

# **"THE APPARENT DENSITY TEST - HOW GOOD IS IT?"**

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## **ABSTRACT**

The ASTM B212-82 and MPIF-04 standards on apparent density determination are widely used tools for process control in the P/M industry. With increasing demands in our industry for tighter tolerances and reduced scrap, a reassessment of the test was perceived to be necessary. The test was questioned in regards to its ability to detect interlot and intralot changes in the as-received powder that could influence the dimensional reproducibility of the compacted product.

The initial goal was to define the variability of the test, and to determine if the spread in data was dependent on test methodology or on small variations of incoming powder lots. Baseline evaluation was accomplished using a typical steel powder. The contributions of individual size fractions of this baseline powder were assessed, together with the influence of particle morphology that varied from highly irregular sponge powder to a near spherical shape obtained by the Rotating Electrode Process. The tests were performed in a temperature and humidity controlled environment. Simple modifications were made to the standard flowmeter in order to improve alignment of the cup beneath the funnel orifice.

Over 2000 tests were conducted with at least 20 tests per series to establish variance. The results demonstrated that the test was operator sensitive even under carefully controlled conditions. However, reproducibility was relatively good. The variance associated with this test also demonstrated a strong dependence on powder morphology and size distribution. The general conclusion is that the test remains a valid indicator of bulk density variations. Suggestions are offered for improving test reproducibility.