COGNIMAN

Additive manufacturing for medical implants
Croom Medical, Ireland

The challenge

Croom Medical offers outsourced manufacturing services for orthopaedic implants. Some of their components have complex geometries, are manufactured in low batch sizes and come with a high diversity. Finding a way to make post-processing easy and cost effective for these components is the challenge this COGNIMAN pilot is set to solve.

Pilot description

This pilot centres on additive manufacturing and precise medical components/implant machining, generating sample parts with advanced support structures. The chosen prototype for this pilot is a bone screw, featuring a diameter ranging from 8 mm to 14 mm. These screws are additively manufactured with a 3D printer, the RenAM500S, which employs Selective Laser Melting (SLM) Powder Bed Fusion (PBF) 3D printing. It is situated within an Additive Manufacturing facility and requires an operator's attention to oversee the manufacturing process.

During the printing phase of this component, a significant number of supports are utilised. After the printing process, an operator carries out all the subsequent manual tasks. These tasks encompass disassembling the printer, detaching the component from the build plate, removing the supports, visually inspecting the piece, placing the components onto a tray, followed by immersing them in an ultrasonic bath, then extracting the tray, allowing the components to dry and finally, subjecting them to a thorough inspection, cleaning and subsequent packaging.

Desired outcome

Croom Medical needs a reconfigurable solution which could replace 90% of the manual intervention in the current post-processing steps after printing. They seek a robust and flexible system that can be easily programmed and allows for operator feedback/direction, with the ability to work independently on repeat products.

Envisaged solution

AI-enhanced robots can streamline the finalisation of personalised medical implants and parts, preserving quality, time and funds. Although some automated and semi-automated surface finishing technologies exist, they lack self-adjusting robots for automated support removal. The objective is to devise algorithms for guiding robots to remove support structures and subsequently refine and polish surfaces automatically.

The resulting robot will be secure, exceedingly adaptable, reconfigurable and self-adjusting, diminishing operator powder exposure risk. It will rapidly reconfigure new designs and receive operator feedback. By utilising collaborative/cognitive robots, this pilot will notably enhance support removal and finishing methods while effectively showcasing harmonious interaction between humans and robots.

Facts and figures

Process challenges

- Task management
- Skill set for machine operation
- Quality assurance
- Potential safety hazards

Integration challenges

- Staff acceptance and management
- Apply the solution to other products
- Validate the system

Time involved in the process

- Batch processing
- One print run: 2-3 days
- Handling by operator: 15-20 hours

Personnel involved in the process

- 3 Operators
- 1 Quality Assurance Specialist
- 1 Developer

Croom Medical

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