Meeting Fly-by-Wire Coating Challenges

The ongoing trend to more compact and faster electronic assemblies that must operate under very challenging conditions is absolutely dependent on the unique performance capabilities of thin film Parylene coating. No other protective coating offers the range of unique abilities associated with this material, and many of today’s highly sophisticated systems simply could not operate reliably without the benefit of Parylene’s unmatched functionality.

One growing Parylene-dependent application is fly-by-wire (FBW) control for commercial aircraft. The newest and most efficient military, passenger and freight aircraft designs rely heavily on this digital technology, with FBW becoming more commonplace as commercial carriers replace aging fleets around the world with lighter weight, more fuel efficient aircraft. FBW contributes to weight reduction as well as improved flying precision and lower maintenance cost compared with traditional electro-mechanical control.

Flawless performance is an absolute necessity for any mission critical application, and FBW electronics must operate with the highest reliability under conditions of mechanical stress and widely varying temperature and humidity. Such applications include electro-hydraulic actuators for flap, rudder and aileron control, as well as electronic brake and landing gear mechanisms.

Parylene satisfies all of the important requirements of FBW electronic including condensation protection, low-mass encapsulation, stress-free and non-bridging coverage, advanced moisture and vapor barrier properties, with full surface compatibility.

Another important Parylene property not associated with other coatings is enhanced manufacturability. This very thin film has a low-friction, lubricious surface, which makes possible the automated handling of small components such as ferrite components or medical device items. A very thin layer of Parylene facilitates vibratory transport of such parts without agglomeration or jamming, and with no impact on part functionality.

As an outside service provider, Para Tech serves the coating needs of advanced technology applications with a solution based, customer centric approach that is even more responsive and cost-effective than in-house coating operations.

Choosing the Best Parylene Coating Option

Para Tech offers a family of high performance deposition systems for in-house Parylene coating, along with raw material, training and long-term tech support. Applying Parylene in-house can be a practical and economic alternative, but in many cases, the use of external coating service will be both more responsive and less costly.

For example, outsourcing Parylene coating needs to Para Tech means that customers have access to the very latest equipment and techniques, managed by highly trained and experienced vacuum deposition experts under optimal conditions, with processes that meet the latest industry certifications.

Users of an outside coating service have no direct costs for equipment, maintenance, floor space, training or staffing. Instead, they enjoy rapid response achieved with sophisticated engineering, production control and quality management resources, with fast ramp up to full production and 100% quality assurance of their finished assemblies.

Para Tech offers a helpful process decision methodology to assist with the in-house or outside Parylene coating decision. Elements of this process include timing requirements, security and contamination control needs, part complexity, fixturing and inspection considerations. It also addresses anticipated costs for capital equipment, floor space, energy, staffing, training, production engineering and system maintenance.

Investment payback time, the impact of mid-stream changes to production requirements, and the potential costs of downtime and manufacturing interruptions must also be considered to determine an accurate cost-per-part for in-house coating as compared to outside Parylene services quotes.

Para Tech has decades of experience assisting customers with these critical decisions, and collaborating to optimize quality along with production economies for the very best Parylene coating results, whether coating occurs in-house or at one of the Para Tech facilities. Visit here for our helpful Para Tech Process Decision Worksheet.

Upcoming Events

- **February 9-11, 2016**
  - Anaheim Convention Center, CA
  - Visit Booth #1472

- **March 15-17, 2016**
  - Las Vegas Convention Center, NV
  - Visit Booth #1710
Addressing Contaminants in Production
A primary challenge in Parylene coating service is to consistently meet exceptionally high performance standards, even in the face of evolving technical requirements. Para Tech recently demonstrated such an ability by implementing rigorous test procedures to confirm that each step in the coating sequence (pre-treatment, cleaning, priming, cleanliness testing, oven baking and vacuum deposition) remains free of contaminants that could compromise long-term coating results.

In this case, the primary contaminant was trace amounts of sulfur residue, which can lead to damaging corrosion of silver surfaces beneath Parylene film. Comprehensive process analysis was conducted in accordance with a customer-defined test standard for Parylene coating of critical circuit assemblies having high silver content. Independent lab tests demonstrated Para Tech’s ability to meet this customer’s rigorous test standard, and support their demanding performance requirements. This is an example of Para Tech’s responsiveness to the specialized requirements of all customers.

“Our challenge is to maintain process standards for our customers that exceed industry requirements for any and all sensitive surfaces,” said Para Tech technical manager Gustavo Arredondo. “We do so by means of ongoing in-process measurements, with detailed documentation and production control that meet client specifications and support repeatability and consistency.”

Click here for more information.

Three Convenient Locations - One Standard of Performance
Para Tech Coating, Inc. operates three self-contained, state-of-the-art coating centers in the United States: the corporate headquarters facility in Aliso Viejo, California; a midwest region center in Neenah, Wisconsin; and an east coast region center in Middletown, Connecticut. Each of these centers meets certification requirements as a qualified vendor for many companies across the full range of Parylene applications.

Every Para Tech facility is staffed with fully trained and experienced specialists, and equipped with technologically advanced production systems and quality assurance tools. All three coating operations are certified and compliant with all pertinent AS 9100 and ISO standards.

Para Tech Coating Center addresses and contacts are listed online here.

Para Tech Supports NASA SLS
Para Tech coating specialists are working with Boeing and NASA on conformal coating solutions for developmental Space Launch System (SLS) avionics. The SLS will be a heavy lift platform for deep space transport of both people and cargo. Full scale development of the approved SLS concept began in August of 2014, and the estimated first launch date is November 2018.

The SLS circuit coating design project focuses on creating the best solutions to protect the newest and most sophisticated backup circuit assemblies in the highly challenging space environment. Optimal Parylene coating performance and manufacturing efficiency depends to a large degree on circuit design and layout refinements, and Para Tech has a solid avionics/aerospace background that parallels the ongoing evolution of component integration and electronic assemblies. Making coating considerations a part of the initial design process is critical to both the efficiency and the ultimate success of the project, and Para Tech is proud to be a participant in this exciting new aerospace project.

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