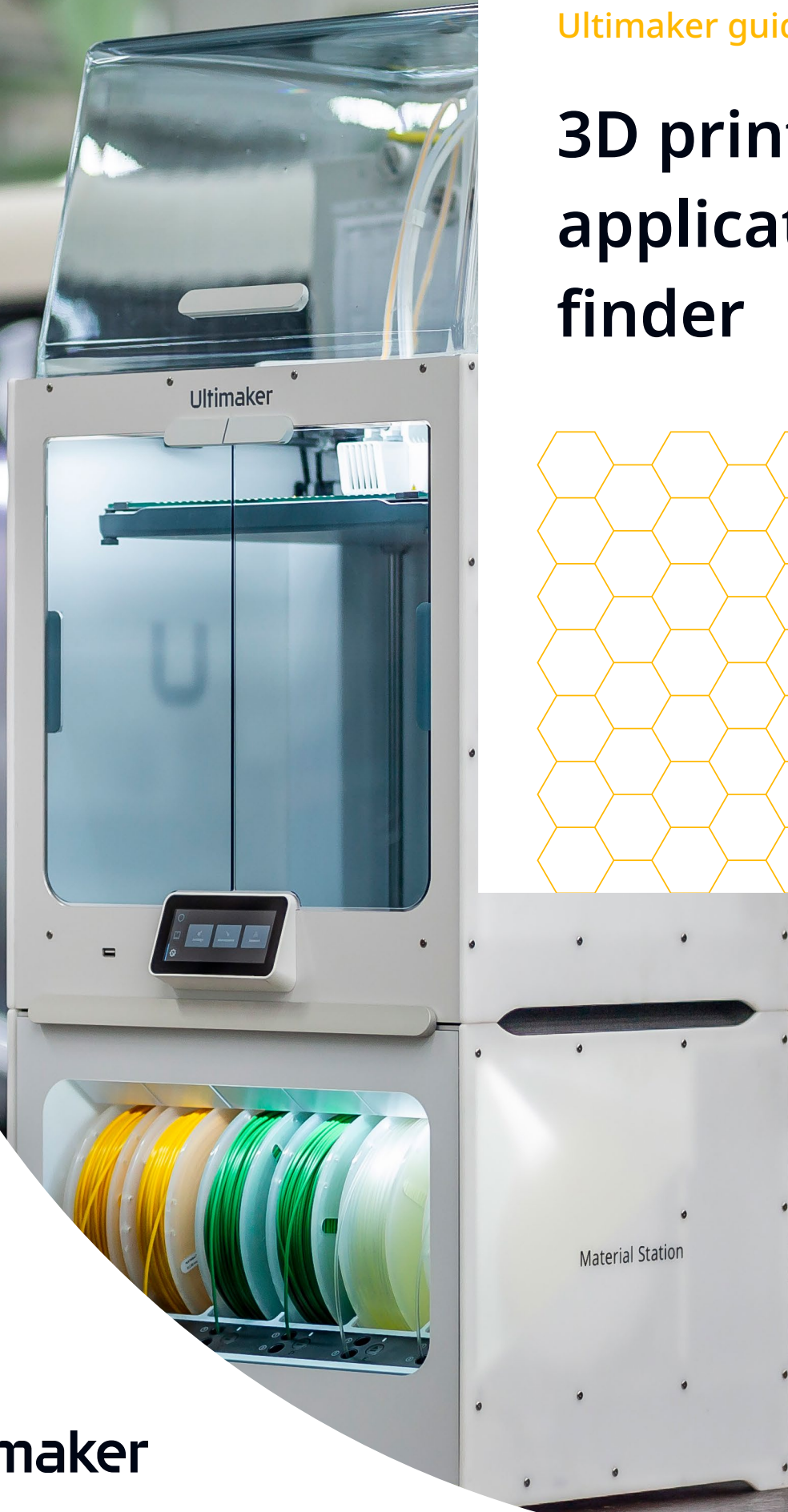
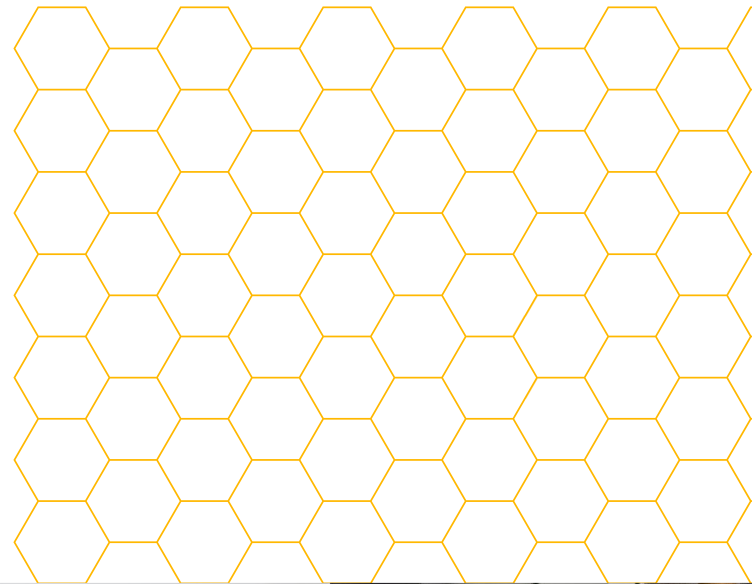


