

Parylene News

Keeping in Touch



By Bill Gleason,
General Manager

The Parylene
custom coating

business is based on a high level of trust, since our customers divert important and often valuable parts from their production setting to the coating provider in order to have value added in the form of high-performance coating.

PTC has a long record—nearly 40 years—of earning trust and delivering service as an outsource supplier that meets customer expectations for timing, careful handling and consistent coating specifications.

Author Stephen M.R. Covey makes several interesting and useful observations about trust in a recent book titled *The Speed of Trust*. For example, he states that while trust is commonly considered to be a matter of integrity, real trust is based on both character and competence.

cont. on page 2...

PTC Protects Avionics Circuits

Oxley, Inc. is a 70 year-old British firm that produces many products including EMI/RFI Filters, Lamps and Displays, Electronic Data Tagging, Mobile Computing and Night Vision Lighting Systems. The company recently developed LED External Lighting Systems for rotary and fixed-wing military aircraft.

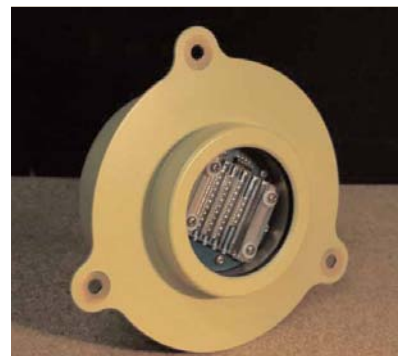
John Bradshaw, operations manager for the Oxley facility in Branford, CT explains that the company's LED aircraft lighting systems are characterized by durability, extremely long life, freedom from EMI and RFI, low current demand and other benefits. These systems represent significant advances over conventional external aircraft lighting in both performance and efficiency.

"A primary challenge in aircraft lighting is moisture protection," Bradshaw explains. "The wide-ranging temperature and humidity conditions during aircraft operation lead to condensation on printed circuit boards, with the threat of corrosion and failure."

Oxley formerly used a liquid acrylic coating on PCBs to exclude moisture, but this material failed to deliver effective protection. Engineers at the company's UK headquarters, working with a major aircraft OEM, determined that vacuum-deposited Parylene would resolve this issue.

"Parylene coating is Mil Spec approved and certified to IPC-830, and was already used by this OEM in other applications," Bradshaw says. "We learned that PTC's headquarters in California is an approved supplier to our customer, and were pleased to find that PTC operates a full-service coating center close to our Connecticut manufacturing facility."

The Parylene qualification process at PTC began with extensive application engi-



LED aircraft lighting system circuit boards are coated with Parylene to exclude condensation moisture

neering and coating tests that included exposure to jet fuels, humidity and salt spray, as well as temperature cycling. Parylene was ultimately confirmed and selected for coating Oxley PCBs, and an optimum coating thickness was determined for each board.

Oxley PCBs are delivered to the PTC coating center in Middletown, CT, where they are given a 100% visual inspection to confirm that each unit is free of damage or defects. PTC site manager Paul Demattie explains that boards are first cleaned and then masked and Parylene coated. Finally they are demasked and given a final QC inspection.

"The coating is certified to Mil-I-46058C, and PTC maintains documentation for traceability for each part by raw material lot number and run number," says Demattie. "Our final inspection confirms that there has been no coating migration to contact areas, and that the coating is clear, homogenous and free of pinholes and bubbles."

"The coating is effective, and we have developed an extremely good relationship with PTC," Bradshaw concludes. "They respond effectively to our requirements, providing 24-hour turnaround when necessary. Oxley is strongly considering Parylene coating for other applications as well."

...Keeping In Touch cont. from page 1

Covey believes that trust accelerates transactions for a company. When an important contract can be ratified with a handshake, it demonstrates that both parties agree to take a risk based on their mutual confidence in one another. He lists integrity, intent, capabilities, and results as the four elements of credibility that underlie trusting relationships. Strong trust promotes innovation, simplifies processes, enhances productivity and can reduce costs because it reduces non-productive steps.

