stratasys

Stop Compromising on Prototypes:

5 Ways Tough PolyJet™ Materials Will Transform Your Prototyping

EBOOK
POLYJET TOUGHONE

Too often we make unnecessary compromises.

Life is full of choices, often leading to tradeoffs or pros and cons. We can learn to accept that nothing's perfect, but sometimes this mentality leads to unnecessary compromises. Sometimes there's a better way.

When it comes to product design and development, there are several compromises companies make, leading to sub-par prototypes.

Compromising on Detail, Accuracy, and Aesthetics

Functional testing of prototypes can be done using various additive manufacturing methods. If the primary purpose of the prototype is to test functionality, it follows that the top criterion is the strength and performance properties of the material used. This tends to preclude the ability to print with high detail, color, and precision.

If you want to show this functional prototype to a client or customer, it might be difficult to convey what the finished product will look and feel like. Furthermore, low detail or accuracy can cause critical features to become distorted or misrepresented.

Compromising on Strength and Toughness

On the flip side, design models can be made to a very high level of realism with PolyJet printing technology. Feature size under 20 microns, full Pantone color matching, and multi-material printing make models look and feel exactly like the final product.

But can it be used for functional testing? Can it withstand the daily wear and tear of rough handling?

Wouldn't it be nice if you could print a 3D model that is both realistic and functional?

Compromising on Material Complexity

Uniform (single material) products can be prototyped relatively easily. But most products are more complex than that. How do you 3D print a cordless drill for example? It has hard plastic sections, complex geometries, as well as soft rubbery parts.

One approach is to just print with a "good enough" material to estimate how the water bottle will look and feel. Again, this shows some aspects of the product but can't really test it for functionality.

Another option is to insist on an accurate representation of the product by printing each material separately and assembling it afterward. This slows down the prototyping process, making each iteration longer and more costly.

What if the water bottle prototype could be printed all at once, with multiple materials in a single print?

Introducing ToughONE™
A High Performance PolyJet Material

PolyJet is known for its unique hyper-realistic printing abilities.
In a single print, PolyJet can produce a model or part with:

- Layer thickness as fine as 14 microns
- Full color and transparency
- Multiple different materials
- Variable Shore values of hardness

ToughONE adds the ability to make parts for functional prototyping, such as:

- Casing assemblies with thin walls
- Fine-detailed mating surfaces
- Parts including self-tapping screws
- Snap fitting parts and electronics

This is possible thanks to the material's:

- Superior impact resistance
- Increased strength
- Enhanced flexibility

On top of that, ToughONE material properties can be further enhanced by reinforcement with digital materials such as RGD531S:

Property	Units	ToughONE™ (Single Material)	ToughONE™ Reinforced (with RGD531S)
Tensile Strength	MPa	48-53	60-65
Elongation	%	45-55	20-30
Flexural Strength	MPa	77-87	83-91
Notched Impact Resistance	J/m	40-55	90-110
Heat Resistance	°C	59-62	79-81
Key Attributes		Excellent in impact resistance and flexibility. Perfect for very thin (<1.2 mm) or bulky parts (>10 mm)	Provides a balance of excellent impact resistance, dimensional stability, and improved HDT. Suitable for applications requiring both strength and flexibility

Vero (PolyJet's bread-and-butter material) could be used to prototype many types of products, in vivid detail. ToughONE adds a host of new applications for both prototyping as well as final products. Here are a few examples:

PJ Material	Closest comparable general use thermoplastics	Examples of typical use cases
Vero	Polystyrene (GPPS)	CD cases, plastic cups, disposable utensils
ToughONE	High-Density Polyethylene (HDPE)	Pipes and fittings, detergent bottles, food containers
ToughONE Reinforced	PC-ABS	Automotive parts, consumer electronics, Power tool housings

The next few examples show how tough PolyJet materials will transform the way you prototype and test your product concepts. Picture yourself in any of the following scenarios:

Full-Color Tough Prototypes

Imagine you have just finished a product design iteration for a customer. Your customer is anxious to see the latest prototype of the product you're designing. By using ToughONE with full color, you can impress him with a product that looks amazing. You watch his jaw drop when you begin to show him functional testing with the same model. In a single print, you can create a model with full color and durable materials.

Durability with Fine Details

The latest product you're testing has a lot of fine details and high-resolution features. You might be concerned that a stress test or functional testing will cause damage to these features. Whether your product will be ultimately created with 3D printing or traditional methods depends on several factors. Either way, however, you need a method to stress test the product with a material that can handle the stress. (And if you are intending to print the final product with PolyJet as well, then all the more so – you will need to see that it can stand up to general stress conditions.)

With ToughONE, you can have the best of both worlds. You can print incredible details without worrying that it will be too fragile.

Test Different Materials Together

Most products are not homogenous. They contain several components made of a variety of material types. This makes prototyping a challenge.

PolyJet is unique in its ability to print a seamless mix of different material properties. For example, this headphone prototype includes rigid, rubber, and clear materials. With PolyJet, this can be printed all at once. ToughONE adds one more element to the PolyJet mix: a combination of high impact strength and HDT for a much tougher material.

