Abstract:

The fatigue strength of the sintered and carburized compact made of the Mo hybrid-alloyed steel powder, which is based on a 0.6 mass% Mo prealloyed steel powder to which 0.2 mass% Mo powder particles have been diffusion bonded, is higher than that of the 0.6 mass% Mo

prealloyed powder[10]. It has also been reported that sintering proceeds more rapidly with Mo contents of more than 4% in a system consisting of pure iron powder with added Fe-60%Mo fine powder[11]. However, with prealloyed steel powder containing 4% Mo, the green density of the powder compact decreases and it is difficult to reduce the amount of pores due to reduction of plastic deformability by solid solution hardening of the powder particles. On the other hand, with mixed powders of pure iron powder and Mo-containing powder, regions of high Mo concentration remain in the sintered compacts, and the microstructure is remarkably inhomogeneous. The fatigue strength of these sintered compacts also decreases.

Therefore, JFE Steel developed an Mo hybrid-alloyed steel powder[12] for attaining a good compressibility with a low Mo content in a prealloyed powder and good sinterability with an Mo-rich region on the surface of the prealloyed powder. The developed powder

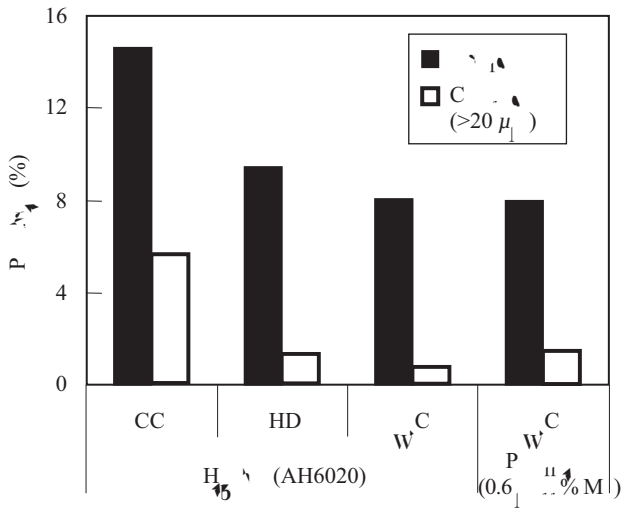

Fig.6 Amount of total and coarse pores over 20 μm of the

compact at the same amount of coarse pores. This means the increase in fatigue strength with the hybrid material cannot be explained only by the decrease in the amount of coarse pores.

The Mo content distribution of a sintered compact of AH6020, as calculated by EPMA area analysis, is shown in **Fig. 8**. The area fraction of Mo content has the maximum point at 0.8%, which is the average Mo content in AH6020. The Mo-rich area contains a maximum of 2% Mo. The area fraction of the Mo-rich area containing more than 0.8% Mo exceeds 40%. The Mo-rich area around the sintering neck should be strengthened in comparison with the matrix, which has a relatively low Mo content. Therefore, the improvement in the fatigue strength of the AH6020 compact is considered to result from suppression of fatigue crack initiation and propagation due to strengthening of the sintering neck.

5. Conclusions

An Mo hybrid-alloyed steel powder with an Mo-rich region on the surface of the prealloyed powder for attaining high fatigue strength in sintered parts was developed. The fatigue strength of sintered and carbu-

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