prototypeprojects
3D MADE. SIMPLE.®

Clear 3D Printed Prototypes: Sophistication in Rapid Design Testing and Iteration

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Removing the traditional constraints for prototyping

The use of clear materials in prototyping changed the way designers approach designs for lights, headlamps, reflectors and packaging items such as bottles, as well as delivered enhanced visibility into on-track engine tests and other fluid dynamics verifications.

3D printing, or additive manufacturing (invented by 3D Systems more than 35 years ago), works by applying materials layer-by-layer to a shape based on the 3D CAD data supplied. This enables new parts that are no longer limited to the restrictions of traditional manufacturing including undercuts, internal geometries and draft angles, but also are not subject to waiting for injection mould tooling nor minimum order quantity (MOQ) constraints.

This white paper covers the applications and benefits of clear 3D printed parts that Prototype Projects offers to meet your specific application needs.

The advantages are clear

3D printed transparent materials deliver an array of advantages to product designers and engineers so that they can 'see' inside a prototype to perform testing.

This methodology delivers far greater insight into how a part or assembly will operate in the real world. The rapid production of prototypes for this kind of testing enables those insights, and resulting design changes, to be made far more quickly.

This delivers business benefits including:

- Higher quality parts and assemblies
- Lower tooling costs
- Innovation for more complex parts
- Quicker design iterations
- Design cycle compression
- Reduced cost of prototyping and testing
- Problem avoidance during production ramp-up
- Significantly faster part-time-to market with more confidence

Transparently superior additive materials

The range of clear materials from 3D Systems deliver options for printed parts that have high thermal and moisture resistance and are robust and strong. The clear materials available have properties such as glass-like clarity and emulate polycarbonate, acrylic and polystyrene materials used in traditional manufacturing.

While the clear materials offer top- level transparency they are also straightforward to tint and dye to deliver realism in certain applications.

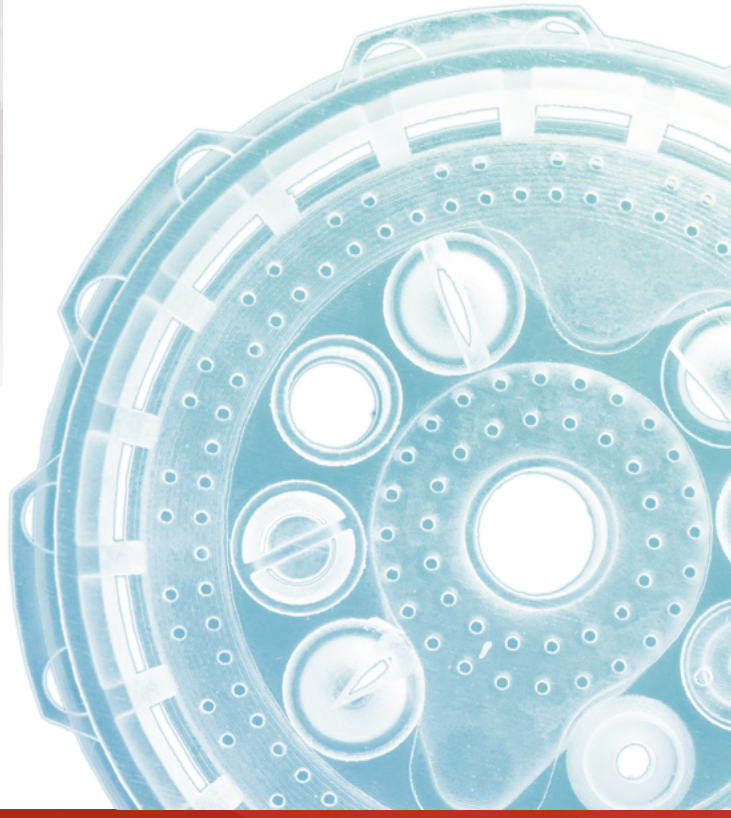
This enables our customers to perform the following functions:

