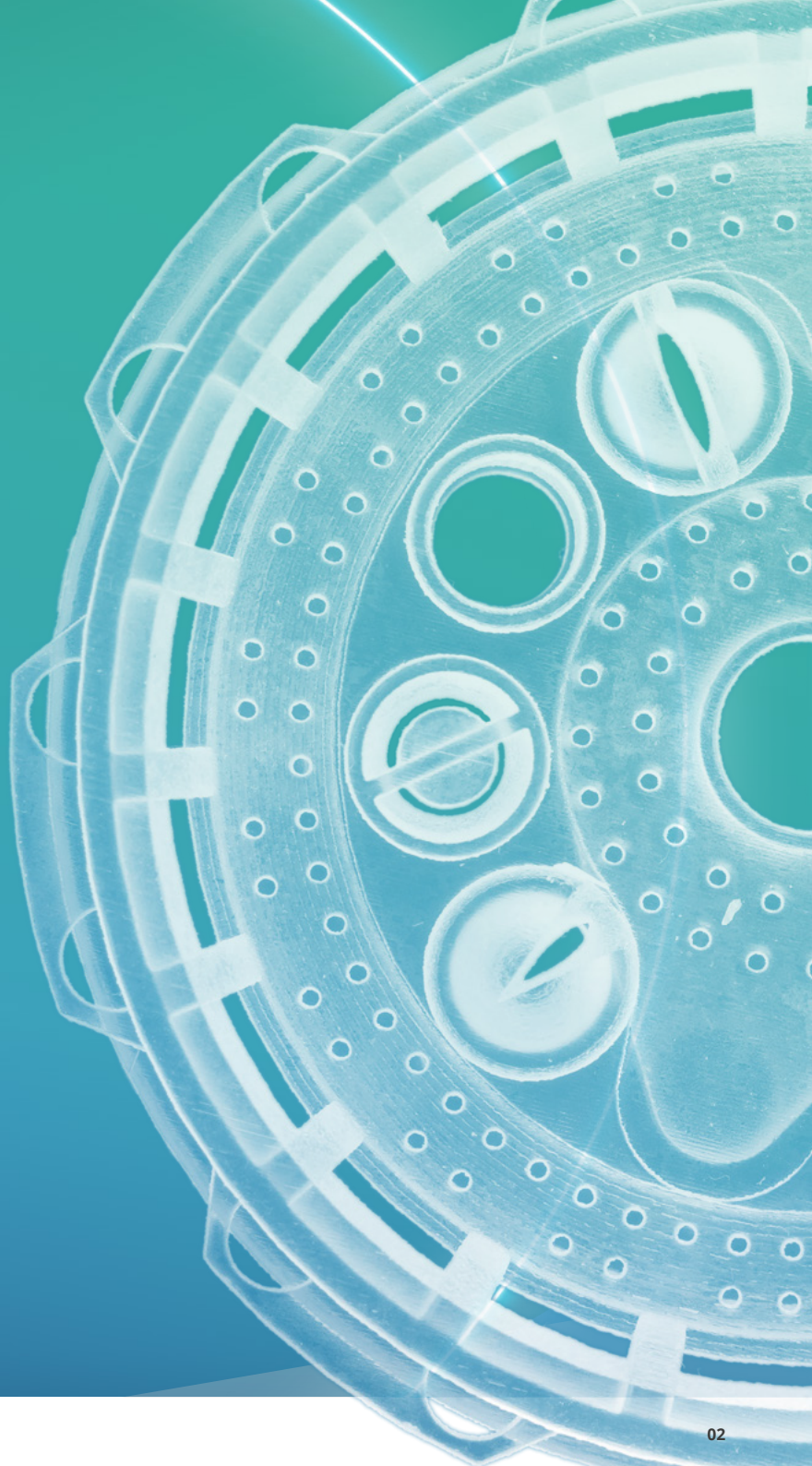
3D SYSTEMS
Additive Manufacturing Solutions

ebook

The Production and Use of Clear Parts with 3D Printing

Contents



What's clear about clear

To get the clearest part, you need the clearest materials.