PTC pursues ongoing improvement in every aspect of our performance to continue earning and maintaining the trust of our customers. For trust to prosper, there needs to be effectiveness in relationships, including the ways we relate to customers as well as with one another. This entails a commitment to straight talk, transparency, a spirit of mutual respect, accountability, immediate response to problems, and consistent, dependable loyalty.

As an outsource supplier in a global economy where business relationships and interdependency extend beyond our doors, our state and even our country, trust remains a never-ending PTC pursuit. While we will always seek to provide the very best in Parylene coating services and systems, trust will always be our single most valuable commodity.

Parylene Technology Advantages – Crevice Penetration



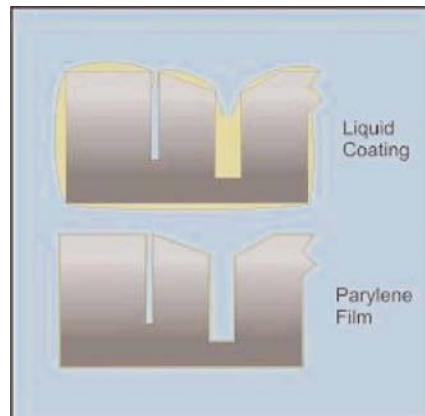
By Gustavo Arredondo, Technical Manager
Para Tech Coating, Inc.

One of the important and useful differences between Parylene film and conventional liquid coatings is ability of this material to penetrate and protect deep crevice surfaces. In contrast, epoxy, silicone and acrylic materials all exhibit liquid properties including meniscus, pooling and surface tension, which compromise conformability and result in uneven or incomplete coverage. Liquid coatings tend to pool in low areas and draw away from sharp edges and corners. Small openings may be plugged, or the coating may not penetrate more than a fraction of an inch into slots or crevices, leaving some areas unprotected.

Since Parylene is deposited in a gaseous state and builds as a polymer film one molecule at a time, it maintains the same thickness at all points. Each of the three common Parylene variants, N, C and D, is superior to

molecules are somewhat less active and thus have reduced penetration ability compared to N, and Parylene D has the least active molecule and least penetration of the three variants. While Parylene N is generally the coating of choice for complex substrates, the C and D variants have their own unique properties that suit them to particular coating applications.

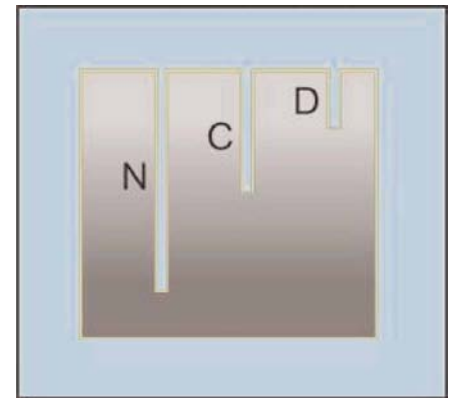
Parylene N penetrates deep into openings during vacuum deposition whether the crevice is closed or is an open passage through the part. Crevice penetration can be demonstrated by coating a segment of tubing and measuring the drop-off in coating thickness along the inner surface. Penetration is important when coating complex surfaces because it results in conformal protection across an entire substrate. PTC can assist customers with tests to confirm crevice penetration results for specific applications.



Liquid coatings tend to pool and draw away from corners, while conformal Parylene has the same thickness in slots, around corners and on planar surfaces.

traditional liquid materials in this regard. However, Parylene N has the greatest ability to coat deeper into crevices and slots.

This penetration property is related to the relatively high activity of the Parylene N gaseous monomer molecule during deposition. Parylene C



Parylene N's more active molecule gives it greater crevice penetration ability than Parylenes C and D.

PTC has long experience in Parylene coating a vast range of substrate materials and physical configurations. Call (800) 999-4942 for assistance with film thickness and crevice penetration questions.

The PTC LabTop® 3000 - Compact Bench Top Parylene Coating System

Full Automation and Production Efficiency in a Compact Coating System

PTC's smallest vacuum deposition Parylene coating system is the compact LabTop® 3000, a fully automated production system designed for short-run applications as well as lab and R&D work. This system has a flat panel operator interface, and system functions are pre-programmed, automated and precisely repeatable.

