

Towards Fingerprinting of Polymeric Coatings II

Date : 11th October 2013
Time : 1.30pm - 6.00 pm
Venue : Tanjung Puteri Golf Resort in Pasir Gudang, Johor
Jointly Organised by: IMM Polymer Committee & IMM Coatings Committee
Co-organized by : Malaysian Offshore Contractors Association (MOCA) & IMM Southern Chapter
Co-sponsored by : Hempel (M) Sdn. Bhd, Kansai Coatings Malaysia Sdn. Bhd., Research Instruments Sdn. Bhd.

Introduction

Many years ago, the Oil & Gas industry discussed the idea of establishing a QA/QC system to check on the quality of paints supplied to the oil & gas industry. There were concerns regarding the cost reduction initiatives - that paint manufacturers may supply "cheapened formula" products labelled as the actual high quality products approved by the oil companies. Scientific testing technologies were not available then for the protective coatings to be "fingerprinted" like metals & alloys, which can be checked against its mill certificates obtained via spectrometers and in-house laboratory QC tests. The idea naturally died off. It is believed that the oil & gas industry continues to be plagued with supply of non-conforming protective coatings due to fierce price competition. Materials testing technologies have advanced exponentially over recent years that it may be possible for polymers to be "fingerprinted" in the near future.

This will be the second of a series of such forums, as the initiative towards "Fingerprinting" technology for polymeric coatings will require many rounds of discussion amongst interested parties.

Objective

The forum is aimed at dispelling the notion that there is no way to fingerprint the polymer coatings on the pipelines for oil and gas industry. Forum of "Towards Fingerprinting of Polymer Coatings" I held on 22th March 2013 by Institute of Materials, Malaysia had sent out the clear message that, there are ISO standards for fingerprinting the polymer coatings and most importantly, the users are urging the paint manufacturers to provide "Mill Certificates & QC test reports" for the products supplied in order to ensure conformation of the approved specifications.

First draft of the Fingerprinting "Mill Certificates & QC test reports" will be presented during the forum which is proposed by the "Task Force on Coatings Fingerprinting". This Task Force is chaired by a PETRONAS representative with IMM Polymer Committee as facilitator and advisor. The key element of forum shall focus on "what are the proposed elements to be listed inside this "Mill Certificates & QC test reports". The ultimate objective is to ensure that protective coatings manufacturers supply products according to specifications.

We plan to have 4 presentations of 20 minutes each covering:-

- a) Chemical Analysis Approaches in Polymeric Coating Identification.
(Speaker: Prof. Dr. Mohamad Kamal Harun, Universiti Malaysia Kelantan and Universiti Teknologi MARA).
- b) Production and Quality Control of Paint.
(Speaker: Mr. Frankie Chua Cheng Huat, PLC Laboratory Sdn. Bhd)
- c) FTIR Application in Coating Industry.
(Speaker: Ms. Renee Teo Yong Yin, Research Instruments Sdn Bhd)
- d) Qualification for New Maintenance Painting System and Products for Offshore Application.
(Speaker: En. Muhd Hawari Hassan, PETRONAS GTS Dept)

Besides, a demonstration of fingerprinting of primers and hardeners as well as finished goods of epoxy coatings by FTIR will be provided after the four presentations. A 30-min floor discussion will be carried out after the FTIR demonstration.

RM 30 for IMM members and RM 40 for non-IMM members

Co-sponsored by



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Chemical Analysis Approaches in Polymeric Coating Identification

*Prof. Dr. Mohamad Kamal Harun,
Universiti Malaysia Kelantan and
Universiti Teknologi MARA*

Abstract

Polymeric coatings for corrosion protection of metals are generally made up of polymer resins that form the binder. These polymeric resins may be in the form of a single pack component or two pack components as in the epoxy-polyamide and the polyurethane binder system. For some system the basic binders may be modified with other organic or inorganic compounds as in the polyurethane modified alkyd or even the chlorinated rubber. Depending on the type of applications, modifications of binders are necessary, to improve properties such as hardness, corrosion resistance and others. Into these binders, other components are often added for specific purposes. Common components such as pigments are added to produce properties like colours and/or corrosion resistance properties. These pigments are usually in the form of inorganic compounds, metallic particles or even glass bids and flakes. Nevertheless in some cases, organic pigments are also included. Other components added are solvents which usually evaporate during curing and some less functional but equally important, such as inorganic talc to increase the volume of the coatings. While it may be difficult to specifically understand the exact formulations of an organic coating, it is possible to indentify the components that made up the coating system. In this paper, we shall discuss laboratory approaches commonly employed in indentifying the basic binder system, pigments or even the additives that made up the coating system. The combination of the applications of some advance chemical analysis approaches like the Fourier Transform Infra Red Spectroscopy, UV- Vis Spectroscopy and Atomic Absorption spectrophotometer can be deployed in order to identify and understand the basic components used in making up any coating system, thus may form the basis for coating finger-printing.

