



Forum on "Towards Fingerprinting of Polymeric Coatings" I, II, III & IV



Background

IMM Polymer Committee & Task force member:

Assoc. Prof. Dr. Chan Chin Han
Faculty of Applied Sciences
Universiti Teknologi MARA



Coatings failure



Figure 1

**NEWLY PAINTED
OFFSHORE OIL PLATFORM**

**HEAVY-DUTY
PROTECTIVE
COATINGS**

Figure 2



Figure 3

**CORROSION
WITHIN
6 MONTHS**



2015

the annual cost for corrosion for all sectors incurred in Malaysia amounts up to **USD 10 billion** (or equivalent to **MYR 39.3 billion RM 33.4 billion**) (Malaysia's GDP in 2015 was MYR 1.16 trillion according to World Bank)

The currency exchange rate in 2014 is approximately USD 1 $\approx$ MYR 4

Table 1 Estimation of costs of corrosion for anti-corrosion painting in the **oil & gas, petrochemical, energy, marine and infrastructure industries** in Malaysia in the year of 2014, USD 1 ≈ RM 3.3

Item	Cost (Ringgit Malaysia per year)
<i>Painting old offshore platforms & facilities</i> (Costs include surface preparation by abrasive blasting, paint materials, application costs, scaffolding and/or barges where applicable, i.e. all-in painting costs) For 5 major operators and others Total offshore platform maintenance painting	800 million
<i>Painting new offshore platforms & facilities</i>	
Major fabrication yards	100 million
Smaller fabrication yards	50 million
Total New offshore facilities painting	150 million
<i>Painting old onshore oil & gas & power plant facilities (refineries, petrochemical plants, LNG plants, power plants, etc)</i>	30 million
<i>Painting new onshore oil & gas & power facilities</i>	100 million
<i>Painting new & old marine ports facilities</i>	30 million
<i>Painting new & old water pipelines</i>	30 million
<i>Painting new & old bridges & highways</i>	30 million
<i>Painting new & old steel structures of large factories</i>	30 million
Total costs of painting	1.2 Billion
Indirect costs of corrosion at offshore oil production facilities due to down-time and/or shut-down of facilities caused by paint failure: Estimation of 2,000 barrels of oil produced per offshore facility per day @ USD 60 per barrel = $2,000 \times \text{USD } 60 \times \text{RM } 3.30 = \text{RM } 396,000.00$ loss in income per day by the oil company.	

Premature coatings failure

The deterioration of the coatings systems, or corrosion of the coated surface, more rapidly than would normally be expected under the service conditions.



Figure 4 Premature coatings failure

Problem statement

Since 70's until NOW!!!

- ❑ The O&G companies are suffering from failure of polymeric coatings on steel structures. **Why?** ↓ quality of adulterated products => ↑ cost of repainting the pipelines => the urge of **quality control certification** of polymeric coatings ↑
- ❑ Local paint manufacturers are reluctant to provide **QC certification**.
- ❑ **Why?** i) trade secret of their paint formulations and ii) lack of knowledge on



- ❑ **Roles of IMM**: assist in interpretation of the results for epoxy paints.





Memory lane.....part 1

1970s & 1980s

The O&G industry used to blame the blasters & painters for paint failures.

1980s

The **Steel Structures Painting Council (SSPC)** in USA, proposed to the industry to develop “**surface-tolerant coatings**” i.e. an epoxy coating which can be applied on not-so-well prepared steel surfaces and yet can perform for **>10 years offshore**.

Why? the blasters and painters were not very educated people and there were no proper training programs those days.

Late 1980s

The major international anti-corrosion paint manufacturers such as Ameron, International Paints, Sigma, Jotun and Hempel developed excellent surface-tolerant epoxy coatings which performed for >10 years offshore in USA, Europe & Asia.



Memory lane.....part 2

1990s

Stiff competition amongst all these manufacturers, the prices ↓, and paint failures became a norm. The blame continued to be put on the blasters & painters.

1999

PETRONAS and IMM initiated the **IMM Blaster & Painter Certification** & **IMM Coating Inspector Certification** Programs to improve the skills of the blasters & painters; and quality of paints applied.

Despite these efforts, paint failures continue both onshore & offshore in the oil & gas facilities.



Memory lane.....part 3

1997-2000

During the “Cost Reduction Alliance” (CORAL), the concern of paint product quality was raised if the prices ↓.

Paint manufacturers said **NO** to “**mill certificate**” for protective coatings.

Why: **(i)** international paint companies will never adulterate or change paint formulation abruptly & **(ii)** that it was impossible & too costly to try to produce mill certificates for every production batch.

2000 – now

Coatings which passed the Qualification Tests of PETRONAS, Shell & ExxonMobil have often failed within months or less than 2 years after commissioning of a facility when they are supposed to perform for more than 5 years.

The urge of provision of **Coating Fingerprint Certificate** for polymeric coatings supplied to the oil and gas companies soars.

