

eBook

Outsource Prototyping and Manufacturing to Help Satisfy Modern Market Expectations



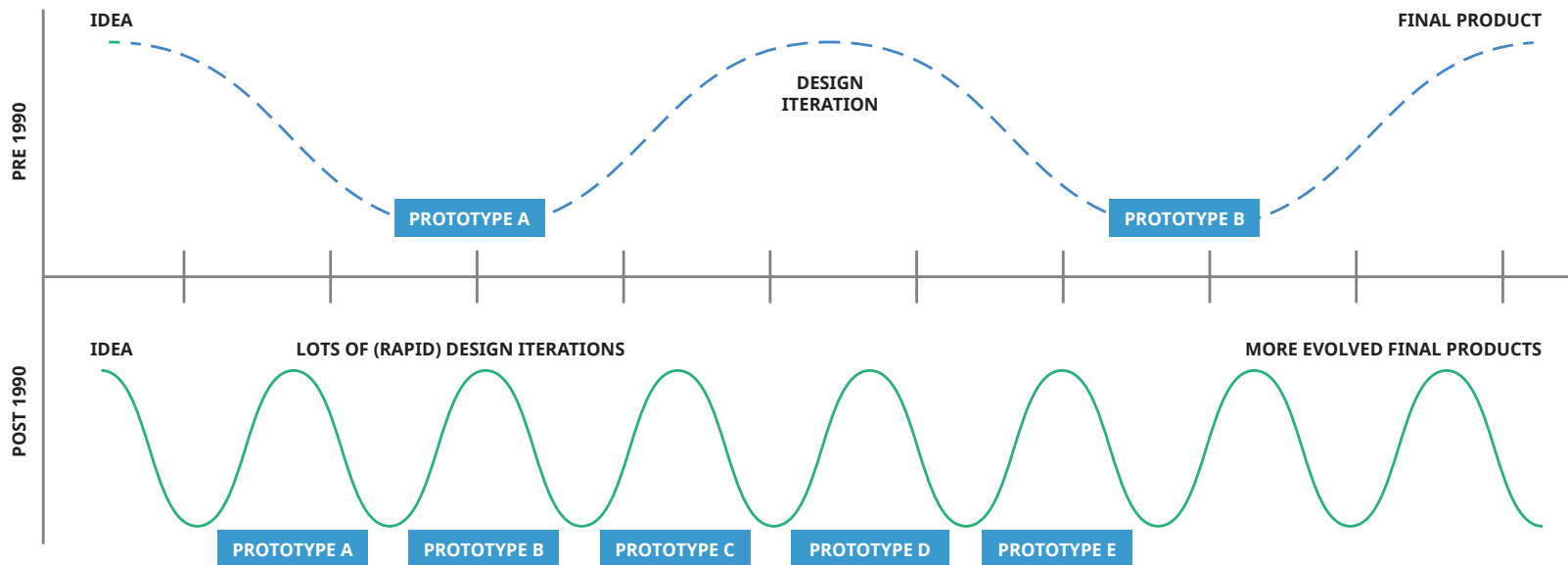
Appearance prototype of clock radio for award-winning designer Robert Bronwasser. (Courtesy of Robert Bronwasser Design)

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Modern Market Expectations

Design and manufacturing expectations keep escalating. There's a heightened consumer desire for variety, customization, automation and technological innovation. Manufacturers across all industries want parts that are more durable, lighter-weight, and cost-efficient. Deadlines are being compressed from months to weeks or even days.



3D printing of prototypes enables a greater number of design iterations and compression of the product design cycle, creating the potential for superior final products in much less time.

