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Fast track prototyping delivers major savings

AT 3D Print, on Auckland's North Shore, three men with a passion for pushing technological boundaries, banded together to form New Zealand's first rapid prototyping and modelling bureau that utilises the benefits of leading-edge 3D colour printing technology. Technical director Martin Brewer, marketing director Richard Keesing and operations director Peter Dawson have for some time been developing an exciting new 'short circuit' to make patterns for foundry castings using 3D printing technology.

"The clear advantage of our system has been the ability to build patterns virtually overnight very economically," says Dawson. The key to this ability is the company's investment in a Contex 3D inkjet printer. This advanced 3D printer creates highly accurate physical models from computer-aided design (CAD) data by using an inkjet print-head to deposit a liquid binder that solidifies layers of powder. And what is truly unique in this country is that 3D Print's 3D machine prints in colour. This is a great bonus for marketing/



At the heart of the process is the Contex 3D printer.

graphic design teams wanting to view how labelling will work with the physical shape of a product. Creating solid objects one micro-thin layer of powder at a time would, not so many years ago, have been deemed pure fantasy. However for today's engineers, inventors, manufacturers, packaging companies, product designers and architects, it represents the passport to speed and economy in prototyping and pattern-making.

Just how quickly 3D Print can come up with a physical prototype, and save tooling time and money, was demonstrated recently with the development of the new style of protective head gear for rugby players. The client was Body Armour Limited, manufacturer of the Canterbury range of headgear and protective wear. After much research Body Armour has designed radical new headgear for rugby players that significantly increases the volume of airflow around the head. However when it came to tooling production, Body Armour CEO Bruce Armstrong admits that the project had virtually ground to a halt. A key issue was the need to see a finished product to check it before committing to final tooling. As many manufacturers will know – it's a classic but expensive 'chicken and egg' situation. And for Armstrong the investment had already exceeded the princely sum of \$80,000.



The in-house 3D helmet design.

"Essentially we had difficulty finding someone who really could make a prototype of the tooling we needed to make the product, without actually producing the tool," he explains.

Fortunately Armstrong and Dawson had kept in touch since they were at school together. At a social function earlier this year Dawson told Armstrong about his



Richard Keesing models the prototype helmet.

"new toy" and the idea for using the 3D printing technology to solve Body Armour's helmet problems was born.

Not only was Armstrong impressed by the technology, he was also impressed by the "real world" experience of Richard Keesing and his team. "It was a case of 'this is what we can do, and

(L-R) Richard Keesing, Martin Brewer and Peter Dawson.



this is how we are going to make it work for you.' 3D Print was able to streamline the whole prototyping and tooling process for the helmet. It first printed a flexible 'proof' of what the tools would produce in normal production. This was done by simulating how the tooling would appear when closed under load in the press. "We then isolated the cavity the tools would create, built a separate 3D computer file of this cavity and then printed the item using elastomeric resin in our 3D printer."

Once any alterations were accepted by Body Armour, 3D Print then printed solid patterns which were delivered to its foundry partner. Just 48 hours later alloy castings were delivered to the machine shop for mounting and guides to be installed.

So final testing of the initial set of tools happened just four weeks after first contact, with the punch and die set operating as per requirements. Body Armour now has product in four sizes and the headgear was despatched for testing by the IRB in time for the 2007 Rugby World Cup. The distinctive new headgear is expected to become a common sight on rugby fields all over the world. Armstrong is somewhat philosophical about the money he spent prior to engaging 3D Print. "I would have saved even more if they didn't have to fix my somewhat wonky drawings," he laments.

Broad applications

Armstrong is sold on the flexible 3D Print capability, and believes that so far they've only touched on the true potential of what they can do. "Pete has always taken a punt on new technology, even though it costs him an arm and a leg," says Armstrong. "He's a risk taker - he sees a market and goes for it. He has faith in his team and he's always at the forefront of what's going on. That's why this latest investment in 3D print technology is such a winner."

Meanwhile Brewer, Keesing and Dawson are also clearly excited about the potential for their 3D prototyping and modelling technology.

"We take the risk away for our customers," says Keesing. "The big difference compared to the more traditional approach to tooling is that we assume responsibility if things don't quite work out the first time. And if we say it can be built, we're confident that it will be," he says. Dawson adds that the technology offers a number of benefits to marketers, who can jump start the process of launching new products to market by seeing a 3D model in colour and with labelling, rather than just a drawing. There is no element of interpretation whatsoever in the prototyping process - models are extremely accurate to scale (to 0.089mm) and to design, says Dawson. And, of course, costly tooling mistakes are all but eliminated.

"Prototyping may be one of the smallest parts of the production process, but potentially offers one of the biggest opportunities for savings," he says.

Applications for the 3D Print technology are far reaching, across all industries, and the 3D Print office in Albany has many examples of their work - from scale models of buildings for architects and developers to plastic products, and even props for movie production houses. It is a new era in prototyping and modelling, and we're only just seeing the tip of the iceberg.

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The flexi prototype.

3D Print's pattern

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