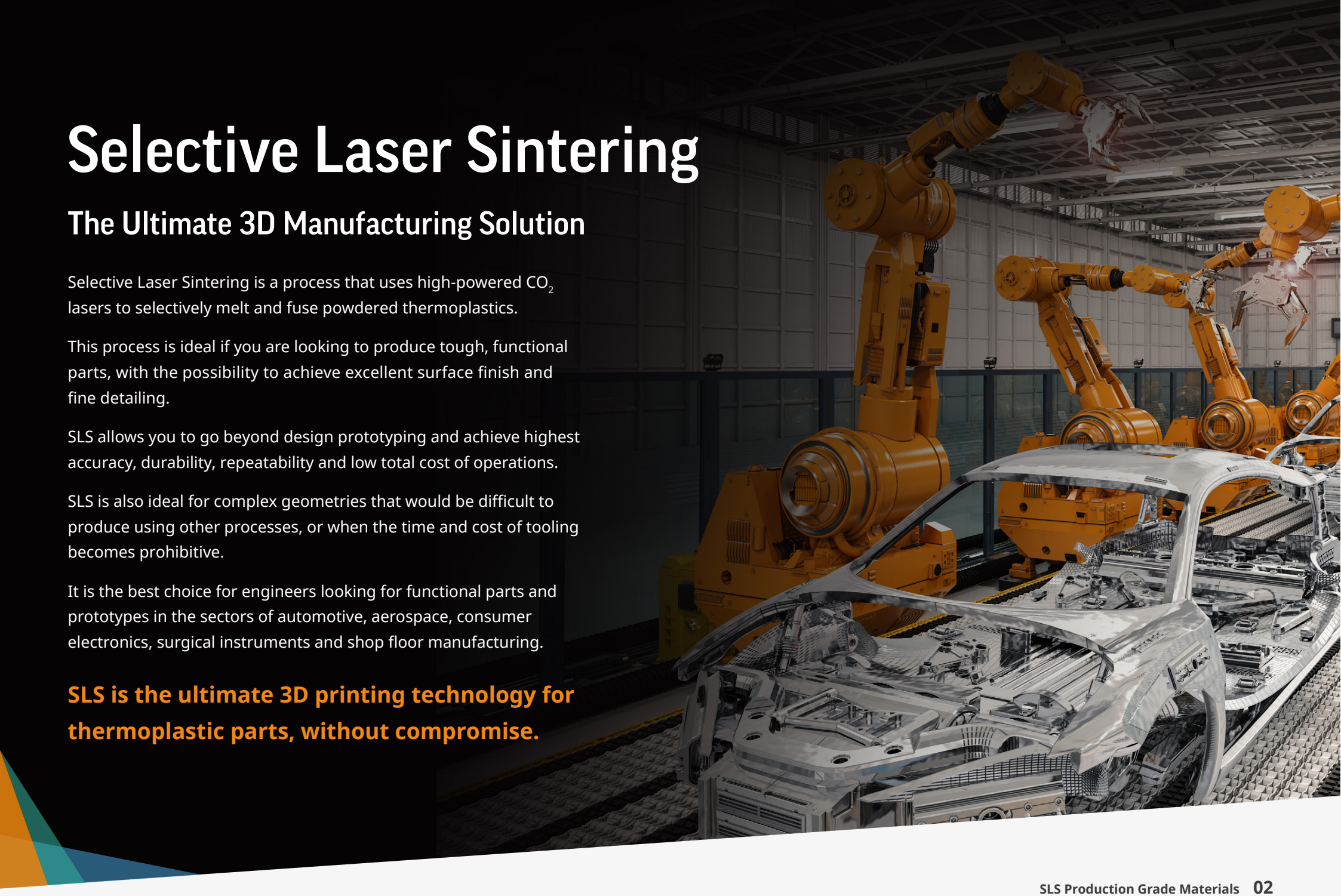
This process is ideal if you are looking to produce tough, functional parts, with the possibility to achieve excellent surface finish and fine detailing.

SLS allows you to go beyond design prototyping and achieve highest accuracy, durability, repeatability and low total cost of operations.

SLS is also ideal for complex geometries that would be difficult to produce using other processes, or when the time and cost of tooling becomes prohibitive.

It is the best choice for engineers looking for functional parts and prototypes in the sectors of automotive, aerospace, consumer electronics, surgical instruments and shop floor manufacturing.