Successful coatings performance control

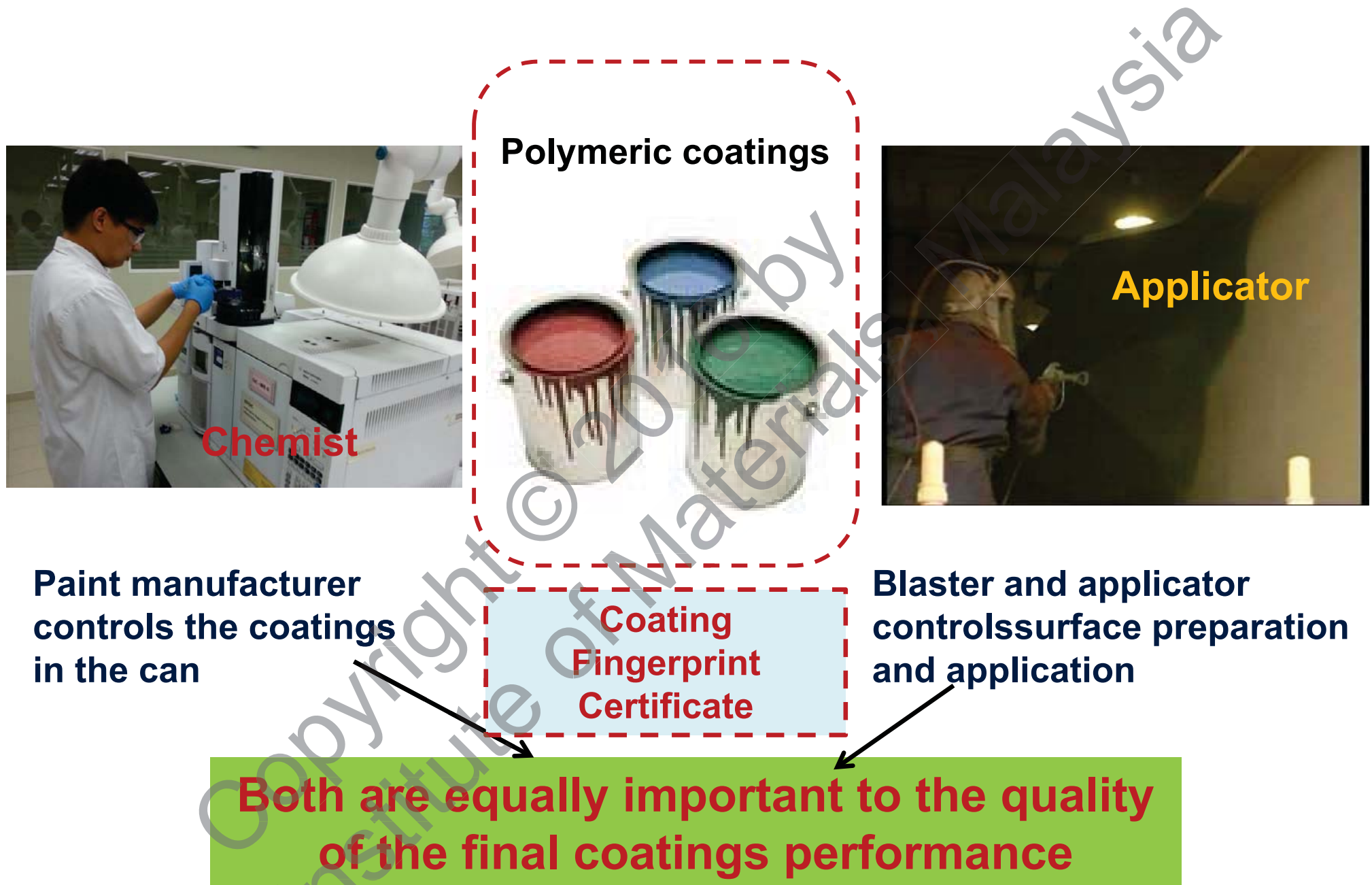


Figure 5

**How did we create
public awareness?**

- to industry

Institute of Materials, Malaysia
Towards Fingerprinting of Polymeric Coatings
2.30pm - 6.00pm : Friday 22nd March 2013
(Dewan Presiden) Kelab Golf Negara Subang,
Kelana Jaya, Selangor

Initiative from



Can we fingerprint polymeric coatings?

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.

The **users** of the oil & gas companies suffer from **high cost of repainting** the steel structures and pipelines when the coatings fail.



Mac 2013

Taskforce on Coatings Fingerprinting (Phase 1)

April 2013

Chairperson
Deputy chairperson
Advisors

Ms. Nurul Asni Mohamed, PETRONAS GTS
Ms. Elizah Samat, Sarawak Shell Bhd
Prof. Dr. Mohamad Kamal Hj. Harun, President, IMM
Ir. Max C. H. Ong, Chairman, IMM Education Committee
Mr. David Lim Chee Cheong, IMM Coatings Committee,
Mr. Zamaluddin Ali, PETRONAS GTS
Pn. Halimah Pit, Shell Deepwater Malaysia
Assoc. Prof. Dr. Chia Chin Hua, Universiti Kebangsaan Malaysia
(Chairperson of the Forum on "Towards Fingerprinting of Polymeric Coatings" I, II & III)
Assoc. Prof. Dr. Chan Chin Han, Universiti Teknologi MARA, Shah Alam
Secretary of the Forum on "Towards Fingerprinting of Polymeric Coatings" I, II & III)
Dr. Tan Winie, Universiti Teknologi MARA, Shah Alam
(Committee for Publicity of the Forum on "Towards Fingerprinting of Polymeric Coatings" I, II & III)