Ultimaker guide

3D printing application finder



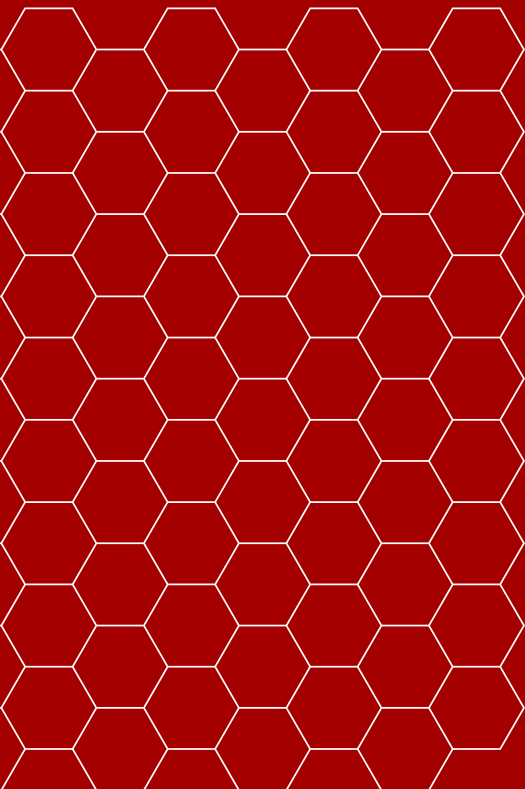
Ultimaker

3D printing application finder



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Introduction: Your hidden career opportunity

Are you excited? We hope so.

Because within this short document are some of the highest-value insights that Ultimaker has ever publicly shared.

That's not an exaggeration.

You're about to read what's usually revealed only at our private workshops with leading global manufacturing customers.

Put to proper use, the following strategies, checklists, and examples have the potential to save your business hundreds of thousands of dollars in reduced downtime and increased output per hour.

And if you end up 3D printing and implementing just a handful of the application ideas you gain as a result of reading this...

You will soon be seen as someone who pioneers innovation and drives business growth.

Sound good? Let's get started!



Today's manufacturing plants are full of optimization opportunities with 3D printing

2 criteria to evaluate and prioritize FFF 3D printing applications

With just two criteria, it's easy to evaluate any functional application for fused filament fabrication (FFF) 3D printing. You can then be more certain that the application will help to achieve ROI against your initial investment in a 3D printing system.

High gain

A "high-gain" application will make a big impact on your operations. It is likely to serve a key function by:

- Maintaining the efficiency of your packaging line
- Making it easier for operators to do their job quickly and accurately
- Increasing staff safety with protective covers and fail-safe devices

In any case, if this high-gain application breaks and needs replacement, it would cause a major delay in manufacturing. The potential gain of the application is further increased if it's a part that you often outsource or need to keep a stock of.

Low complexity

A "low-complexity" application is easy to 3D print with FFF technology and easy to implement. This is often because:

- Its geometry is simple – easy to design, print, and optimize with few iterations
- It's used in normal environmental conditions – simplifying material choice
- It does not have safety requirements – cutting down on testing

"Low-complexity" parts are quick to produce and implement in a production environment. Because of this time saving, they quickly help to achieve ROI against the cost of 3D printing technology.



Combining high gain and low complexity

If a potential application meets the two criteria of “high gain” and “low complexity”, then it hits the sweet spot of what you can achieve with an in-house 3D printer. With these criteria, you can then be confident that an application will easily increase productivity and achieve ROI.

Here’s a true story to demonstrate the power of these criteria combined in one application:

During his morning shift in 2019, a plant operator discovered a malfunctioning part on the gripper of a 4-pack boxing machine, causing multiple short stops in production. Because the part is low in complexity, he quickly modeled a replacement and started printing a full batch of these on an Ultimaker S5. After his shift was over, an evening-shift colleague mounted the finished 3D prints on the boxing machine and production could continue without interruption. And that original part is still used on the production line to this day.



