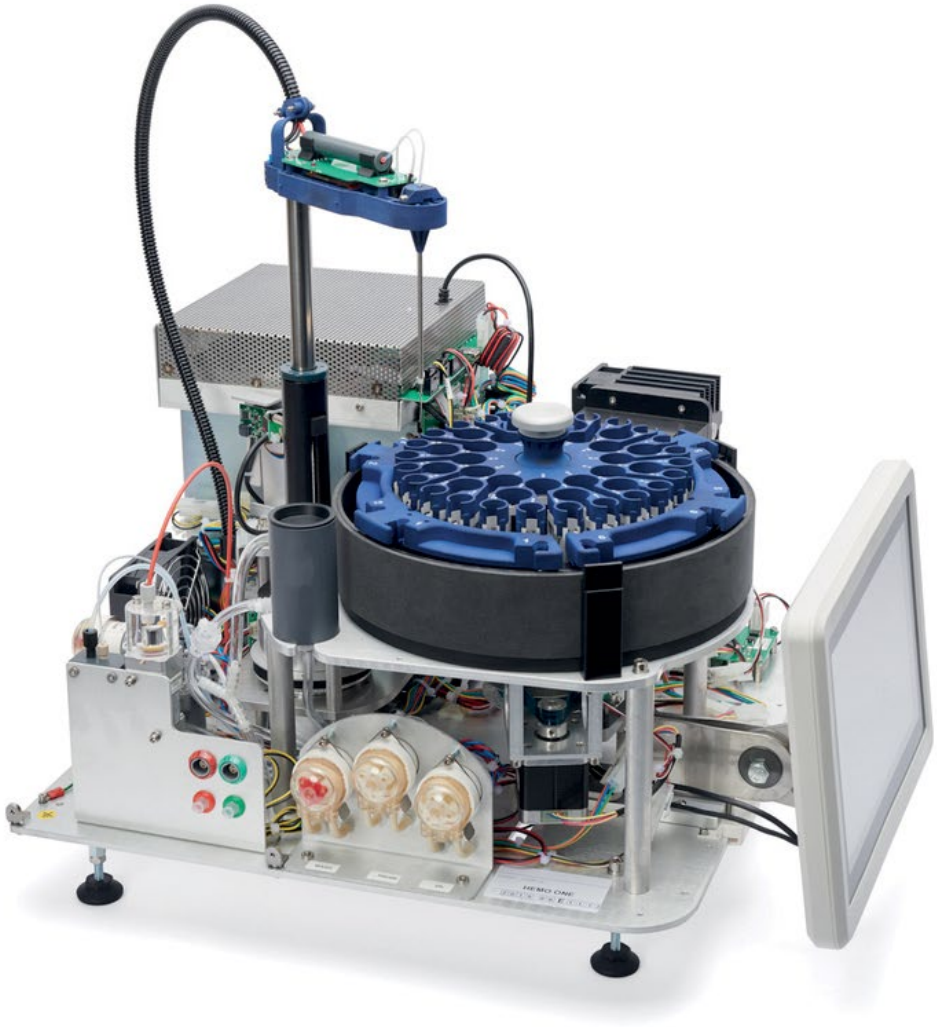
CASE STUDY | EVEREX

With HP Multi Jet Fusion, Everex Engineering re-imagines medical devices



Data courtesy of Everex s.r.l

HP Multi Jet Fusion technology has replaced some of Everex's previous production process, resulting in medical devices with fewer components, lighter weights, and lower costs to meet customer demands

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Introduction

Everex is an engineering-focused company that for the past 30 years has set out to create unique and technologically advanced products that meet the needs of their customers in the medical sector. Based in Sesto Fiorentino, Italy, Everex teams specialize in instruments for in-vitro diagnostic (IVD) analysis, the concept and design of which are proposed by the customer.

Everex customers have the ideas but often lack the internal resources to bring these ideas to fruition; therefore, they rely on Everex as a partner to review proposals, develop prototypes, and manage production.

Everex has recognized 3D printing as a crucial technology for new products, specifically in the field of diagnostic instruments.

• Industry

Healthcare

• Sector

Medical equipment

• Objective

To replace traditional manufacturing processes with HP Multi Jet Fusion technology in order to prototype new designs as well as consolidate final parts.

