

Warm Compaction Method with Die Wall Lubrication (WD Method)

A Warm Compaction Method Applying Die Wall Lubrication and Reducing Lubricant Amount in Material Powder to Realize High Density Compacts

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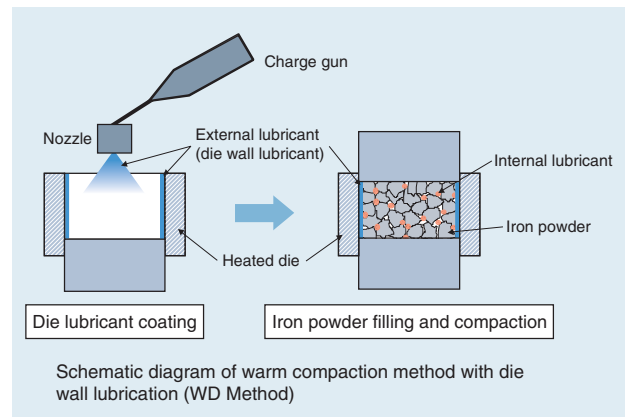


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A combination of warm compaction and die wall lubrication (WD Method), in which an electrostatically-charged lubricant powder is coated on the die wall before compaction, makes it possible to reduce the amount of lubricant mixed in the raw material powder. A low-cost process for high densification, which is effective for obtaining high strength in sintered parts (achieves sintered density of 7.5Mg/m³ with single compaction/single sintering).

Key Points of Technology

- Ejection force during compaction is reduced by proper selection of the die wall lubricant.
- The mixing ratio of the internal lubricant, which has a low specific gravity, can be reduced to 1/4 that with the conventional material (0.8% → 0.2%).



Features

- 1 Higher densities (+0.2Mg/m³) in comparison with the conventional compaction method are achieved through the reduction of the internal lubricant content (Fig. 1).
- 2 The densified materials give improved mechanical properties (Fig. 2).

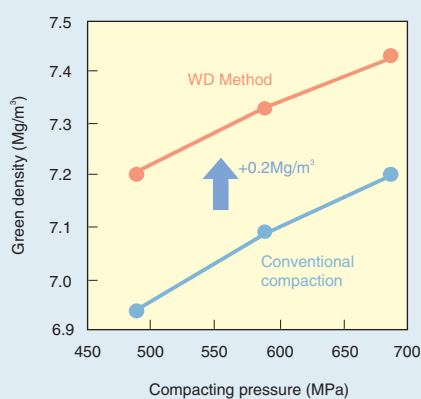


Fig. 1 Relationship between compacting pressure and green density

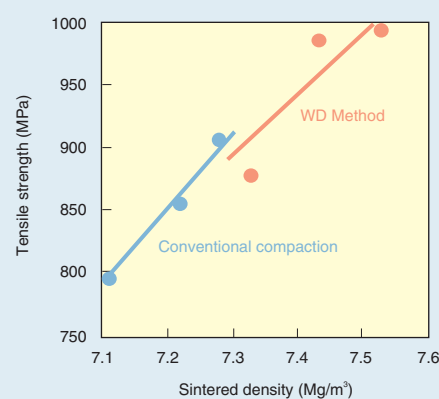


Fig. 2 Relationship between sintered density and tensile strength of sintered compacts

Mix composition: JIP Sigmalloy 415S (4%Ni-1.5%Cu-0.5%Mo partially-alloyed steel powder) + 0.6%Gr
Compaction: Compacting pressure 490, 588, 686MPa
· WD Method: Internal lubricant 0.2%, compacting temperature 130°C, with die wall lubrication
· Conventional method: Internal lubricant 0.8%, compacting at room temperature (RT), without die wall lubrication
Sintering: 1250°C x 60min, N₂-10vol%N₂

Applications

Automobile parts, etc. (synchronizer hubs, sprockets, oil pump parts, pulleys, etc.)