Salcomp

Facts

Challenge

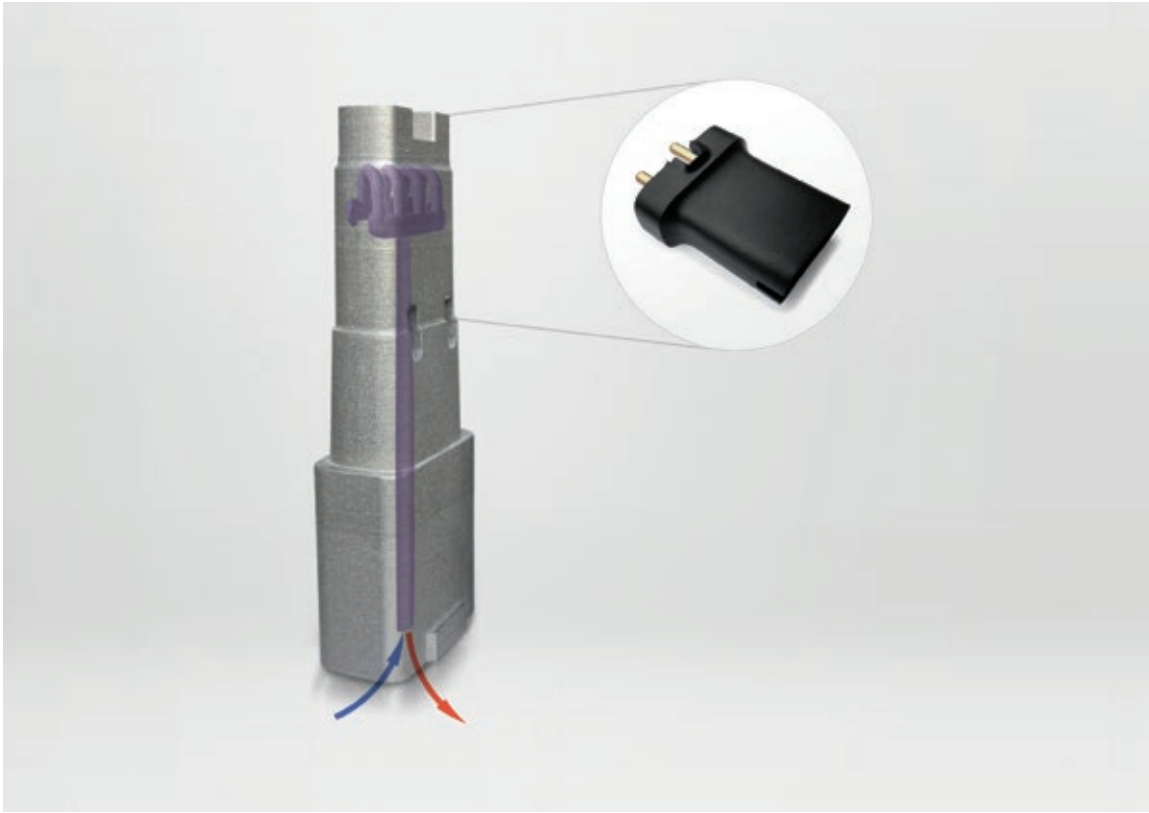
Optimize the cooling system design for the production process of plastic parts to make precision cooling become a reality.

Solution

Develop an improved cooling design and manufacture new core inserts using Additive Manufacturing.

Results

- Greater efficiency: production increased by approx. 56,000 units/month
- Cost-saving and sustainable: rejection rate reduced from 2% to 1.4%
- Economic: annual cost savings of approx. 20,000 euros



Tool insert and injection-moulding component: Thanks to conformal cooling the time required for cooling was reduced from 14 to just 8 sec for each production cycle and the quality of the final part improved (Source: Salcomp).

Additive Manufacturing Permits Optimized Cooling for Maximum Production Efficiency

e-Manufacturing Solutions

EOS Technology helps to implement precise conformal cooling channels for increased production and less waste

Short profile

Salcomp, who is a supplier to Nokia, offers mass production of power adapters, chargers and LED drivers. The total capacity of its production plants in Shenzhen (China), Chennai (India) and in Manaus (Brazil) is over 440 mill. pieces. The company delivers large volumes globally and provides worldwide service.

