Recommended Mil Thickness

Reasons to measure film thickness

Film thickness is arguably the single most important measurement made during the application and inspection of protective coatings. Powder coatings are designed to perform their intended function when applied within a thickness range specified by the manufacturer. Many physical and appearance properties of the finished coating are directly affected by the dry film thickness (DFT). DFT can affect the color, gloss, surface profile, adhesion, flexibility, impact resistance, and hardness of the coating. The fit of pieces assembled after coating can also be affected when film thickness isn't within tolerance.

Precisely measuring finish thickness has other benefits, too. Whether to meet International Organization for Standardization (ISO), quality, or customer requirements for process control, companies need to verify coating quality to avoid wasting money reworking product. By checking their application equipment, they ensure the coating is being applied in compliance with the manufacturers' recommendations.

Conformance to a standard

Measurements of powder coating thickness can be made by using different methods depending upon whether the test is being performed before or after powder cure. The American Society for Testing and Materials (ASTM) has a series of standards describing these techniques.

- Test Method D 4138 describes destructive measurements over rigid substrates made with cross-sectioning instruments.
- Practice D 7091 describes nondestructive measurements over metal substrates made with magnetic and eddy current coating thickness gages.
- Test Method D 6132 describes nondestructive measurements over nonmetal substrates made with ultrasonic coating thickness gages.
- Practice D 7378 describes three measurement methods for the thickness of applied, pre-cured coating powders to predict cured thickness.

An overview of film thickness measurement

Film thickness measurements can be taken either before or after cure and crosslinking. The type of substrate, the thickness range of the coating, the size and shape of the part, and the economics of the job determine the method employed.

On uncured applied powders, height measurement can be performed with powder combs and with electronic gages (Figure 4) employing special powder probes. Since coating powders generally diminish in thickness during the curing process, a reduction factor needs to be determined to predict cured DFT. Alternatively, ultrasonic instruments measure uncured powder without touching the surface and predict the cured thickness of the powder automatically.