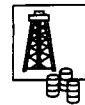


OIL & GAS TECHNOLOGY



THERMIE PROGRAMME: promotion of energy technology in Europe

European offshore technologies focus on safety

DURING THE LAST DECADE, innovative technologies have played an increasingly important role in improving safety levels in the offshore oil and gas industries. Everything from fire and blast technologies to systems for preventing ship collisions have all helped to make the hydrocarbons industry a safer environment.

The European Commission's THERMIE Programme has been at the forefront in encouraging the development of safety technologies and this issue of O>N describes four projects with safety



EDITORIAL

implications. These include an offshore traffic prediction system developed in the

Netherlands, a methane detection system for rigs developed in Italy, a technique for assessing defects on offshore structures developed in the UK, and an advanced risk management system developed in France.

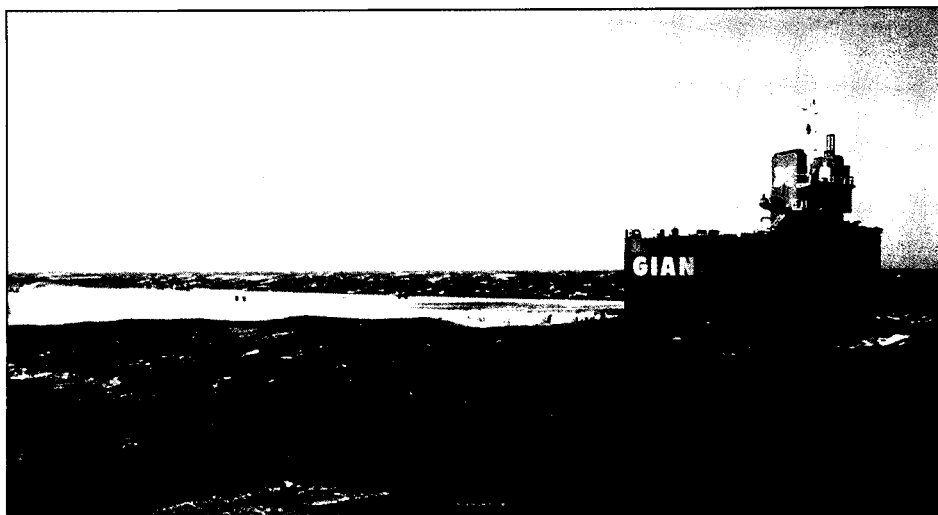
Safety, however, is only one of the many technical areas which THERMIE is concerned with in the hydrocarbons sector. Examples of other innovative European oil and gas technologies will be on show at the European Union's booth (No. 6277) at the Offshore Technology Conference in Houston (6-9 May 1996).

Improving traffic and offshore platform safety

DURING THE LAST TWO DECADES the growth in offshore oil and gas production has resulted in many platforms being sited in the North Sea and Mediterranean, traditionally busy shipping routes. These platforms are increasingly threatened by drifters, i.e. vessels without propulsion or steering which are subjected to wind, waves and current.

TOPSS (Traffic and Offshore Platform Safety System), developed by MARIN in The Netherlands with support from the EC's THERMIE Programme, aims to provide an operational system for the prediction of the track of an arbitrary vessel drifting in arbitrary weather conditions. The system contains extensive data on tidal currents, water depths, coastlines and platform locations. Basic data on wind wave and current loading is available in the system for various ship types. The drifting track of the vessel can be simulated with a minimum of input information such as the length of the drifter, its position and the wind speed and direction. The system is also able to evaluate possible interventions such as the use of rudders, bow thrusters and tugs.

The simulation model is incorporated in a user friendly operational system running on a graphical workstation under Unix. The X-windows based system is menu driven and



Giant-4 barge during drift trials in the North Sea

features presentation of all relevant data together with a 2-D graphical area manager showing the drifting track in the area, coast lines, shipping lanes and platform locations.

The model has been verified with results from tests conducted at 1:50 scale under laboratory conditions followed by extensive full scale demonstration trials in the North Sea with three vessels under various weather conditions. TOPSS-simulated tracks show a good agreement with the measured tracks for the drifting vessels in the sea trials. Both the course over ground and the speed over

ground proved to be within acceptable accuracy for practical applications.

TOPSS will contribute to safe shipping and offshore production in European coastal waters; avoiding ship-platform collisions and tanker groundings significantly contributes to conservation of the seas and coastal environments. TOPSS can also be applied to search and rescue (SAR) operations for small objects such as life rafts and containers with dangerous cargo. TOPSS has been installed by the Dutch Coast Guard and is now being considered by the UK Coast Guard.

European Commission - Directorate-General for Energy DG XVII

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Assessing defects on offshore structures

ASSURING THE STRUCTURAL INTEGRITY of an offshore platform requires the compilation and analysis of enormous volumes of data. This includes inspection, maintenance and repair reports and structural analysis results. Until now much of this assessment work has been done by hand which is both costly and labour intensive. To rationalise this process BOMEL has developed a new package called AMaDeOS (Assessment and Management of Defects on Offshore Structures), which combines a comprehensive structural and inspection database with an expert system capable of monitoring and assessing the integrity of a platform throughout its operational life.

