

Aerospace Manufacturing and Design / January February 2020

## Ensuring coating thickness meets spec

Features - Gaging

Simplifying the process can increase product quality and services while optimizing cost.

January 31, 2020

John Bogart

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Aerospace original equipment manufacturer (OEM) assembly lines and spray booths and maintenance, repair, and overhaul (MRO) hangars must precisely coat aircraft for reliable performance, protection, and prolonged life.

Accurate coating thickness measurement enables plating, anodizing, powder coating, and other coatings, preventing corrosion or wear of metal substrates.

The following reviews the industry's challenges, along with the benefits of instantaneous handheld coating thickness gages.

### **Q: What are typical aerospace coating specs and how hard are they to achieve?**

**A:** Properly applied coatings, with thickness measured in mils (0.001") or microns (0.001mm) prevent coating breaches that can lead to corrosion of underlying substrates. Precise application to spec, along with coating measurement, can prevent leaks and other safety issues.

Until recently, conducting frequent laboratory-quality coating thickness tests throughout the manufacturing process or in the field, required meticulous sampling and preparation, as well as laboratory evaluation. Although portable coating thickness gages are not new, most fail to provide the accuracy, speed, or simplicity required for quick checks on the production line or in the field.



### **Q: How has coating thickness measurement traditionally been done, and what are the drawbacks?**

**A:** Traditional laboratory and online-based coating thickness measurement techniques are useful in the right settings, but they lack the simplicity and flexibility required for frequent spot checks.

Conventional coating tests, such as scratch testing, are destructive, preventing products from returning to the production line without recoating or repairs at additional expense. Also, since only a small

portion of the component is usually tested, results may not be representative of the entire part.

Various portable coating thickness measurement devices that have been developed have not always provided the necessary accuracy or ease of use.

In certain environments with multiple substrates, devices typically had difficulty determining the substrate or using the correct test for the application. So, manufacturers needed multiple measurement devices, complicating testing and adding cost.

Finally, typical coating measurement methods can't usually measure curved or complex surfaces accurately. This prevented easy spot-checking for pipe, piping, and convoluted component designs.

### **Q: How can using portable coating thickness measurement devices help aerospace OEMs and MROs?**

**A:** Handheld devices now allow personnel to easily and quickly perform lab-quality coating thickness measurements. Some options instantly measure coating thickness of almost any non-magnetic coating on ferrous and non-ferrous substrates. This is possible using only one hand, even on curved and complex surfaces.

### **Q: How can using accurate coating thickness gages help test for safety, compliance, and quality control?**

**A:** Coating thickness directly affects aircraft and component quality, whether for paint, electroplating, anodizing, or a wide range of other coating applications. For example, checking the

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paint coating consistency on an aircraft or component guarantees a superior finish, and can offer essential data about paint consistency when it is wet.

Incorrect paint consistency can affect drying times or eventual paint film flaking. Too little paint coating creates cosmetic issues in opacity, and protective issues such as corrosion, wear, and exposure.

For adhesion in anodizing and electroplating, a coating thickness gage should be able to read the coating thickness precisely, preventing corrosion while eliminating any excess use of expensive plating products.

A coating thickness gage can also test anti-corrosion coatings in aircraft engine piping and tubing or exhaust pipes to find weak spots where the coating is too thin and a breach of the coating could lead to corrosion.

A nondestructive gage ensures the protective coating has not been applied too thinly or becomes thin in use. Excessively thin coatings are more likely to be chipped or breached, which can lead to corrosion promoters such as water or oxygen getting under the coating and accelerating corrosion in the substrate.

**Q: What are some examples of handheld coating thickness test devices now in use?**

**A:** The LZ990 portable coating thickness gage by Kett combines two of the most widely used measurement methods, magnetic inductance and eddy current, in a dual-mode device that can measure the coating thickness of almost any non-magnetic coating on ferrous and non-ferrous substrates.

The unit automatically determines the substrate and uses the appropriate measurement circuit, enabling instant, non-destructive testing on painting, plating, anodizing, and organic coatings with 0.1µm accuracy in less than a second.

Making consistent contact between the instrument and the test surface achieves accurate, repeatable measurements so the unit uses a spring-loaded probe to generate consistent contact pressure with the measured surface. The integrated probe uses built-in edge guides to easily measure curved and edged surfaces. To ensure device stability during measurement, the probe's foot provides a firm platform when placed onto the test piece.

*accurate coating thickness measurement enables plating, anodizing, powder coating, & other coatings, preventing corrosion or wear of metal substrates."*

**Q: What design considerations can improve handheld coating thickness gage operation in the field?**

**A:** It's best for the unit to have no moving parts, other than the probe. Similarly, the unit should be impervious to vibration, with measurement independent of its orientation.

Large displays allow quick reading and results and the gage should be able to store results for transfer to a computer and/or printer for documentation and averaging. An instrument that stores many test measurements lets operators perform numerous tests before downloading results.

Easier, more accurate aerospace coating and plating measurement with handheld units will help improve quality checks so defects can be immediately detected and corrective action taken to minimize scrap and faulty components.

**Kett USA**

*About the author: John Bogart is managing director of Kett US, a manufacturer of coating thickness testers.*

NDT   quality   inspection   surface finish