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## Editorial

Dear Reader,

Welcome to the latest issue of Material News.

Next year the new requirements as regards CE-marking of steel and aluminium are expected to come into force. That means increased requirements for quality management systems with both manufacturers and sub-suppliers. Are you ready for that? In this issue you will learn what it takes to meet the requirements.

Innovation is of the essence with us and as one of the latest developments you may read about the concept Marine Engineering and a new system for automation of the welding process in wind turbine towers. At present, the system is being tested with Skykon A/S.

Have you experienced problems with the goods you bought in the Far East? Participate in our project day and learn how to avoid pitfalls, if any! We will hold the project day again, as our premises were filled to the brim four times this year with people interested in the topic.

Finally, we present our news on staff and you will find our course calendar for 2011.

Enjoy your reading!

Ernst C. Kristensen  
Vice president

## Marine Engineering – new concept

FORCE Technology now focuses on developing Marine Engineering as a concept and put 145 specialists at the disposal of the industry.

Marine Engineering often directs our attention to vessels and the shipping industry, but Marine Engineering actually also includes FPSO (Floating Production Storage and Offloading) and oil rigs, as the applied machines and equipment are identical to a large extent.



Engine at shop test

### We cover both stages of design and operation

A vessel is a complicated "product", and many questions must be considered in the stage of design. The ship's structure and safety regulations must comply with current IMO and rules of classification. Furthermore, the technical and commercial operation, including the increased emission requirements must be met. Not only in the design phase of a vessel, is knowhow within "Marine Engineering" of the essence, it also applies when the vessel is in operation, i.e. the actual operating mode, wear, failures, cracks, fuel/lubricating oil, performance, condition monitoring, root cause analysis, and troubleshooting are topics that require expert knowhow.

### Specialists' availability

The Department for Corrosion and Metallurgy include 45 specialists of which five have extensive knowhow of vessels and machinery, whereas the remaining 40 specialists hold their core competences within corrosion, metallurgy, assessment

and tests. Furthermore, two external specialists are available, whose core competences are within the fields of 2- and 4-stroke diesel engines, bearings, turbochargers, turbines, gears and boiler systems.

Therefore, the Department for Corrosion and Metallurgy will, together with the Division for Maritime Industry (DMI) who dispose of more than 100 specialists within hydro- and aerodynamics will be able to offer the concept of Marine Engineering at a very high level.

### International memberships

FORCE Technology is a member of both the CIMAC Denmark (The International Council of Combustion Engines) work group and WG 10 Users. We became members of WG 10 in June 2010, during the CIMAC congress in Bergen, Norway. The group is a dialogue forum among users and engine manufacturers. We will therefore obtain extensive knowledge of a number of operation related problems, providing us with the opportunity to offer our assistance and at the same time share our knowledge, through e.g. case stories.



Totally destroyed compressor wheel

### Further information

Jens Thomsen  
+45 76 10 56 82 • jjt@force.dk

# New welding automation for windmill towers

FORCE Technology has facilitated the welding process for windmill towers considerably by developing a new, unique method. Form and adaption of the weld groove is measured by sensors, and the process is adapted automatically in the making. Skykon A/S is testing the new method, which has many advantages and e.g. reduces the need for repair.

Correct welding parameters like volt, ampere, welding speed, etc., and the welder's capability to adjust the process, are the most important elements for accomplishing a successful result.

Often the attempt to mechanise or automate a welding task ends in concluding that the groove varies too much, and welding is therefore performed manually or in a simple form of mechanisation.

### A new system has been developed

FORCE Technology has succeeded in designing a general system, enabling automation of welding tasks that – due to large geometric variations – have not been possible to automate previously.

The system is a spin-off from a project with Odense steel shipyard Lindø, which showed that we could produce our own laser sensors capable of functioning in a hard production environment. The project also evidenced that welding parameters can be generated "on the fly" by laser sensor signals automatically.

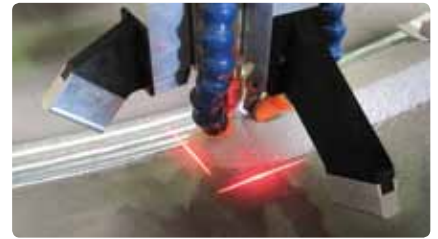
### Skykon A/S tests the system

A new application for the system is presently being implemented with Skykon A/S in Give, Denmark, in one of their automatic, submerged-arc welding devices used for production of windmill towers.

