University of Huddersfield Repository

Unver, Ertu, Sorbie, Chris, Kagioglou, Mike and Paxman, Richard

3D printing for Medical Product Development: The Advantages of Additive Manufacturing to Reduce Cost of Design and Development in the Medical Industry: Paxman Case Study

Original Citation


This version is available at http://eprints.hud.ac.uk/id/eprint/28191/

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

For more information, including our policy and submission procedure, please contact the Repository Team at: E.mailbox@hud.ac.uk.

http://eprints.hud.ac.uk/
Title:
The Advantages of Additive Manufacturing to Reduce Cost of Design and Development in the Medical Industry: Paxman Case Study

Event:
Invited Speaker at Medtec Europe 2016 Conference Programme
12-14 April 2016, Messe Stuttgart, Germany

Team:
**Christian Sorbie:** Design and Development Associate at Paxman Coolers / University of Huddersfield
**Dr Ertu Unver:** Principal Enterprise Fellow, Product Design course leader, University of Huddersfield
**Prof Mike Kagioglou:** Dean of Art, Design and Architecture, University of Huddersfield
**Richard Paxman:** Paxman Director, University of Huddersfield
Conference Presentation

- Contents
- What is Paxman and scalp cooling?
- Paxman's previous design and new design
- Paxman's main aims
- Medical design process vs the standard design process
- 3D scanning and ergonomic data?
- Cap design and development
- Why did we use SLS?
- Who did we use?
- Time and Cost
- Challenges with 3D printing
- Conclusion
What is Paxman and scalp Cooling?
Paxmans previous design and new design
Paxman’s main aims

Improved fit

Improved Comfort

Improved Scalp Contact
Medical design process vs the standard design process

Feasibility
   Plan
   Inputs
   Outputs
   Validations
   Verifications
   Changes
   Review

DESIGN
EVALUATE
PROTOTYPE
3D scanning and ergonomic data?

Using data various 3D Database, research and also using 3D scanners from the University accurate standard size head model created.
Cap design and development

Using the head map, the design of our cap idea was generated and several ideas were tested to get maximum scalp contact.
Why did we use SLS?

- Good Material Options
- Good Heat Resistance
- Large Scale Printing
- Good Accuracy
Who did we use?

3M Buckley Innovation Centre

Building Success Layer by Layer

e-Manufacturing Solutions

i.materialise more than online 3D printing services

Materialise innovators you can count on
### Time and Cost

<table>
<thead>
<tr>
<th></th>
<th>Time</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtractive manufacturing</td>
<td>4 – 8 Months</td>
<td>£15000 – £25000</td>
</tr>
<tr>
<td>Additive manufacturing</td>
<td>5 – 10 days</td>
<td>£750 – £1500</td>
</tr>
</tbody>
</table>

**Saved costs** - In total 8 sets of caps were printed, in all costing around £14,000. Traditional manufacturing we were estimated £150,000

**Saved Time** – all 8 sets took a week to be completed so 8 weeks in total, traditional manufacturing would have taken approximately 48 months to complete saving us a total of 46 months
Challenges with 3D printing

The main challenges with 3D printing we found were **Tolerances** and **Repeatability**

Male Tool  
Female Tool
Conclusion

Additive Manufacturing is a benefit to SMEs that may not have the funding for traditional manufacturing.

Product quality can be improved and time to market can be shortened using additive manufacturing in the design and development process.

A link is needed between product design and 3D printers to achieve the best results, reducing tolerance errors and printing in the most reliable way.
Thank you for listening

Any Questions?