Like other PTC systems, the LabTop® uses PTC's proprietary tangential flow process for introducing gaseous monomer to the coating chamber. This design ensures optimal film uniformity and makes efficient use of raw material. The chamber is baffle-free for maximum capacity.

This table-top unit has an 8-inch diameter, 9-inch deep cylindrical coating chamber that accommodates multiple small components as well as larger substrates. It is self-contained and can be easily moved and set up, requiring only 208 volt, three-phase power. No external venting is necessary. The system measures 13.5-inch high by 48-inch wide, and is just 24-inch deep.

The LabTop® produces very thin, pinhole-free film for specialized applications such as optical components and silicon wafers. Many PTC LabTop® coating systems are in service across the country with typical production coating applications including printed circuit boards, medical components, electronic sensors and other small substrates.

For full LabTop® 3000 and other PTC equipment details, visit our website at www.parylene.com/equipment.



The compact PTC LabTop® 3000 is self-contained, and incorporates proprietary PTC control features for efficient Parylene coating

Meet Our People

Patricia Langraphi joined PTC in mid-2005 as Quality Control Supervisor. Her responsibilities include the coordination of daily quality routines at the company's CA and CT coating centers, and supporting the coating production and customer service departments.

Patricia maintains PTC's ISO 9001:2000 Quality Management program, and that task includes internal audits, analysis of performance indicators and company-wide training.

"I'm proud to say that we achieved our ISO 9001:2000 certification last year with great results," Patricia explains. "There were only three findings in the ISO inspection, and we were able to resolve those issues before completion of the audit."

She will be working in AS9100 certification in upcoming months, and also supporting PTC's Connecticut facility in ISO certification.

Patricia earned a Bachelor in Business Administration and International Trading from Metodista University in Sao Paulo, Brazil, and attended the Graduate School for Quality Engineering at Industrial University, also in Sao Paulo. She has ten years of experience in quality control and quality management, including a position with a major PC board manufacturer.

"I really enjoy my chosen career," Patricia concludes. "Working in the quality process, I have the opportunity to interact with all of the departments in the PTC organization." Patricia and her



*Patricia Langraphi,
PTC Quality Control Supervisor*

husband were married in 2005, and are celebrating the recent arrival of their baby girl Emma. She enjoys travel, film and reading.

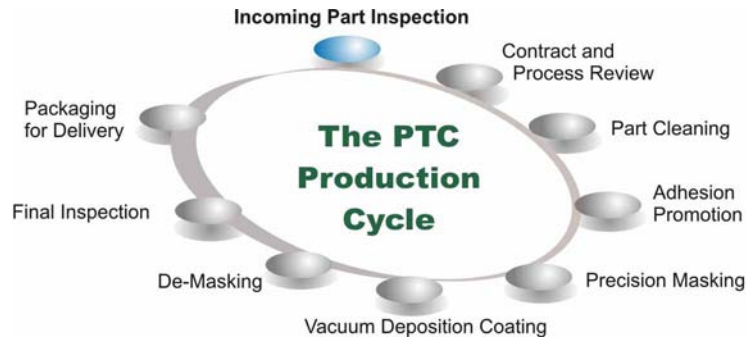
The PTC Customer Support Process

By Erika Partida, PTC Customer Support

PTC follows a careful nine-step process for each Parylene coating order to ensure that all operations conform to precise customer coating requirements and ISO 9001:2000 requirements. I will explain this step-by-step process in upcoming newsletters to help customers better understand this process and what happens during the standard 5-7 day turnaround time offered by PTC.

The process begins with **Incoming Part Inspection**. Parts are received at our shipping/receiving dock entered into the PTC internal tracking system and assigned a work order number that is linked to the purchase order. All parts are inspected for damage and veri-

fied against the purchase order to ensure that the correct part number and the proper quantity have been received based on the purchase order, and that incoming parts are free from material defects.



If any defects are noted, the order is placed on hold and the customer notified so that the appropriate steps can be taken based upon the customer's needs via the Non-Conforming Material Report.

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