SLS is the ultimate 3D printing technology for thermoplastic parts, without compromise.



True Production-Grade Materials

The key to robust, repeatable parts

This guide has been assembled to assist you in choosing exactly the right material combination for your production part.

To produce robust functional prototypes and end-use parts, you need a selection of the very best production-grade materials.

These materials are designed to offer you the full range of capabilities and isotropic properties, from rigid to elastomeric, high elongation, high impact strength, and high-temperature resistance. Only true production-grade materials are able to offer you these options.

What's more, you will be amazed at the level of accuracy and surface finish now available.

Read on to get the full picture!

Tough Black Nylon 11

Tough, impact and fatigue-resistant black Nylon 11 for prototypes and end-use parts requiring molded-part performance in harsh environments.

- Flexible / durable
- High elongation
- High impact strength

APPLICATIONS

- ✓ Production parts
- ✓ Snap fits / living hinges
- ✓ Automotive design
- ✓ Aerospace parts and ducting
- ✓ Jigs / fixtures / tools
- ✓ Connectors

BENEFITS

Complex end-use parts can be economically manufactured without the expense of tooling

Parts have toughness required to replace injection molded ABS and polypropylene

Functional parts can be tested in real life environments such as crash tests or other stress simulations

No painting required for a deep black color that doesn't fade or chip

NEW!

Tough Natural Colored Nylon 11

Tough and durable polypropylene-like thermoplastic for prototypes and end-use parts requiring molded-part performance.

- Flexible / durable
- High elongation
- High impact strength

APPLICATIONS

- ✓ Tough and durable prototypes
- ✓ Low to mid volume direct manufacturing of end-use parts
- ✓ Complex, thin-walled ducts
- ✓ Aircraft and motorsports parts
- ✓ Enclosures and housings
- ✓ Parts with snap-fits and living hinges

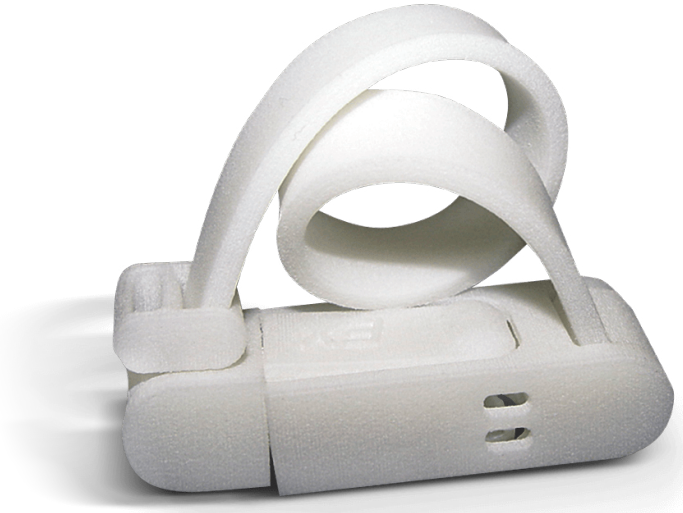
BENEFITS

180°

Ideal for snap-fit and living hinges - plastic parts that are flexible enough to fold over 180° and bounce back to their original shape

Parts have toughness required to replace injection molded ABS and polypropylene

Functional parts can be tested in real life environments such as crash tests or other stress simulations



CASE STUDY DuraForm® PA

Idaho Steel embraces 3D printing to deliver superior-quality parts faster

Company produces end-use forming inserts in a third of the time through SLS 3D printing compared to CNC machining and traditional assembly processes.

Established in 1918 in Idaho Falls, Idaho Steel manufactures, maintains and customizes machines used to render potatoes in an almost infinite variety of sizes and shapes.

Idaho Steel purchased a 3D Systems ProX 500 SLS 3D printer to manufacture key production parts for its fabricating machines. The ProX 500 produces ready-to-use functional parts and complete assemblies for a variety of aerospace, automotive, medical, consumer and industrial machining applications. It uses DuraForm ProX, a durable nylon material, to produce components that equal or surpass injection-molding quality.

“SLS 3D printing enables us to design for superior strength and durability,” says Jon Christensen, marketing and sales manager at Idaho Steel. “For those new to it, the idea of ‘printing’ parts may not convey the fact that when finished, these parts are solid plastic. Parts can also be designed for added strength in ways that are not possible through traditional machining.”

