

KAWASAKI STEEL TECHNICAL REPORT

No.28 (June 1993)

Special Issue on Chemicals and
New Materials and Construction Materials

Deformation Behavior of Metal Injection-Molded Compacts During Sintering

Keiichi Maruta, Yukio Makiishi, Hiroshi Ohtsubo, Shigeaki Takajo

Synopsis :

The shape deformation behavior during sintering was measured and correlated to the bonding between particles in injection-molded compacts. Stainless steel powders of different particle size were injection molded and sintered. Sintering shrinkage began at around 1000 °C, and a finer powder promoted sintering. Before sintering shrinkage occurred, residual carbon from the binder was concentrated on the particle surface and contributed to the adherence between particles in a compact. This carbon decreased as a result of the C-O reaction up to 1000 °C. Therefore, the bonding between particles loosened transiently, and shape deformation of the compact occurred during this stage. The promotion of sintering by means of fine powder suppressed this shape deformation. The shape deformation behavior during sintering was simulated by the finite element method, and the result is in good agreement with the experimental results.

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The body can be viewed from the next page.

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specimens with an external diameter of 30 mm, internal diameter of 26 mm, and height of 20 mm were injection molded by using powder C and the height and the side

316L stainless steel powders produced by water atomization were used, **Table 1** showing the composition of these powders. Each powder was sieved to the particle

2.2 Results and Discussion



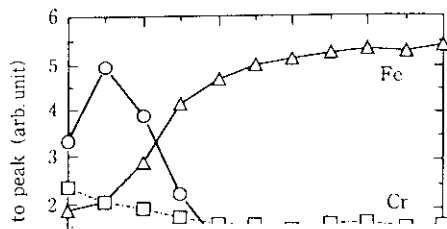


Fig. 5 Auger depth profiles of Fe, Cr and O for water atomized powders of SUS316L

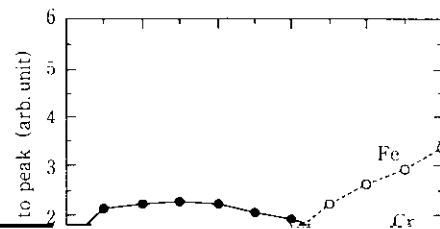
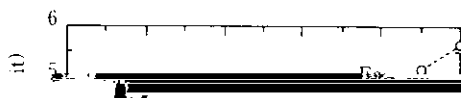


Fig. 7 Auger depth profiles of Fe, Cr, O and C in a compact sintered at 1000°C



rapidly between 1000°C and 1100°C, the particle size having an effect on sintering during this stage, sintering

temperature. Therefore, the bond between particles loosened and deformation progressed rapidly at that stage. Above 1100°C, sintering had progressed, and the skeletal structure formed is shown in Photo 2. Further deformation was caused by the

varies according to the shape. The manufacture of complex shapes is an objective of metal injection molding, so that predicting and controlling the deformation is important. In the next section, the simulation of defor-

