**Problem:**

**How to Repair Ballast Tank Coatings with Minimal Downtime**

Keeping a ship in service is a very considerable value. When corrosion protection in ballast tanks is compromised, however, service is interrupted and immediate attention is required, due to the importance of ballast tanks to the structural integrity of a ship.

To deal with localized coating breakdown in a ballast tank, conventional methods of repair take significant time and may require abrasive blasting, residue removal, dehumidification, special work lighting, respiratory protection for workers, multi-coat application of repair coatings, and time to allow the coatings to cure before the ballast tank can be put into service.

Early results of a recent demonstration project employing a fluoropolymer film material for repair of localized coating breakdown in ballast tanks have shown that this approach allows very fast turnaround time.

**Screening and Trials**

A demonstration project has been...
conducted for an international shipper of petroleum goods in a ballast tank of a double-hulled tanker ship. The project employed fluoropolymer film repair materials manufactured by Integument Technologies (Tonawanda, NY).

The shipper conducted a survey of candidate repair materials for coatings in ballast tanks, using the following criteria:

- single-coat application,
- tolerance of the material to a humid environment,
- surface tolerance,
- ease of application,
- elimination of solvents, and
- capability of immediate service upon application.

Among the repair materials the shipper considered, including a number of liquid coatings, the fluoropolymer film scored the highest and was selected for the demonstration project, together with conventional candidates.

**Material Types**

The fluoropolymer film used in the shipper’s demonstration project is fluorinated ethylene propylene (FEP), commonly referred to by its trade name, Teflon®. This plastic material is extremely resistant to chemicals, temperature cycling, and mechanical stresses. Additionally, it demonstrates low surface energy and is easily cleaned.

For attachment to a substrate, the film employs a pressure-sensitive adhesive laminated to its back side. For the ballast tank project, a 4-mil-thick, acrylic-based adhesive was used. The fluoropolymer film itself is available in 3-, 5-, and 10-mil thicknesses. A 5-mil-thick version of the film was used.

**Surface Preparation and Application**

Prior to application of the repair film to the oil tanker, surfaces were prepared by hand tool cleaning to remove loosely adhered paint in the repair area. Then the surface area to be
alternatives to tributyltin (TBT) antifoulings, which have been banned by the International Maritime Organization, in his article, “TBT Antifouling Paints Are Now Banned! What Are the Alternatives and What of the Future?” (Surface Coatings Australia, January/February 2003).


dotted was solvent-wiped with alcohol. The manufacturer says the film’s adhesive will adhere to paint, to metal, and to concrete as long as the surface is clean, dry, and sound.

About 100 sq ft of the material was applied in the tanker. The manufacturer’s employees applied some of the material for the shipper, then instructed the shipper’s personnel in applying the remainder. Common hand tools, such as rollers, squeegees, and knives, were used for the application. The corners of the repair film were rounded prior to application.

**Costs**

Compared to conventional repair materials, the fluoropolymer film with laminated adhesive backing is more expensive. But because of lower labor and deployment costs, the company says the overall project costs are competitive with repair carried out by conventional methods.

**Early Results**

Repairs on the oil tanker have been in service for 15 months. Figures 1 and 2 show the successful performance of the repair material after 6 months of service in the oil tanker.

According to the manufacturer, initial results were very promising, but the project is part of an ongoing development program between the shipper and the film manufacturer.

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**LATEST LITERATURE**

**Alternatives to TBT Antifoulings Reviewed**

John A. Lewis of the Defence Science and Technology Organisation (Melbourne, Australia) reviews the alternatives to tributyltin (TBT) antifoulings, which have been banned by the International Maritime Organization, in his article, “TBT Antifouling Paints Are Now Banned! What Are the Alternatives and What of the Future?” (Surface Coatings Australia, January/February 2003).

Continued
Many participants in the marine industry have doubted the capability of alternative antifouling systems to match the performance of TBT-based systems, the author reports. But the author describes trials to date that have demonstrated the viability of "new technology" copper-based, self-polishing antifouling products, which he says are comparable in performance to TBT copolymer paints and should allow docking cycles of up to five years.

The author also reviews trials of non-toxic, foulant-release coatings in Australia and suggests that improvements in cost and durability must be made before these products can be seen as replacements for conventional antifoulings.

**NEW PIGMENT IMPROVES INSPECTION, QC**

An article in *Paint & Coatings Industry* reports on the development of an optically active coating system to improve inspection and quality control ("New Optically Active Coating System Revolutionizes Quality Control and Structural Inspection," March 2003).

The new coating system, designed by NCP Coatings Inc., utilizes a pigment additive that is reactive to specific ultraviolet light. According to the authors, both a primer coat and a coating applied over the primer containing the additive can be inspected by ultraviolet light to assure coating continuity and thickness.

The article describes numerous potential applications for this technology, including both industrial maintenance painting and factory finishing.

**POLYUREAS COMPARED TO POLYURETHANES**

Author Shiwei Guan compares polyurea and polyurethane coatings in the article, "100% Solids Polyurethane and Polyurea Coatings Technology: When It Comes to Corrosion Protection, How Do These Technologies Stack Up" (*Coatings World*, March 2003).

The author first describes the chemistry of three materials: 100% solids polyurethanes, 100% solids polyureas, and rigid or structural polyurethane coatings.

The author then reviews the performance and application properties of each of the three materials and provides guidelines for deciding which of the three is best suited for a particular application.

The strengths and weaknesses of these materials for atmospheric service and immersion in various media, as well as their use as waterproofing, as primary linings, and as secondary containment linings are discussed.