Biocompatible Nylon 12

Strong, tough biocompatible material that stands up to the rigours of long-term real world use, replacing traditionally injection molded articles.

- Flexible / durable
- High elongation
- High-impact strength
- Food grade
- Medical grade

APPLICATIONS

- ✓ Production parts
- ✓ Snap fits
- ✓ Automotive design
- ✓ Aerospace parts and ducting
- ✓ Medical / food applications
- ✓ Jigs / fixtures / tools
- ✓ Covers / housings / enclosures

BENEFITS

Suitable for general prototyping and end-use manufacturing

Compliant with FDA CFR 21 11 and the Plastic Directive of the European Union (EU), No 10/2011and its amendments

Suitable for medical parts that require USP Class VI and ISO 10993 compliance or must be sterilized

Exceptional recycling rate reduces waste and decreases production costs

NEW!

Flame Retardant Nylon 12

Ideally suited for end-use parts in aerospace, transportation and consumer goods where excellent surface finish, reliable fire retardancy and reduced smoke and toxicity are required.

- Flexible / durable
- Flame retardant

APPLICATIONS

- ✓ Production parts
- ✓ Cabin interiors for aerospace & transportation
- ✓ Fire retardant production parts
- ✓ Consumer goods needing modest fire retardancy

BENEFITS

FAR 25.853 certified for aerospace use. Passes AITM smoke density and toxicity requirements

Excellent flame retardancy at 12-and 60-second exposures. UL 94-V2 Compliant

Excellent surface quality for end-use parts

CASE STUDY DuraForm® FR1200

Emirates brings in a step change in 3D printing for aircraft parts

Emirates has announced that it has used cutting-edge 3D printing technology to manufacture components for its aircraft cabins.

The airline has reached a significant milestone in innovation by using Selective Laser Sintering (SLS), a new and innovative 3D printing technique to produce video monitor shrouds. One of the other recent achievements has been the 3D printing, certification and installation of aircraft cabin video monitor shrouds for onboard trials.

Emirates has worked with 3D Systems' advanced aerospace engineering teams, and with UUDS, a European aviation Engineering and Certification Office and Services Provider based in France, to successfully print the first batch of 3D printed video monitor shrouds using 3D Systems' Selective Laser Sintering (SLS) technology platform.

This technology uses lasers to bind together powdered plastic into the required shape defined by a 3D model and is different from the Fusion Deposition Modelling (FDM) technique normally used for printing aircraft 3D parts. The material used to print Emirates' Video Monitor Shrouds is a new thermoplastic developed by 3D Systems - DuraForm® ProX® FR1200 - with excellent flammability resistance properties and surface quality suitable for commercial aerospace business applications.

NEW!

Aluminum-filled Nylon 12

Excellent surface finish and high stiffness with a metallic aesthetic delivered directly from the printer. Easily machined and polished to add press fits, tappings and other post-print modifications.

- Stiff / rigid
- High impact strength

APPLICATIONS

- ✓ Production parts
- ✓ Automotive interior styling parts
- ✓ Aerospace components
- ✓ Jigs / fixtures
- ✓ Rigid enclosures / cases

BENEFITS

Aluminum-filled Nylon 12 with a metallic appearance

Excels in load-bearing applications at high temperatures

Excellent surface finish for end-use parts

Improved recyclability for an aluminum-filled powder leading to a lower cost per part

Glass-filled Nylon 12

Engineering Nylon 12 with excellent stiffness and heat resistance for durable prototypes and low- to mid-volume production parts.