• Approach

With HP Multi Jet Fusion technology and HP Jet Fusion 3D Printing Solutions, Everex engineers have conceptualized new ways to design their medical devices to reduce the number of parts required, thus decreasing the weight of the devices while also decreasing the cost of production and freeing up warehouse space.

• Technology | Solution

HP Jet Fusion 3D Printing Solutions, HP Multi Jet Fusion technology

• Material

HP 3D High Reusability (HR)[1] PA 12

1. HP Jet Ftusion 3D Printing Solutions using HP 3D High Reusability PA 12 provide up to 80% powder reusability ratio, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for reusability). Parts are then made from each generation and tested for mechanical properties and accuracy.

Challenge

Because Everex and their customers do not require a high production volume of parts, Injection Molding is not a viable method of production. Often, Everex's customers ask them to customize parts for certain instruments in order to expand to new markets. To meet their customers' requests, Everex explored the option of 3D printing technology.

Everex was first introduced to HP Multi Jet Fusion (MJF) technology in July 2017 during a CAD software presentation. A representative from Everex was eager to learn more about what the technology could do in terms of helping the company transition from prototyping to production in order to reduce time to market and autonomously create specific parts.

One of Everex's devices is called Hemo One, which is used to analyze blood samples in clinical chemistry and can reveal various abnormalities in the blood.

All parts that comprise Hemo One were previously produced using traditional methods, such as milling, lathing, and sheet metal bending.

"We wanted to design a new type of instrument that would be easier to assemble, that would require fewer parts to produce, and with an eye on reducing costs," said Massimiliano Ramalli, Senior Mechanical Engineer at Everex.

With HP MJF, **"we saw the possibility to achieve these goals,"** Ramalli said. Everex was able to redesign and rework four parts for the Hemo One: a sampler arm, two samples reagent plates, and an electronic support device.

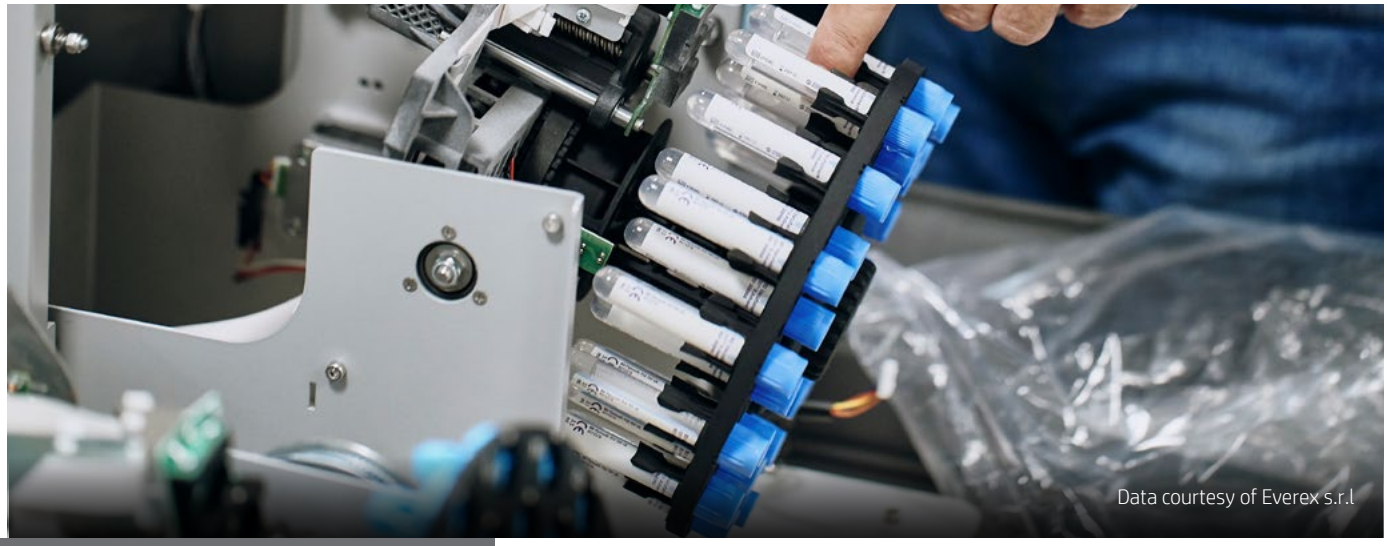
Solution

The sampler arm sub-assembly affixes to an arm that is used to distribute the exact amount of the sample of blood that needs to be analyzed, as well as the related reagents that are required to perform specific tests. Composed of multiple parts, the traditionally manufactured sampler arm would ensure that sensors, the needle sliding, and the external cover were in the right positions. With HP MJF, Everex was able to reduce the number of parts of this sub-assembly from 10 to 12 pieces to just two pieces. With this part reduction, Everex experienced easier assembly processes, increased productivity, and decreased production times.