Secretary

Pn. Ainil Fidrah Mohd Ghazali, Manager, MTE (M) Sdn Bhd

Committee members

Mr. Abdul Aziz Haron, Head of Paint Testing Laboratory, SIRIM
Mr. M Shahril Atiqi B M Sharip, PETRONAS GTS
Ms. Rohana Jaafar, PETRONAS GTS
Mr. Lim Chuan Gee, Senior Researcher, SIRIM
Mr. Kenneth Way, Sales Manager, Perkin Elmer (M) Sdn Bhd
Ms. Kelly Hong, Team Leader, Research Instruments (M) Sdn Bhd
Ms. Renee Teo, Application Chemist, Research Instruments (M) Sdn Bhd
Ms. Chow Mee Ling, Spectroscopy Product Specialist, Agilent Technologies Sales (M) Sdn Bhd
Mr. Frankie Chua Cheng Huat, Director, PLC Laboratory Sdn Bhd
Mr. Terence Wee, Technical Manager, PPG-Sigma Coatings (M) Sdn Bhd
Mr. Vincent Y. S. Tan, General Manager, Jotun (M) Sdn Bhd
Mr. Wong Ing Chiew (alternate), National Sales Manager, Jotun (M) Sdn Bhd
Mr. Ahmad Badli Shah Aziz, Business Development Manager, International Paints (M) Sdn Bhd
Mr. Ricky Szeto (alternate), Manager, International Paints (M) Sdn Bhd
Mr. Lewis Yee (alternate), Engineering Sales Manager, International Paints (M) Sdn Bhd
Mr. Selvendran, Technical Service Manager, Hempel (M) Sdn Bhd
Mr. Liew Shann Ching (alternate), Deputy General Manager, Hempel (M) Sdn Bhd
Mr. Tan Ying Teck, Kansai Coatings (M) Sdn Bhd
Ms. Lim Suat Ping (alternate), Kansai Coatings (M) Sdn Bhd
Mr. Robert Lo, General Manager for Heavy Duty Coating Division, KCC Paints Sdn Bhd
Mr. Theng Soo Siang (alternate), Technical Manager, KCC Paints Sdn Bhd

The end deliverable:

to enhance the overall painting
coating quality assurance



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.

Initiative from



Fingerprinting of intermediate materials of epoxy coatings, i.e. epoxy resin and using **FTIR** spectrometer **is possible and reliable**.

The FTIR spectroscopy testing shall be performed on these intermediate materials **immediately after production in the paint factory**, in addition to the standard quality control tests conducted on the produced intermediate materials.

Presentation of the draft of the **Coating Fingerprint Certificate**.



Oct 2013

Final Forum on “Towards Fingerprinting of Polymeric Coatings” III

Initiative from



- **Date** : Friday, 20th June 2014
- **Time** : 2.30 pm – 7.00 pm
- **Venue** : Cenderawasih 1 & 2, Glenmarie Golf and Country Club, Shah Alam, Selangor

Fingerprinting regions of FTIR for epoxy resin and hardener are proposed and the **confidence level of acceptance** for QA & QC control is proposed at **$\geq 90\%$** .



Jun 2014



Task Force on Coatings Fingerprinting (Phase 2) Dec 2014

Chairperson
Deputy chairperson
Advisors

Ms. Nurul Asni Mohamed, PETRONAS GTS
Ms. Elizah Samat, Sarawak Shell Bhd
Prof. Dr. Mohamad Kamal Hj. Harun, President, IMM
Assoc. Prof. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA, Shah Alam
Assoc. Prof. Dr. Chia Chin Hua, Universiti Kebangsaan Malaysia
Dr. Huang Nay Ming, Universiti Malaya
Dr. Tan Winie, Universiti Teknologi MARA, Shah Alam
Ir. Max C. H. Ong, Chairman, IMM Education Committee
Pn. Halimah Pit, Shell Deepwater Malaysia
Mr. Zamaluddin Ali, Custodian Engineer, PETRONAS

Secretariat
Committee members

Zalilawati Hasan, Assistant Manager, MTE (M) Sdn Bhd
Dr. Chew Kong Chin, Becker Industry Coatings (M) Sdn Bhd
Abdul Aziz Haron, Head of Paint Testing Laboratory, SIRIM QAS International Sdn Bhd
Ahmad Badli Shah Aziz, Business Development Manager, International Paints (M) Sdn Bhd
Andrew Lin (alternate), Technical Services, KCC
Chow Mee Ling, Spectroscopy Product Specialist, KCC
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Frankie Chua Cheng Huat, Director, Kansai - PPG
Kelly Hong, Product Manager, Research Instruments, KCC
Kenneth Way Chiang Poh, Sales Manager, Permatapaints
Kuhan Sivalingam (alternate), PPG - Sigma Coatings
Lee Choon Siong (alternate) Technical Services, KCC
Lewis Yee (alternate), Engineering Sales Manager, KCC
Lim Chuan Gee, Senior Researcher, SIRIM Berhad
Lim Suat Ping (alternate), Kansai - PLC Coatings
Mark Hew Yoon Onn, Managing Director, Unipol
Michelle Lee Jia Yee (alternate) Application Chemist, KCC
M Shahril Atiqi B M Sharip, PETRONAS GTS
Renee Teo Yong Yin, Sales Engineer, Bruker
Ricky Szeto (alternate), Manager, International Paints
Robert Lo Tung Ming, General Manager for Hong Kong, International Paints
Rohana Jaafar, PETRONAS GTS
Selvandran s/o Vello, Technical Service Manager, KCC
Shamsul Farid Samsudin, PETRONAS Research
Terence Wee, Technical Support Manager-Asia, KCC
Theng Soo Siang (alternate), Technical Manager, KCC
Vincent Y. S. Tan, General Manager, Jotun (M) Sdn Bhd
Wong Ing Chiew (alternate), National Sales Manager, KCC
Yoga Sugama Salim, Norimax Sdn Bhd