- Stiff / rigid
- High temperature resistance

APPLICATIONS

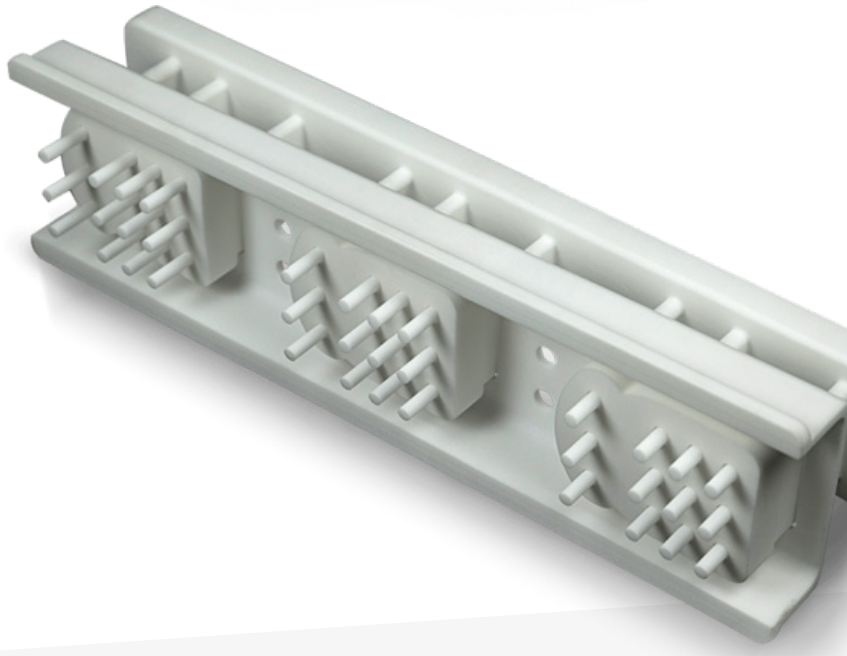
- ✓ Production parts
- ✓ Automotive design
- ✓ Aerospace components
- ✓ Jigs / fixtures
- ✓ Rigid enclosures / cases

BENEFITS

Glass-filled Nylon 12 for high strength and heat resistance

For rugged physical testing and functional use

Aircraft and automotive end-use parts



Fiber-reinforced Nylon 12

A fiber-reinforced engineering nylon with excellent stiffness and high temperature resistance. Non-conductive and RF transparent. For testing and use in rugged environments.

- Stiff / rigid
- High temperature resistance

APPLICATIONS

- ✓ Production parts
- ✓ Automotive design
- ✓ Aerospace parts
- ✓ Jigs / fixtures
- ✓ Housings / enclosures

BENEFITS

- Fiber-filled reinforced composite
- Non-conductive and RF transparent
- High strength-to-weight ratio
- High thermal resistance under load

CASE STUDY **DuraForm® GF and DuraForm® PA**

3D printing productivity drives R&D at Renault Sport Formula One

Partnership with 3D Systems speeds development and fuels innovation from wind tunnel testing to flow rigs to robust on-car parts.

Formula One racing is an endurance engineering sport fueled by relentless innovation. Teams work tirelessly to reach and beat an ever-evolving standard of peak performance, and the spirit is no different at Renault Sport Formula One Team. There, the research and development machine never stops and the contributions of technical partners play a crucial role in helping the organization reach its targets.

“Race after race, new components made of complex composites and aerospace alloys see the light after surviving a harsh selection in the R&D and simulation labs,” explains Renault Sport Formula One Technical Director, Nick Chester. “At the end of a racing season, we expect our race car to be in excess of a second per lap quicker than when we started, and our technical partners have to survive the same ruthless selection. We aren’t interested in relationships that don’t bring value in our quest for performance.”

This requirement for ongoing innovation and active collaboration is the foundation for Renault Sport Formula One Team’s choice of 3D Systems and its array of 3D printing technologies and expertise.

Elastomeric Thermoplastic

Durable elastomer with good tear resistance, surface finish and feature detail.
Shore A hardness can be varied without changing material.

- Elastomeric / rubber-like
- High elongation

APPLICATIONS

- ✓ Production parts
- ✓ Gaskets, seals and hoses
- ✓ Footwear

BENEFITS

Durable thermoplastic urethane material

Rubber-like flexibility for prototyping and production

Tear and abrasion resistant

Prototyping and production of footwear components

Rubber-like Thermoplastic

A durable, rubber-like material with good tear resistance and burst strength.
For durable prototypes that require rubber-like properties.

- Elastomeric / rubber-like
- High elongation

APPLICATIONS

- ✓ Production parts
- ✓ Gaskets, seals and hoses
- ✓ Footwear

BENEFITS

Durable thermoplastic elastomer with rubber-like properties

Excellent tear resistance

'Soft-touch' over-molded grips

Low- to mid-volume direct manufacturing of end-use parts

New Balance uses SLS to deliver mid-soles and prototypes for running shoes

SLS and full-color 3D printing, plus innovative elastomer materials, deliver shoe and mid-sole prototypes faster and more accurately than ever before.

