FORCE TECHNOLOGY

Material News

No. 7 A newsletter from FORCE Technology on corrosion, metallurgy and chemical analysis October 2008

This issue

Editorial

Dear Reader,

Damage and failure investigation is one of FORCE Technology's key competence areas, and we are pleased to hold Denmark's best preparedness in the field. When things go wrong, it is of utmost importance that we provide immediate assistance, since both huge financial and safety aspects may be involved.

This applies not least to the field of aircraft where we have assisted the Accident Investigation Board in several investigations, and in this issue you can read about our failure analyses on the Dash 8 Q400 crash at Aalborg airport.

How do you examine jewellery to make sure it complies with the rules and regulations applicable to the Danish jewellery market? Read about our long-standing expertise in the field, and you will have no doubt what could and should be checked and inspected.

You can also read about our latest recruitments and take a look at our course overview for 2009.

Enjoy your reading!

Nils Linde Olsen
Vice President

How to examine jewellery

FORCE Technology has been engaged in inspection and guidance on jewellery and materials used in making jewellery since 1988 when we were appointed the Danish Assay Office. Since then, tasks such as performing examinations and issuing instructions in other areas connected with jewellery and thus other similar products have naturally been included.

Harmful metals

These investigations originated as a consequence of the Danish regulation of the nickel content in goods, designed to be worn on, or close to, the skin for longer periods of time. This regulation was later adopted in the EU as a directive. Later came adjustments on other health-harmful metals such as mercury and cadmium, and as the most recent measure the Danish regulations on lead contents have been adjusted so that metals applied for jewellery can no longer contain lead in amounts exceeding 100 ppm in homogenous individual parts.

Metallic materials

Traditionally, FORCE Technology holds great experience and expertise in examining metal materials in a large number of areas. Thus, assignments including examination and guidance on materials applied for manufacturing jewellery are cohesive with FORCE Technology's usual tasks and assignments. Therefore, FORCE Technology may provide and offer many different kinds of jewellery examinations, be it of a destructive or non-destructive nature – each with its own set of advantages and disadvantages, depending on the type and nature of the specific task.

Heavy metals and chemical reactions

Lately, there has been a lot of focus on harmful substances in jewellery. FORCE Technology has conducted an investigation of the jewellery market for the Danish Environmental Protection Agency, and it turned out that a part of the jewellery exceeded applicable limits.

FORCE Technology is able to trace all kinds of heavy metals in materials applied for jewellery on the basis of specific methods – regarding both content and release. The most traced heavy metals are: lead, cadmium, nickel and mercury, but as mentioned other heavy metals such as arsenic, barium, chromium, selenium and copper may also be determined at the customers own choice.

FORCE Technology examines jewellery within a number of areas

Apart from heavy metals and metal materials, FORCE Technology also performs examinations of a number of chemical connections. In relation to materials applied in jewellery, this could be benzidine applied in textile-chained jewellery or chromate applied in leather.

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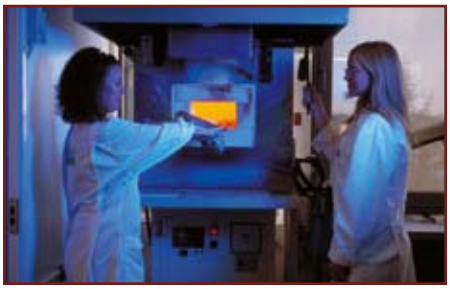

No tasks are too small

FORCE Technology performs tasks of all sizes. Often, the requesting party is initially interested in an indicative examination where costs can be kept modest. However, in some cases they choose to require more thorough examinations that will lead to final and definitive results.

Tasks of an indicative nature are often called screenings. They are non-destructive and based on the X-ray florescence (XRF)-technique. Definitive methods often include destruction and/or homogenisation of test samples and may usually be performed at atom absorption- or ICP-analysis after acid-opening.

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Fast analysis and conclusion after plane crash

"Force Technology supplied a fast and well documented analysis and acted as a flexible and competent partner", says Martin Puggaard from the Accident Investigation Board Denmark.

In 2007 the Danish aviation industry attracted significant attention, when a SAS aircraft of the type Bombardier Dash 8, Q400 crash-landed at Aalborg Airport.