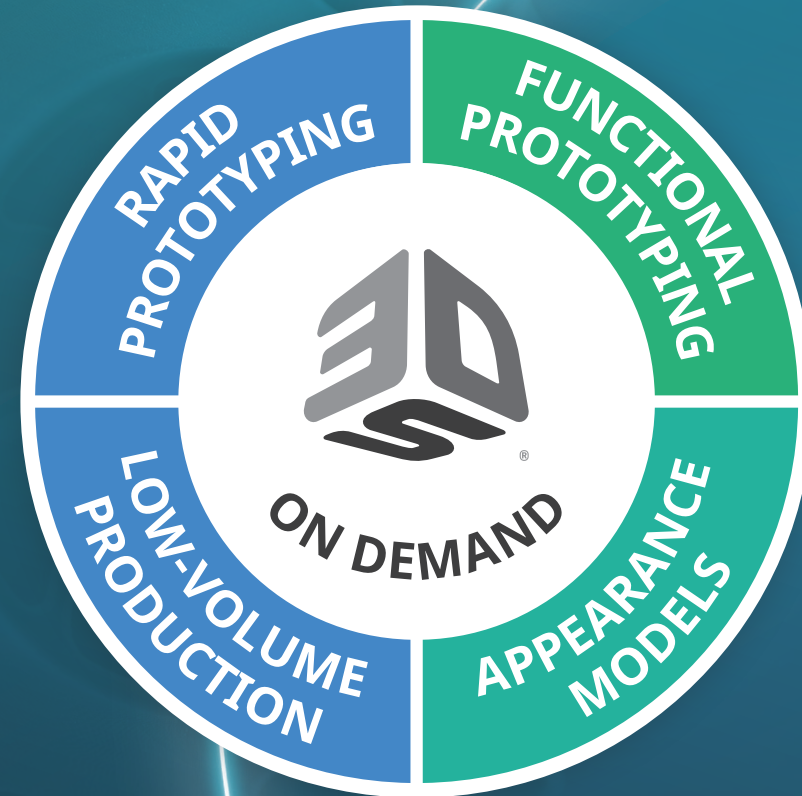
Fortunately, 3D printing is addressing these challenges by shortening the prototyping process, stimulating new design innovation, and giving designers and manufacturers the ability to experiment with new product development processes before committing on large production costs. And, all of it can be done via outsourcing.



3D Systems On Demand Service

3D printing outsourcing takes on many forms and is referred to by different names. At 3D Systems, we call it **3D Systems On Demand**.

It encompasses everything from rapid and functional prototyping to appearance models to low-volume production using both additive manufacturing and traditional subtractive processes.



Advantages of 3D Printing Outsourcing

Outsourcing 3D printing and low-volume manufacturing has several advantages for designers and manufacturers:

- It provides the ability to test new processes, materials and approaches.
- It frees customers from tooling and machining constraints, opening up a new level of design freedom that can result in lighter-weight, more durable, and lower-cost parts and assemblies.
- It delivers cost-efficient customization to meet market demands for more personalized products.
- It complements in-house 3D printing capabilities with a wider range of material and printing options.
- It offers an on-ramp to move from outsourcing parts production to ownership of in-house 3D printing systems.
- It enables customers to team 3D printing with traditional manufacturing approaches such as CNC and injection-molding production.
- It allows access to outside experts who can take a fresh approach to design and manufacturing challenges.



From RP to Low-Volume Manufacturing

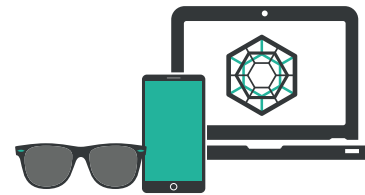
A range of applications can be serviced via outsourcing, from rapid prototyping to low-volume manufacturing.



Rapid prototyping gives customers a good idea of the look and feel of a product or part before committing to the more costly aspects of production. Prototypes can include a wide range of materials, including hybrids of two materials or more, and an array of digitally produced textures that mimic those that will be found on the final product.



Functional prototyping goes beyond look and feel, enabling customers to assess factors such as usability, ergonomics, manufacturability and materials testing for their designs. The obvious benefit is the ability to fully test functionality before committing high-value resources to a design concept.



