



Case Study

Powerful Lightweighting Capabilities in nTop



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Objective

As part of an internal exercise we used nTop to lightweight the end of arm tooling, designed for our Automated Quality Control solution, the RoboSCAN-R.

The RoboSCAN-R is an integrated package utilising the Creaform HandySCAN with a 6 axis Universal Robot. Our 'off-the shelf' solution is completely integrated with a specially designed portable workstation, inclusive of rotary table. The system uses a bespoke clamp to attach the HandySCAN to the end of the robotic arm.

The vision for this solution is to offer OEM's, Tier one, Tier Two and SME's access to automated quality control, at an affordable price. The objective of the lightweighting exercise was to explore how we could use nTop to remove all excess material from the clamp, creating a lighter part with less material that would be more cost effective to manufacture, whilst still maintaining the required strength.

Find out more about the RoboSCAN-R



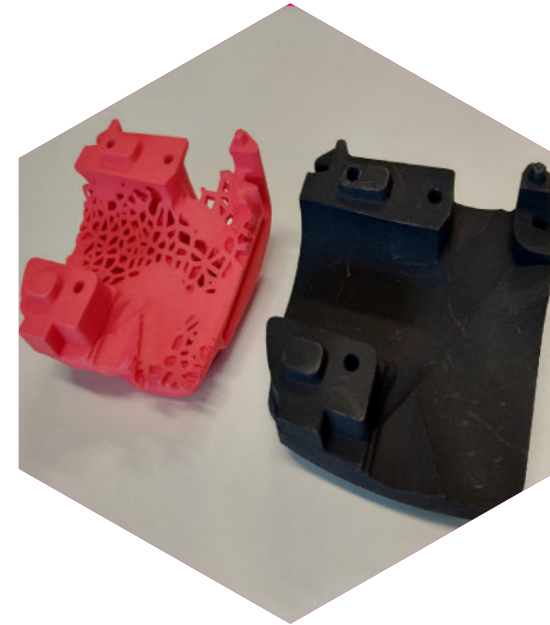
Application

Lightweighting means "doing more, with less" and offers benefits beyond just material reduction. A lighter component leads to improved performance, increased energy efficiency, reduced manufacturing costs and greener products.

Engineers can very quickly apply lightweighting techniques using nTop's optimisation tools at lightening-fast speeds, enabling enormous weight savings across a vast range of different parts.

As mentioned we focused on lightweighting the end of arm tooling for the RoboSCAN-R, we took the existing design and removed all excess material, whilst maintaining the strength required from the part. We reduced the weight and material usage by 48%, and took the cost of the assembly from £556 to £315.

Find out more about lightweighting in nTop





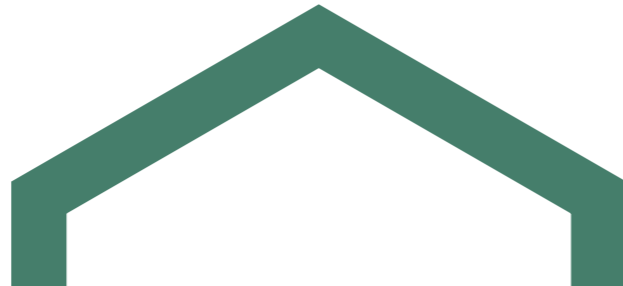
Challenge

The challenge was to take the original clamp from the RoboSCAN-R and make it lighter, more cost effective to produce and to improve the performance. The interfaces with the arm and the scanner had to remain the same shape, but more ventilation for the scanner was required.



We had a very short period of time to design and print the part ready for the MACH exhibition, the fact that we were able to turn them around in such a short space of time is testament to the capabilities of nTop.

Majid Yaqub, AQC Account Manager





Lightweighting in nTop

Despite the original version being designed for AM, it was overengineered and didn't take full advantage of all the benefits AM could offer.

With nTop, we were able to use topology optimisations to remove all unnecessary material. We could then use the inbuilt FEA tools to prove that even with half the material, the optimised clamp could still support twice the required weight.

Using nTop's powerful latticing tools, we were also able to create a lattice that is completely conformal to the surface of the scanner, giving a near perfect fit while offering exceptional ventilation to the scanner.

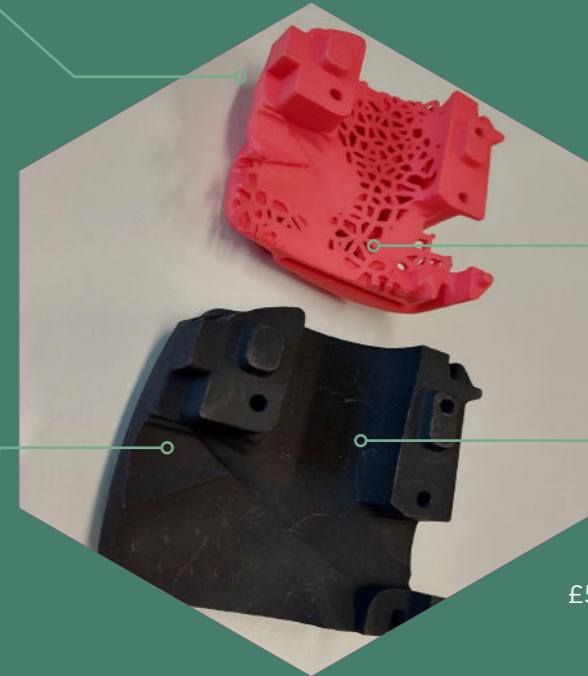
Once the workflow was set up for the first half of the clamp, we were able to optimise the second half with minimal additional design time. This workflow can now be used to automate the creation of clamps for the entire range of Creaform scanners.



	Original version	Optimised version	Savings
Weight	989g	518g	48%
Cost	£556	£315	44%
Material Used	1040cm ³	545cm ³	48%

518g in weight

£315 to produce



989g in weight

£556 to produce



The final outcome

The results of this lightweighting activity have delivered a cascade of benefits to the RoboSCAN-R system. Not only has the upfront cost been drastically reduced, but because the part is on the end of a robotic arm, the weight savings result in reduced running costs and increased accuracy. Maximizing the efficiency of the system throughout its lifetime.

In addition to this, the powder bed manufacturing process means that only the material required for the part is actually printed and all excess material is able to be recycled. This makes the 48% saving in material usage very significant and helps to produce a more environmentally friendly product.

AM also allows the product to be printed on demand, meaning that there is no minimum batch size and therefore no stock to hold.

Each optimised assembly that is manufactured for the RoboSCAN-R saves £241, so if an organisation manufactured 50 of these parts, then they could save over £12,000.



Because nTop creates a process, rather than describing a physical part, a reusable 'workflow' is created.

If we had a family of similar parts, this optimisation process could be automated and applied to all similar parts, saving a significant amount of an engineers time.

Joe Winston, nTop Account Manager





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