All of the 76 passengers were rescued without serious injuries. But the attention of the outside world had been invoked, and with it further pressure on those responsible to try and find the cause of the accident.

The expertise at hand

In Denmark, this is a matter for the Accident Investigation Board Denmark. In that connection, FORCE Technology was contacted and asked to perform material technical analyses on components from the wrecked aircraft.

FORCE Technology holds great experience in dealing with failure analyses, and has assisted with investigating both plane and train accidents.

A fast effort

In 3 to 4 days FORCE Technology presented their conclusion to the analysis. A fast and smooth performance considering the complexity of the case.

"We enjoy a good and close business relationship with the Accident Investigation Board, dating back years. When we were contacted about the accident with the Dash 8, Q400 aircraft, we knew that it was important to the involved parties that we performed the material technical analyses quickly", says Head of Department for Corrosion and Metallurgy, Peter Bo Mortensen from FORCE Technology.

Furthermore, he adds that the "cancellation of planned departures results in impatient and frustrated passengers. Aircraft manufacturers and air line companies are worried about safety and of course responsibility and financial consequences. At the same time, the public authorities would like a valid, thoroughly prepared material technical analysis for the further investigations. Thus focus is on speed and validity".

Galvanic corrosion was the cause

During the entire process at FORCE Technology, all analyses were followed by the Accident Investigation Board and technical advisors from the manufacturing country.

"Our analyses revealed that the material combination and the physical environment surrounding the landing gear during operation, resulted in galvanic corrosion, which made a component in the landing gear of the Dash 8, Q400 aircraft give in", explains Peter Bo Mortensen.

Authority

"It has been an advantage using FORCE Technology for this analysis. An otherwise similar impartial competence should have been found abroad. This would have delayed the conclusion on the cause that lead to the failure", explains Martin Puggaard.

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FORCE Technology helped the Accident Investigation Board find the cause for the accident with the SAS plane, type Dash 8, Q400

Aircraft on its knees at runway

Apart from the examinations of the Dash 8 aircraft, FORCE Technology was also involved in the examination of a Boeing aircraft for the Accident Investigation Board in 2001.

The aircraft had just finished boarding its passengers and was fully loaded with fuel and luggage when a truck beam in the undercarriage collapsed, leaving the aircraft supported by the destroyed remains only. No one was injured but the situation would probably have been different had the collapse occurred during landing.

Identified the fault

"When we started analysing the truck beam from the plane's undercarriage, it was soon obvious that this was a case of stress corrosion cracking which was also confirmed by all the thorough scanning and micro structure analyses of the metal. Subsequently, it was concluded that the surface treatment of the inside of the pipe-shaped part had not been correctly performed according to the aircraft manufacturer's service manual, and this had exposed the undercarriage to corrosion", Hans Peter Nielsen, specialist with FORCE Technology, explained at the time.

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New employees

Lisbeth Rischel Hilbert

39, M.Sc. Eng. Ph.d., has, as of 1 September, been employed with the department for Corrosion and Metallurgy in Brøndby as a materials specialist.

Lisbeth holds a degree in chemical engineering and has specialised in corrosion, electro-chemistry and materials technology in biologically active environments. She will be working with VVS installations, electrochemical measurements and stainless steel.

Lisbeth previously worked as an associate professor with the Department of Manufacturing Engineering and Management at DTU, where she has been teaching corrosion and doing research on corrosion monitoring, materials development and hygienic design in the food industry for the past 7 years.

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Peter Kristensen

37, has, as of 1 September, been employed with the department for Corrosion and Metallurgy in Brøndby as a technician.

Peter will be a part of the versatile group of material technicians who daily partake in solving the many tasks within e.g. materials selection and damage and failure analyses. His primary tasks will be within electrochemical corrosion examinations and service life assessments at power stations, but Peter will also help solving a number of other ad hoc tasks in the department.

Peter has a background in process technology and has specialised in process techniques. He previously worked as a technician with Haldor Topsøe in the development department for diesel catalyst converters.

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Olga Mishina

M.Sc. Eng., has, as of 1 October, been employed with the Department for Corrosion and Metallurgy in Brøndby.