Appearance models are the equivalent of an architect's building model, turning 3D photorealistic renderings on the computer into prototypes that transform designs into physical reality. These models can encompass a wide range of materials, 3D printing processes, finishes, and manufacturing production expertise.



Low-volume and quick-turn injection molding production services help customers reduce tooling costs and refine designs before moving into expensive production molds. Customers benefit from a diverse range of available technologies and expert advice from an experienced team of engineers.

Broad Range of Options

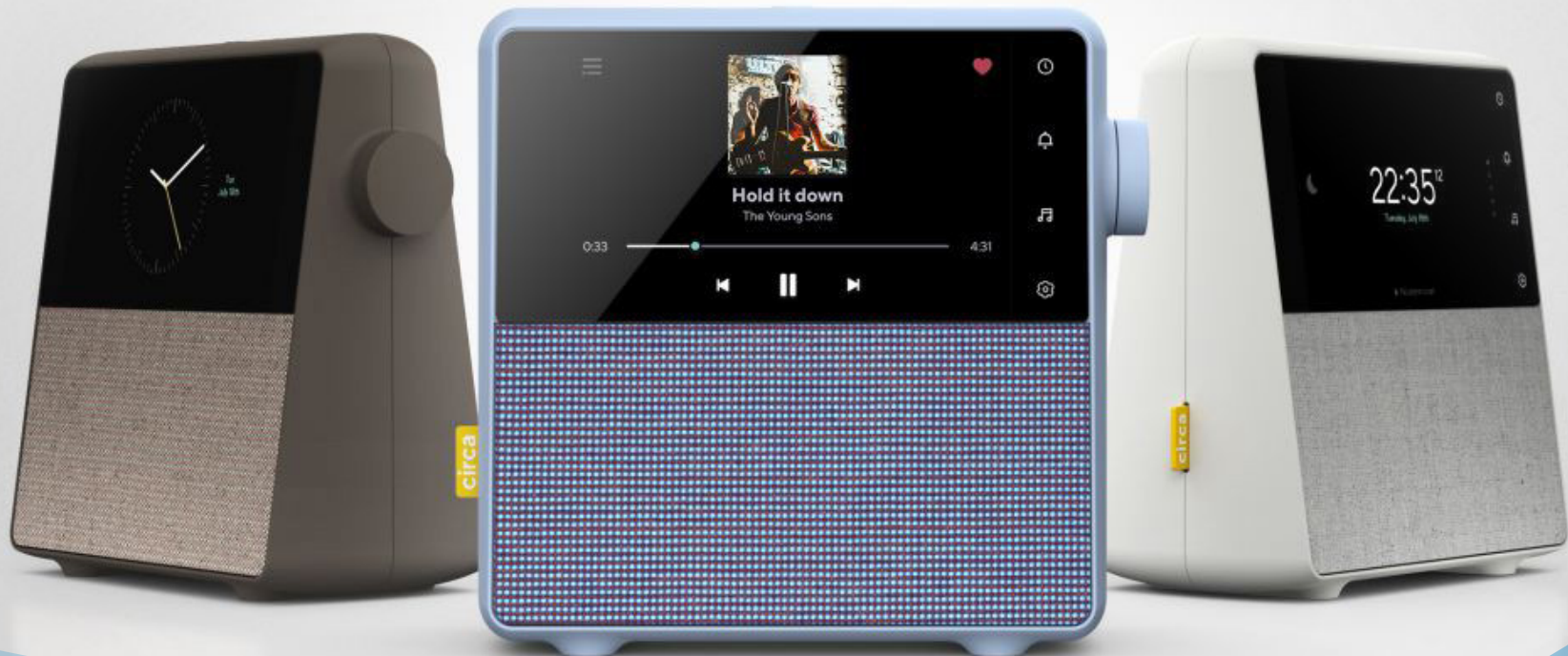
Even if a company has 3D printers in-house, outsourcing selected work can open up options for printing using different materials, processes, properties and colors. These options can be used singularly, in combinations, and/or integrated with traditional processes.

