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Scalp Cooling Cap Design Using Anthropometric & 3D scan data

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PAXMAN^o
PIONEERS IN SCALP COOLING

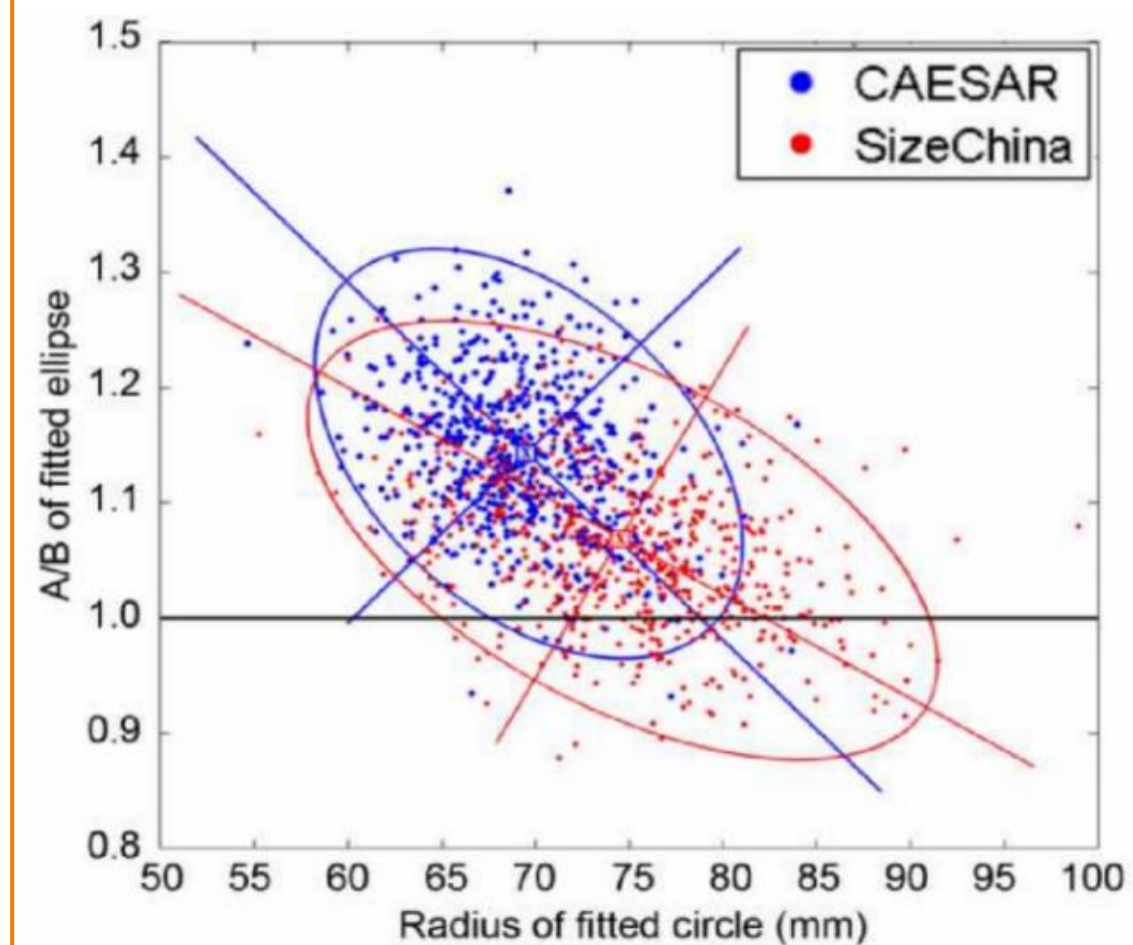
HUDDERSFIELD MATERIALS FORUM, Thu 12 January 2017, 09:30 – 15:30, Brontë Lecture Theatres, Huddersfield

ABSTRACT:

Huddersfield University experts received a number of awards for design and development of a scalp cooling cap which could reduce hair loss in cancer patients. The brief was to redesign the cap so it is a better fit – vital if the device is to be effective – and can be mass-manufactured, making it more economical. The cap developed fits the head more efficiently and improved flow pattern of the coolant. The team did extensive research into head sizes and used 3D technology to develop a new design and now granted two internationals and two UK patents. The new cap uses 3D printed tooling technologies for mass manufacturing of lightweight silicone material.

Comparison of Head Sizes:

The knowledge of the human head shape is essential information for a variety of fields including design, medicine, anthropology, among others. Databases such as the CAESAR project, the North American and the European edition and the SizeChina Project were studied where measurements from approximately 2400 males and females and include both 3-D scans, traditional measurements. A review of ergonomic head data was evaluated to conclude a standard size needed for scanning.

