A 3D Systems Success Story

Industrial Product Designer
Sinterstation® Pro SLM System • Direct Manufacturing

Designer Utilizes SLM System to Improve Bakery Conveyor

Customer: Industrial product designer and a major bakery.

Situation: Replacing the chain on a bakery conveyor was costly and time-consuming.

Solution: Using a 3D Systems' SLM System to directly produce metal parts for the manifold, a steam-cleaning system was designed and built to clean the chain, eliminating the need for replacement.

Benefits: The bakery saved time and money by not having to replace the chain each year, and the redesigned manifold was sold to other bakeries.

Design for Function

INDUSTRIAL PRODUCT DESIGNER KEITH HANDY BUILT FULLY operational end-use parts for a conveyor cleaning system for a bakery using 3D Systems' Sinterstation® Pro SLM System.

The SLM System enabled the designer to not only produce functional end-use parts, but also deliver parts that had previously been impossible to manufacture.

The challenge was to design a steam cleaning system to remove the build up of breadcrumbs and cooking oils from plastic chain conveyors. Previously, it had not been possible to clean the chain in-situ and it had to be replaced every year – a time consuming and costly process.

From CAD to Direct Metal Part

DELIVERING THE POWERFUL STEAM JETS ONTO THE SMALL, fast-moving chain belts was the biggest challenge as steam had to be applied close to the nozzles to be effective. Various aluminium manifolds were machined, anodised and assembled with proprietary jet nozzles. Size limitations meant there were always some parts of the chain not being cleaned. Several versions were tried and although the results were promising, the cleaning operation was only reaching about 70% of the chain. Also the cleaning process was slow, requiring several passes of the belt.

Using SLM technology, Handy created a 3-D design and sent the CAD file to the SLM System.

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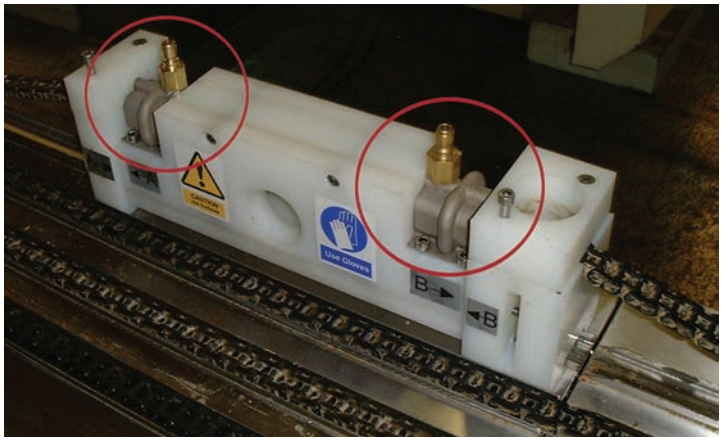
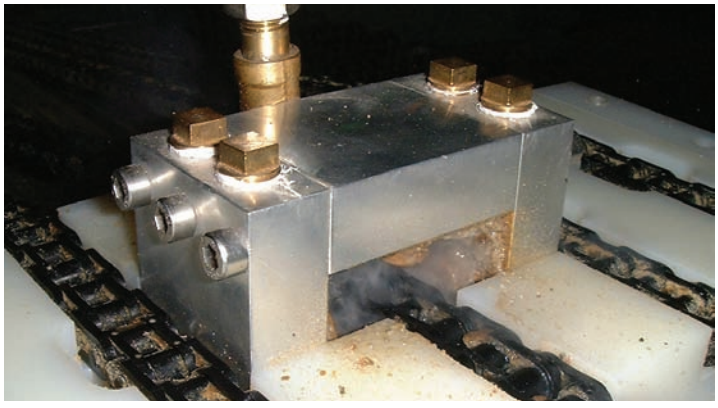
What is SLM?

Selective Laser Melting (SLM) is an Additive Manufacturing process that builds fully dense metal parts directly from CAD data by fusing metal powder into a solid, three-dimensional part. The result is accurate, detailed metal parts with excellent surface quality built within hours without significant additional tooling.



The new manifold (photo above) built on 3D Systems' SLM System for the conveyor cleaning system for a bakery replaced the old manifold (below), allowing the chain to be cleaned and eliminating the need for replacement every year.



