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Characteristics of Chromium-Containing Alloyed Steel Powders with High Wear Resistance

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Synopsis :

Alloyed steel powders containing Cr have been developed for the production of heavy-duty structural parts with high wear resistance. KIP 4100V is a low-oxygen pre-alloyed powder containing 1%Cr -0.7%Mn-0.3%Mo, and provides high compressibility. Produced by a water-atomizing and vacuum-annealing process, KIP 4100V attains a tensile strength of more than 1100 MPa after carbonizing. Composite-type Cr-containing alloyed steel powder, which contains 1% pre-alloyed Cr and 1% composite-type alloyed Mo to improve the compressibility of Cr-containing powders, attains a compressibility of 7.18 MPa when pressed at 686 MPa, and a higher tensile strength than that of KIP 4100V after bright-quenching at 1420 MPa. Its wear resistance is comparable to that of KIP 4100V, and is more than one hundred times greater than that of Ni-containing composite-type alloyed steel powder. The sintering shrinkage of the composite-type Cr-containing alloyed steel powder is suppressed due to transient liquid-phase sintering and the dimensional change during sintering is very small.

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The body can be viewed from the next page.

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Synopsis:

Alloyed steel powders containing Cr have been developed for the production of heavy-duty structural parts with high

wear resistance. KID-4100K is a typical example.

2 Low-Oxygen Cr-Containing Alloyed Steel Powder

The mechanical properties of sintered parts made

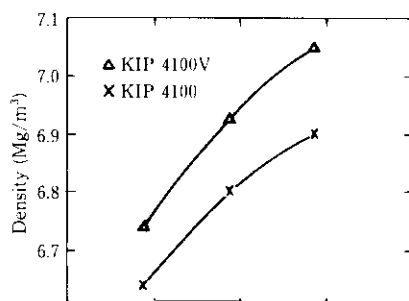
3 Features of Carburized Materials Made from Cr-Containing Pre-Alloyed Steel Powder

After carburizing, the surface of the material

mentally depend on the sintered density of the part in use in applications requiring wear resistance [1].

Table 2. The Effect of Graphite Addition on the Sintering of the Steel Powder in Various Atmospheres

Compacting and sintering conditions			Carbon potential (%)	Tensile strength (MPa)	Absorbed energy (J)
Graphite addition (%)	Compacting pressure (MPa)	Sintering atmosphere			
0.15	686	75%H ₂ -25%N ₂	0.7	1100	8
			0.9	1090	7
			1.1	990	6
0.15	686	10%H ₂ -90%N ₂	0.7	1180	8
			0.9	1160	7
			1.1	970	7



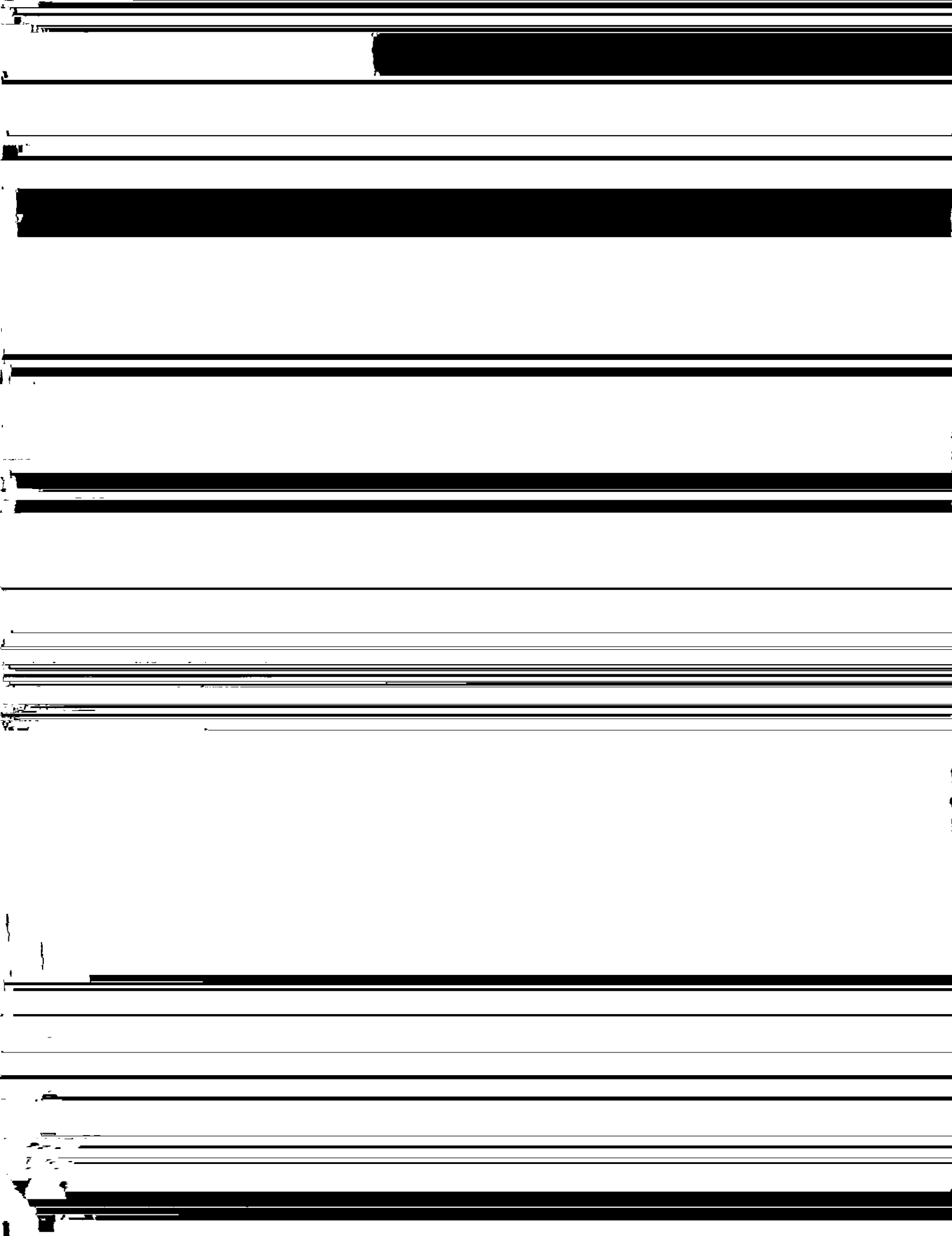
tered in the 75%H₂-25%N₂ atmosphere, demonstrating that KIP 4100V can be effectively sintered in an energy-saving 90%N₂-10%H₂ atmosphere.