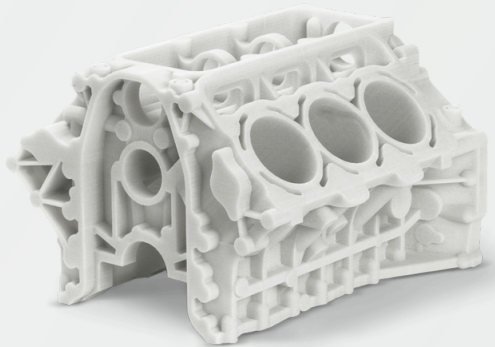
The most commonly used systems for rapid prototyping are based on **stereolithography (SLA)**. Although SLA has been around for more than 30 years, it hasn't stood still. The technology for

creating precise and accurate resin-based parts has made huge leaps over the last three decades in areas such as speed, affordability, range of materials, cleanliness, level of detail, texturing,

finishing, and overall automation of the 3D printing process. A company might have SLA systems in-house, but they might pale in comparison to the latest and greatest at an outside facility.

Appearance prototypes of clock radios for award-winning designer Robert Bronwasser. Using a combination of materials and technologies, functionally accurate appearance models can be created with working hinges, wheels, lighting, electronics and accurate colors. (Courtesy of Robert Bronwasser Design)

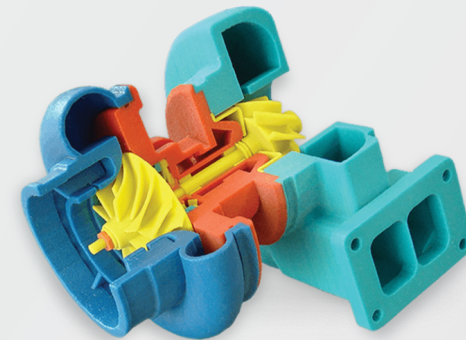




Selective Laser Sintering (SLS) has been around about as long as SLA technology, but it too has continued to evolve rapidly in its ability to produce durable and heat-resistant parts. SLS doesn't require support structures, making it capable of producing geometries that no other technology can. Common SLS applications include housings, machinery components, functionality testing, jigs and fixtures, ducting, customized consumer goods, mechanical joints, snap fits, and living hinges.



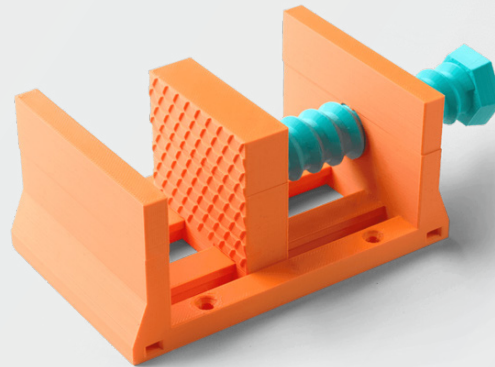
Multijet technology is an inkjet printing process that deposits either photo-curable plastic resin or casting wax layer by layer to build a part. Multijet printers output parts with high accuracy and resolution. They are used for applications such as design validation, aesthetic assessment, performance and assembly testing, manufacturability testing, rapid tooling, and jigs and fixtures manufacturing.



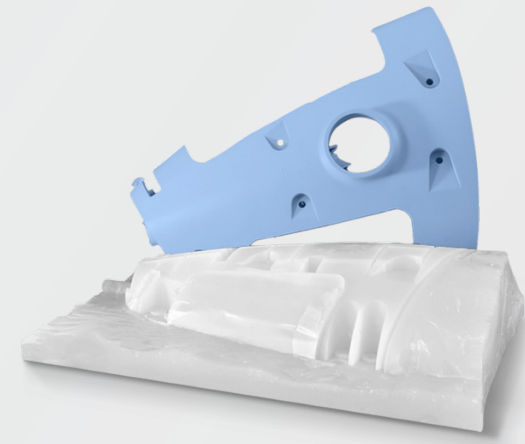
ColorJet printing outputs full-color parts with complex geometries at high speeds. The realistic color range makes this technology appropriate for aesthetic and ergonomic evaluation of new designs and authentic-looking demonstration models for trade shows and sales presentations.