High-gain, low-complexity parts can be quickly designed and printed to solve production headaches or bottlenecks

The 3-way application category checklist

When it comes to identifying these “high-gain, low-complexity” 3D printing applications, where do you start? To give you an idea, below we’ve mapped out common machines and processes, against potential application categories that will solve a range of potential challenges:



Machines and processes

- Picker lines
- Flow-wrapping machines
- Top-loading machines
- Process machines
- Filling machines
- Labeling machines
- Inspection
- Conveyors
- Primary packaging
- Secondary packaging
- Recycling



Application categories

- Maintenance tools
- Safety tools
- Transport tools
- Production tools
- (Dis)assembly tools
- Ergonomic tools
- Quality assurance tools
- Spacer and alignment tools
- Tool organizers and holders
- Covers, buttons, trays
- Shock absorbers
- Protection covers
- Cushioning devices
- Labels, tags
- Hooks, brackets, hangers
- Tubes, connectors, clips
- Cable management



Potential challenges

- Weight
- Ergonomics
- Time (manufacturing, assembling, usage, etc.)
- Cost
- Functionality
- Material property
- Size / volume (fitting)
- Wasted materials, products
- Safety concern / hazard
- Productivity opportunities

5 useful questions to ask when looking for applications

- What difficulties are operators facing as part of their job?
- What common task interactions could be faster or more efficient?
- Which parts need to be frequently replaced?
- Which outsourced parts have long lead times?
- Do you have any recurring production headaches?

Although we hope these lists are helpful, sometimes it can be tricky to imagine exactly how a new application might be realized. So let’s take a look at some...

Industry-proven application examples

Each of the 3D printing applications below have high-gain, low-complexity characteristics. While some are the result of a quick design and print, others have been iterated upon multiple times to perfect their geometry and discover the ideal 3D printing material for use.

Ready for the big news? All the applications below achieve between 70 - 90% cost and lead-time savings compared to an outsourced alternative.



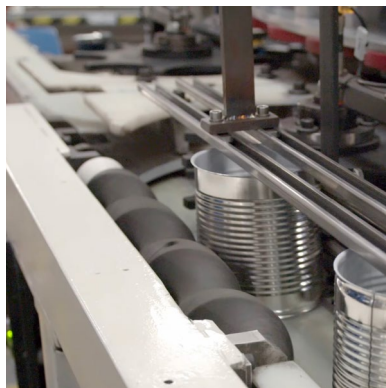
Gripper fingers

Based in Michigan, Azoth combines traditional manufacturing quality with the efficiencies of rapid prototyping with 3D printing. Aluminum gripper fingers were previously used for end-of-arm tooling. They were converted to polymer gripper fingers, which are able to be 3D printed more quickly, at a fraction of the cost. The custom geometry includes space for replaceable hardened dowel pins. If a lighter touch is needed, the design can be modified to hold replaceable rubber inserts instead.



Seal mold

The machines at Trivium require many seals. These are either expensive to outsource or no longer available. Their solution was to 3D print seal molds in ABS with a 16 micron layer height to create a perfectly smooth surface. Then silicone is poured into the molds whenever they need a new seal. If ever a new seal is needed, the design and printing process takes just 24 hours.



Machine worm

Because the original in-feed worm was no longer available from the supplier, manufacturer, Trivium, took the opportunity to 3D print their own replacement and also improve its design. This two-part assembly is printed in carbon fiber-reinforced nylon. Even though the new part is far more durable, if it ever needs replacing, it can be printed and installed within a day.



Wheel protection jig

This wheel assembly tool allows a single operator at Volkswagen Autoeuropa to work quickly and efficiently – without fear of scratching the car’s alloy wheels. White tubes guide the wheel nuts. But because they gradually wear down over time, the tubes are modular and designed to be easily replaced. The red hole provides a clear visual cue where the locking nut should be inserted. A central plunger is filled with a TPU 95A spring, which prevents the tool from pushing too far against the wheel.



Sticker placement gauge

L'Oréal maintains its leading quality standards by creating precise gauges to spot-check product label placement. The previous version of this gauge was previously milled from POM (polyoxymethylene). However, it had sharp corners, and would often break if dropped. This 3D printed gauge allows products to slide easily in and out of the tool. It is also less fragile, wear resistant, and can be printed to achieve tight tolerances.



