Edinburgh Shield Force

A volunteer group producing Face Shields for our NHS healthcare workers

Email: press@edinburghems.com

Date:

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Headline:

1 Month from Idea to Mass Production. Edinburgh Shield Force starts Injection Moulding, can now deliver 3 thousand Face Shields daily

Location:

Edinburgh, the Central Belt, the Borders

Lead:

Today, Edinburgh Shield Force starts manufacturing their Face Shields using Injection Moulding. We will increase our daily capacity from 1 thousand to 3 thousand. We currently deliver to the Central Belt's major hospitals. These include Edinburgh Royal Infirmary, Glasgow Royal Infirmary, and the Borders General Hospital.

3 weeks ago, the original team decided to make Face Shields. We had an empty room, some people and some ideas. We initiated production using 3D-printers, at the start of April. We have now delivered 10 thousand Face Shields over the last 3 weeks.

To go from nowhere to mass-production of our design in one month - this is an outstanding achievement. To put this into context, it typically takes 3-6 weeks just to get a tool cut to start injection moulding.

It has only been possible, because of the combined experience of the team. And the tireless dedication of the volunteers running the production line and deliveries. And the flexibility and hard work of our external partners, Eadie Bros & Co and Cademuir

Engineering, both in Selkirk. And the willingness of everyone to work together with the common aim of helping our NHS workers.

Body:

What is Injection Moulding, and why is this breakthrough so important? 3D-printing has been an excellent method to prototype the design. We then ramped up the quantities by adding more 3D-printers into the production line. One 3D-printer can normally produce 5-6 units per hour. We are currently producing about a thousand per day.

Injection Moulding is a more efficient factory process, intended for mass-production. There is a higher setup cost; but then the process will produce far more parts at a much reduced per-unit cost.

We expect our Injection Moulding process to produce 200 units per hour. By adding this Injection Moulding output to our existing 3D-printing capacity, we will produce 3000 units per day.

More Face Shields for more of our precious healthcare workers, and more saved lives.

Background:

"Edinburgh Shield Force" (ESF) is a project which is part of "Edinburgh Emergency Medical Supplies", a volunteer group of engineers and academics. We have combined our expertise and experience to respond to the emergency need for Personal Protection Equipment (PPE).

The core group originally met as part of the Edinburgh Hacklab. This is a shared space for people who like to see what they can do with technology for fun. They pool resources, and thereby benefit from access to better facilities, rather than working individually.

Importantly for the success of this project, they are experts as well as enthusiasts: in the fields of engineering, computer science, regulatory testing and compliance, CAD/CAM, and innovation. Team members also bring experience of dealing with the NHS, and post-disaster relief.

Initially the group considered a response to the Ventilator Challenge posed by the UK Government. However, they soon decided that the production of Face Shields for

essential healthcare workers would be a more useful problem; and one that the team could address quickly. Edinburgh Shield Force is the resulting project.

People in the team produced initial prototypes of 5 designs. We then offered these prototypes to the Borders General Hospital, and the Edinburgh Royal Infirmary. We asked them to rank each on factors including comfort, protection, ease of use, stability, positioning and robustness. The hospital staff approved 2 models, one to be 3D printed and the other made by hand.

Our 3D-printed model is derived from an open-sourced design by Erik Cederberg / 3DVerkstan. We have modified it to adapt for local needs; for example, to accommodate the UK hole punches used to cut holes in the visors. The original 3DVerkstan design was released under the Creative Commons Attribution Share Alike license; our design will be publicly released under the same terms.

We then set up a reliable production line using donated 3D-printers in an office-space donated by 1partCarbon, with a committed team of volunteers to staff the line. Euan Mackenzie, founder of 1partCarbon, said "'The organisational abilities, the engineering talent and the work ethic of this truly exceptional team has just been amazing."

Production began in earnest at the start of April 2020. By 21 Apr 2020, we have produced 10 thousand face shields, which we have delivered to our healthcare workers in Scotland's leading hospitals.

One ICU doctor, who asked not to be named, said "I just wanted to thank you for your Shield Force visors. They are a huge improvement on what we had before and have made our lives much more comfortable. The biggest challenge for us has been working effectively in the PPE and the new visors have really helped. Your work is deeply appreciated."

This has been made possible by the generosity of the volunteers giving their time, donations from people inside the team, and a crowdfunder which has raised over £30,000 from the public.

In parallel with that 3D-printing production, a sub-team with experience in Injection Moulding worked to improve the design for that production process. Miles Franklin led this design team, and his expertise was crucial to optimising the design for rapid production, and achieving the right mechanical properties for comfort. He succeeded in

getting this right first time on an extremely aggressive schedule whilst also holding down a full-time job as Lead Engineer at Gravitricity Ltd, a energy storage technology start-up.

Brian Eadie, of Eadie Bros & Co Ltd in Selkirk, has been crucial to the achievement of reaching this Injection Moulding milestone within a month of the project start. He had already completed his own injection mould tooling based on the original 3Dverkstan design and begun producing parts, which we are now using to supplement our own 3D printing operations. Brian was ready to machine a revised version of his own tool, but after we reached out to him, he instead offered immediately to let us use his machining effort for Miles' improved design. This enabled us to produce a finished steel tool 1-2 weeks earlier than we could have done otherwise.

We must also thank the team at Cademuir Engineering Ltd, in Selkirk, who have worked flat out on our behalf. While keeping Brian's first tool running they have designed, machined, set up, tested and tuned our new tool in one week flat, and are now hosting our production. Their state-of-the-art equipment enables each part to be robotically handled, which minimises contamination risk and maximises efficiency.

Press Contact:

Please email press@edinburghems.com for more information, or to request an interview.

For more information on:

- links to previous press coverage on the BBC, and in print
- Information about the people behind the project

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