Direct Metal Printing (DMP) delivers high accuracy, precision and design freedom for handling complex free-form surfaces, lattice structures, conformal channels, and thin walls. DMP is used for end-use replacement parts, producing lighter-weight parts, reducing the number of parts within an assembly, increasing part performance, and strengthening parts and assemblies.



Fused Deposition Modeling (FDM) is commonly used for high-strength ABS-like parts and prototypes. It allows parts to go directly from 3D CAD to thermoplastic materials without tooling. Applications include design validation, fit and function testing, small production runs, and end-use jigs and fixtures.



The **Cast Urethane** process enables production of parts that mimic the appearance and physical properties of injection-molded parts. A 3D-printed master pattern is imprinted into SRM (silicone rubber mold) tooling, enabling manufacturers to deliver cast urethane parts within days. An additional benefit of the process is the ability to over-mold existing parts or hardware with a second material.

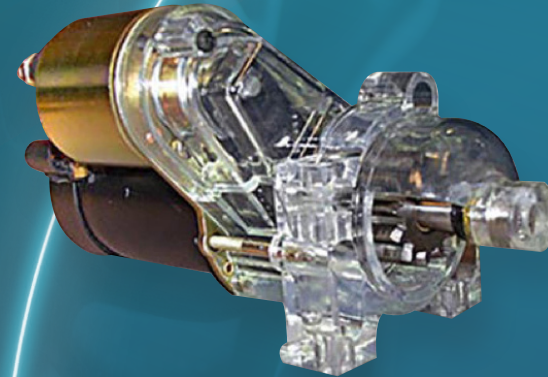
A Working Prototype in Days

A recent case study shows how outsourcing can benefit a manufacturer facing time-to-market pressures.

Generac Power Systems, the leader in home standby power generators, was redesigning an internal engine component that interfered with other parts in testing.

Producing an actual production part would have taken months. Generac didn't have that luxury of time – the company needed a redesigned prototype part quickly to ensure that the part worked properly before

committing to production. Receiving the prototyped part in days allowed Generac to test the part, verify it would work, and push forward with die-cast manufacturing.



GENERAC[®]

Receiving a working prototype in days helped Generac Power Systems shave weeks off of production time of a redesigned internal engine part for a home power generator.

What to Look for in a Provider

Besides solid references and the experience one always seeks in an outsourced service provider, there are several key factors one should look for in a 3D printing partner, including:

EASE OF ENGAGEMENT

Free online quotes, fast turnaround and shipping times.

LEVEL OF EXPERTISE

Proven success in all key areas of design, manufacturing and technologies related to the project.

INTERNATIONAL FOOTPRINT WITH LOCALIZED SERVICE

Localized service to accommodate different cultures, languages and working conditions and a worldwide presence to ensure the greatest number of available resources and expertise.

DIVERSITY OF APPROACHES AND CAPABILITIES

Having the machines, expertise, materials and resources to meet a client's exact needs.

CREATIVE SOLUTIONS

The ability to go outside the box to create a solution that the customer might not have considered, but that delivers a breakthrough in design, performance and/or affordability.



China's Fujikon uses SLA printing and Visijet SL Flex material to produce tough headset prototypes for assembly testing, screwing and fit testing, and surface finish evaluation.



Anticipating the Future

According to a report by the research firm Markets and Markets, the 3D printing market is expected to be worth \$32.78 billion by 2023, with a compound annual growth rate (CAGR) of nearly 26 percent between now and 2023.

