

IRON-CARBON MASTER ALLOY

Key words: Powder metallurgy (PM) | powder manufacture | PM-precision parts |

Graphite addition to ferrous PM-precision parts can be substituted by new developed high carbon iron master alloy, which allows high compressibility and introduction into parts production without adoption of the common technology. By reduction of melting temperatures the production route of the master alloy allows massive energy savings and cost reduction.

Background

Ferrous PM-precision parts are increasingly used for high mechanical loads. These parts are produced by powder mixes, axially pressed and sintered. Carbon is introduced by admixing of graphite which causes problems during the mixing process and dusting during pressing. Especially theoretical green density is limited by the low density of the admixed graphite.

The invention claims a Fe-C master alloy which allows overcoming the cited problems.

Technology

The developed technology allows admixing of carbon as high carbon master alloy to the commonly used powder for precision parts manufacture. The usually claimed hardening effect of dissolved carbon is overcome by the production route of the master alloy. The master alloy can be produced by water atomizing of high carbon containing iron melt, which reduced markedly the melting temperature. By special heat treatment the hardness of the produced powder can be reduced to passable values. Thus the addition of the master does not affect the compressibility of the base powder too much.



The manufacture route of the parts producers must not be adapted, except no addition of graphite is needed. The mechanical properties are identical to the existing technology.

Benefits

- Cost reduction during production of master alloy
- Raw material is not limited to extra fine ultrapure graphite
- Extension of materials compositions (higher C-contents possible)
- Elimination of health risks and pollution by graphite dust
- Elimination of special mixing effort

Applications

- Substitution of graphite in precision parts
- Extension of ferrous PM to high carbon contents (>0.8%)
- High density green parts

Status of the development

Prototype available

Options

R&D-collaboration

Inventors

Herbert Danninger
Christian Gierl
Youssef Hemmatpour