The end deliverable:

to enhance the overall painting
coating quality assurance





FORUM ON “TOWARDS FINGERPRINTING OF POLYMERIC COATINGS” IV

Date : Thursday, 29th Oct 2015

Time : 9.00 am - 2.00 pm

Venue : Dewan Tunku, Kelab Golf Negara Subang, Selangor



Please register online at:
www.iomm.org.my/events-activities

For enquiries, please contact :

Ms. Zalilawati Hasan

+6018-322 7310 | zalilawati@mte.com.my



BIG WAVE: Progress and implementation of
Coatings Fingerprinting in oil and gas industry!

Owner's Perspective & Commitment

Oct 2015

IMM's Initiative

Coatings Fingerprint Satellite Symposium

under the auspices of 10th International Materials Technology Conference and Exhibition (IMTCE2016)

17th May 2016

Putra World Trade Centre (PWTC) Kuala Lumpur, Malaysia.

Supported by:



www.imtce2016.org



Institute of Materials, Malaysia



Putting Coating Fingerprint Certificate to work

May 2016

All the committee members of Institute of Materials, Malaysia (IMM) Task Force on Coatings Fingerprinting (Phase 1, Phase 2 and Phase 3)



A successful collaborative work from:



PPG Protective & Marine Coatings
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Agilent Technologies



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Beckers

UCE

**How did we get
industry acceptance?**

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INDICATIVE COSTING FOR FTIR FINGERPRINTING ON COSTINGS FINGERPRINTING

The Task Force on Coatings Fingerprinting has calculated an indicative costing for the testing of paint batches using the FTIR method as follows:-

Option 1 (Paint Manufacturer In-house Laboratory)

Cost of FTIR-ATR equipment = RM150,000.00 amortized over 10 years
Durability = RM15,000.00 per year
Annual equipment maintenance cost = RM2,000.00
Laser source replacement every 3 years = RM2,00.00 per year equivalent.
One technician cost = RM24,000.00 per year.
Airconditioning & electricity = minimal impact.
Total cost per year = RM43,000.00
Average paint production per year = 2,000,000 litres.
Average number of paint production batches per year = 2,000.

Testing cost per batch = RM21.50
Testing cost per litre = RM0.02 i.e. 2 sen.

Option 2: Testing by 3rd Party Laboratory

Universities / SIRIM / Private Laboratories = RM100.00 per sample.
Based on smallest batch size of 1,000 litres,
cost per litre = RM0.10 i.e. 10 sen.

Plant Visit to PPG Performance Coatings Sdn Bhd

*Reported by Nor Azrie Abu Samah, Materials Technology Education
Edited by Ir. Max Ong Chong Hup and Assoc. Prof. Dr. Melissa Chan Chin Han,
Editors of Materials Mind*

Date: 27th June 2014, Friday

Time: 10 am to 12 noon

Venue: PPG Performance Coatings Sdn Bhd
4070



Plant Visit

to Jotun Paints (Malaysia) Sdn Bhd

Date: 24th October 2014, Friday

Time: 9.30 am to 1 pm

Venue: Jotun Paints (M) Sdn Bhd, Lot 9143, PN 38500,
Kawasan Perindustrian Nilai, 71800 Nilai, Negeri
Sembilan, Malaysia



Visit to Faculty of Applied Sciences Universiti Teknologi MARA

19th November 2015, 10.00 am (Thu)



Mock execution of Coating Fingerprint Certificate for 2-component intermediate materials of polymeric coatings at paint factory



By Ms. Nurul Asni Mohamed,
Chairperson, IMM Task Force on Coatings Fingerprinting
Principal Engineer (Corrosion), Group Technical Solutions, Technical &
Engineering Division, PETRONAS GTS, Malaysia

It is an excitement to share the quantum progress of IMM Task Force on Coatings Fingerprinting (Phase II). Starting in May 2015, there will be mock execution of **Coating Fingerprint Certificate** for 2-component intermediate materials of polymeric coatings at paint factories in Malaysia for a period of 2 – 4 weeks. Feedbacks and comments from paint manufactures will be compiled. Stay tuned with us for the latest development of the first-of-its-kind coating fingerprinting initiative in the WORLD!