Achieving transparent 3D printed parts can be challenging if you don't have the right materials and technology, but the value and versatility of clear parts makes finding the right materials a hurdle worth vaulting.

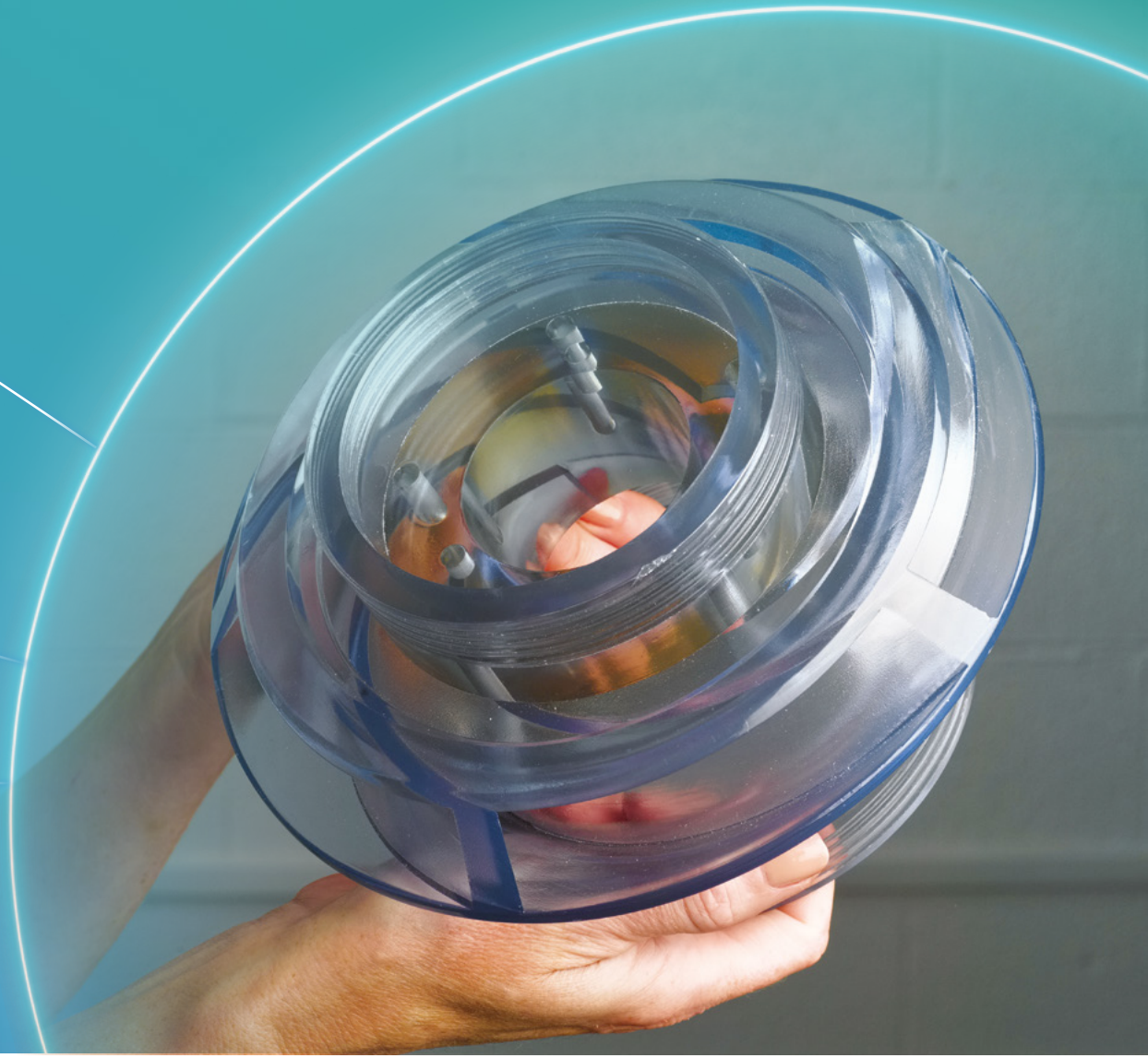
The ebook provides examples of applications where the combination of clear materials and 3D printing can bring new insights and innovation, as well as significant savings in time and cost.