Another example of how HP MJF led to significant part reduction, thus also contributing to decreases in costs and production time, is evident in Everex's reagent plate, a device that contains multiple samples in individual compartments. Although the plate must reach a specific metallic mass in order to produce accurate measurements, Everex sought to replace a metal piece of this device with a part made by HP MJF that undergoes metallization after production in hopes that this would not alter the accuracy of the measurements. In doing so, they produced a plate that weighs 50% less but still performs the necessary measuring functions. They also reduced the number of parts from 26 different pieces to just two pieces.

A second reagent plate that was previously composed of all metal parts was redesigned and now only consists of 3D printed parts made with HP MJF technology. Everex engineers began to prototype different unification points around the circular plate while still retaining some of the metallic components, but upon completing the prototyping stage, they realized that they could produce the entire assembly with HP MJF. The redesigned reagent plate now consists of two wheels, one placed inside the other. On the exterior panels of the inner plate, Everex added 24 bar codes to identify the available slots for samples.

The final part that Everex reconfigured to produce with HP MJF is a structure that supports electronic and mechanical elements of the Hemo One device. Previously made by sheet metal bending, the device consisted of six different elements. By producing the support structure with HP MJF, engineers redesigned the components and reduced the number of parts to two, which were lighter in weight and therefore less costly to make.


Data courtesy of Everex s.r.l

Result

Since the addition of HP MJF technology, Everex has been able to develop prototypes and final parts with fewer components, more quickly, and at reduced costs.

Constructing a model of an **external cover** used to take up to 2 months, but with HP MJF technology, this time has been reduced to just 5 days. A parallel decrease in production time occurs as the waiting time for sub-suppliers to deliver parts has been eliminated thanks to Everex's new ability to manage every step of production themselves.

When using HP MJF for production purposes, Everex experienced a significant reduction in costs as molds were no longer necessary to produce complex parts and the cost of the pieces was competitive with similar parts made with machined tools. Additionally, the overall number of parts that comprise an assembly decreased as HP MJF makes it easier to incorporate a single piece into the assembly.

Reducing the **sampler arm** from a sub-assembly of 10 to 12 parts to only two parts reduced the weight of the part by 40% and reduced production costs by 65%.

By replacing a metal part in the **samples reagent plate** with a part made by HP MJF, Everex decreased the number of parts from 26 to two and reduced the cost of the assembly unit from 350€ to 200€, for a cost reduction of 43%. In the case of the second **redesigned reagent plate**, the transition from a metallic device to an entirely HP MJF–produced device resulted in cost savings of 28.5% (a decrease from 350€ per part to 250€ per part), and for a production run of 300 units per year, Everex was able to save nearly 60.000€.

The support device for the electronic and mechanical elements of the Hemo One device was reduced from six parts to two parts, while the cost decreased from 25€ per assembly unit to 6€ per assembly unit, a cost decrease of 76%.

"Now, thanks to HP MJF technology, we can design and manufacture finished parts that include several pieces that were not possible with chip-cutting machines," said Ramalli.

"I believe that in the coming months we will still be able to optimize most of the parts we produce with traditional technology by reducing assemblies, reducing warehouse space, and reducing costs and waste," said Lorenzo Balli, CEO of Everex. **"For new developments, we think we will be able to reduce the time and immediately reduce the parts that make up an instrument, to immediately reach certainty about the cost of the parts.**

"Thanks to the technology from HP and to the know-how that Everex has acquired, we are conducting important research and development work on instruments for IVD analysis. We plan to increase the turnover in the IVD sector by over 30% in the next 2 years."

Connect with an HP 3D Printing expert or sign up for the latest news about HP Jet Fusion 3D Printing
hp.com/go/3Dcontactus

Learn more about HP Multi Jet Fusion technology at
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