MORE
with **IMM**

LET YOUR
VOICE
BE **HEARD**

Join the mock execution
be involved in the
STANDARDS PROCESS

**How did we get
academic recognition?**

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Publications

1

Magazine



FT-IR FINGERPRINTING OF ORGANIC COATINGS: POSSIBILITIES AND PRACTICALITIES IN INDUSTRY

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2



Fourier-transform infrared analysis of polymeric coatings as benchmark for paint industry

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²Research Instruments (M) Sdn. Bhd., D7-1-G, Block D7, Pusat
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Malaysia
Email: renee.teo@ri.com.my

3



4

FTIR structural analysis of epoxy paints on steel structure for coating fingerprinting certificate as benchmark for paint industry

CHAN Chin Han^{1*}, Max ONG Chong Hup², TAN Winie¹, Mohamad Kamal HARUN¹, LEE Jia Yin³

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Email: michelle.lee@ri.com.my

ATR-FTIR: A Simple and Rapid Tool For Coating Fingerprinting

WAY Chiang Poh¹, TAN Winie^{2*} and CHAN Chin Han²

¹PerkinElmer (M) Sdn. Bhd., #2.01, Level 2, Wisma Academy, Lot 4A, Jalan 19/1, 46300, Petaling Jaya, Selangor, Malaysia

Email: Kenneth.way@perkinelmer.com

²Universiti Teknologi MARA, Faculty of Applied Sciences, 40450 Shah Alam, Selangor, Malaysia

E-mail: tanwinie@salam.uitm.edu.my and tan_winie@yahoo.com (*corresponding author)

cchan@salam.uitm.edu.my and cchan_25@yahoo.com.sg

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Magazine



Technical article 1

Compare functions of FTIR software for structural analysis of epoxy paints on steel structures for coating fingerprinting certificate

CHAN Chin Han^{1*}, Max ONG Chong Hup², TAN Winie¹, Mohamad Kamal HARUN¹, LEE Jia Yin³

¹Universiti Teknologi MARA, Faculty of Applied Sciences, 40450 Shah Alam, Selangor, Malaysia

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Magazine



Technical article 1

Analysing Organic Coatings

CHEW Kong Chin

Becker Industrial Coatings Sdn. Bhd., 3 & 5, Jalan Anggerik Mokara 31/54, Seksyen 31, Kota Kemuning, 40460 Shah Alam, Selangor, Malaysia

E-mail: kongchin.chew@beckers-group.com

7

Scopus-indexed journal

Saaïd FI, Chan CH, Ong MCH, Winie T, Harun MK (2015) Analyzing FTIR spectra using high sensitivity compare function of FTIR software for 2-pack epoxy paints. American Institute of Physics Conference Proceedings 1674:0200301-0200307. doi:<http://dx.doi.org/10.1063/1.4928848>

Analyzing FTIR Spectra Using High Sensitivity Compare Function of FTIR Software for 2-Pack Epoxy Paints

Farish Irfal Saaïd^a, Chin Han Chan^{a*}, Max Chong Hup Ong^b, Tan Winie^a, and Mohamad Kamal Harun^a

Macromol. Symp. 2016, 365, 209–222

DOI: 10.1002/masy.201650025 | 209

Quality Control Tests and Matching Fourier-Transform Infrared Spectra for Raw and Intermediate Materials of 2-Pack Epoxy Paints

Yoga Sugama Salim,¹ Chin Han Chan,*¹ Chong Hup Ong²

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How do we implement Certification scheme?

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Proudly presents to you

IMM Coating Fingerprint Certification Scheme

Tentative IMM Coating Fingerprint Certification Scheme comprises certification courses