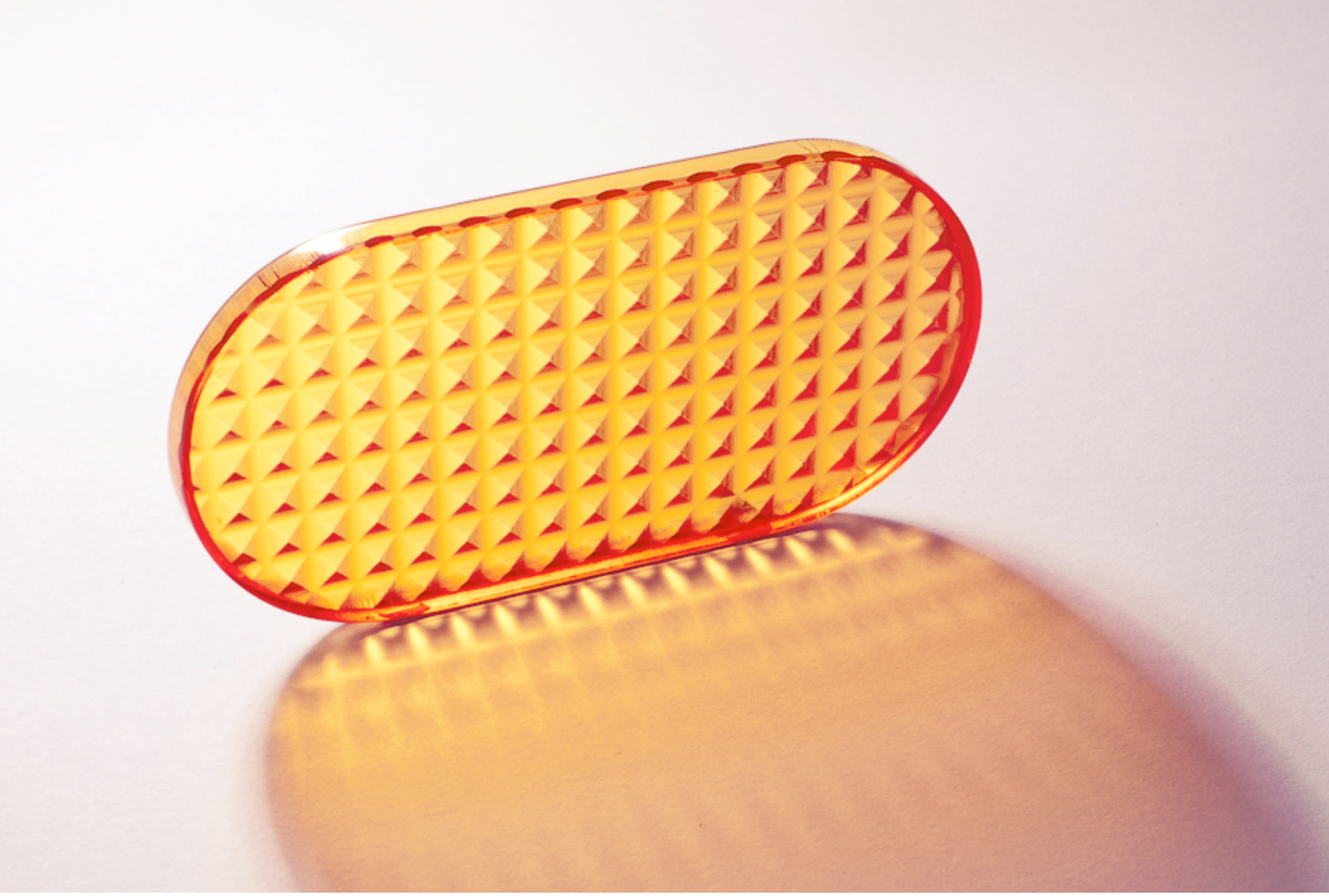
- On-car testing for fluid flow
- Functional testing of clear air filter parts to determine air flow and filter functionality
- Clear housings around an assembly to perform interference checks
- Testing of reflectors and lens designs for clarity, direction and focus of the light beam
- Creation of custom jigs and fixtures that need a clear view into the part being assembled
- Creation of anatomical models that need selective colorization to highlight contained geometries
- Prototyping of light pipes and IR sensor packing
- Production of custom drill guides for surgery and dentistry
- Production of prototype packaging such as bottles for look, feel, adherence to brand and aesthetics

In a class of its own

3D Systems' Accura® ClearVue SLA transparent material has been proved in laboratory testing to be the clearest (closest to the transparency of water) additive material available in the industry.

With a light transmission measurement of 95.45, this material can deliver significant benefits where almost perfect transparency is required.





Additive technology that meets your needs

For clear prototyping, Prototype Projects uses Stereolithography (SLA) with a range of materials.