AMaDeOS is a state-of-the-art PC based object oriented program running under Microsoft Windows. Structural and inspection data is centrally located and accessed via a Graphical User Interface (GUI) which is a powerful visual tool for immediate retrieval and display of the structural model, structural analysis, results, inspection data, drawings and photographs.

The structural data is stored in a neutral file system which can be interfaced to most commercially available analysis software. The inspection data including photographs



and drawings is entered using the Inspection Data Entry System, designed for both onshore and offshore applications. The knowledge-based system which has direct access to this data has been designed to identify anomalies and trends in the data and provide expert advice including assessing strength, fatigue, fracture and

reliability analysis software modules. This advice, combined with a structural indexing system, will allow optimised inspection plan schedules to be developed.

The development of AMaDeOS was supported by the THERMIE Programme and Amoco (UK) who will use the system to monitor a number of their North Sea platforms.

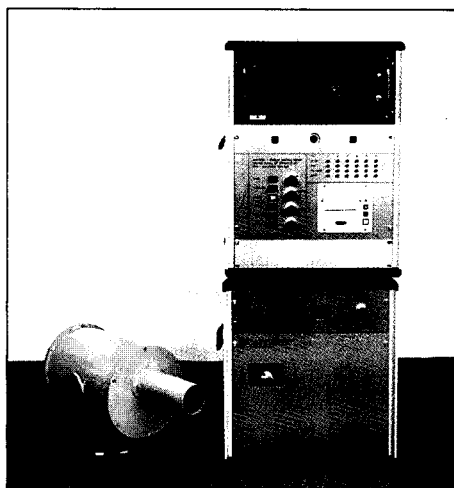
Methane detection improves offshore platform safety

A SEVEN MONTH OFFSHORE TEST has successfully demonstrated that fibre optics laser based gas detection technology is mature enough to be proposed for field use. The tested instrumentation is the prototype of GASTRACK, a methane detection system, designed and constructed by Tecsa spa (Italy) and Vuman Ltd (UK) in co-operation with Snamprogetti Ltd (UK).

The system was installed at an offshore gas rig owned and operated by Agip spa (Italy) in the Adriatic Sea close to Ravenna. The main advantages of the instrument include:

- the absence of any electrical part in the field;
- high sensitivity and very good stability;
- the system does not need any field re-calibration.

GASTRACK consists of a number of open path gas detection cells (typically 5-10) connected by silica optical fibres to a central unit hosting the spectrometer and the electronics.



The Gatrack system

The principle of operation is the measurement of the high-resolution infrared absorption spectra of a methane band close to 1.3µm. The infrared radiation (less than 1 mW) is emitted by a Fabry-Perot laser diode and directly coupled with an optical isolator and a monomode silica fibre. An opto-mechanical

multiplexer allows the fibres leading to the cells to be connected sequentially to the source. The same fibre brings the IR radiation back to the main unit where it is detected by a photodiode. A sealed gas cell filled with methane is provided in the main unit to check the system operation and its calibration.

The instrument is controlled by a 80486 based industrial PC which also performs extensive self checking and supports a user friendly interface. GASTRACK was designed to fulfil the requirements of all the applicable EN regulations.

The demonstration of GASTRACK has shown the system to be technically excellent. However, the project cost per cell is approximately double that of the best open path gas detectors available on the market. As a result, the next development will be to extend the measurement to CO and H₂S. TRI srl, a daughter company of Tecsa, is planning to complete the development and manufacture the resulting product.

Advanced risk management

ARMS (Advanced Risk Management System) is a decision support system which helps operational personnel manage hazardous situations onboard offshore production platforms. The system, developed by Bureau Veritas (France), Technicatome (France), TNO (The Netherlands), D'Appollonia (Italy) with support from the EC's THERMIE Programme, provides operators with an estimate of the risk level at a given time, and expected changes in the risk level within a specified time window. It also provides guidance for rational risk management decisions.

The estimation of the risk level is based on various factors including:

- the current status of maintenance activities;
- the anticipated variations of the most critical process parameters;
- the states of safety systems;

- organisational factors such as personnel qualifications.

Offshore platforms are dynamic and changing systems, therefore the risk level that characterises the hazard is updated at each time interval. Depending on the time horizon and the time available for a primary decision, ARMS allows a choice to be made from various alternatives (e.g. a sequence of tests to improve the primary decision).

The architecture of ARMS relies on four modules:

- Work Permit System Model
- Platform Model
- Risk Assessment
- Decision Analysis.

The Work Permit System assists platform operators in managing activities on board and the risk associated with them, taking into account safety concerns, compatibility between concurrent tasks

and organisational factors. The Platform Model consists of two sub-models: a topological one characterising, for example, the compactness of the deck, and a functional one showing the different process functions.

The Risk Assessment module evaluates and updates the probability of an explosion in the gas compressor due to a gas leak for a given time window. The Decision Analysis module treats the key trade-offs. For example, in critical situations this may be full shutdown to maximise safety versus no shutdown to maximise production, and delaying action for information gathering versus immediate action.

