ACETABULAR HIP CUP IMPLANT

MAXIMIZE OEE AND REDUCE PRODUCTION COSTS OF HIP IMPLANTS

HISTORY

Acetabular cups are used during total hip replacements to sit against the native bone of the illum and articulates with the femur through the hip stem. Inside of the hip cup there sits a liner that connects with the head of the stem for articulation of the hip. Acetabular hip cups are traditionally manufactured by casting and forging. This method has a long turnaround time from order to final product. This is primarily because of the lost wax method. This method creates a sacrificial wax mold in which a shell is formed around. Then the wax is melted out of the shell and the metal of choice is poured into the shell. The shell is then broken to reveal the final part in the metal of choice. Then these acetabular hip cups must have some sort of porous structure applied to them, which is either expensive to manufacture or difficult to validate. When additively manufactured, the part is originally printed using Electronic Beam Technology (EBM). This manufacturing process uses a stream of electrons guided by a magnetic field to melt layers of powder on top of each other. The EBM technology is subject to unpredictable failures. This is particularly unsatisfactory when multiple hip cups are being stacked onto one another in a single build.

This creates a cascading effect where one failed part can create a large amount of scrap at once. Additionally, it complicates the validation process as each layer must be mechanically validated independently. Although EBM can be faster than Laser Powder Bed Fusion (LPBF), LPBF produces smoother and more accurate parts with no supports.

CHALLENGE

Casting and forging parts require a large amount of time to manufacture. This method requires foundries that are only justified with large part volumes. The long primary process along with the additional steps creates a bottleneck in the supply chain. This leads to increased prices, inventory, and lead times.

INDUSTRY

Medical

CHALLENGE

Bringing Laser Powder Bed Fusion (LBPF) to Total Hip Replacements to reduce production costs using a multi laser system and a larger build plate

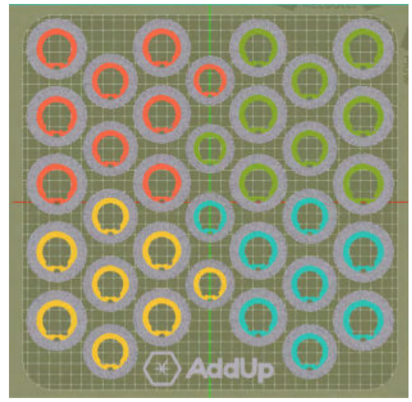
KEY RESULTSS

- Maximum throughput with 78% OEE
- No supports = reduced post processing = lower part cost
- Reduced lead time
- Fine feature resolution and optimal osseointegration for better patient outcomes!

INTEGRATED FEATURES | REDUCED LEAD TIME | NO SUPPORT | PERFORMANCE

CHALLENGE

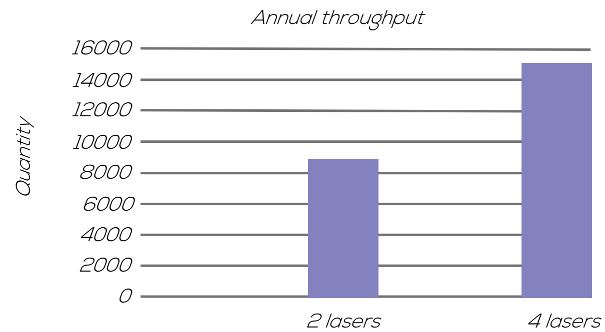
Parts manufactured by EBM technology are less precise and have a higher surface roughness. This results in increased post-processing costs. More material that is melted must be traditionally machined away and the medical device industry is specifically sensitive to roughness that can lead to an increase in risk of build failure as the build time is longer. This does not coincide well with a technology that has a lower Overall Equipment Effectiveness (OEE).

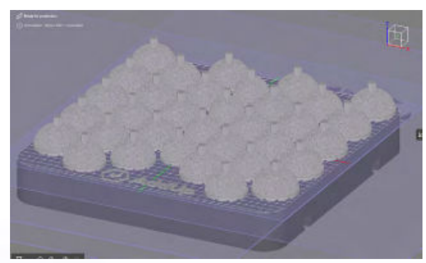


Top-down view with laser assignment

SOLUTIONS

Laser Powder Bed Fusion (LPBF) technology provides a closer net shape part compared to EMB technology. There are also no supports needed in LPBF technology. All of which significantly reduces post processing, reducing lead times. The FormUp® 350 also has a larger build plate with more lasers compared to EBM printers leading to potentially more than double the throughput. AddUp's FormUp 350 also has a fine feature resolution and a roller recoater which allows for a lattice structure printed with the implant. Lattice structures improve the osseointegration which allows for longer lasting implants and better patient outcomes.





RESULTS

The FormUp 350 from AddUp delivers throughput capabilities currently unchallenged on the market. This can be seen in the below Hip Cup Productivity Study. Parts shown were printed with a compression roller technology in 30um layers of Ti6Al4V ELI. Compared to EBM technology, the AddUp 350 has a shorter run time of 12:41 compared to 15:23 (EBM) which leads to an improved annual throughput of 9,309 (16,403 LPBF, 7,094 EBM)

	2 lasers Competitor 250	**4 lasers FormUp 350**
Parts per laser	10	8-9
Medium, 30μm powder (hrs)	15:23	12:41
Annual throughput	7.094	16.403

CONNECT WITH US

AddUp Inc. - North America
5101 Creek Rd
Cincinnati, OH 45242
+1 (513) 745-4510
contact.usa@addupsolutions.com

AddUp - Headquarters
13-33 Rue Verte
ZI de Ladoux, 63118 Cebazat
+334 73 15 25 00
contact@addupsolutions.com

AddUp
GLOBAL ADDITIVE SOLUTIONS