In the summer of 2015, the 109-year-old sportswear manufacturer New Balance encapsulated its culture of relentless innovation with a fitting slogan: “Always in Beta.”

Nine months later, New Balance put paid to those words with Zante Generate, the world’s first high-performance running shoe with a full-length 3D printed midsole. In tribute to chairman Jim Davis’ 44 years of New Balance ownership, 44 pairs of the shoe were produced at the company’s Lawrence, Massachusetts facility in collaboration with 3D Systems.

The Zante Generate was made possible by 3D Systems Selective Laser Sintering (SLS) printers and DuraForm® Flex TPU material. For the day-to-day quest to fulfill the “Always in Beta” philosophy, New Balance relies on 3D Systems ColorJet Printing (CJP) for color and form prototyping.

Polystyrene Casting Material

Compatible with most standard foundry processes. For prototype metal castings and low to medium production runs without tooling.

Short burnout cycle

APPLICATIONS

- ✓ Prototype metal castings
- ✓ Low to medium production runs without tooling
- ✓ Plaster castings
- ✓ Titanium castings
- ✓ Aluminum, magnesium and zinc castings
- ✓ Ferrous castings

BENEFITS

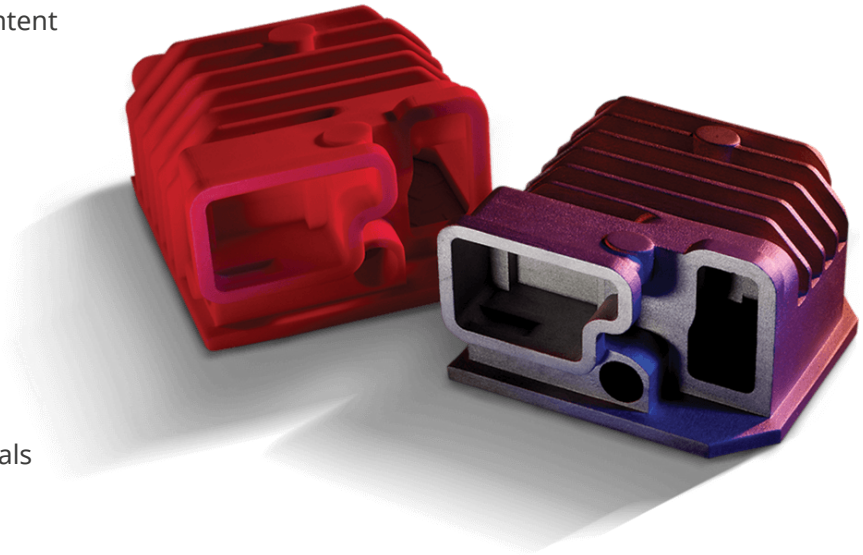
Short burnout cycle and low ash content

Create sacrificial patterns for metal castings

Use of low melt alloys Al, Mg, Zn

Use of ferrous and non-ferrous metals

Use of reactive metals like Ti



Introducing the ProX 6100

The ultimate SLS printer

- Ideal for production-grade functional prototypes and end use parts
- Excellent surface finish and fine detailing
- Competitive Total Cost of Operation (TCO)
- Automatic material handling and feeding saves time and money
- Integrated 3D Sprint software makes planning the builds easy, maximizing space and part orientation
- Air-cooled laser eliminates need for chiller
- Reduced number of unique machine parts for easy maintenance
- OPTION: 3D Connect for remote diagnostics

sPro 60 & sPro 230

Production-grade SLS 3D printing

sPro 60

- For high resolution end use parts
- Use with thermoplastic, composite and elastomeric materials
- Applications include housings, machinery components, complex end-use parts such as ductings, functional test parts and assemblies
- Produces strong parts with high thermal and chemical resistance
- Economical thermoplastic solution for large quantities of part

sPro 230

- For high throughput of high-quality, robust thermoplastic parts
- Print parts with build volume of 550 x 550 x 750 mm, increasing part strength and reducing assembly time
- Applications include superior living hinges, snap fit and other mechanical joints, jigs and fixtures, engine housings and other protective covers
- Available materials deliver high thermal and chemical resistance
- Lower cost of ownership with high throughput and capacity

Need help to choose the right material for your application?

Our experts are here to support you.
Get in touch today - we will be right with you.

Get in Touch

3D SYSTEMS®