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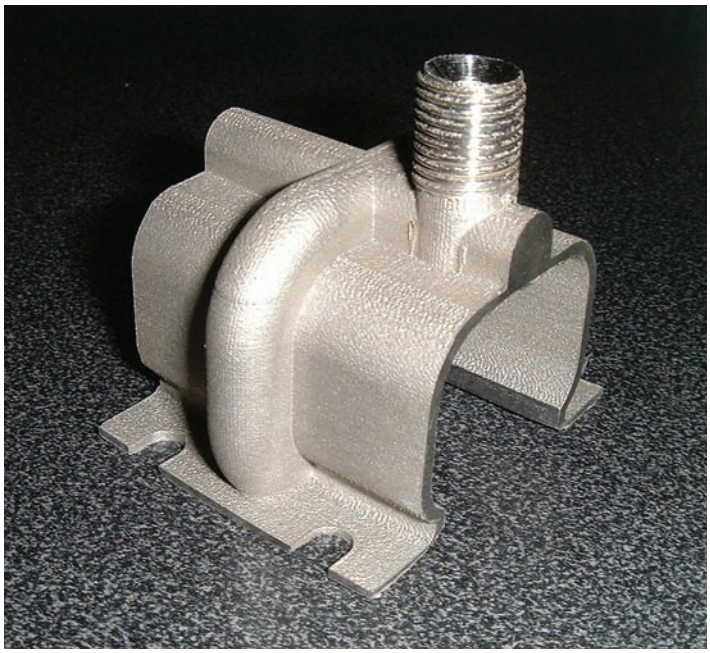
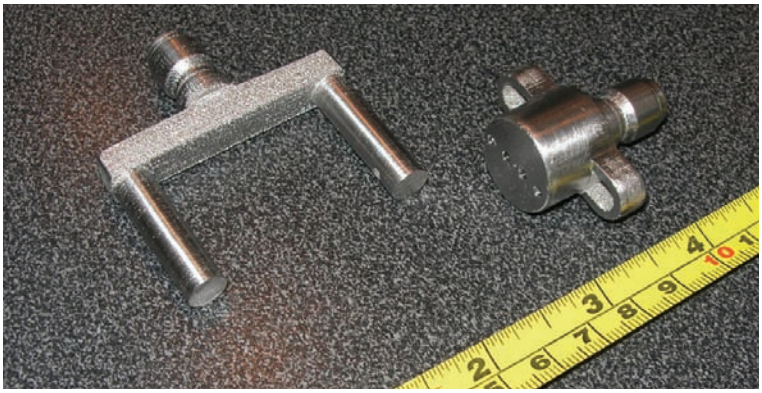


> "I was designing something that was otherwise impossible to manufacture — it was like being back at college."



"The design freedom of SLM let me design a hollow 3-D manifold with pre-determined steam nozzle positions at specific angles to clean each critical point of the chain," Handy said. "I did not have to worry about parting lines, assembly techniques or post-finishing for this application."

He continued, "I was able to integrate a 0.635 cm (0.3 in) BSP thread in the CAD file to attach the steam fitting. The result is a manifold that delivers 10 bar (145 psi) steam through 10 jets at multiple angles, all within a single component that is 50 by 50 by 50 mm (1.97 in)."

100% Clean in One Pass!

THE SLM MANIFOLD WAS BUILT AND TESTED AT THE BAKERY two days later. The test showed a big improvement — 85% clean. A second manifold was digitally redesigned and built the same way and further tests showed a full clean — 100% — in one pass.

The manifold was integrated into a production design for the customer, then sold to other bakeries.

"In effect, I was designing something that was otherwise impossible to manufacture – it was like being back at college," Handy said.

Broad Range of Applications

THE SLM SYSTEM IS WELL SUITED FOR A BROAD RANGE OF medical, dental, aerospace, automotive, electronics and military applications as well as for tooling and conformal cooling applications that require accurate, fully dense metal parts. The system builds in a variety of metals, from aluminum to titanium to tool steels, for a number of applications, including rapid, low-volume manufacturing.

For more information on the Sinterstation® Pro SLM System, visit 3D Systems' Web site at www.3dsystems.com.

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