

JFE Steel started production of iron powders in

needs that include high strength, high toughness, wear resistance, oxidation resistance, and others. JIP® Clean Mix is a line of premixed powders which are given segregation-free treatment by fixing the graphite on the surface of the iron powder. The main ingredients of these powders are pure iron powder (reduced iron powder) or atomized iron powder, and alloyed steel powder, which are blended with submaterials (copper powder, graphite powder, etc.) and lubricants according to the customer's specifications. In addition to the excellent properties of the base materials, these are also high value-added products which contribute to increased productivity, stable product quality, and cost reduction for the customer.

Recently, there have been increased needs for low alloyed steel powders due to instability factors in alloy market conditions. To meet these needs, JFE Steel has developed resource-saving alloyed steel powders which feature the minimum limit chemical composition and minimize process costs. On the other hand, in response to increased development of sintered products with high strength by high density compaction of Fe-Cu-C system materials, which are more economical than alloyed powders, the company developed high performance "JIP® Clean Mix" which enables high density compaction with low ejection force by realizing higher functionality in lubricants.

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2.1.5 Segregation-free powder for high density compaction

Mechanical characteristics such as tensile strength and fatigue strength improve as the density of sintered compacts increases. For this reason, various methods of higher density compacting have been studied.

Warm compacting¹¹⁾ is one method of higher density compacting. For this process, JFE Steel developed “JW Wax,” which is suitable for use at warm temperatures, and began marketing a line of segregation-free powders for warm compacting, “JIP® Clean Mix HW Series,” in 2001¹²⁾.

JFE Steel also developed the die wall lubrication method with warm compacting by combining the die wall lubrication method¹³⁾ with warm compacting, and developed “JIP® Clean Mix DL,” which is suitable for this method¹⁴⁾.

However, in these warm compacting methods, it is necessary to heat the powder and die, and there were many problems in maintenance control of these heaters.

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