Recovery of spindles from rubber extruders

IBARMIA.
YOUR MACHINE TOOL POINT

Email: innovatek@ibarmia.com | **Telf.**: +34 943 857 130 | **Web**: www.ibarmia.com

Sector: Automotive

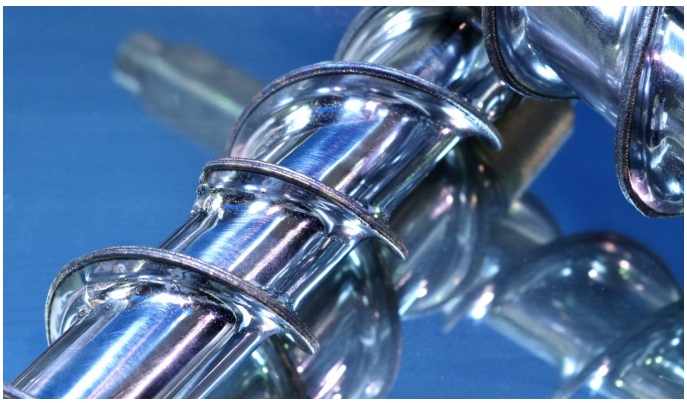
Challenge: Within the framework of the European PARADDISE project, the Michelin company proposed the recovery of damaged rubber extrusion spindles.

Solution: The proposed solution consisted in coating the damaged areas of the extrusion spindle using laser cladding technology.

CHALLENGE

Michelin manufactures 200 rubber extruding spindles each year to produce tyres. During the extrusion process, the rubber is heated and propelled by spindle rotation toward the head of the extruder. Due to the high friction and temperatures, the spindle threads undergo severe wear, which reduces their service life.

The extrusion spindles are made of 42CrMoS4 (AISI 4140, DIN 1.7227), a structural steel with low welding properties.

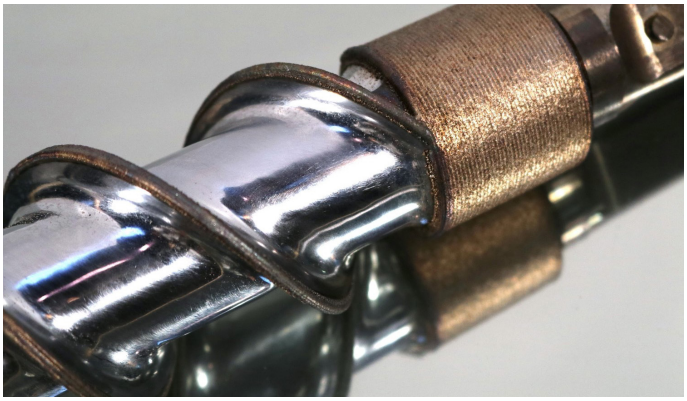


SOLUTION

Laser cladding is widely used to coat and repair high added value components in a variety of industries. The process is characterised by its capacity to produce coatings with properties similar to those of the base material, to which it is bonded with minimum heat impact. It also offers high flexibility in the production of shapes and can be applied to a wide range of metal materials. Laser cladding is therefore a valid technology for the recovery of extrusion spindles.

It was decided to coat the damaged areas of two rubber extrusion spindles with Eutroloy 16606, which has a high abrasion wear-resistant martensite structure, even at high temperatures combined with fatigue-generating loads, characteristic of the working conditions of the spindles in question. Due to the nature of the added material, it was necessary to avoid large temperature gradients between it and the base material. This requirement and the low welding properties of the base material, 42CrMoS4 (AISI

4140, DIN 1.7227), made it necessary to preheat the part requiring repair to ensure proper repair. Thus, once the parameters for the added material were obtained and bearing in mind the shape of the area to be repaired, recovery of the parts began by adding material in excess of the final dimensions to facilitate subsequent machining. The result was coatings with a hardness of 61 HRC and free of defects, such as cracks or pores.



ADVANTAGES

The recovery of damaged parts using laser cladding technology is an alternative to the manufacture of new parts, while preserving existing parts. This extends product service life, minimises the entry of raw materials and waste production and favours a business model based on a circular economy. The purpose of all the above is to search for a more sustainable model and make better use of resources.

Besides, this proposal for the recovery of damaged parts has its technical advantages, given that high-performance coatings with improved wear, corrosion or thermal fatigue-resistant properties are obtained, among others, depending on the material added.