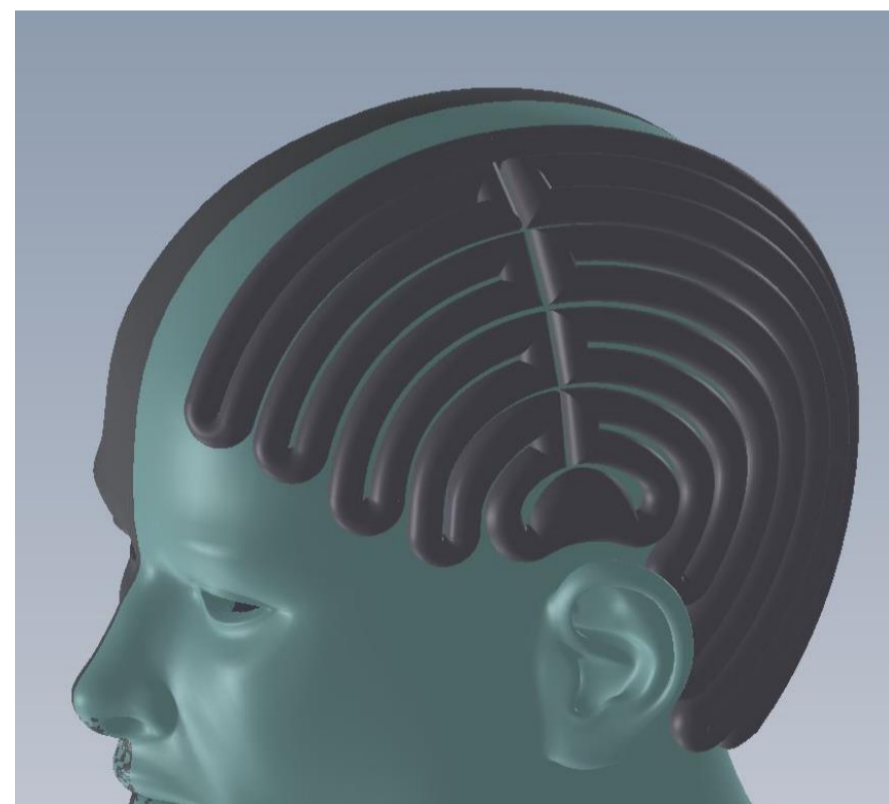


Introduction:

Scalp cooling is a method used to reduce hair loss for patients undergoing chemotherapy treatment. Scalp cooling reduces hair loss with many prescribed chemotherapy drugs. It can result in a high level of retention or complete hair preservation which can improve patient's self-confidence leading to a positive attitude to their treatment and recovery. (Paxman 2015)

Development:

The 3D technologies used were scanning, design software, 3D printing and sheet silicone forming, using the scanned data a channel and shape design was created so that the Rapid tooling could be achieved, this tooling was then used to create sheet silicone prototype, ready for product evaluations and testing. Several design and 3D printed tooling iterations were evaluated to improve the manufacturability of the chosen design before the final tooling and prototype were created. The cap has been developed, made and globally marketed by Huddersfield firm Paxman, which has formed close ties with experts at the University, where the scientific basis for scalp cooling in preventing hair loss during chemotherapy has been also been studied.



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In the School of Art, Design and Architecture, the research team have worked on major improvements to the design of the cap. The team worked closely with the firm Primasil Silicones in the creation of a silicone rubber formulation that gave the cap greater flexibility and enabled the coolant to be in close contact with the scalp. The design is a winner in the international Exhibitor Innovations Competition during Medtech World Awards also it was also one of 46 finalists in the INDEX: Design to Improve Life Awards, which received 1,123 entries from 72 countries as well other two more awards. The collaboration with Paxman will continue as the firm seeks to further improve its cooling caps.

Conclusions:

The ability to use Rapid Prototyping in tool making in the last few years has enabled the boundaries of current manufacturing methods to expand, while reducing costs. This process has enabled the creation of innovative designs, which were impossible to manufacture in few years ago.

The new cap which is undergoing clinical trials in the UK, the US and Japan and has seen very positive results in terms of hair retention and patient acceptability.

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Patents:

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Award:

- Winner of Yorkshire and Humber Healthcare Partnership with Academia Award, (24th Feb 2016), Royal Armouries Hall, Leeds, UK
- Winner of West Midland Medilink Innovation Award (14 Jan 2016)
- Winner of Medtec Ireland Exhibitor Innovations Accolade Award (4-5 Oct 2015),
- Insider's 2016 Made in Yorkshire Awards (4/Mar/2016)