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Coating Fingerprint Certificate



By Nurul Asni – Chairperson, IMM Task Force on Fingerprinting Polymeric Coatings

The Task Force on Fingerprinting of Polymeric Coatings has numerous working committee meetings and had conducted 2 public forums to highlight the objectives of the initiative, the first one in March 2013 (Selangor) and the second one in October 2013 (Johor) which were both attended by over 100 representatives from the Oil & Gas companies, Paint Manufacturers, Blasting & Painting applicators, Paint QC Inspectors, Engineering Consultants, Materials Testing companies, and Academicians. Following the 2nd Forum in October 2013, a draft of the "Coating Fingerprint Certificate" (equivalent to a metal's Mill Certificate) has been prepared by the Task Force for deliberation in forthcoming events and forums.

It is anticipated that this Coating Fingerprint Certificate will be finalized by end-2014 and a Specification prepared for implementation by the Oil & Gas companies in Malaysia. The 3rd Forum is planned for June 2014 which will deliberate further on the spectroscopic and physical testing methods to be incorporated into this certificate as well as the pass-fail criteria.

The Coating Fingerprint Task Force has reached an important milestone since the announcement of the initiative in the previous Materials Mind publication. It can now be concluded that Fourier-Transform Infrared Spectroscopy (FTIR) can be used to fingerprint coatings.

Among the tests conducted were as follows:

1. Feasibility and reproducibility of using FTIR for coating fingerprinting.
2. Testing fingerprint matching for pigments of similar colour, should there be any substitution in the original formula.
3. Effects on fingerprint with minor changes in coating formulation which involved extra epoxy, hardener as well as other components.
4. The effect of sun exposure with laboratory dried coating and its effect on fingerprint matching.
5. Changes in fingerprint for different priced coating components.
6. Changes in fingerprint for different shelf life coating.
7. Changes in fingerprint for different batches of coating.

The summary of the findings are listed below:

1. Fingerprints are reproducible with high matching percentage (97%) for dry finished products on test panels. Dry finished products and their wet equivalent do not produce satisfactory matching percentage values (59%). Comparisons can either be made dry to dry or wet to wet only.
2. The use of dissimilar pigments if different to the original formulation will give a significant fingerprint.
3. Changes in coating component's composition were also tested such as additional 5% epoxy, 5% Polyamine, 5% Aluminium as well as other components. Changes in fingerprint absorption bands can be observed where the intensity of the absorption bands was increased. This

also indicated that a reduction in compositions will lead to reduction of the intensity of the absorption bands.

4. A short term test using panels under sun exposure of 2 weeks were compared with laboratory applied coating (freshly dried) and no significant differences (89%) in the fingerprint absorption bands were observed. This finding could be considered as a potential testing protocol of verifying coating quality after application, within a stipulated timeframe.
5. It is interesting to note that different pigment and epoxy qualities will produce different fingerprints and the matching percentage becomes smaller with significant quality difference. A small difference in price produces a matching percentage of 75% where as a large variation in price produces a matching percentage of only 6%.
6. The fingerprints of relatively fresh coatings of 3 months were compared to those that are over 2 years of shelf life and a significant difference (49%) was detected.
7. Generally, the fingerprints of hardeners do not change much for different batches. The correlation for different batches of epoxy will require further testing.

Members of the task force from paint manufacturers such as PPG, PLC, Hempel, Jotun, International Paint, Kansai, Akzonobel and KCC will continue to support this initiative by providing samples to determine realistic acceptance criteria for different batches of epoxy fingerprints. For the purpose of the exercise by the Task Force, the FTIR tests will be conducted by the equipment suppliers, Research Instrument, Agilent and Perkin Elmer. Subsequently, it is expected that the paint manufacturers will purchase their own FTIR equipment and train their laboratory technicians to conduct the tests during each paint production batch.

A quick recap of the Task Force objectives:

1. To review the available standards and specifications requiring Fingerprinting of Polymeric Coatings in the Oil & Gas Industry.
2. To review quality control and quality assurance techniques practiced by the paint manufacturers during manufacture and storage.
3. To review QA and QC techniques practised by the blasters & painters in regards to the paints prior to application and during application
4. To review fingerprinting testing methods available in regards to the reliability, speed of testing and costs.
5. To establish a Fingerprinting Document Template acceptable to all parties involved in the manufacture, application and usage of Polymeric Coatings in the Oil & Gas Industry.

