INTRODUCTION

Fatigue is a complex phenomenon influenced by numerous factors, as illustrated in Figure 1. For powder metallurgy (P/M) steels, pores, microstructure, surface finish, residual stresses and external notches are of primary importance. The shape and distribution of the pores may be altered by the powder characteristics, by the processing route (for example, the powder-size distribution, alloying and lubricant additives, compaction pressure) and by the propensity for the pores to act as crack precursors which can be reduced. The microstructures of P/M steels depend on the alloying mode and the processing conditions.

There are four major alloying modes used for formulating P/M steels and these establish a classification for the steels: admixed, partially alloyed, pre-alloyed, and hybrid. The resulting microstructures may be homogeneous or heterogeneous with respect to chemical composition and to the constituents in the P/M steel.

The effect of homogeneity/heterogeneity on the fatigue properties of P/M steels reflects significant differences of opinion. Several investigators observe that the constituents in het-