Advantages of clear 3D printed parts

SPEED UP
DEVELOPMENT TIMES

TEST, VERIFY
& DELIVER
BETTER PERFORMING PRODUCTS

SIMULATE APPEARANCE OF
GLASS, ACRYLIC &
OTHER TRANSPARENT MATERIALS



Advantages of clear 3D printed parts

No other manufacturing process produces clear components for product development more cost-effectively than 3D printing.

In addition to the key product development advantages outlined in the sidebar, 3D printing enables increased design complexity due to the way parts are created one layer at a time.

The additive process allows intricate, highly complex geometries and features to be produced that would otherwise be unattainable due to the constraints of traditional manufacturing methods.

The value of a clear material is the ability it gives you to see through or into a component that mimics a final product. Combining 3D printing with clear materials merges the advantage of visibility with geometric freedom, enabling designers and engineers to more thoroughly test, verify and deliver better performing products and speed development timelines.

For some applications, design evaluation necessitates additional material properties such as thermal resistance, moisture resistance, or a certain strength threshold. Knowledge of, and access to, a wide range of materials can help designers and engineers choose the best material for their application.

3D printed prototypes lower costs by allowing you to:

Get visibility into the workings of a complex assembly

Functionally test fluid and gas flows through a system

Significantly reduce length of total product design cycle

Where clear materials matter

With the right materials and post-processing techniques, 3D printing can produce clear parts that simulate the appearance of glass, polycarbonate, acrylic and other transparent materials, which is helpful for design verification where transparency is needed.

The practicality of clear printing extends beyond one-to-one representations and can be used for a broad range of advanced design verification and functional prototyping. The ability to see into a part or system during testing is tremendously beneficial, and expands the applications and value of clear printing accordingly.

PACKAGED CONSUMER GOODS

- Bottles, cosmetics, cleaning products, personal care, etc.
- Lenses and light covers
- Housings and enclosures
- Complex assembly prototypes and verification
- Demonstration models and executive reviews

AUTOMOTIVE & AEROSPACE

- Lenses and light covers
- Fluid flow visualizations in sub-systems or components
- Moving vehicle turbulence and drag (ship, auto, train, bus)
- Computational Fluid Dynamics (CFD) verification
- Complex assembly prototypes and verification

INDUSTRIAL & ELECTRONICS

- Engine, turbine and transmission covers, housings, components
- Valves, pipes, pumps, pressure and flow devices
- Computational Fluid Dynamics (CFD) verification
- Light pipes and LED covers

HEALTHCARE & DENTAL

- Anatomical models
- Fluid flow in biological vessels and medical devices
- Medical models and devices
- Microfluidic devices

Post-processing translucent and tinted parts

With a few simple steps, high quality clear materials can be transformed with incredible results. Typically this involves a combination of wet and dry sanding, bead or vapor blasting, applying a surface tint or dye as desired, and a final clear coat for enhanced surface smoothness.

Watch the video here ›

It's clear because...

You want the most aesthetically clear part for packaged consumer goods

A visually accurate prototype is also known as an appearance model. When comparing an appearance model to a final product, the two should be virtually indistinguishable, with the frequent exception of scale and function.

As a testament to what is aesthetically possible with clear 3D printing, Orora, a glass bottle supplier, called on 3D Systems On Demand Manufacturing to produce a series of beer bottle prototypes that were included in in-store trials. Customers were unable tell the difference between the tinted 3D printed bottle and actual glass, and ultimately gravitated toward the 3D printed versions to confirm the new bottle design for Orora's customer.