BIODATA

Professor Dr Mohamad Kamal is currently the Assistant Vice Chancellor (Research, Innovation and Entrepreneurship) and Head of the Global Entrepreneurship Research and Innovation Centre at University Malaysia Kelantan. He was the Deputy Vice Chancellor (Industrial and Community Networking at University Teknologi MARA from 2007 – 2010, Dean of the Faculty of Applied Science, UiTM from 2005 – 2007, and the Director of the UiTM Malacca Branch Campus (2002 – 2005). Dr. Mohamad Kamal is also the President and Fellow of the Institute of Materials, Malaysia, Fellow of the International Institute of Plantation Management, Chairman of the Malaysian Accredited Certification Body for the Asian Welding Federation, Member of the Industrial Consultative Council, Malaysian Petroleum Resource Cooperation under Pemandu and currently is also the Cluster Head for Industry and Innovation, National Council of Professors.

Dr. Mohamad Kamal is a Professor of Chemistry and earned his PhD from the University of Manchester, Institute of Science and Technology specializing in the areas of Corrosion and Adhesion Science. His areas of research are in corrosion protection by paints and inhibitors including the study of polymeric barrier coating degradation under atmospheric conditions. He has been awarded the e-science grants, fundamental research grant scheme, university grants and others for his research and has published more than 60 publications which include journal publications, several chapters in books and reviewed journals for international publications, proceedings, mainly focussing on the corrosion protection by novel inorganic Schiff based compounds as inhibitors, under film corrosion, adhesion modifiers, electro-polymers and electronic and ionic conductivity of polymers, and polymer electrolytes and barrier protection degradation dependency on ionic resistance of polymeric coatings. Besides teaching and research, Dr. Mohamad Kamal also contributes his expertise through training and consultancies mainly within the paint industries, government research agencies, and module fabricators for off shore platforms.

Prof. Dr. Mohamad Kamal has been the keynote and invited speaker for several national and international conferences such as the International Conference on Traditional & Renewable Energy, & Nanomaterial Technology, China, International Materials & Technology Conference & Exhibition, International Conference on Functional Materials & Devices and The Science & Technology, International Conference on Plantation Industries and Industry Linkage Round Table Forum, Academy Science Malaysia. Nationally, Prof Dr Kamal was also invited to represent several panels at the ministerial level.



Production and Quality Control of Paint

*Mr. Frankie Chua Cheng Huat,
PLC Laboratory Sdn Bhd*

Abstract

The process of paint manufacturing will be covered from the raw materials to the finished product including the in-house production quality control tests. Paints are essentially made up of the polymer resin, additives (including pigments, extenders, fillers, property-modifying agents, etc) and solvents. An overview of the manufacturing process will include the review of the paint formulation, raw materials storage and sourcing, paint mixing, production QC tests, packing and delivery. The production QC tests include viscosity, solids, specific gravity, opacity, finess-of-grind, pigment-volume-concentration (PVC), adhesion test, pencil hardness test, color, etc and are performed in the in-house laboratory during the paint manufacturing process. Special tests such as the salt-fog test, cathodic disbondment test, chemical resistance tests, etc will be carried out where required by the customers, and will generally be a once-off test carried out by a third-party laboratory. No spectroscopic testing has been carried out on polymer coatings to-date due to the lack of technological capabilities of spectroscopy.

BIODATA

Mr Frankie Chua Cheng Huat graduated in 1986 with B.Sc.(Hons) in Chemistry. He has more than 25 years of experience in Corrosion Control covering Protective, Architectural, Marine and Industrial Coatings, Fire Proofing and Waterproofing - as a manufacturer, service contractor, and technical consultant. Mr Chua founded PLC Laboratory Sdn. Bhd. in 1995 and is the Managing Director and Chief Chemist overseeing Research and Development.