The next milestone will be the establishment of a Coating Fingerprint Certificate template by May 2014. The subsequent steps involve the internal discussions within the Oil & Gas operating companies on procedures and possible implementation as well as Task Force roadshows to IMM fraternities.



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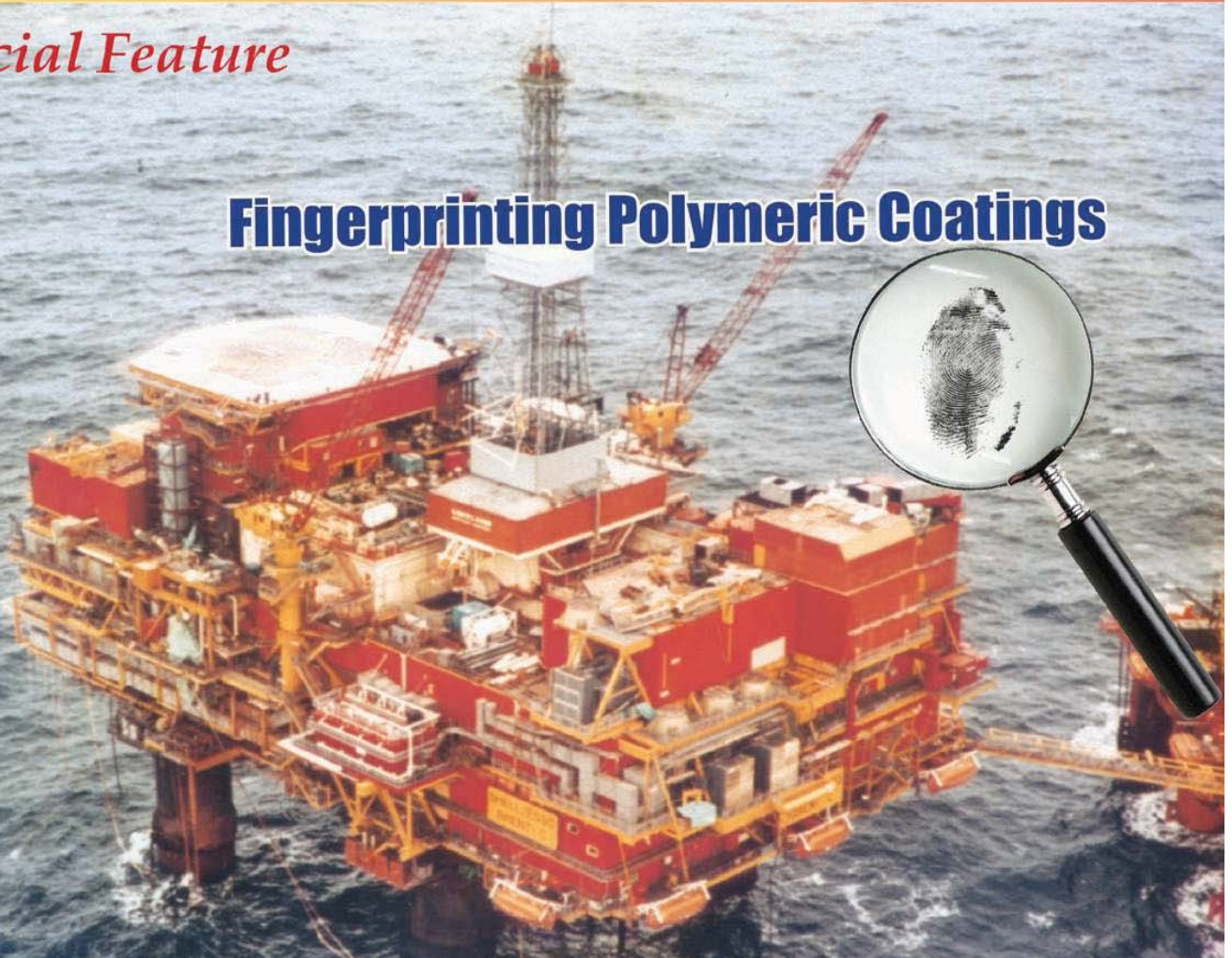
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Special Feature

Fingerprinting Polymeric Coatings



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Cover Story

IMM and PETRONAS have initiated Fingerprinting of Polymeric Protective Coatings supplied to the Oil and Gas Industry in a same way as Mill Certificates for metals.

Guideline for submission of articles (Academic papers as well as Industry technical papers) can be downloaded from www.iomm.org.my