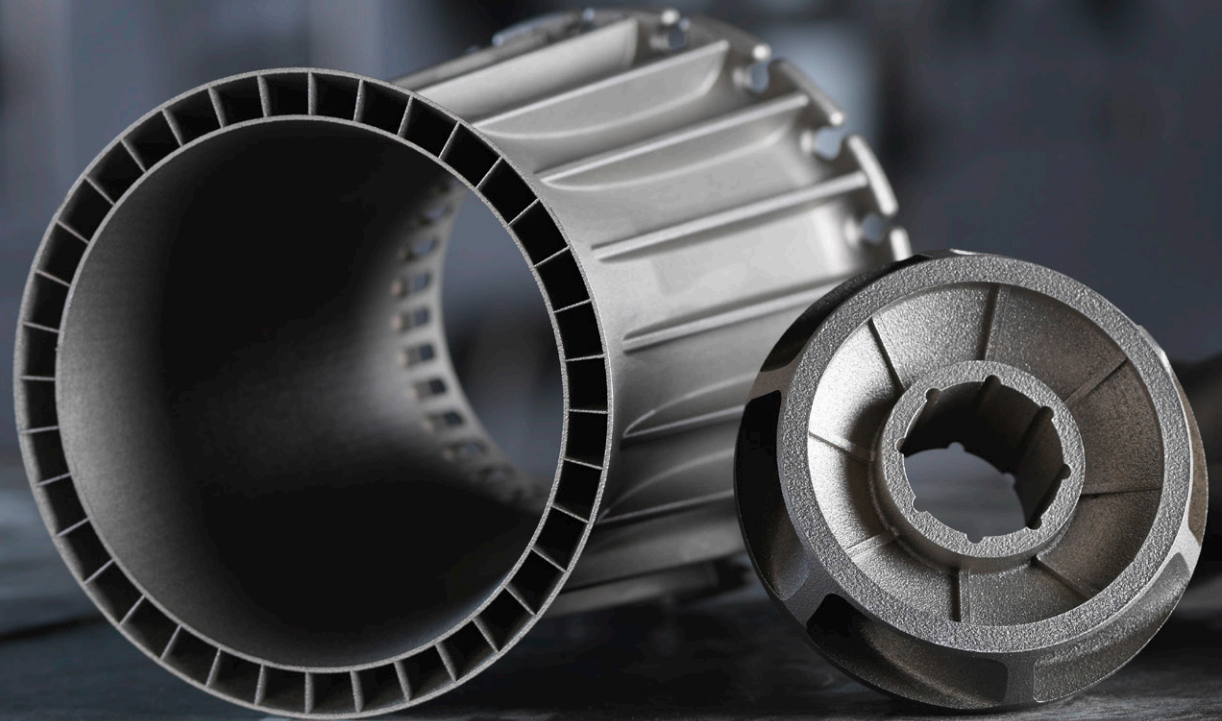
The report attributes this growth to factors such as the ease of development of customized products, ability to reduce overall manufacturing costs, and

government investments in 3D printing projects for the development and deployment of the technology.

ADDITIONAL FACTORS SPECIFIC TO OUTSOURCED 3D PRINTING INCLUDE:

- Worldwide competitive pressures for faster time to market.
- The need for greater innovation to develop new products aligned to lifestyle and societal changes.
- Cost savings through the ability to verify design changes early in product development.
- The ability to implement just-in-time prototyping and low-volume manufacturing that speeds production and reduces warehousing and shipping costs.
- Increasing movement towards production agility and nimbleness vs. traditionally large, slow-moving operations.

All the indicators point to a bright future for those adopting 3D printing, either in-house, through outsourcing partnerships, or as a combination of both.



3D Systems On Demand delivers the technologies, processes, tools and expertise to quickly translate your designs into manufactured parts. We offer rapid prototyping, functional prototyping, fully realistic appearance models, and low-volume manufacturing using a full range of proven capabilities.

This includes additive manufacturing, cast urethane, CNC machining, injection molding, metal-die casting, sheet metal fabrication, and expert finishing. Customers rely on the engagement with our engineers to help speed time-to-market, access the widest range of processes and materials across our facilities worldwide.

Visit the 3D Systems website for more information or to get a quote.

[Get in Touch](#)