

Powder metallurgy: the scope, the technology and the product

The process

PM is understood in this document to mean the processing of materials in powder form to manufacture components, either sintered or bonded.

As a forming technology, PM is of increasing importance in manufacturing engineering since it demonstrates significant environmental and economic advantages over the longer-established casting and forging routes.

The areas of application

This second phase of the Project covered two PM market areas: ferrous structural components and magnets.

Ferrous structural components represent the dominant sector in terms of tonnage: the near net shape forming of (largely) ferrous engineering (largely automotive) components, where PM is preferred on economic grounds and because of the significant environmental benefits from high materials utilisation and low energy consumption (in PM around 95% of the raw material is used in the final product, compared with levels often of 50% for other processes). In Europe, around 130 000 tons of product is produced annually by this route with a sales value of around EUR 1.1 billion. Added value is high.

PM magnets: 80% of hard magnets are produced using powder metallurgy techniques, against about 20% of soft magnets produced by that method (the majority of soft magnetic components being produced from sheet). The majority of magnets produced by the PM route are sintered at high temperature with significant size change. The global market for soft magnets so produced is USD 2-3 billion and for hard magnets USD 4.5-5 billion.

Advantages offered by the PM route and its products

- ⇒ energy savings in part processing
- ⇒ cost-effective production methods
- ⇒ resource conservation through high material yield even in complex parts
- ⇒ component and system weight reductions for the same performance
- ⇒ relatively environmentally friendly processes
- ⇒ some unique materials with unique properties