The system consists of two parts:

1. Laser-based optical sensors that ensure uniform welding and correct position of the welding wire in the groove.
2. Automatic calculation of welding parameters by use of neural networks. The sensors "see" the shape of the groove in front of the welding wire. They are then capable of calculating where and how the welding should be performed in the groove when the welding wire reaches that point.

Presently, both supervision and all corrections are made manually. Skykon A/S wishes to enable one operator to supervise welding of several towers simultaneously without having to do more repair work.



Skykon A/S tester automatiseringssystemet

### Unique system with many advantages

The system is the first of its kind in the field of welding and can be used in almost all arc welding processes.

Besides the advantage that one operator is able to supervise several workstations, another advantage is that the finished product is less operator-dependant, meaning that operators may be recruited from a wider circle, and that Skykon A/S achieves a more uniform weld quality with less repair work.

#### Further information

Lars Holmberg  
+45 43 26 71 89 • lkh@force.dk

# Project days were very popular

Risks when acquiring less expensive goods in the Far East is a very popular topic. Indeed so popular that up until now, FORCE Technology has held four project days on this subject.

"We have often been involved in cases, in which the quality of the supplied material has not met the demands of the customers", says Henrik Bang, one of the lecturers. "Therefore we decided to hold project days on the subject, to alert Danish companies as to which pitfalls to avoid", he continues.

### The result may be financial losses

"Unfortunately, we have seen examples of the company having to reject steel materials or products acquired in the Far East" complements Jakob Mølholm, who is the other lecturer. And he continues: "This often leads to financial losses and in the worst cases it may result in complaints and compensation claims".



### The project days were quickly over-subscribed

"We knew that the subject was of current interest and we were very pleased when we soon had to find three extra dates, for our project day.

### Extra dates

We still receive requests on the issue and we have now scheduled two more days: 25 November 2010 in Esbjerg and 9 March 2011 in Brøndby", concludes Henrik Bang.

#### Further information

Henrik Bang  
+45 76 10 06 76 • hip@force.dk

# Are you ready for the new requirements for CE-marking of steel and aluminium structures?

The new European performance standard 1090-1 is expected to come into force in August 2011. The standard deals with requirements for CE-marking of supporting components and structures of steel or aluminium work, i.e. all structures that are part of construction of some sort.

For a manufacturer, with his or her own, production or a sub-supplier this means increased requirements for the quality management systems and higher documentation requirements in general than previously specified.

Meeting the requirements for CE-marking requires the following:

**1. Individual production control:** the manufacturer must determine, document and maintain a system for production control FPC (Factory Production Control). E.g. this may be structured on an adjusted quality management system according to EN/ISO 9001 aiming/targeted at performing/making steel and aluminium structures or based on EN/ISO 3834.

**2. Introductory testing:** EN 1090-1 differs between manufacturers who only produce and those who perform both design and production. If the manufacturer both designs and produces he has to prepare a basis for design for the properties that have to be declared ITC (Initial Type Calculation). If design is applied, e.g. EN 1090-2, a procedure for the projection phase must be prepared,

as this is part of the quality system.

Anyone who produces components has to test his or her product to verify that the production meets the design/calculation requirements. This applies whether you have performed the design yourself or whether you perform ITT (Initial Type Testing).

If either material, production methods or performance standard change a new test must be performed. The test must be based on a European standard and it must be supplemented by calculations of structure.

**3. Sampling, testing and supervision at the works:** It is a requirement that the company must supervise the planning work and production through random sampling. Furthermore, production needs an inspection procedure for check, registration and material traceability.

**4. CE approval:** The Execution Class (EXC) defines the interval between the audits, performed by a notified body, e.g. FORCE Certification A/S. If no design or production changes have been made, the audits are infrequent. However, if

e.g. the responsible welding coordinator or the basic equipment etc. is changed, audit bodies will regard this as a new production and a new period will commence.

The above is a brief, summarised listing of the requirements about to come. Since this is a European standard, the challenge for us in the industry is to jump the bandwagon, are you ready?



#### Further information

Lars Holmberg  
+45 43 26 71 89 • lkh@force.dk

## New employees

### Jens Thomsen



a chief engineer, 44 years old, has been employed with FORCE Technology, the Department for Corrosion and Metallurgy, as per 14 June 2010.

Jens' job with FORCE

Technology, will be to develop "Marine Engineering" into a new business area entailing failure analysis, troubleshooting, consultancy and services.

