

Efficient production of safety screws thanks to sprue recycling

OBE Ohnmacht & Baumgärtner GmbH & Co. KG, Ispringen

Technology/Process Technology:

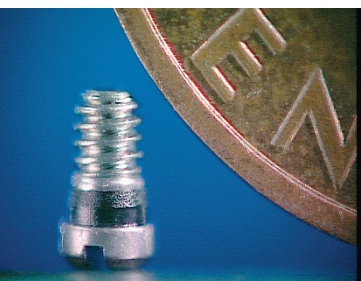
Agglomeration

Measure:

Integration of a granulation mill into an existing process for recovery of plastic sprues

Background and objectives

The company OBE has its headquarters in Ispringen in the northern Black Forest region of Germany and is one of the leading manufacturers of large quantities of precision mechanical metal parts. Through the technological development of spectacle hinges and micro safety screws in particular, OBE has established itself as a key supplier to the eyewear industry.



Size comparison of a micro safety screw overmoulded with plastic

Picture on the right: Automatic feeding of the screw blanks into the injection moulding machine

Micro safety screws in the size range M1.2 to M1.6 that are made of high-quality stainless steel are equipped with a safety system which consists of highly resistant and thermally stable polyamide (PA) moulded precisely under the screw head. This prevents the screws from loosening on their own, even if they are not optimally tightened. Besides for spectacles, these screws are also used in musical instruments, watches and electronic devices.

When the screws are overmoulded, only 2.6% of the granulated plastic used remains directly on the product, while the remaining 97.4% goes into the sprue and is lost as waste. As a result, along with the annual increase in screw production a steady increase in material requirements and consequent raise in the amount of plastic waste could be observed. A solution was therefore sought to re-use the plastic waste and reach a better material efficiency.

Challenge

The processing of plastic waste was to be integrated into production, i.e. the plastic used was to be converted from the waste product sprue into injection-mouldable plastic pellets at economically justifiable expense. Ideally, the plastic would not change its pro-

perties even after repeated re-use, neither on the finished product nor during processing with the existing injection moulding machines. The change in the manufacturing process must have no negative effect on the properties of the end product either; ultimately, it was important to maintain the usual product quality.

Idea

The sprues were to be crushed by means of a mill and turned into pellets. This would allow them to be used once, possibly even several times, with the existing machinery for overmoulding micro safety screws. For this purpose, a suitable granulation mill had to be integrated into the existing granulating cycle.

Implementation

In order to realise the idea, grinding trials were first of all carried out at various mill manufacturers. The result was a range of granule sizes with varying dust contents in the reground material. These test results were analysed and compared with the properties of the new plastic granules. Initial injection tests were carried out on the regrind that was closest to the new material using the existing injection moulding machines. During these trials the overmoulded screws were subjected to extensive product tests to check whether any noticeable changes in the end product had occurred. After these tests had led to a positive result, selected customers were supplied with screws overmoulded with recycled granulate. The selected customers had to confirm the results of the internal product tests in practical trials. These trials proved that the use of reggranulated plastic for overmoulding has no negative influence on function in the end product. Larger quantities of

