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Mark Davies / YKK Europe Ltd.

YKK produces sacrificial die block inserts for injection molding in just one or two hours with 3D printing, instead of waiting a week or more for machined metal inserts.

CASE STUDY

Putting Fast in Fastener

ZIPPER MANUFACTURER YKK CUTS PRODUCT DEVELOPMENT TIME WITH POLYJET 3D PRINTING

In an increasingly global and competitive marketplace, YKK Europe Ltd. (YKK) is leading the assault on product development times with PolyJet™ technology. Sacrificial die block inserts for injection mold tools that previously took a week or more to make in the company’s busy machine shop now take just one to two hours with additive manufacturing.

While the company is world-renowned for its zipper solutions, YKK produces a full range of fasteners including hook-and-loop tapes, plastic buckles, snaps, buttons and more.

Continuous innovation is what keeps YKK at the vanguard of the fastener industry. The company works directly with customers and uses the very latest technology to produce high-quality products in an effort to do R&D faster.

“Today, the world’s textile and sewing product industries are seeing ever-greater diversification in consumer needs and shorter product cycles, which means we must work even harder to speed up product development and reduce costs,” said Mark Davies, Product & Machinery Development.

By adding PolyJet 3D printing to its R&D center, YKK benefits considerably from its speed, accuracy and wide range of materials.

“We picked this (technology) due to the potential to have up to 100 materials, including blends and colors, available on the tray at any one time. In combination with high resolution, we knew this would more than cover our requirements for the foreseeable future.”

High-Performance Materials for Tooling

YKK’s R&D center in the U.K. is home to a number of injection molding machines designed and built in-house that are used to manufacture product prototypes. Traditionally, the company would produce the mold tools, including die block inserts, using its well-equipped CNC machine shop. But due to high company demands, often the R&D team had to wait a week or more before parts could be manufactured.

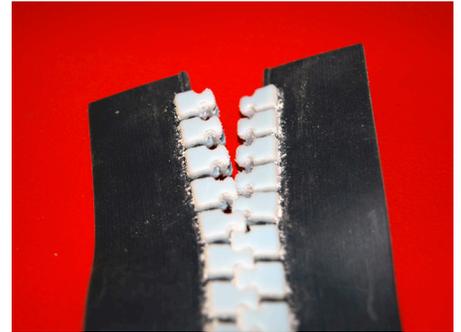
Today, die block inserts are produced in as little as 60 minutes using the company’s Connex3™ 3D Printer. The sacrificial inserts are printed in a transparent material, which is strong and stiff enough to withstand up to five injection molding shots of polypropylene or POM (polyoxymethylene). This is enough for the R&D team to assess the form, fit and function of the prototype.

“We don’t have to machine four or five inserts out of metal as we work through various iterations,” said Davies. “We can simply make our design modifications and start another 3D print. The amount of time this saves during product development is significant, to say the least.”

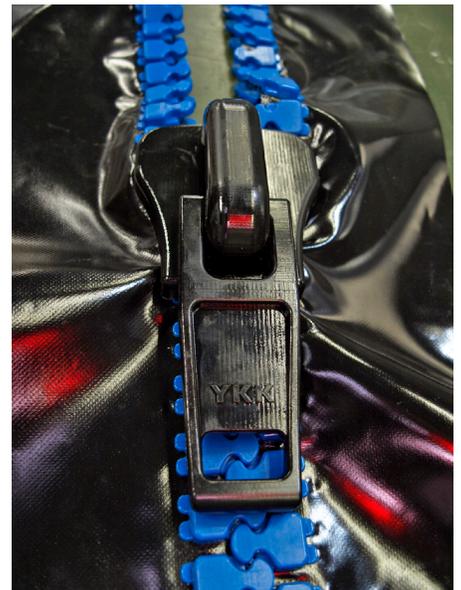
Rapid Design Assessment

Beyond the die block inserts, YKK also 3D prints zipper elements, or teeth, as well as slider mechanisms. These are often printed oversized to help confirm whether initial design concepts will be successful before transitioning to actual size prototyping using injection molding.

“We produce all kinds of fastener parts using the Stratasys 3D printer,” said Davis. “The capability of the machine is ideal for our requirements and has proven to be an irreplaceable part of the R&D process. We do in fact have another brand of 3D printer on site, but we don’t use it as much as it takes two hours just to warm up. Using the Connex3, we can print a die block insert in that time.”



This oversized example of zipper teeth was 3D printed on the Connex3 to demonstrate the function of a new design concept.



Functional 3D printed demonstrator models enhance YKK’s presentation at exhibitions around the world.

Demonstrator Models

While the benefits of 3D printing are felt across numerous manufacturing applications, YKK also 3D prints impressive demonstrator models for global exhibitions. And aside from product development, YKK's U.K. facility is also responsible for machine development, supporting production in 14 other EMEA countries, as well as sister R&D sites in Italy, Germany and Turkey. A high percentage of the machines used by YKK are built in-house, where 3D printing is proving useful.

"We are now 3D printing a number of parts for actual use on our machines," said Davies. "We have replaced many of the metal component chutes on our injection molding machines with 3D printed versions – it's just so much quicker and far more cost effective."

The successful deployment of PolyJet 3D printing has allowed YKK to not only respond quickly to product development requirements, but to also overcome time-consuming barriers of conventional machining for low-volume prototyping, enabling YKK to stay ahead of the competition.



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