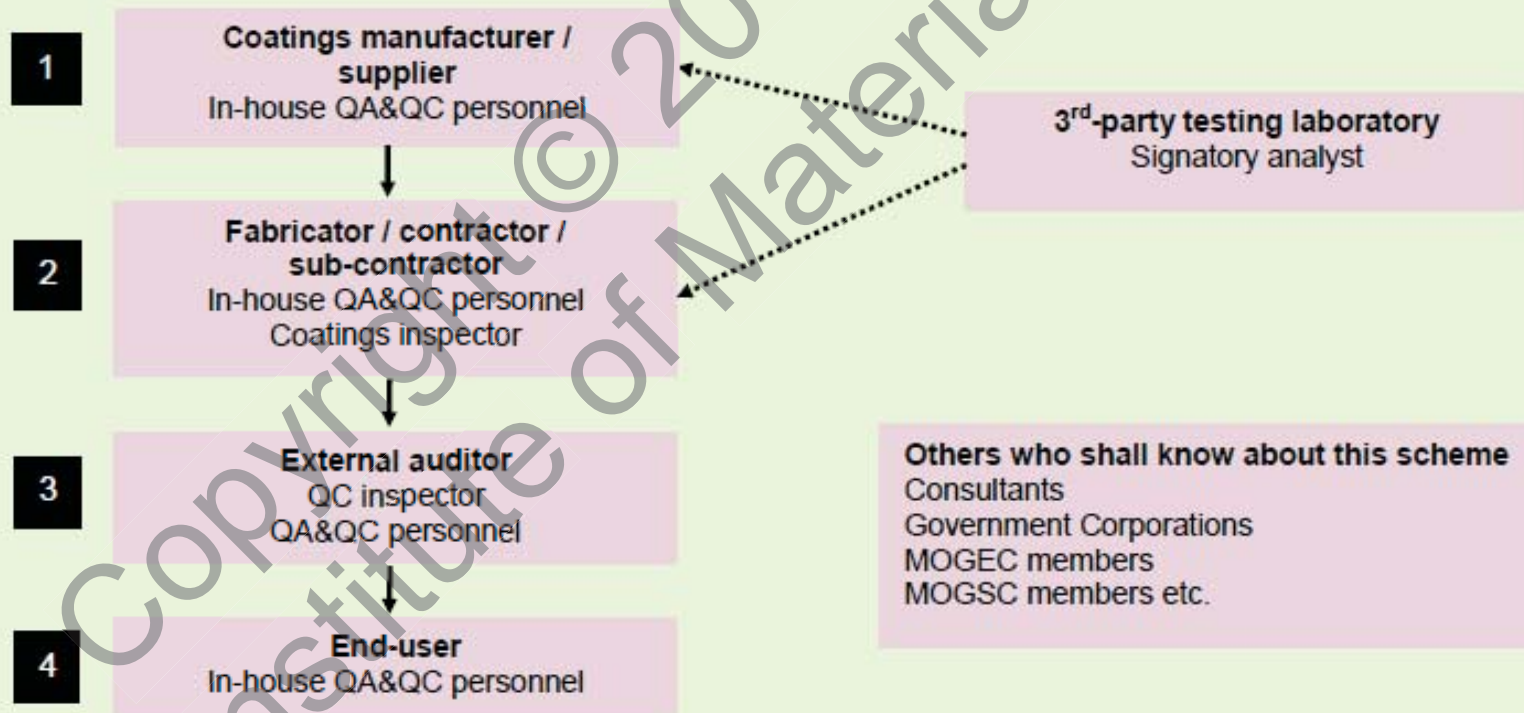
1. IMM Coating Fingerprint Foundation Course (a 1-day classroom & laboratory course) (*pre-requisite for IMM Certified Coating Fingerprint Quality Controller*).
2. IMM Certified Coating Fingerprint Quality Controller (a 2-day classroom & laboratory course, with an exam consisting of 100 multiple-choice questions to be answered within 3 hours at the end of the course).

Objective: To assure the quality of protective coatings products used in the oil & gas industry.

Who shall attend and be certified?

For all those who produce, inspect, review and validate Coating Fingerprint Certificate.

