



Report on IMM Task Force on Coatings Fingerprinting (Phase 1: 2013-2014)

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Background of “Coating Fingerprint Certificate”

Each year, oil & gas companies worldwide spend billion dollars on polymeric coatings for corrosion protection of steel structures and pipelines for the transportation of crude oil and gas. The frequent failures of the polymeric coatings lead to the corrosion of steel structures and pipelines and thus, leakage of crude oil and gas to the environment. These pose a severe inventory loss to the companies and serious threat to the environment, and also cause many safety issues to plant, personnel and surrounding public. Since mid 90s, PETRONAS, Shell Malaysia, ExxonMobil Malaysia and other oil companies have called for a “mill certification” of the supply of polymeric coatings from local paint manufacturers for the quality assurance of the coatings supplied. However, there was widespread perception within the oil and gas industry that certification of polymeric coatings was not possible because the expertise on spectroscopic analyses and interpretation of results for such purpose were not available back then. Hence, the provision of **Coating Fingerprint Certificate** for polymeric coatings supplied to the oil and gas companies did not materialize.

The Malaysian oil & gas industry had been focusing on the paint quality control inspection, surface preparation (abrasive blasting) and paint spraying application techniques & skills since 1990 to improve coating performance. Despite efforts to improve quality in these 3 skill sets, coating failures continue to get worse. Thus, the oil & gas industry now realizes that the coating materials can be another factor causing the failures. Since materials testing technology, particularly on non-metallic materials, has improved significantly over the past decade, it is timely for the industry to focus on the testing of the coating materials in the same way as metals are tested and issued with a mill certificate.

Forum on “Towards Fingerprinting of Polymeric Coatings” I held on 22nd March 2013, highlighted the prime concerns of the local paint manufacturers, e.g. the protection of product formula, lack of expertise on spectroscopic analyses and interpretation of results. On the other hand, the users of the oil & gas companies suffer from high cost of repainting the steel structures and pipelines when the coatings fail.

A Task Force on Coatings Fingerprinting was set up under IMM in April 2013 to look into the issues brought out by various parties. The end deliverable of this Task Force is to enhance the overall painting coating quality assurance with the aim of ensuring all protective coatings manufacturers supply products according to specifications.

On 11th October 2013, **Forum on “Towards Fingerprinting of Polymeric Coatings” II** was held. Presentation of the draft of the **Coating Fingerprint Certificate** by Chairperson of the Task Force, Ms. Nurul Asni Mohamed from PETRONAS GTS, was attempted. Refining on the **Coating Fingerprint Certificate** based on the feedbacks during Forum II and periodic meetings of the Task Force was persistently carried out. The objective of the final **Forum on “Towards Fingerprinting of Polymeric Coatings” III** was to present the **Coating Fingerprint Certificate** of polymeric coatings, which is acceptable to the oil and gas companies. The involvement of IMM through multi-lateral discussions and practical trials using the FTIR equipment jointly with the oil and gas operators, paint manufacturers, materials testing organizations and FTIR instrumental specialists over many months have resulted in a new step towards improved quality of paint supply and paint performance in the oil and gas industry.

This final forum had succeeded in create awareness for the practicality of the fingerprinting of the polymeric coatings. The well acceptance from the Malaysia oil & gas users for the Coating

Fingerprint Certificate as one of the effective approaches for QA & QC tools for the enhancement of the overall painting coating quality assurance was noted.

Deliveries of 1st phase: 2013 – 2014

1. Tentative Coating Fingerprint Certificate for 2-component intermediate materials of epoxy coatings was presented.
2. Fourier-transform infrared (FTIR) is a simple and reliable tool for the study of reproducibility (i.e. to fingerprint) of the epoxies and hardeners as well as to differentiate different types of epoxies and hardeners without any intrusion of paint formulations.
3. Fingerprinting regions of FTIR for epoxy resin and hardener are proposed and the **confidence level of acceptance** for QA & QC control is proposed at $\geq 90.0\%$.

Current situation

Currently, only 2-component epoxy coating (intermediate materials) was used in the evaluation of the practicality of the structural analysis by FTIR for complete **Coating Fingerprint Certificate**. We note here, this FTIR analysis shall not be limited to 2-component epoxy coating, but has to be extended to inorganic zinc coating, epoxy-zinc coating, polyurethane coating, acrylic coating, polyester coating etc.





For Members Only
Issue 8

MATERIALS IND

July - Sept 2014

www.iomm.org.my

Institute of Materials, Malaysia



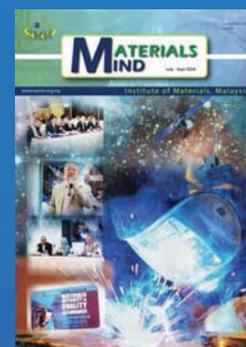
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