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University of Sunderland Uses Z Corporation 3D Scanner to

Engineering education shines when students go beyond just learning about todays technology and acquire advanced expertise that prospective employers cant resist.

This is precisely what drove the University of Sunderland, UK, to bring high-resolution 3D laser scanning to its Digital Factory.

Digital Factory is a training and technology transfer project focused around digital engineering technologies. The project is delivered by the Institute for Automotive and Manufacturing Advanced Practice (AMAP), a department of the Faculty of Applied Sciences at the University of Sunderland in the North East of England and funded by One NorthEast (Regional Development Agency).

The Digital Factorys students and professional consultants provide technical training and support to North East UK businesses in computer-aided design, engineering and rapid prototyping. The Digital Factory team recently helped 3M UK PLC, for example, improve manufacturing accuracy and reduce costly waste at its plant in Aycliffe, UK.

We had a long list of demanding requirements for our 3D laser scanning technology, and the ZScanner 700 from Z Corporation was the only one that met them all, says Sajid Abdullah, Lead Consultant with the Digital Factory. It was the perfect tool for the 3M project.

3M was struggling with a manufacturing glitch at its Aycliffe plant, where the company manufactures respirators. Foam breathing filters that are supposed to fit inside the breathing modules were emerging flawlessly from one production line yet out of spec from another. As a result, a number of masks couldnt be assembled properly. Units were scrapped. Materials were wasted. Valuable time was lost.

To solve the problem, the Digital Factory team used the ZScanner 700 to scan four pairs of tooling and some plastic-moulded mask units. The team then used Geomagic Qualify software to compare scan data against theoretical dimensions in computer-aided design drawings. The work revealed a flaw in one set of tooling that Abdullah says neither the naked eye nor a 2D scanner could have caught. The solution was to scan the defective tools properly functioning counterpart and use the resulting CAD data to digitally machine a properly dimensioned clone. A simple

half day of scanning saved 3M significant time, money and frustration and dramatically improved productivity.

Traditional inspection methods take a long time and are very costly, says Fraser Shearer, 3M Senior Manufacturing Technologist. However, by using the latest digital technologies available from the Digital Factory, including

their laser scanner, we achieved 3D measurements in two days without any factory downtime. Without University of Sunderland-Digital Factorys invaluable help, it would have taken a consultancy two weeks worth of work at a high cost. This project has really helped us improve our working practices to remove waste and improve processes.

Choosing their solution

The University of Sunderland evaluated scanners from NextEngine, Metris and Roland. As the only self-positioning scanner, the ZScanner is easiest to use, says Abdullah. The self-positioning laser is great. It requires no turntables or tripod-like fixtures as the others do. You just hold the scanner in your hand, swipe it across the surface of the object, and let the lasers lock on.

The ZScanners unique portability means we can easily take the scanner to our industry partners instead of asking them to come to us. It also means we can share the scanner around the universitys engineering department, the Digital Factory and the nearby Nissan plant, where we do a lot of consulting. Being handheld, the ZScanner can be used to digitize both large objects and areas that are hard to reach, like automotive interiors. The ZScanner 700 was the only solution available with its own reverse-engineering software to capture and repair point cloud data. Other systems required a separate purchase of CAD software to clean, repair and produce CAD models.

Several months after the 3M project, the Digital Factory team used these capabilities to tackle an entirely different manufacturing problem replacing 19th century artefacts at County Durhams Beamish Museum, which tells the story of the North East England during the 1800s and early 1900s.

Three exhibits were missing critical damaged parts. An 1877 Lewin Locomotive had a broken steam injector, a tram had a broken handrail, and a cart had a broken wheel. The Digital Factory team visited the museum, scanned the damaged parts, and restored the resulting data to the original using 3D CAD software, giving the

museum detailed designs with which to create new parts.

In the case of the steam injector, the Digital Factory team went a step further and used its 3D printer, a Z Corporation Spectrum Z510, to produce a physical model accurate down to the threads that was used as a casting pattern for a brass part.

Replica parts are notoriously hard and costly to source and manufacture, says Paul Jarman, Curator of Transport at Beamish. However, with the help of the latest digital technologies, I have been given exact prototypes that can now be used to manufacture new parts. Without the universitys invaluable help, I would have had to try and source the parts myself, proving extremely difficult and costly, or use a wooden pattern maker, which would provide an interpretation of the part rather than match it exactly. This would diverge from the original, and we really need all restoration to be as near to the

original as possible to preserve character especially for people who will look back at the exhibits in 100 years time.

Digital Factorys Dave Knapton explained, The new ZScanner 700 captures object form and geometry exactly, allowing us to create a 3D part in STL format straight onto a computer, with little need for CAD modeling, which can then be very easily used to manufacture replica parts directly on the Spectrum Z510 as simple as doing file and print. Helping a museum really makes you appreciate how things were made in the past when people had to do these things without the help of modern technology. It has been great working with Beamish to help them solve real problems faced during restoration.

University students also use 3D laser scanning on their own projects, including those working on SU Racing Formula Student. Formula Student is a program challenging European university students to design, build, develop, market and compete as a team with a small single-seater racing car. University of Sunderland race teams have begun scanning their engines to provide 3D CAD data to ensure proper fit in the vehicle chassis.

They are also scanning hand-shaped Styrofoam prototypes and making auto body parts directly from the CAD data, reducing product design time. They use the Spectrum Z510 to create prototypes of uprights for suspension systems and other parts to share with suppliers who will machine the finished part.

3D scanning, and printing as well, have delivered great benefits to our students and business partners alike, says Abdullah. A lot of companies havent been exposed to the multifaceted role of laser scanning in the manufacturing arena. Our students, however, are becoming experts and are going into business situations with valuable knowledge to impart. They hit the ground running and their employers immediately benefit. Its the beginning of a long relationship.

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