**Additive Manufacturing, 3D printing for the provision of custom made head supports.**

**Introduction**

This report is a reflective piece on the presentation by Jonathon Howard on 3D printing for the provision of custom made head support. I was keen to sit in on this presentation as I have felt during my years working for the NHS, within Special Seating and the Wheelchair Service that some of the design, development and manufacturing processes within the field are antiquated not “moving with the times”. This has usually been due to financial and time constraints.

It was great to see someone now investigating modern manufacturing processes, especially one that has seen a positive impact in the Orthotics field.

**Presentation**

Jonathon Howard gave a good overview of Additive Manufacturing which would have been excellent for people who wanted to understand the process further with good use of diagrams.

Advantages and disadvantages of the process were covered well giving an impartial perspective.

The research presented to try and give some evidence base to pursue this project was good as it was basic and simple to follow however some people could have found it too basic and too wide not focusing on specifics.

The case study unfortunately did not have clear pictures and I would have liked some more information in regards to the strength requirements in relation to the headrest as this was not mentioned and it is an important factor to consider with head supports.

The presenter was very informative on the subject of testing highlighting limitations and then showed us good developments implemented.

The conclusion of the presentation was accurate when describing this type of manufacturing process as a “good tool”.

**Question and Answers from Presentation**

When questions are asked after a presentation has been delivered I feel they fall into two categories. Questions asked because an audience member would like to know something more specifically in relation to a topic mentioned. Or a question is asked because an audience member felt a topic was not covered or was lacking in information.

Both of these types of questions the presenter had to tackle when the presentation was finished.

Somebody asked a question in regards to the comparison of weight between the 3D printed headrest and the conventional custom made headrest. This is when the presenter mentioned about the honeycomb design of the 3D printed headrest which may have been more useful to elaborate on this during the presentation.

A question was asked to have some more information about costs and time taken to produce headrest. The answer was a little contradictory as it was stating the cost would be £100 but 40 hours of labor time spent, not including the upholstered cover which would probably have to be a bespoke cover.

**Conclusion and Summary**

The presenter delivered a good presentation introducing a relatively new manufacturing process to the field of Wheelchairs and Rehabilitation Engineering.

The presentation briefly mentioned the use of Finite Element Analysis (FEA) which is one of the major advantages of this design and manufacturing process, however it was not ecplained with enough detail. Finite element analysis is a computerised method for predicting how a product reacts to real forces, vibration, load, and other physical effects. Finite element analysis shows whether a product will break, wear out or work the way it was designed. The process works by breaking down a real object into a large number (thousands to hundreds of thousands) of finite elements, such as little cubes. Mathematical equations help predict the behaviour of each element. A computer then adds up all the individual behaviours to predict the behaviour of the actual object. More information in regards to this should have been presented as one of the advantages of 3D printing for provision for a custom made headrest. The ability to test a 3D Computer Aided Design model of a headrest on the screen without the expense of making prototypes or testing rigs, would be great thing to take into consideration for public funded departments.

One of the limitations spoken about for this project was the limitation of size when it came to the production of parts. The overcome this issue the custom made headrest was made in two smaller parts. This led me to think about other smaller parts and aspects of wheelchairs that would be more suitable to develop. For example more ergonomically designed power wheelchair controller knobs having the ability to be custom made unique to the wheelchair user hand grip and motor movement.

Even though I don’t think this was the best manufacturing method for a custom made headrest it was an interesting and informative presentation. Which led me on to think about other aspects and parts that may be more suitable and beneficial using this design and manufacturing process as mentioned which I would like to research further to provide more options for my service users to aid the control and mobility in a wheelchair.