Save Time on Prototype Assembly

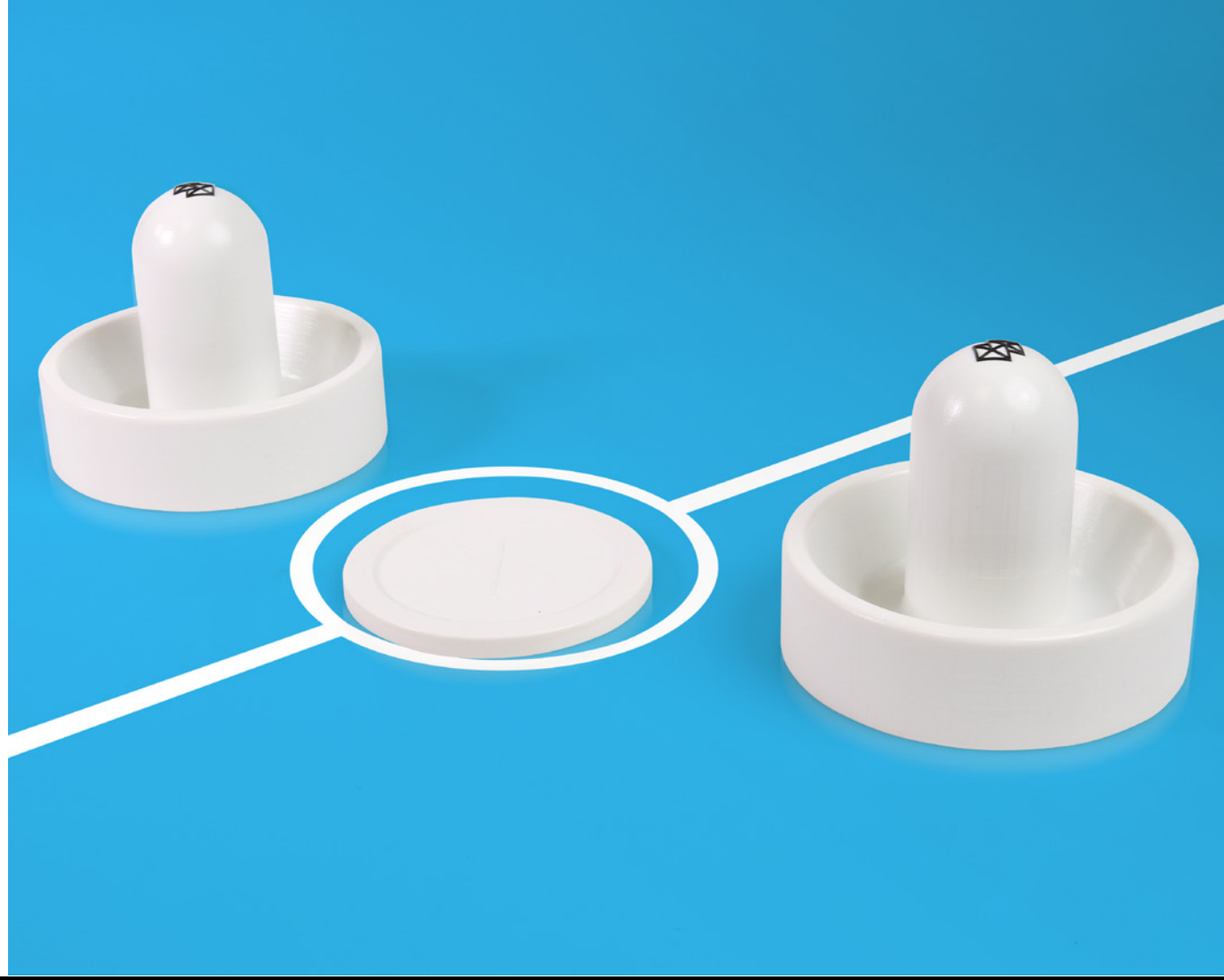
Another benefit of printing with multiple materials is that in many cases you can print the multi-material part together, rather than as separate components. In a single print, you can create a prototype with various components of completely different materials. This saves time and labor costs of assembly. That means quicker design iterations, which can compound to significantly impact your time-to-market.

Test Variable Hardness

Digital materials let you blend various PolyJet resins to achieve different Shore values of hardness/softness. For example, you may have a rubber component in your design, but you want to test a few different levels of hardness (Shore) to see what works best. PolyJet lets you print various levels of Shore hardness, all in one build. Take out the printed components and test them all to find the best one. This is obviously much faster than printing one at a time and testing one by one before going back to the drawing board.

Conclusion

Isn’t it time you stopped compromising on your prototypes? Add ToughONE, and PolyJet in general, to your design toolbelt to save significant time and headache getting better prototypes printed. Let the printer print and go back to doing what you do best: designing and producing great products.



stratasys

stratasys.com
ISO 9001:2015
Certified

Stratasys Headquarters

5995 Opus Parkway,
Minnetonka, MN 55343
+1 800 801 6491 (US Toll Free)
+1 952 937-3000 (Intl)
+1 952 937-0070 (Fax)

1 Holtzman St., Science Park,
PO Box 2496
Rehovot 76124, Israel
+972 74 745 4000
+972 74 745 5000 (Fax)

EBOOK
PolyJet ToughONE