SLA 3D printing uses photopolymerisation to create parts layer by layer in a tank of resin that is cured using directed UV light. As well as being the original 3D printing technology, it is also the most advanced, delivering superior surfacing of parts better than any comparable additive technology.

Prototype Projects uses Projet machines from 3D Systems. Housed in our 3D printing suite, we have four Projet 6000's and a Projet 7000. We also use a Viper SLA machine (used for medical device prototyping).

We use clear material on our Projet 6000 machines and Viper machine.

The Projets use an Ultra High Definition build mode, delivering fine feature parts via a dual spot laser, as standard. The terms 'Normal Res' and 'Hi Res', therefore, are no longer relevant for 99% of builds. The dual spot intelligent scanning laser is adjusted automatically to suit the geometry being printed. This applies to the whole bed size:

- Projet 6000: 250x250x250

This machine delivers fine point scanning for borders and small features and, broader scanning for infill hatching for each layer (slice):

- Fine feature: down to 75 µm (0.003 in)
- Larger feature: 750 µm (0.030 in)

SLA 3D printing delivers high throughput and part detail with the widest range of materials in the industry.

The clear material for SLA 3D printing

SLA 3D printing delivers industrial-grade batch 3D printing with superior surface finish on parts. Prototype Projects uses **Accura® ClearVue™** for the production of SLA parts.

Laboratory testing has shown that 3D Systems' Accura ClearVue material is the most transparent in the industry, enabling parts that appear incredibly close to water transparency – the standard in clear materials.

Accura ClearVue also complies with USP Class VI certifications and so can be used for medical device prototyping. We have a dedicated medical device SLA machine which is housed in a segregated area of our 3D printing suite.

LIQUID PROPERTIES OF
Accura® ClearVue™

DISTINGUISHING PROPERTIES

- Unbeatable clarity
- Rigid and tough
- Excellent humidity and moisture resistance
- Complies with USP Class VI certifications

APPLICATIONS

- Lenses
- Headlamps
- Consumer packaging
- Applications that require transparency or clarity to match glass, polycarbonate, acrylic etc

Post-processing translucent and tinted parts

Our clear materials can be post-processed for exceptional clarity, and tinted for realistic prototypes such as automotive lights or consumer product casings. The process typically requires some dry sanding, spray tint or application of dye, with UV- resistant clear coating for the final overall effect.

The importance of surface smoothness to part clarity can be observed in frosted glass. By altering the surface smoothness of an otherwise transparent material, glass appears opaque. In many cases the clarity of 3D printed clear materials can be improved by sanding and applying a clear over-coating.

Tinting and clear-coating 3D printed parts allows users to achieve the visual appearance of glass, polycarbonate, and acrylic, or any familiar hue of lighting or housing cover.

About Prototype Projects

Your parts. Your process.

- SLA*
- SLS*
- FDM*
- PolyJet*
- Figure 4*
- Vacuum Casting
- CNC Machining
- Laser Cutting
- Model Making

*NEXT DAY DISPATCH available on express orders

Your parts. Your finish.

Depending on the purpose of the part, different levels of finishing are often needed. Our range of 3D print finish levels, is available on our website.

Your parts. Your speed.

We offer four dispatch options for 3D Printing helping you meet tight timescales or economy budgets.

Express | next day dispatch**
Standard | in 3 working days
Economy | in 5 working days
Super-Economy | in 10 working days

***If quoted before 4.00pm and ordered before 5.00pm*

Your parts. Your colour.

We offer a consistent and repeatable SLS dyeing service, using our 'Print-to-Product' workflow. As well as our standard colours, we offer an entire RAL classics palette.

Your parts. Your texture.

SLS and SLA parts can be textured to give them an 'Off Tool' look and feel, such as leather or other natural materials. We can also apply a texture to the surface of Figure 4 parts.

Your parts. Your team.

We have been producing high quality prototype parts for our customers since 1980.

Our experience in model making, 3D printing, prototyping, additive manufacturing, CNC milling, and more, is vast. We continually invest in the latest technology.

Talk to us about your next prototype project to ensure you achieve the results you expect.

01763 249760
office@prototypeprojects.com
www.prototypeprojects.com

Want to learn more about clear 3D printed prototypes?

Talk to our team of experts

CONTACT US

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3D MADE. SIMPLE.®

Prototype Projects Ltd
Unit 2, Greenfield
Royston
Hertfordshire SG8 5HN

www.prototypeprojects.com
01763 249760