3D SCANNING WITH ARTEC EVA FOR HEALTHCARE

A UK charity focused on helping children with brain-related neurological conditions needed to create custom riding helmets using 3D scanning and printing

CREATING 3D-PRINTED RIDING HELMETS FOR CHILDREN WITH BRAIN-RELATED NEUROLOGICAL CONDITIONS

Imogen can't run and play with the other children, but she can ride a horse. Born 11 weeks early with spastic diplegia, a form of cerebral palsy, much of her time is spent in a wheelchair or sitting down. Riding horses has been a great joy to Imogen, yet because she was also born with hydrocephaly, an excessive swelling of the brain, her head is wider than normal, which means she could never find a riding helmet that fitted correctly.

The design engineers at Cerebra Innovation Centre have already made several custom helmets for children with hydrocephaly.

Dr. Ross Head explained how it all began:
"The very first process was using the Artec Eva scanner, once I saw what it could do, my mind began percolating with ideas on how we could make use of it in our work, and that's when it hit me! The idea of using it to make bespoke helmets."

Ross Head was first introduced to the Artec Eva by Ian Walsh, director of ATiC (Assistive Technologies Innovation Centre) and their team of innovators. Prior to this, ATiC consulted with the 3D scanning specialists at Artec's Gold-Certified Reseller Central Scanning, and it was during a presentation of Artec's scanners when ATiC understood that Eva would be an invaluable addition to their tool chest.

Using Artec Eva to scan the exact measurements of Imogen's head in less than one minute

helmets are in the works, and Cerebra Innovation Centre is beginning to see growing interest in the helmets from elsewhere.

Ross Head was very pleased with the results and stated, "We're really just at the beginning with the Eva scanner...because we're creating customized products for each individual child. Eva lets us make things using a child's exact measurements, so when it's time for the child to put it on, or sit down on or in it, it fits like a glove, and for a child who's used to going through life feeling like they're not fitting in, this kind of perfect fit is simply a dream come true."

He continued, "This time it's the helmets, but we're already looking at so many applications for Eva...and because we know that it gives us all the accuracy we need and then some, the sky is the limit as far as what we're going to be dreaming up and bringing to life here for our children."

The ATiC team has so far collaborated with Ross at Cerebra, providing 3D scanning using Artec Eva, innovating the development of Imogen's helmet. This collaboration will hopefully be the first of many, as both ATiC and Cerebra aim to develop and innovate the design and manufacture process even further.

The Artec Eva is a lightweight 3D scanner that uses 100% safe structured white light and scans quickly, requiring children to hold still for less than one minute. The 3D scan appears in real time on the screen in Artec Studio, the scanner's software. Scans are then processed and exported off to CAD software prior to 3D printing. Once in CAD software, an offset of the child's head is created, which allows the exact dimensions for creating a precise 3D model that will in turn be made into a perfectly-fitting helmet.

After scanning and exporting to CAD, a two-part model is created. Ross then explained the physical process of the helmet's creation. "The inner polystyrene protective layer

is exported for CNC machining and the shell model is used to create a 3D printed (female) mold. Once the inner surface of the mould is made smooth, layers of fibreglass and Kevlar are laid up using epoxy resin to make an extremely strong outer shell."

Subsequently, the helmet has been fully approved and certified by the BSI (British Standards Institution), attesting to its high level of protection and quality. Three helmets have been made so far, with two children (including Imogen) having been scanned with ATiC'S Artec Eva. More

Dr. Ross Head with a commercial helmet on the left, and a new bespoke helmet on the right

Artec 3D