The flow of Coating Fingerprint Certificate



Successful coatings performance control

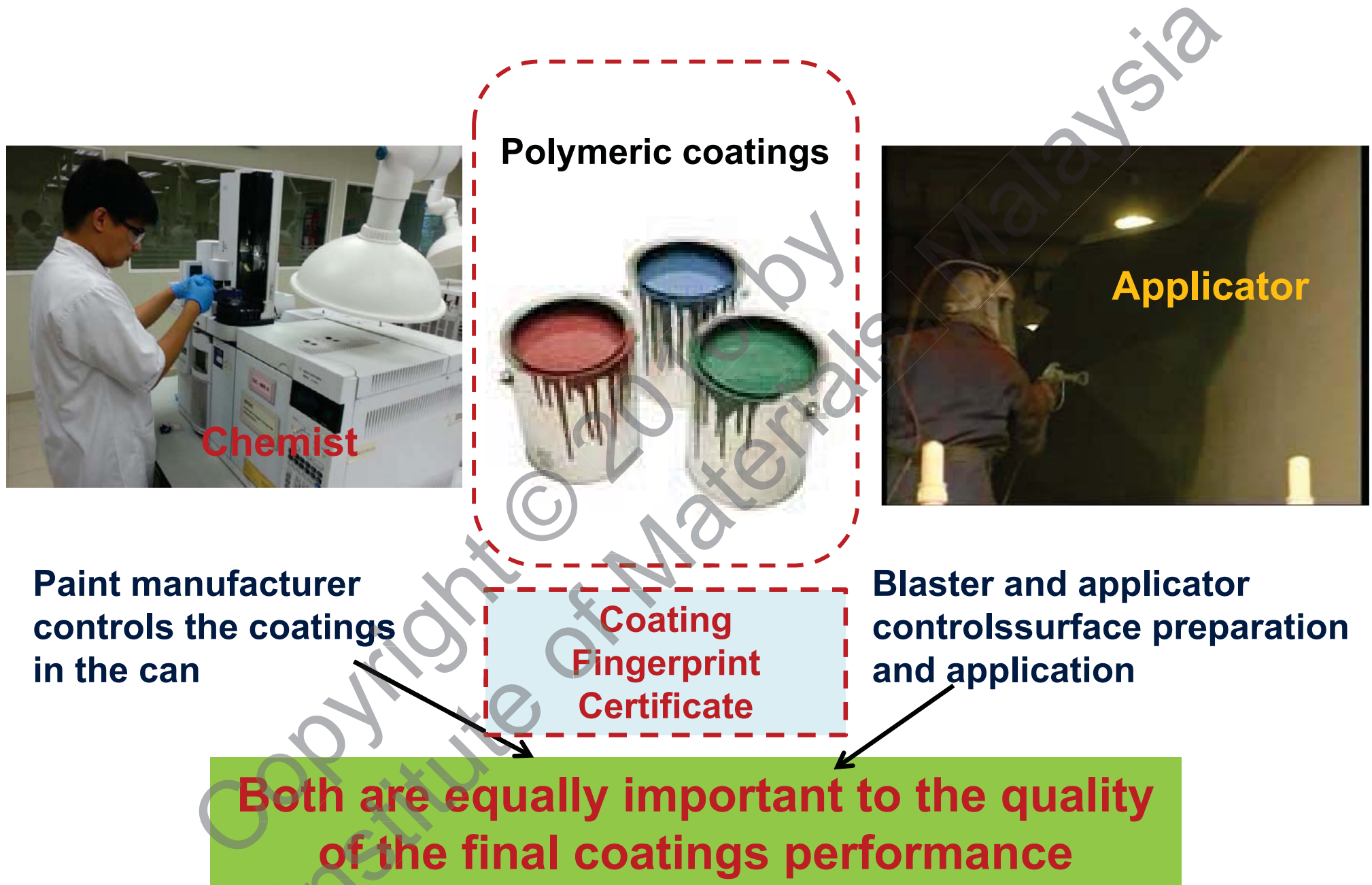


Figure 5



Tentative Coating Fingerprint Certificate for 2-component intermediate materials of polymeric coatings

(Rev. 2.3 on 20 September 2015)

Company name:		Country:	
Section 1: General information			
Product name:		Product type:	<i>e.g. epoxy, polyurethane, polyester, inorganic zinc, epoxy zinc, etc</i>
Date of issue:		Base material (<i>e.g. epoxy / epoxy zinc / polyacrylate / polyester / inorganic zinc</i>)	Curing agent / hardener (<i>e.g. amine / isocyanate / peroxide / ethyl-silicate</i>)
Specify base material & curing agent		<i>e.g. epoxy</i>	<i>e.g. amine</i>
Trade name			
Generic			
Factory location			
Batch number			
Production date			
Shelf life			

Physical analyses



Section 2: Test methods and results					
Physical analyses					
Parameters	Method	Specification	Result	Specification	Result
Viscosity	e.g. ASTM D4287 ASTM D5125 ASTM D562 ISO 2431 ISO 2884-1				
Density	e.g. ISO 2811-4				
Color code	e.g. BS 4800 OSHA				
Non-volatile matter (by mass)	e.g. ISO 3251				
Weight Solid: Zn metal/Total Zn Note: submit certificate of % purity by manufacturer Note: applicable to <u>organic and inorganic zinc only</u>	e.g. ISO14680-2				

Structural analysis



<i>Structural analysis</i>					
Infrared spectra	Wet sample as supplied in can. Matching criteria ≥ 0.900				
Base material: epoxy Curing agent: amine	ASTM D7588	600-4000 cm^{-1}	0.988	600-4000 cm^{-1}	0.970
	ASTM D7588	1000-1300 cm^{-1}	0.995	1000-1400 cm^{-1}	0.957
	ASTM D7588	700-900 cm^{-1}	0.996	N/A	N/A
Base material: polyacrylate / polyester Curing agent: isocyanate	ASTM D7588	600-4000 cm^{-1}		600-4000 cm^{-1}	
	ASTM D7588	1600-1800 cm^{-1}		2000-2500 cm^{-1}	
	ASTM D7588	3000-3800 cm^{-1}		3000-3800 cm^{-1}	
Base material: polyester Curing agent: peroxide	ASTM D7588	600-4000 cm^{-1}		600-4000 cm^{-1}	
	ASTM D7588	1600-1800 cm^{-1}		900-1200 cm^{-1}	
	ASTM D7588	2700-3100 cm^{-1}		N/A	N/A
Base material: epoxy zinc Curing agent: amine	ASTM D7588	600-4000 cm^{-1}		600-4000 cm^{-1}	
	ASTM D7588	1000-1300 cm^{-1}		1000-1400 cm^{-1}	
	ASTM D7588	700-900 cm^{-1}		N/A	N/A
Base material: inorganic zinc Curing agent: ethyl-silicate	ASTM D7588	600-4000 cm^{-1}		600-4000 cm^{-1}	
	ASTM D7588	N/A	N/A	2700-3200 cm^{-1}	
	ASTM D7588	N/A	N/A	1000-1500 cm^{-1}	

Section 3: FTIR test details (as per ASTM D7588)

Analyst & company name			
Brand & model of FTIR			
Type of FTIR spectrophotometer	e.g. benchtop / mobile / handheld		
Benchtop: ATR crystal material	e.g. diamond, zinc selenide (ZnSe), germanium		
Spectral correction	YES / NO [Note: if YES, please state the correction(s) made]		
Note: correction is NOT recommended.	e.g. automatic baseline correction		
Spectral range (cm^{-1})	e.g. 600 - 4000 cm^{-1}		
No. of sample scans (min 32)	e.g. 32 scans		
No. of background scans (min 32)	e.g. 32 scans		
Resolution (min 4 cm^{-1})	e.g. 4 cm^{-1}		
High sensitivity of correlation compare algorithm for matching ratio in absorbance mode	Note: Correlation compare algorithm of the FTIR software should depend on both x - (wavenumber) and y - (absorbance) vectors. High sensitivity compare algorithm, which analyzes the variations <i>via</i> summation of the squared differences of each variation from the overall mean OR equivalent, should be used.		
	Dependence on BOTH x - and y - vectors	YES / NO	High sensitivity compare algorithm
Trade name and batch number of reference spectrum for base material			
Trade name and batch number of reference spectrum for curing agent / hardener			