Read the full story here ›

It's clear because...

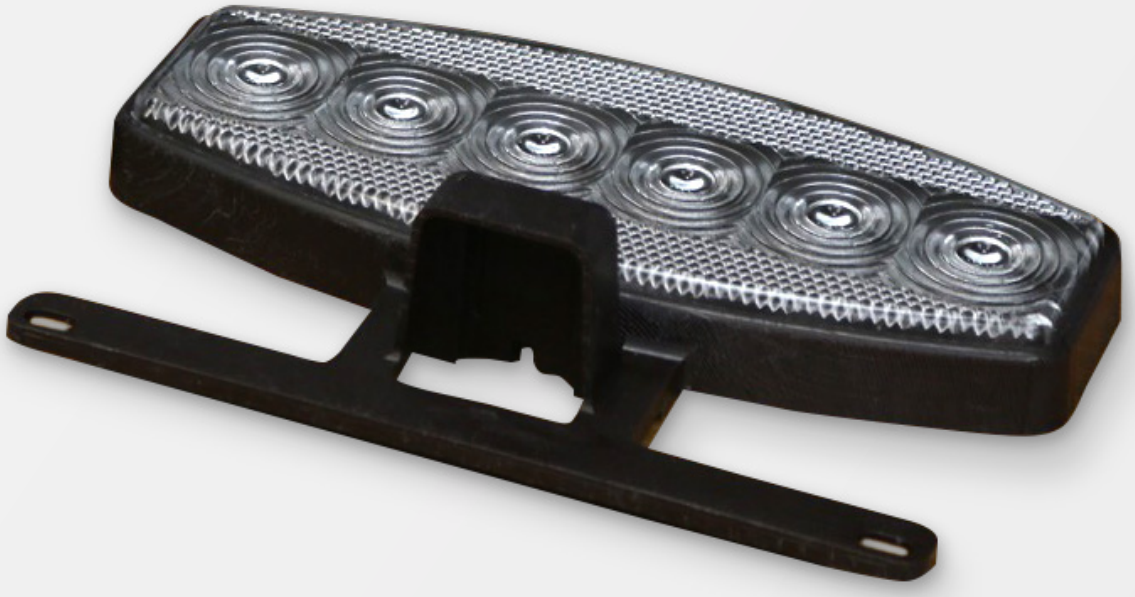
You want the most aesthetically clear part for automotive lenses and headlamps

Clear 3D printing provides a quick and cost-effective way to prototype clear parts.

TecNiq is a leading provider of LED lighting solutions based in Michigan that uses 3D Systems' SLA 3D printing in almost every part of its business. According to company president Jeff Condon, clear 3D printing is serving both the engineering and business side of his organization. In terms of engineering, his team is able to use VisiJet® SL Clear prints to check snap-fit functionality and address potential tooling problems in assemblies before they become larger issues.

From a business perspective, Condon says: "Customer decisions made since we've [introduced clear 3D printing] are delivering a measurable ROI." TecNiq has even had two lamps meet U.S. Department of Transportation output specifications "right out of the printer," according to Condon.

Read the full story here ›



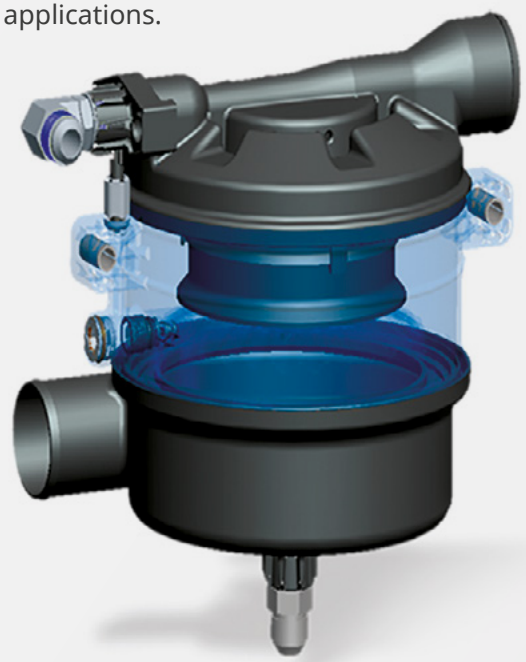
It's clear because...

