

BDL 3D enhances patient outcomes with HP Multi Jet Fusion technology

BDL 3D offers true industrial scale 3D printing capability in New Zealand, using HP's Multi Jet Fusion (MJF) technology. From high-quality prototypes to large scale production, BDL 3D offers end-to-end additive manufacturing solutions with short lead times and fast turnaround.



Industry

Medical/Healthcare

Objective

Elevating patient care experiences with 3D printed prosthetics

Technology & Solution

- HP Jet Fusion 500 Series 3D Printer
- HP Jet Fusion 5200 Series 3D Printing Solution

Sector

Orthotics & prosthetics

Approach

BDL 3D prints dimensionally stable yet lightweight prosthetics and other medical devices with HP's advanced 3D printing technology, Multi Jet Fusion.

Material

HP 3D High Reusability PA 12, enabled by Evonik

Introduction

BDL 3D Print Service is a sister company of BDL, a family business founded in 1973, which has been one of New Zealand's major print suppliers since its inception. Business Distributors Limited (BDL) has five decades of experience that speaks to their legacy in the New Zealand print landscape.

BDL first partnered with HP in 2017 when they entered the A3 print market. As an organization which thrives on the principles of people-centric innovation, sustainability, and giving back to the community—HP aligned perfectly with the business.

In fact, BDL 3D was the first 3D print bureau in New Zealand that uses HP Multi Jet Fusion technology to offer and deliver industrial scale additive manufacturing.

Background

“Back in 2019, we visited Barcelona with HP Print Partners. We were lucky enough to visit the HP Center of Excellence at Sant Cugat, where they showcased their new and upcoming technologies. This was where we first saw a Multi Jet Fusion 3D printer. At that very moment, we knew this was the future, and we wanted to be a part of it ... that's where it all began.”

- Penny Huston, Director, BDL 3D

BDL 3D itself was founded in 2022, as a separate trading arm from BDL to provide MJF 3D Printing Services in New Zealand. Under the leadership of Ben and Penny Huston, BDL 3D has established itself as a key player in 3D printing orthotics and prosthetics locally in New Zealand.

HP's MJF technology has enabled BDL 3D to form strong partnerships across the healthcare industry, enabling specialist designers of orthotics, prosthetics, AFO's and other devices, have more freedom in designing personalized, comfortable patient solutions.

BDL 3D's focus on this sector reflects their belief that advanced 3D printing solutions can deliver improved quality of life for patients who have suffered traumatic injuries, by producing prosthetic sockets that are lighter, more comfortable and more customizable in aesthetic design as well



Data courtesy of BDL 3D

Challenge

The way prosthetics were traditionally made resulted in devices that were heavy and rigid, causing discomfort for the patient. With 3D scanning and the bespoke design methods now available, HP MJF 3D printed prosthetic sockets are developed to perfectly fit the patient, resulting in better patient outcomes.

Production times

Conventionally producing prosthetic sockets is a manual process which is labor-intensive and time-consuming. 3D printing sockets enables a quick turnaround time for the patient.

Functionality

Due to the superior strength and durability of HP MJF printed sockets, you don't see the malfunctions that can happen with sockets manufactured by other technologies.

Solution

In early 2022, BDL 3D purchased the HP Multi Jet Fusion 580 3D Colour Printer, marking an important milestone for the business as it enabled them to print prosthetic sockets that are purposefully crafted, customizable, and comfortable for patients.

With the printer in-house, the team kickstarted operations by working closely with innovators and manufacturers in NZ - educating them about HP's Multi Jet Fusion technology and its amazing possibilities.

MJF 3D printed sockets are substantially lighter, facilitating a better range of movements, allowing for increased patient comfort and longer wear times.

The HP 3D High Reusability PA 12, enabled by Evonik material is pivotal in achieving parts that are highly durable, waterproof, yet still lightweight and able to withstand the rigors of daily use.

Driving purposeful innovation with 3D printed sockets

One of BDL 3D's very first customers, Peke Waihanga (New Zealand Artificial Limb Service), specializes in the creation of high-tech medical devices—primarily prosthetics and orthotics, for individual patients. As they ventured into 3D printing for prosthetic sockets, they sought out various technologies, partnering up with BDL 3D to enhance patient care by leveraging HP's MJF technology.

Peke Waihanga was particularly drawn to the bespoke capabilities of the HP Jet Fusion 580, which allowed for versatile designs:

- The customizability benefit of HP's MJF technology even helped them offer specific sockets for specific patients.
- The new sockets were lightweight, and allowed for more flexibility in terms of movement and motion, ultimately making everyday lives easier for patients.

Recognizing that losing a limb is an intensely personal experience, the HP MJF 580 printer allowed Peke Waihanga to offer patients the opportunity to also have a say in the appearance of their prosthetics—an aspect that significantly contributes to their well-being.