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According to the German industry association BITKOM, more than 700 mill. smartphones were sold worldwide in 2012 – an unbelievably dynamic growth market and one in which, in addition to the large well-known manufacturers, the suppliers play a decisive role. Market leader Salcomp, based in Chennai, India, produces plugs and power supply units for cell phones. The company has additional market potential through the production of LED drivers. The total manufacturing capacity amounts to more than 440 mill. units per year. In the light of such large quantities, optimizing the production process becomes a crucial factor in a company's ability to compete. For the construction of its production tools, Salcomp relies on the Additive Manufacturing technology provided by EOS.

Challenge

As is the case in the mass production of comparable products, Salcomp usually produces the in-house parts by means of a plastic injection moulding process provided by their qualified supplier: The respective machine transports heat-liquefied plastic into a mould, known as the cavity. In the hardening process the part must cool in the shortest time possible. Immediately after-wards the machine releases the finished part. Thanks to state-of-the-art materials and ever more efficient manufacturing tools, the production process has been significantly shortened, while quality has also improved.

Further improvement to an already successful process is difficult. However, efficiency gains are a necessity when competing internationally.

With Additive Manufacturing Salcomp was able to increase its monthly output of mobile chargers by more than 56,000 units (Source: Salcomp).

The key element of the production process which need to be improved is cooling. But this is also difficult element to improve: Even the fastest machines cannot increase production speed once the physical limitations of the base material have been reached, or when the relevant raw material costs cannot be reduced any further. The fact of the matter is that the temperature and the ability to cool rapidly play a decisive role in the manufacturing process.

Cooling channels are responsible for dissipating heat. These are situated all around the cavity. Under traditional production methods the scope for flexibility in the design of the cooling system was extremely limited: Because the tools themselves were either cast or turned from metal, the form specification was restricted by the possibility

of drilling or hollowing out the corresponding moulds. It was not possible to produce curves and other complex shapes using such processes.

Solution

A change in the plastic proprietary production material was not an option, so Salcomp decided to seek new alternatives for the optimization of the cooling system. The aim was to construct the manufacturing tools in such a way that the parts could cool at a faster rate. As a consequence, the project managers decided to look more closely at the design of the cooling channels. Following this process, they looked into the possibility of perfecting the form and finding a technology capable of producing the corresponding structure.

The solution to the first part of the task was as follows: The cooling elements themselves were to be brought closer to the cavity. In this way, the heat from the layer of metal can pass through and exit the machine faster. At the same time, the fine points of the design should make sure that this evacuation takes place as effectively as possible. In order to bring the plan to fruition, Salcomp required a technology that made the precision positioning of the cooling channels possible, without causing any new problems.

Since drilling, turning, or other options could neither provide the necessary flexibility of design nor the required precision, Additive Manufacturing, in this case metal-based, entered the discussion: Salcomp commissioned a third party to utilize EOS technology in the producing EOSINT M 270, applying Direct Metal Laser Sintering (DMLS) for the manufacture of its core inserts. Simulation models were used in order to establish an ideal form for use in the production process.

Results

The successful change to tool production had an effect: As planned the cooling channels were to be moved to the smallest possible distance from the edges of the core inserts, so they became conformal. At the same time, the quality of the end-product as a whole was improved thanks to the use of Additive Manufacturing. "The reason for this is the extreme precision that the process offers, in which a laser beam hardens the metal granulate, layer by layer, to exactly the specifications set down by the engineers using 3D software", explains Krishnan Ramkumar, Tooling Specialist from EOS India, who was in charge of the project on site.

The improvements are now showing positive effects in the daily production run at Salcomp: The time required for cooling was reduced from 14 to just 8 sec for each production cycle. The company was able to increase its monthly output through this efficiency gain by more than 56,000 units, without having to make adjustments to their manufacturing machinery. The annual cost savings amount to 20,000 euros.

In addition, the reject rate fell from 2% to 1.4%, bringing cost savings and a reduction in the environmental impact of the production process. The final result is increased production quality, in spite of shortening the production cycle.

"We are extremely satisfied with the results achieved through our new, precision cooling design. Our core inserts, produced using Additive Manufacturing technology, are achieving the benefits that we were looking for: We were able to shorten the production cycle while simultaneously improving quality. The reduced costs combined with the increased rate of production have shown that technology is not simply self-serving but also has a positive impact on our business", says Arumugam Narayanaswami, responsible for sourcing at Salcomp. "We are confident that in the future we will be able to identify further fields in which EOS technology can be utilized to increase our profitability."

"The production process using Additive Manufacturing technology proved to be ideal. We were able to furnish the core inserts with optimally designed cooling channels. The heat was evacuated far quicker, cutting the production cycle from 14 to just 8 sec, and bringing about a 56,000 unit rise in monthly production."

Arumugam Narayanaswami, Sourcing at Salcomp

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