

A Model for Success

Märklin Transforms its Production Line With 3D Printed Tools

Known worldwide for creating exact, lifelike model trains, Märklin delivers models built as precise miniature replicas. However, the planning, design, and manufacture of a miniature train is no small undertaking.

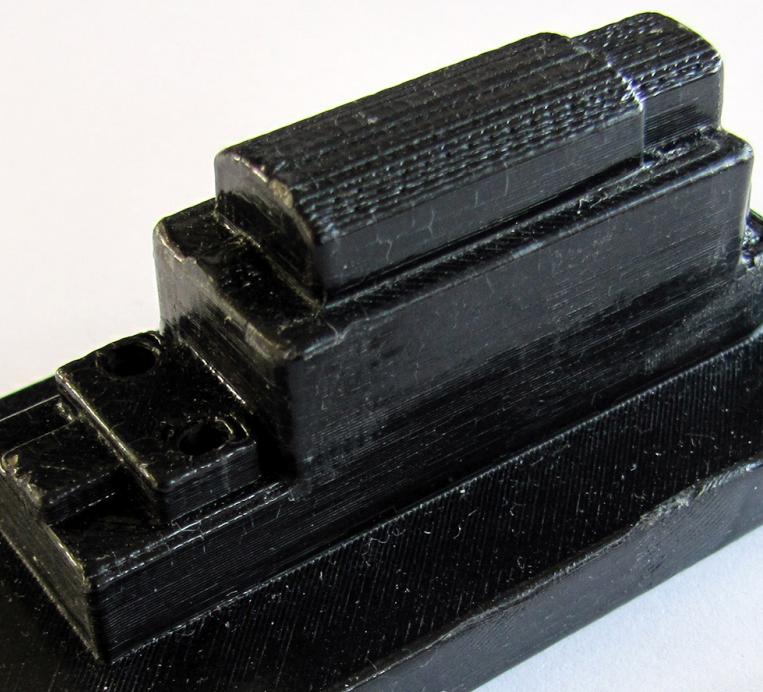
The production of a single model train requires numerous manufacturing stages that include zinc die-casting, electroplating and CNC milling, pre-assembly, surface priming, pad printing, final assembly and hand-painting. With a multi-step procedure comprising so many different time-consuming stages, production line requirements demand expensive, custom tools. As a result, the company recognized the need to address the time and cost constraints of producing tools via conventional manufacturing methods and looked toward 3D printing as a solution.

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Michael Zauner

Project Supervisor and Innovations Management, Märklin



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Advanced Manufacturing of Customized Production Tools

Using CNC milling to create customized assembly tools was an extremely labor-intensive operation and did not easily allow for adaptation or improvement. Tool manufacturing cost was high and produced a lot of waste, which slowed down the assembly line.

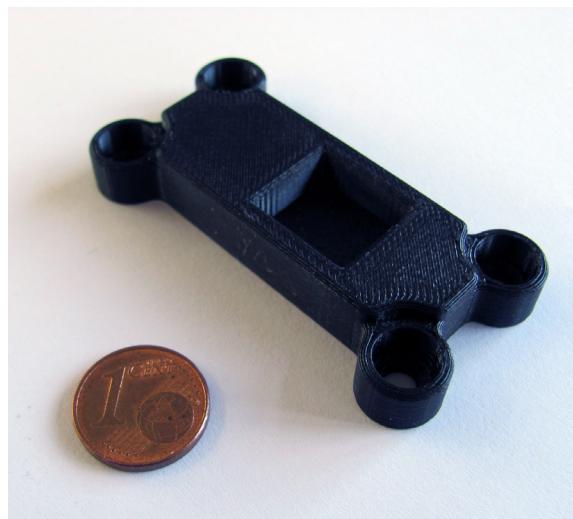
As a solution, Märklin installed 3D printers, which allows the company to produce tools, jigs and fixtures in a short timeframe. The result is that 3D printing has almost entirely replaced the traditional methods of assembly tool production in certain areas.

"We realized the benefits of 3D printing very quickly, especially the production flexibility, which has accelerated delivery times of parts," said Michael Zauner, Märklin Project Supervisor and Innovations Management. "3D printing allows us to produce a customized tool within a day, compared to several weeks, meaning employees can focus more on producing the model trains instead of manufacturing tools. This is also aided by the increased design freedom that 3D printing offers. For low- to medium-volume production, the improved efficiencies and distribution of labor within the company have taken our production to another level and ensures our business runs effectively."

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Stratasys 3D printing enables Märklin to produce precise assembly tools for the manufacture of model trains, with time and cost savings of up to 90%.

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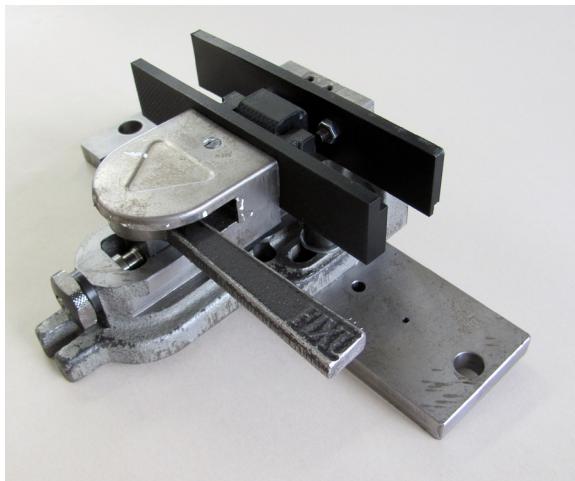
Making Production More Flexible

Creating model trains is a multi-stage production process. The need for flexibility and easy-to-use tools is essential. One example is the production of the clamps used in digital printing. In this process, the model train casing is printed (labeled) with the required design to achieve the utmost authenticity. When using traditional CNC-milled steel clamps, the quality of the printed parts is compromised because the applied high pressure puts a strain on the models.

In contrast, the durable but light 3D printed clamps hold the train components in place without incurring damage. Märklin has partly replaced steel clamps in the manufacturing processes, or combined CNC-milled parts together with 3D printed components in the same tool to achieve optimum results. To support its 3D printing capability, Märklin uses Stratasys FDM® and PolyJet™ technology.

"Rethinking how we construct tools has been a focal point for our production line and design team," Zauner explained. "Besides the FDM technology, we have also discovered PolyJet technology for manufacturing our jigs and fixtures. Being able to combine soft and hard materials in one print provides us with manufacturing tooling options we didn't have previously."

3D printed designs are stored digitally and can be easily reproduced or adapted, giving the company more flexibility to quickly adjust and tailor tools to train models or processes. 3D printing has enabled the team to include tool and purpose labels on the CAD designs without additional costs, so the printed parts are clearly marked and allocated to the correct step during



Märklin has partly replaced CNC-milled steel clamps in the manufacturing process and combined CNC-milled parts together with 3D printed components in the same tool.

their manufacture. This avoids the need to halt production, resulting in an improvement in production workflow.

"Our employees now ask what else they can 3D print," Zauner said. "They have recognized the advantages in their own work as well as more widely throughout manufacturing. Indeed, the way in which it makes production more efficient, while also allowing time for employees to come up with new ideas, has seen 3D printing truly open up lots of opportunities for us."



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