**3D SYSTEMS**
Additive Manufacturing Solutions

# Transforming productivity for distributed, agile manufacturing enterprises with the FabPro 1000

## PRODUCT DESIGN AND PRODUCTION IN AGILE MANUFACTURING ENVIRONMENTS

To stay competitive, manufacturers have to meet the rapidly changing needs of customers while retaining high quality products, at the same time as controlling costs. Product lifetimes are shrinking and customers are expecting more customization and innovation. Agility is the key to staying ahead of the competition and meeting the needs of customers.

Product development in most companies requires a sequential iterative process to come up with the right product. It can be time-consuming and time is a resource that is in the shortest supply. Production of parts is also subject to delays—having to wait for tooling, production line and assembly setup means that opportunities are missed in rapidly changing markets. Back ordering, minimum order quantities (MOQs) and holding inventory are all costs of business that need to be minimized or eradicated for full profitability.

The modern agile manufacturer is now using 3D printing technology to take advantage of market shifts and narrow windows of opportunity. 3D printing enables very fast prototyping of parts for the product development process. It also transforms how manufacturers make end-use products: with less reliance on a centralized factory producing exactly the same product, turning instead to distributed manufacturing points that produce end-use parts locally.

### WHAT IS THE PROBLEM?

Manufacturers in agile environments want to build increased productivity in their engineering teams and are looking for solutions to enable this.

### HOW WE ADDRESS IT:

FabPro 1000 delivers reliable, fast, affordable desktop printing within a distributed manufacturing enterprise. This entry-level industrial system produces high-quality parts with lightning speed, remarkably low operating costs and unsurpassed ease of use.
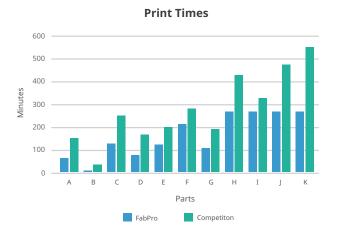
The FabPro 1000 entry-level industrial 3D printer delivers production-grade parts, at high speed, with six sigma repeatability, and can be used across a distributed manufacturing and engineering enterprise. With a low cost of entry, FabPro 1000 enables agile manufacturing operations to meet customer needs rapidly and effectively empowers engineers to deliver more value and quality in the product development process.
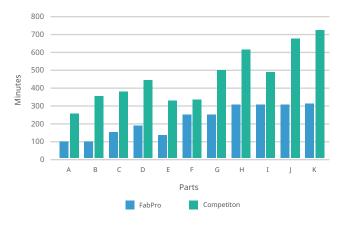
## POWERING THE FOUR PILLARS OF AGILE MANUFACTURING WITH FABPRO

There are 4 stated pillars that empower agile manufacturing: modular product design, information technology, corporate partners and knowledge culture. FabPro 1000 enables manufacturers to build on these practices by delivering parts instantly, with high quality and at low cost, empowering better product knowledge among distributed teams.

**Print Times**



**Time to Part in Hand**



## IMMEDIATE PRODUCTION OF PARTS

Agile manufacturing is about getting parts produced quickly, whether as prototypes for product development or as end-use parts. Since 3D printers do not need tooling but instead use direct digital CAD data, a part can be produced as soon as the design work is complete.

FabPro delivers print speeds of up to 21 mm per hour, with internal tests showing the FabPro to have an average 45% faster print speeds than comparative 3D printers.

External lab testing by Keypoint Intelligence—Buyers Lab found similar results compared to four competitive desktop SLA 3D printers.

"The FabPro 1000 did very well in speed tests, it was the fastest printer overall in most of the tests we conducted," said Len Wolak, Solutions Lab Technician with Buyers Lab. "We were also impressed with the FabPro 1000's print accuracy."

Most 3D printing technologies have some form of post-processing required for the part to be suitable for end use. In the case of DLP and SLA technologies light and/or heat curing will be used. FabPro has a very fast UV curing process which enables time to first part in hand to be an average of 52% faster than the nearest competitive 3D printer. This in turn delivers opportunities to accelerate time to market and win the time-to-profit product development race.

Scott Young, engineering manager, Bastech, Inc. commented, "The FabPro 1000's speed allowed me to build parts and finish them in the same day, and the surface quality rivals what I've seen on more expensive technologies."

# 3D SYSTEMS®

## PRODUCTION OF QUALITY PARTS

The FabPro technology uses Digital Light printing (DLP) to deliver great part accuracy, feature definition, surface finish and repeatability. DLP technology enables very fine layer thicknesses as small as 30 microns, depending on material and print resolution selected. The combination of high-quality materials with DLP technology also enables very good surface finish, visibly superior to 3D prints from comparative systems. In addition, internal testing of feature definition of the parts printed on a FabPro demonstrates very precise, minute features such as vertical pins, wall thicknesses and clean holes are more precise than on competitive printers.

| Feature | Details | FabPro 1000 Proto | FabPro 1000 Tough | Formlabs Claimed* Clear |
|---|---|---|---|---|
| Minimum Clean Hole | 3 mm thick | 0.400 | 0.400 | 0.500 |
| Minimum Clean Slot | 3 mm thick | 0.300 | 0.250 | |
| Minimum Vertical Pin | 5 mm thick | 0.300 | 0.300 | 0.300 |
| Minimum Captured Wall Thickness | 7 mm thick | 0.250 | 0.300 | 0.400 |
| Minimum Non-Captured Wall Thickness | 7 mm thick | 0.250 | 0.200 | 0.600 |

*Source: https://formlabs.com/3d-printers/form-2/design-specs/  August 17, 2018

"FabPro is small, lightweight and easy to move around. It is super easy for prototyping parts with a great finish and durability. The 3D Sprint software, which is supplied free, makes 3D printing very easy, and the system itself has a great ease-of-use and is not messy with the materials."
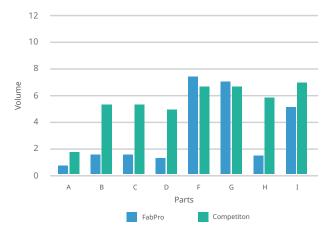
– a FabPro 1000 enterprise customer

In addition to the results above, internal testing has shown that with the integrated 3D Sprint software, using the controls for Offset and Scale, FabPro can achieve six sigma repeatability for its parts.