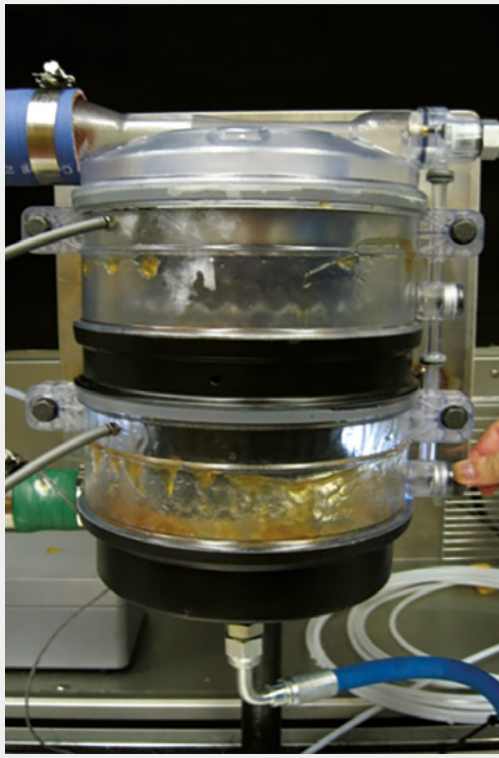
You need visibility into a system or for visual evaluation of fluid flow

When testing fit, function, serviceability, and assembly, see-through parts replace guesswork with observation and insights.

Engineers in the filtration department at Parker Hannifin, the global leader in motion and control technologies, have reported great success using 3D Systems' clear SLA materials to observe oil flow within a separator system, among other applications.

The speed and easy integration of 3D printing into Parker Hannifin's workflow helped the company develop and prove an optimized prototype within three weeks according to its R&D Manager.





It's clear because...

You need visibility through an anatomical model or drill guide

The ability to selectively color clear 3D prints is of great benefit in the field of anatomical modeling and surgical planning.

Selective coloring is particularly useful for obtaining a better visualization of specific anatomical features. Features such as veins, nerves and tooth roots, as well as masses such as tumors can be selectively colored in certain clear materials and used to help plan surgeries and for reference within the operating room.

Clear 3D printing is also popular for producing drill guides used in dental applications due to the ability to visually confirm that they are sitting properly.

Selectively coloring clear materials helps give a better view of specific anatomical features.

How to get clear parts

In-house vs. on demand

If you think clear 3D printing should be part of your current design verification or prototyping process, you have a few ways to get started. The first is ordering parts on a project-by-project basis through a 3D printing service bureau. This is a great way to get clear parts when your requirements are somewhat infrequent and not immediate. This is also an excellent way to guarantee quality finishing, as service bureaus such as 3D Systems On Demand Manufacturing typically produce thousands of clear parts each week.

It is worth considering in-house 3D printing technology when you have or anticipate a frequent need for 3D printed parts and want to accelerate your development cycles with fast access to physical models. Companies seeking to maintain the highest level of design secrecy may also wish to bring 3D printing in-house as a security measure to protect their IP. Once you have narrowed your selection to the right technology family, many users find they are best served by a complete 3D printing solution. Complete solutions are defined by the hardware, materials, software and support services required for success. Companies like 3D Systems are equipped to handle these demands across technologies and application areas.

What's next?

Interested in learning more about clear materials and solutions for 3D printing? Our application engineers are ready to help you find the solution that's right for your application.

Get in touch today - we will be right with you.

Get in Touch

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