Jens has previously been employed as a chief engineer with the shipping company A.P. Møller-Mærsk A/S for 27 years with the Technical Organisation, and latest as a senior specialist, with the

Shipping Company's two-stroke diesel engine department as his special area of responsibility. Jens has also been attached to the R&D and technical services departments of Winterthur with Wärtsilä Switzerland during 2003/2004.

#### Contact Jens at

+45 76 10 56 82 / +45 22 69 70 20 • jjt@force.dk

### Kirsten Grønning Sørensen



M.Sc. Eng. Ph.D., 47 years old, has been employed with FORCE Technology, the Department for Corrosion and Metallurgy as per 1 September 2010.

Kirsten has specialised in mechanical engineering within metallurgy and non-destructive inspection. In future Kirsten will be engaged in failure and damage investigations in general and also on assignments within the power plant sector.

Kirsten has previously been employed

as a metallurgist in the R&D department with NKT Flexibles, where she has been engaged in developing flexible pipes for the oil and gas industries for the past 2 ½ years.

#### Contact Kirsten at

+45 43 26 75 44 • kgs@force.dk

## Courses in "Corrosion and materials technology" and "Maintenance"

Area	Ref	Title	Duration	Date (1st half year 2011)	Price DKK
Aluminium	A.1	Aluminium – Materials knowledge	2 days	8-9 February	8.900
	A.3	Aluminium – Surface treatments	2 days	8-9 March	8.900
Construction	B.4	Metals in construction - How do I achieve durable solutions?	1 day	27 April	5.300
Power plants	E.3	Water treatment and corrosion in technical systems	1 day	28 April	5.300
Machinery	M.50	Failures and damages – Damage investigation	4 days	11-14 January	15.100
	M.53	Fatigue fractures	2 days	12-13 April	8.900
Stainless steel	R.1	Introduction to stainless steel	2 days	18-19 January	8.900
	R.3	Stainless steel surfaces in pharma- and biotech industries	2 days	29-30 March	8.900
	R.8	Food safety – Stainless production equipment	2 days	26-27 January	8.900
	R.76	Corrosion and choice of stainless steel	2 days	5-6 April	8.900
Steel	St.4x	Steel – Surface treatment, paint systems	2 days	8-9 February	8.900
	St.52-I	Steel metallurgy for non-metallurgists, I	2 days	22-23 March	8.900

## Courses in "Welding" and "Welding inspection"

Area	Ref	Title	Duration	Date	Price DKK
Update in welding technology	S.43	Heat treatment of steel and welded joints	6 days	23 November - 2 December + 5 December	19.700
International Welding Specialist	IWS 0	Welding specialist basic – Preparation course	12 days	10-25 January	36.400
	IWS 1	Welding methods and equipment - Theory and practice	13 days	3-18 March	38.700
	IWS 2	Materials and their weldability	10 days	18 May - 1 June	31.400
	IWS 3+4	Construction, manufacturing and quality control	10 days	17-30 August	33.500
International Welding Technologist	IWT P	Practical welding and cutting	5 days	31 January - 4 February	17.000
	IWT 1	Welding methods and equipment	15 days	30 March - 15 April + 28-29 April	44.500
	IWT 2	Materials and their weldability	12 days	25 May - 1 June + 6-9 June + 15-16 June	38.000
	IWT 3	Construction and design of welded products	5 days	22-26 August	17.000
	IWT 4	Manufacturing and quality control	12 days	3-14 October + 27-28 October	39.800
International Welding Engineer	IWE P	Practical welding	5 days	31 January - 4 February	17.000
	IWE 1	Welding processes and equipment	17 days	30 March - 15 April + 26-29 April	8.900
	IWE 2	Materials and their weldability	15 days	25 May - 1 June + 6-16 June	46.000
	IWE 3	Construction and design of welded products	10 days	5-16 September	33.500
	IWE 4	Manufacturing and quality control	15 days	3-14 October + 24-28 October	48.000
	IWE M	Oral exam	1 day	15 November	7.000

Register on [www.forcetechnology.com](http://www.forcetechnology.com) under "Courses and Events".

Material News is a newsletter on corrosion, metallurgy and welding and is published twice a year. Material from the newsletter may be used with clear indication of source.

**Editors:**  
Marianne Krogsgaard Berg  
Jette Jacobsen

FORCE Technology  
Park Allé 345  
2605 Brøndby  
Tlf. +45 43 26 70 00  
Fax +45 43 26 70 11  
[info@forcetechnology.com](mailto:info@forcetechnology.com)  
[forcetechnology.com](http://forcetechnology.com)