3D Sprint, which is supplied free-of-charge with FabPro 1000, is 3D Systems' powerful print preparation and monitoring tool for plastic 3D printers. With file support for 13 3D file formats, it far exceeds the file import support of any comparative printer, and delivers an array of advanced tools including file repair, file nesting, optimized part placement and slicing. 3D Sprint also offers materials savings through intelligent support structure placement, with an average of 45% less materials used on supports, saving both time and money on 3D printed parts.
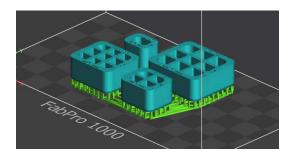
**Support Material Usage**

Repeatability is non-negotiable for volume production, and 3D Sprint works in tandem with FabPro 1000 to enable printed parts at six sigma repeatability. The statistical result is stated as Cpk > 2, where Cpk is the process capacity index. A result of 2 or higher is considered a "six sigma" quality process. FabPro and 3D Sprint enable printed parts to achieve a six sigma Cpk > 2, at a tolerance of +/- 0.125, which ensures repeatability of the parts. Using the Offset and Scale wizard in the software, the FabPro printer can be 'dialed in' to deliver consistently accurate results. This is compared to results from competitive printers that have a Cpk of below 1.0. Testing protocol covered 5 printers, with 40 data points for both systems compared.

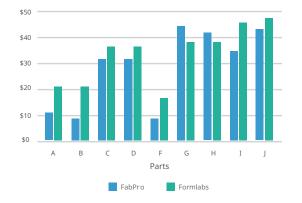| Printer | FabPro 1000 | FabPro 1000 |
|---------|-------------|-------------|
| Material | FabPro Proto Gry | FabPro Tough BLK |
| Cpk | 2.43 | 2.06 |



Based on independent testing of 3D Sprint with FabPro by Keypoint Intelligence, the following was found:

"The 3D Sprint software was the best of the five vendors' offerings. It is intuitive to use, and is upward compatible with higher-end 3D Systems' plastic printers, which provides a scalability that only one additional competitor also offered," said George Mikolay, Associate Director, Copiers/Production, with Buyers Lab. "3D Sprint has many advanced features and a CAD/Modeling interface that provides the user with considerable control over the print process."

The winning combination of FabPro 1000 and 3D Sprint enables speed, accuracy and repeatability in the manufacturing enterprise, allowing agile manufacturers to transform productivity in the product design and production process.



## QUALITY THROUGH 3D PRINTING MATERIALS

Agile manufacturing requires enterprises to deliver products rapidly but at high quality. The two key prototyping and production 3D printing materials available for the FabPro deliver exceptional value for this need. The FabPro Proto GRY is a fast, general purpose plastic material best suited for prototypes. The FabPro Tough BLK material is ideal for end use and testing with a good surface finish.

## LOWERING COST OF ENTRY TO 3D PRINTING IN THE ENTERPRISE

There are two key elements to 3D printing cost—first is the cost of the 3D printer but an equally important consideration is cost of materials per printed part. FabPro is available for purchase for $4,995 which is a comparatively low cost for the good print speed, accuracy and repeatability. FabPro materials are, in the most part, cheaper than, or about the same cost as materials from competitors. In addition, while about 80% of FabPro parts are significantly cheaper than competitor parts to produce, they cost about 22% less on average. This delivers on the promise of agile manufacturing by further minimizing cost and building efficiencies.



Part Cost

## EASE-OF-USE IN AN AGILE ENVIRONMENT

FabPro 1000 has been designed and created for ease of use, including installation, software setup, material replacement, and post-processing. This enables rapid deployment in a distributed industrial enterprise for rapid production of parts.

As noted by Keypoint Intelligence: "In over 600 hours of testing and 22 different resin types among the five printers evaluated, we found the FabPro 1000 to be competitive or superior in many of the areas tested. It was easy to set up, with no need for complex calibrations before use. Loading resin was particularly simple with the QR code automatically making most of the necessary slicer settings. Maintenance was straightforward, and internal examination of the printer identified the very high-quality build components and engineering that went into the FabPro 1000."

With ethernet network connectivity, the FabPro can operate across a local area network to enable fast, streamlined printing operations for engineers.

The FabPro 1000 raises the bar for industrial entry-level 3D printing, producing high-quality parts with lightning speed, with remarkably low operating costs and unsurpassed ease of use, and repeatability. With a build size of 125 x 70 x 120 mm, and print speeds of 21mm per hour, FabPro 1000 enables very fast prototyping and production for the distributed engineering enterprise.

> " ... the FabPro 1000 surprised me with a perfect fit from the first print. Considering the speed, quality and ease-of-use of the FabPro1000, this system redefines the entry-level 3D printer market."
>
> - Stijn Hanssen, CEO, DigiFlow3D

Find out more about the FabPro 1000 entry-level industrial 3D printer:

## https://www.3dsystems.com/fabpro-1000