“Another example of how 3D Printing with MJF helped create a unique patient solution, was the crafting of the Kayak Prosthetic Wrist in collaboration with Peke Waihanga. The design was based on using a ball joint as the mechanism to replicate the biomechanics of the wrist motion, and it enabled the (amputee) kayaker to efficiently transfer force through the paddle, move the boat, and prevent injury. This design was a finalist in the Best Design Awards 2022, Value of Design Category.”

- Penny Huston, Director, BDL 3D





Data courtesy of BDL 3D

Making revolutionary product designs a reality

Innovation and customization:

3D printing with HP's MJF technology allows for innovation and customization. Designers can experiment with new designs, iterate quickly on prototypes, and respond rapidly to market demands. Customization is key for many applications suited to printing using HP Multi Jet Fusion technology.

"Much of our work to date has been in printing prosthetic sockets for amputees. But we have many other customers who recognize the benefits of printing their parts or designs with HP's MJF technology. We print parts for many industries, including in aerospace, marine, product development, defense, and architecture to name a few.

We often work closely with our customers right from the start of their design process to help them understand the design techniques that will produce the best quality part at the most efficient cost.

Many customers are new to the idea of 3D printing their parts or designs, so at the beginning they may design with methodologies used in conventional production, like Injection Moulding. It's our job to help them understand that we can often look at the project in a completely different way. There is huge freedom in design when you are 3D printing parts using HP's MJF technology, which allows us to depart from the way things have been done in the past," says Penny Huston.

Challenging traditional methods:

“One traditional way of manufacturing parts is injection Moulding. Making the mould can be expensive. To offset the high set up costs, the customer then needs to manufacture a large quantity of the same part to justify the investment in the mould. When 3D printing parts, you can print as many or as few parts as you want, then change the design and print some more when you need them. For many applications, this is more economical and efficient than mass producing parts that may be actually end up being wasted.”

- Penny Huston, Director, BDL 3D



Data courtesy of Weera

From prototypes to volume production at scale

In 2023, BDL 3D added the HP Jet Fusion 5200 Series to their fleet (designed for high-volume, production-grade 3D printing), offering a significant leap in production capabilities.

While the HP Multi Jet Fusion 580 3D Colour Printer is more like a prototyping machine, the HP Multi Jet Fusion 5200 has next-level production capabilities to get batches 3D printed once the prototype is ready.

The 5200 Series excelled at producing large batches, allowing BDL 3D to scale up to industrial-level production. The resultant parts are grey, but textures or patterns can be incorporated into the design with color by a variety of post processing techniques, such as dyeing, painting or hydro dipping.

This strategic move allowed BDL to transition from prototyping to full production runs, ensuring consistent and predictable print times for all parts.



How the HP MJP 5200 Series made a difference

The HP MJP 5200 Series 3D Printing Solution has opened up opportunities for BDL 3D to explore new applications and expand into new markets with breakthrough productivity and automation.

Enhanced sustainability

3D printing with HP MJP technology promotes a lower carbon footprint in part production by utilizing HP 3D materials known for industry-leading reusability. BDL 3D's approach to sustainability extends beyond the use of eco-conscious materials. Any excess material or parts are recycled in New Zealand or Australia. This practice not only reduces the environmental impact but also aligns with the principles of the circular economy, promoting a more sustainable manufacturing cycle.

Economic impact

Driving manufacturing in New Zealand has the potential for positive economic impact as manufacturing has largely gone offshore. Utilizing Industry 4.0 technologies, like 3D printing with HP MJP technology, will have a range of benefits for New Zealand, including creation of job opportunities, stimulating local businesses, and contributing to the overall growth of the manufacturing sector.

BDL 3D's materials

BDL 3D primarily uses HP 3D High Reusability (HR) PA 12, enabled by Evonik for its exceptional balance of 3D printing performance and sustainability. This material is ideal for producing strong, low-cost, quality parts for a range of low to high production volumes.

As a sturdy thermoplastic, HP 3D HR PA 12, enabled by Evonik excels in creating dense components that boast precision, stability, and resistance to both water and heat, making it a top choice for printing strong, lightweight, and highly customized prototypes and final parts.

The compatibility of HP 3D High Reusability PA 12, enabled by Evonik with HP's Multi Jet Fusion Printing Solutions allows for the creation of parts that incorporate up to 80% recycled material.

While BDL 3D currently prints in HP 3D High Reusability PA 12, they plan to expand material selection in 2024/2025 to BASF Ultrasint® TPU01, HP 3D High Reusability PA 11, and HP 3D High Reusability PP enabled by BASF.

What lies ahead

It might be too soon to measure goals since BDL 3D is still evolving and expanding every day, since 2022. The business is "significantly ahead of where we thought we would be at this time," as stated by Director, Penny Huston.

HP Multi Jet Fusion technology will be a pivotal part of the business's future goals - they do have plans of having an entire fleet of HP 3D printers with all the different kind of materials. This can open up a whole new manufacturing spectrum at BDL 3D and be a key driver for digital manufacturing in New Zealand.