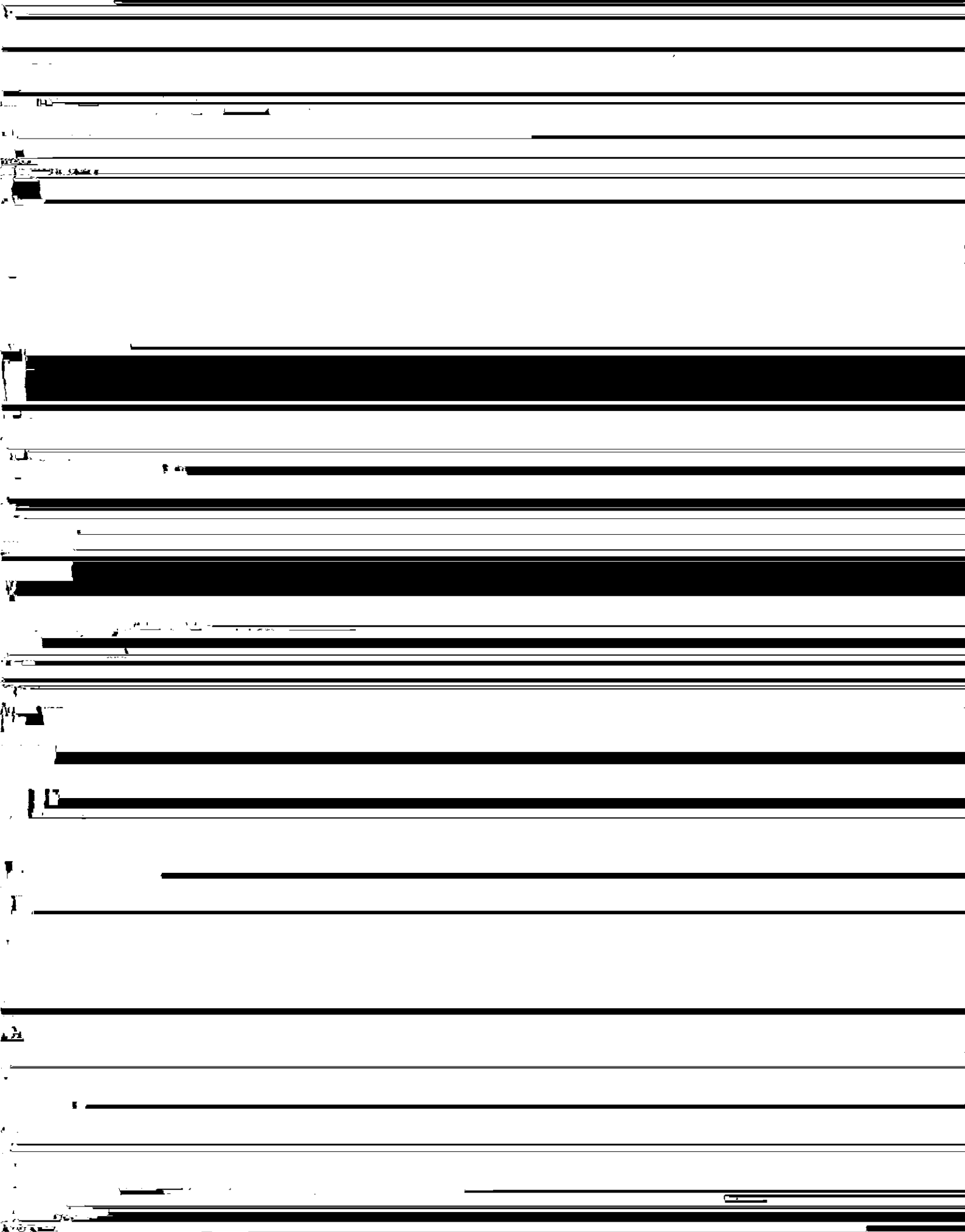
4 High-Compressibility Cr-Containing Composite-Type Alloyed Steel Powder

To enhance the compressibility of Cr-containing steel powders, the contents of O, C, and N impurities in the powder were lowered by vacuum sintering. The effect

Mixing	Composite-type	Modified composite-type	Prealloying
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ment, Mo shows a weaker affinity for oxygen than Cr







pre-alloyed steel powder KIP 4100V, which is produced by the water atomizing/vacuum annealing process and

References

- 1) S. MocarSKI, D. W. Hall, I. Khuria and S. K. Sub: "Powder

of the features of heat-treated compacts and the sinter-

Paper 890409, Intl. Congress and Exposition, Soc. Auto.