Packaging robot tools

Gerard Schubert GmbH builds custom packaging lines for manufacturers. Their top-loading machines are modular and flexible to pick up and package products of all shapes and sizes. By 3D printing the end-tooling used on their machines, Schubert gives customers freedom to package their products while maintaining high productivity. These tools can also be color-coded to make changeovers faster and often the 3D printed designs avoid the need for complex assemblies.

How to choose a 3D printing platform that works for you

We believe that there should be no barriers to using additive manufacturing to drive productivity where you work. Whether you're an expert or novice at 3D printing, Ultimaker is the ideal solution for optimizing line efficiency. That may sound like a big claim. But here's why...

Our recipe for a great 3D printing experience:

ROI made effortless

Just one of the applications above makes it easy to achieve ROI on an Ultimaker 3D printer within a few months. Our platform's low total cost of ownership gives you a highly affordable solution, that will quickly allow you to prove the value of 3D printing to stakeholders.

Become an expert with e-learning

Ultimaker 3D Printing Academy makes it easy to maximize the value of 3D printing. Our in-depth online courses include expert training for engineers who want to stay at the top of their 3D printing game or get everyone else up to speed.

Maximum results. Minimum hassle

Ultimaker S-line 3D printers are easy to install and easy to use. Safe to be left printing day and night, these workhorse machines are modular. That means you can start small and dream big as you scale repeatable production.

191 materials and counting...

More materials enable more applications. And with the world's widest "click-and-print" material compatibility, Ultimaker 3D printers allow you to easily experiment. Print parts and tools with your choice of mechanical properties – including composites and metal.

Software that IT will love

Ultimaker's enterprise-grade software brings an end to the IT permissions struggle. As part of an Ultimaker Essentials subscription, Ultimaker Cura Enterprise provides the most stable, secure, and compliant version of the world's most popular slicer.

Share 3D printing with others

As more people start 3D printing at work, Ultimaker Digital Factory professionalizes your workflow. Easily manage printers and teams. Send and monitor remote print jobs. And share your winning designs with your colleagues.



Conclusion: Ready to make a difference?

Hopefully you already have a mental shortlist of high-gain, low-complexity applications that you're eager to start designing and printing. (If not, use the lists on page 6 to trigger some creative application ideas.)

Because there's no time to lose.

98% of businesses report that every hour of downtime is costing them on average \$100,000.¹ And you are now equipped to start reducing that cost.

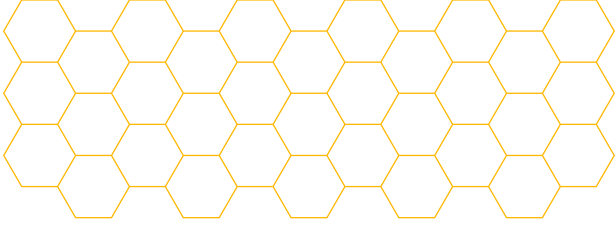
So if you're ready to transform your business, to be seen as a pioneer of innovation where you work, then click below to talk to an expert.

Or if you know that management will need some convincing to invest in 3D printing technology, take what you've learned in this document and head to our ROI calculator to create a business case.



Clicking this button will open a new tab in your browser. Here you can fill in a request for a conversation with an Ultimaker partner. This certified consultant will be happy to advise you on the ideal 3D printing setup for your business – no hard sales pitches involved.

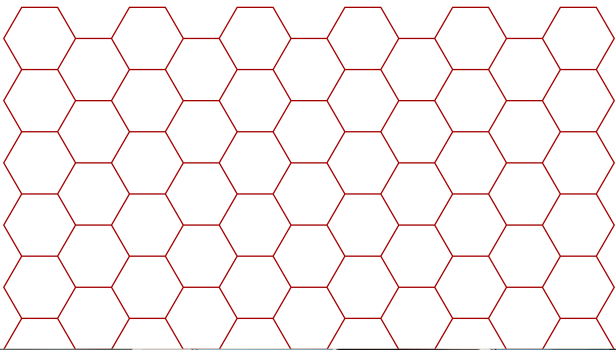
¹ <https://global.hitachi-solutions.com/blog/top-manufacturing-trends>



About Ultimaker

Since 2011, Ultimaker has built an open and easy-to-use solution of 3D printers, software, and materials that enable professional designers and engineers to innovate every day. Today, Ultimaker is the market leader in desktop 3D printing. From offices in the Netherlands, New York, Boston, and Singapore – plus production facilities in Europe and the US – its global team of over 400 employees work together to accelerate the world's transition to local, digital manufacturing.

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