Olga has a degree in mechanical engineering and has specialised in metallurgy and technologies for plastic deformation.

Olga will be part of the department's group of materials' specialists, and she will use her competences in the varying tasks of the department.

Previously, Olga worked as a research engineer in an R&D department at SAPA AB in Sweden, where she worked for 6½ years, primarily with commercial Friction Stir Welding of aluminium related research and development projects.

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Susann Geschke

39, M.Sc., has, as of 1 October, been employed as a specialist with the department for Chemical Analysis in Brøndby.

Susann is a Master of Science in analytical chemistry and she holds a Ph.d. in analytical chemistry.

Susann will be working in the fields of customs and organic analysis.

Susann has previously worked as an analytical chemist with Eurofins Miljø A/S in Vallensbæk, where she, for the past 3 years, has been working primarily with QA, QC and methods development for pesticides and their decomposition products in drinking and surface water.

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Nanna Svendsen

40, M.Sc. Eng., returns, as of 1 November, to the department for Chemical Analysis after having met other challenges for the past year.

For the past eight years Nanna has worked as a consultant in the field of plastics, and she has undertaken tasks within all aspects of the polymers and plastics fields. Nanna will continue to work within polymers and plastics as well as within the field of customs analysis.

Nanna has worked as a development engineer with Chempilots A/S for the past year. Here, she has been engaged in development tasks within "Medical Devices".

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Courses in "Corrosion and materials' technology" and "Maintenance" in 2009

Area	Ref.	Titel	Duration	Date	Price DKK
Aluminium	A.1	Aluminium – Material knowledge	2 days	To be offered in 2010	
	A.2	Aluminium – Decomposition forms, corrosion, cracks, wear	2 days	To be offered in 2010	
	A.3	Aluminium – Surface treatments	2 days	3-4 February	8.300
	A.5	Aluminium – Joints	2 days	6-7 October	8.300
Construction	B.3	Domestic feed water installations, materials and corrosion protection	2 days	24-25 February 15-16 September	8.300
	B.4	Metals corrosion in construction – Galvanic corrosion	1 day	17 March	4.900
	B.5	Legionella and water quality in domestic feed water systems	1 day	8 December	4.900
Energy systems	E.1	Maintenance of boiler systems	3 days	9-11 December	11.300
	E.2	Maintenance of district heaters and tube/pipe systems	3 days	10-12 March	11.300
	E.3	Water treatment and corrosion in technical systems	1 day	13 January	4.900
	E.80a	Cooling with seawater	1 day	22 September	4.900
	E.80b	Cooling with fresh water	2 days	27-28 October	8.300
Machine Systems	M.50	Damages and failures – Analysis	4 days	27-30 January	14.200
	M.53	Fatigue fractures	2 days	21-22 April	8.300
Stainless steel	R.1	Stainless steel – Materials knowledge	2 days	3-4 March	8.300
	R.3	Stainless steel – Surface treatment	2 days	20-21 January	8.300
	R.5	Stainless steel – Joints	3 days	8-10 September	11.300
	R.8	Foods safety measures – Stainless steel production equipment	2 days	29-30 September	8.300
	R.76	Corrosion and choice of stainless steel	2 days	28-29 April	8.300
Steel	St.3a	Steel – Surface treatment, corrosion protection	2 days	24-25 November	8.300
	St.4x	Steel – Surface treatment, paint systems	2 days	1-2 April (Århus)	8.300
	St.52-I	Steel metallurgy for non-metallurgists, I	2 days	14-15 April (Århus)	8.300
	St.52-II	Steel metallurgy for non-metallurgists, II	2 days	3-4 November	8.300
Systematic maintenance	V.01	Systematic maintenance – Quality control in the operating phase Intensive course for managers and employees	5 days	According to agreement	
	V.06	Inspection and maintenance, module 1 (Materials and decomposition)	3 days	19-21 October	11.300
	V.07	Inspection and maintenance, module 2 (NDE and NDT methods)	4 days	9-12 November	14.200
	V.08	Inspection and maintenance, module 3 (Planning of inspection and maintenance)	3 days	30 November - 2 December	11.300

Registration

Please register with Jette Jacobsen by phone: +45 43 26 74 26, on email jtj@force.dk or on our website forcetechnology.com

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