He is a Fellow of the Institute of Materials, Malaysia (IMM), an Associate in the Technology of Surface Coatings (ATSC) - Oil & Colour Chemist Association (OCCA) UK as well as a Protective Coatings Specialist and Senior Corrosion Technologist of NACE.

He has served as Chairman of the IMM Coatings Committee (2004-2009) and as a committee member of the OCCA Kuala Lumpur and Selangor Section (2006-2007).



FTIR Application in Coating Industry

*Ms. Renee Teo Yong Yin,
Research Instruments Sdn Bhd*

Abstract

FTIR is a powerful analytical technique that can readily be applied to the analysis of coating systems. An FTIR spectrum contains a wealth of information about the basic functional chemical groups and finger print region of a sample that can be used for identification and for evaluation of chemical changes that occurred. FTIR can be used to study the identity of raw materials and pigments, cross check the quality of end product and also used for failure analysis in coating system. Therefore FTIR should be the technique of choice for the initial identification in paint systems.

BIODATA

Ms. Renee Teo B.Sc Biology & Chemistry - Campbell University of North Caroline, U.S.

Has worked in the production sector as Quality Control and also in commercial lab as Chemist. She has experience in handling various analytical instruments such as FTIR, Raman, NIR, ICPMS and UV Spectrophotometer. Currently, she works as Application Chemist in Research Instruments, specializes in Thermo Fisher Scientific FTIR, NIR and Raman. She is responsible for installation, application training and troubleshooting.



Qualification for New Maintenance Painting System and Products for Offshore Application

*En. Muhd Hawari Hassan,
PETRONAS GTS Dept*

Abstract

Corrosive external environment at offshore poses a great deal of challenges for the operators to sustain high integrity and reliability of equipment and piping. Visual inspection reveals that protective coatings failures occur after relatively short span of application. There are many areas for improvement for conventional paint application. This paper highlights the initiative to improve the coating performance through setting up new requirement for testing and qualification prior to site application. Among discussion points are limited surface preparations, simulation of real conditions during applications, testing protocol, challenges and opportunity.

BIODATA

Has been with PETRONAS since 1996 (~ 17 years). He started his career at PETRONAS Refinery Kerteh as Inspection Engineer looking after refinery and Aromatics plant, asset integrity mainly focusing on Materials, Corrosion and Inspection related matter.

After 10 years in refinery, he then transferred to PETRONAS Group Technical Solutions (GTS) and promoted to Technical Professional position. Under GTS, he serves all PETRONAS OPU's (downstream and upstream sectors, local and abroad) providing technical consultancy especially in Corrosion matters. Amongst responsibilities includes;

- i. PETRONAS Technical Standard Corrosion Discipline Custodian
- ii. Development of Corrosion Management Program (CMP), Corrosion Design Basis Memorandum (CDBM) and Asset Integrity Limit (AIL)
- iii. Pipeline Corrosion Assessment for Process Optimization & Fitness for Service
- iv. Corrosion Study for PETRONAS Risk Based Inspection
- v. Selection and qualification of Protective Coating and Integrity Chemical Injection
- vi. PETRONAS Coating Committee leader.

PROGRAMME

- 1:30pm : Lunch / Registration
- 3:00pm : Opening Remarks by Forum Chairman, IMM Polymer Committee (*Dr. Chia Chin Hua, Universiti Kebangsaan Malaysia*)
- 3.10pm : Chemical Analysis Approaches In Polymeric Coating Identification (*Professor Dr. Mohd Kamal Harun, Universiti Malaysia Kelantan / Universiti Teknologi MARA*)
- 3:35pm : Production and Quality Control of Paint (*Mr. Frankie Chua Cheng Huat, PLC Laboratory Sdn Bhd*)
- 4:00pm : Tea break
- 4:20pm : Qualification for New Maintenance Painting System and Products for Offshore Application (*En. Muhd Hawari Hassan, PETRONAS GTS dept*)
- 4:45pm : FTIR Application in Coating Industry & Demonstration of FTIR (*Ms. Renee Teo Yong Yin, Research Instruments Sdn bhd*)
- 5.15pm : Q & A
- 5:45pm : Summing up by Fingerprinting Task Force Chairperson (*Ms. Nurul Asni Mohamed, PETRONAS GTS*)
- 5:50pm : Closing Remarks by Chairperson, IMM Polymer Committee (*Dr. Chan Chin Han, Universiti Teknologi MARA*)
- 6:00pm : Adjourn

**Please register with the IMM secretariat at
iomm@po.jaring.my by 4th October 2013**