Authorized QA/QC Executive:-	Validated by:-
	
Signature:	Signature:
Date:	Date:
	IMM membership member:

Section 4: Compulsory appendices (to be submitted in CD or other digital formats)	
Appendix 1	Overlay reference and sample FTIR spectra for base materials (Note: In addition, raw data of reference and sample FTIR spectra must be provided in two raw data files)
Appendix 2	Overlay reference and sample FTIR spectra for curing agent / hardener (Note: In addition, raw data of reference and sample FTIR spectra must be provided in two raw data files)
Appendix 3	Certificate of analyses which are relevant to the in-house standard testings
Appendix 4	Certificate of % purity of zinc by metal manufacturer for organic zinc and inorganic zinc



Institute of Materials, Malaysia

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IMM COATING FINGERPRINT FOUNDATION COURSE

The first-of-its-kind one-day course on "Coatings Fingerprint Certificate" in the WORLD



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Enabling Next-Generation Science

10th Sept 2015 / Thursday | Holiday Inn Glenmarie, Shah Alam, Selangor | 9.00 am to 5.00 pm

Background of Coating Fingerprint Certificate and all related articles can be accessed on
<http://iommm.org.my/coating-fingerprint-certificate/background-of-coating-fingerprint-certificate/>

All registration & enquiries shall be direct to :

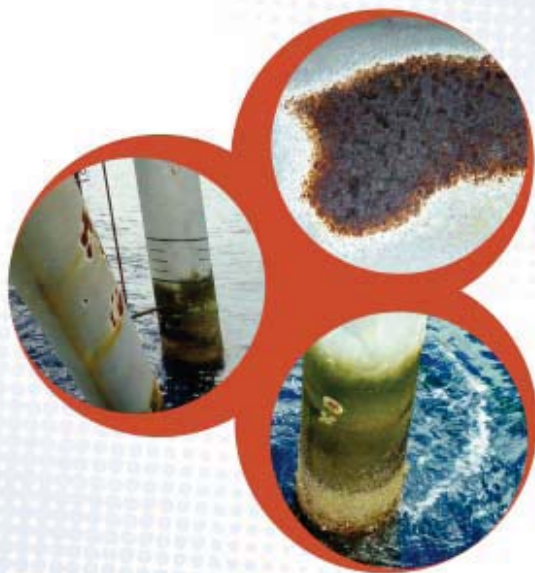
Ms. Ainil Fidrah Mohd Ghazali | +6019-385 3605 | ainil@mte.com.my

A group shot of trainers, sponsor and participants of the 1st IMM Coating Fingerprint Foundation Course



IMM COATING FINGERPRINT FOUNDATION COURSE

under IMM Coating Fingerprint Certification Scheme



Chan Chin Han

Training and Certification by



Institute of Materials, Malaysia

Course organizer



The-first-of-its-kind IMM Coating Fingerprint Foundation Course in the WORLD



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Chin Han from Universiti
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Dr. Chew Kong Chin from
Becker (M) Sdn Bhd

Joe Set from Research
Instruments Sdn Bhd

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IMM Certified Coating Fingerprint Quality Controller Course 1st Edition

under IMM Coating Fingerprint Certification Scheme
Coatings Fingerprint Basics: Putting Coating Fingerprint



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Register Today!!



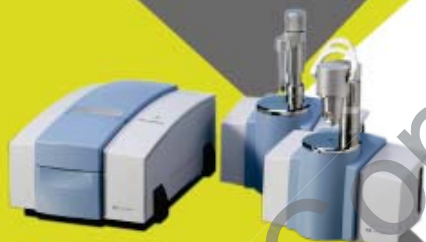
The first-of-its-kind, two-day course on "Coating Fingerprint Certificate" in the WORLD

IMM Certified Coating Fingerprint Quality Controller Course

Date : 24th - 25th February 2016 (Wednesday - Thursday)

Venue : Four Points Sheraton Hotel, Bandar Puteri, Puchong, Selangor

Time: 9.00 am to 5.00 pm



For Registration and Enquiries,
Please contact :
Ms. Ainil Fidrah Mohd Ghazali,
Mobile tel: (+6)019-385 3605
Email: ainil@mte.com.my

Currently

2-component Epoxy Coating was used in the evaluation

Coming!!

- ☐ Inorganic Zinc Coatings
- ☐ Epoxy-Zinc Coatings
- ☐ Polyurethane Coatings
- ☐ Acrylic Coatings
- ☐ Polyester Coatings, *etc.*

Coming!!

- ☐ In-house FTIR testing
- ☐ 3rd-party lab testing
- ☐ On-site testing
- ☐ QC inspectors
- ☐ *etc.*

**FTIR can be used to fingerprint
all these other types of coatings !!**

Background of Coating Fingerprint Certificate and all related articles
can be accessed on

[http://iommm.org.my/coating-fingerprint-certificate/
background-of-coating-fingerprint-certificate/](http://iommm.org.my/coating-fingerprint-certificate/background-of-coating-fingerprint-certificate/)

Thank you

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