ARMS provides an important safety tool for in-service offshore platforms by providing operators with on-line risk assessment and management of abnormal situations and unplanned changes.

CONFERENCE, EXHIBITION and WORKSHOP REPORTS

Workshop on Decontamination and Rehabilitation of Polluted Areas, Western Siberia, 24-25 October 1995

A two-day workshop on the decontamination and rehabilitation of polluted areas, organised by COMERINT and the EC Energy Centre Tyumen, attracted 50 participants from industry, academia and government. Particular interest was shown in soil remediation and mapping with case studies of technologies and techniques generating a lot of discussion.

Oil And Gas India Exhibition, New Delhi, India, 1-4 November 1995

The EU stand at the Oil and Gas India Exhibition, organised by GOPA Consultants, featured innovative technologies developed by five European SMEs. This included: a vapour recovery system developed by Cool Sorption of Denmark; geophysical data processing systems developed by IKODA of the UK; solar powered signalling systems for oil and gas platforms developed by ORGA BV and R&S Renewable Energy Systems both of The Netherlands; and pigging systems developed by Rosen Engineering of Germany.

The stand was visited by a great number of people from a wide range of backgrounds including government ministers, embassy representatives and local businesses. The company representatives were pleased with the contacts made and expressed their interest in attending similar events in the future, for instance the Oil and Gas fair in Bombay.



The EU stand at Oil and Gas India Exhibition

AERION '95, Athens, Greece

1-3 December 1995

AERION '95, the 2nd International Natural Gas Exhibition, was organised by LDK Consultants under the patronage of the Public Gas Corporation (DEPA S.A) and with support from the European Commission's THERMIE Programme, EUROGAS and ETBA (Hellenic Industrial Development Bank).

The introduction of natural gas in the Greek market creates new opportunities for contacts and co-operation between foreign and local natural gas companies. The participation of national and international companies in the

exhibition was substantially increased this year with more than 170 foreign firms represented.

The EU participated at the event with a stand featuring four natural gas demonstration projects funded by THERMIE. In parallel with the exhibition a THERMIE workshop on "Financing Schemes for the Implementation of Conventional and the Conversion to New and Improved Natural Gas Technologies" was held.

The AERION '95 exhibition catalogue is available free of charge from LDK Consultants [Tel: +30-1-8563181 Fax: +30-1-8563180]

New Publications

A new maxibrochure entitled 'Market Prospects for Multiphase Technology', assesses the current status of multiphase developments and identifies world-wide opportunities for developing and exporting multiphase products. The maxibrochure will be of interest to anyone involved in multiphase technology and covers a wide range of subjects including produced fluids, pipeline simulation, boosting, metering and primary separation. Copies are available free of charge by faxing your request to Jonathan Shackleton at PSTI [Fax: +44 (0) 1224 706601]

Oil and Gas Technologies - a EUREKA Brokerage Event, Edinburgh 23-24 April 1996

This event sponsored by EUREKA, the EC, Scottish Enterprise and LEEL provides companies with a unique opportunity to build international partnerships for R&D and demonstration projects. Further details from Jane Kennedy at PSTI [Tel: +44 (0)1224 706600].

Offshore Technology Conference, Houston, 6-9 May 1996

The EU is participating at OTC with a large stand which will feature hydrocarbon technologies from Denmark, Germany, Sweden, the UK, Italy, France and The Netherlands. Delegates to OTC can visit the EU on booth No.6277 and see some of the technologies being developed in Europe. Further details from Jane Kennedy at PSTI [Tel: +44 (0) 1224 706600].

Workshop on Pipeline Integrity and Rehabilitation, Tyumen, 23 May 1996

A series of workshops (organised by GOPA, GEP, IRO and COMERINT) is planned to address the productivity and environmental situation in the oil and gas sector in Western Siberia and the CIS. The first workshop on pipeline integrity and rehabilitation will be held in Tyumen and will focus on pipeline management, leak detection and repair as well as corrosion protection. Further details from Sam Malin at GOPA Consultants [Tel: +49 6172 930235. Fax: +49 6172 35046].

Offshore South East Asia, Singapore, 24-27 September 1996

The EU is looking for small, innovative



Members of the 5th EC Oil and Gas Technology Symposium organising committee meeting in Edinburgh: Max Shwer (DG XVII), Peter Bigg (PSTI), Michel Flohic (Europa), Dieter Koenig (Mecon), Jose-Luis Pena (EVE), John D'Ancona (Consultant), Ioannis Samouilidis (DG XVII), Richard Lawrence (Scottish Enterprise), Ole Jacob Kvinnsland (Euroil), Gian Mario Bozzo (Tecnomare), Hee Lum Wu (Wu Flow Consultancy), Lucio Deluchi (AGIP), Enzo Millich (DG XVII), Jane Kennedy (PSTI), Perry Argyris (DG XVII), Thierry Pellerin (EuroGep)

companies from the European Union wishing to exhibit their products at OSEA '96. Companies must be able to show that without support they would not otherwise be able to attend this event. For further details contact Jane Kennedy at PSTI [Tel: +44 (0) 1224 706600]

International Offshore Contracting and Subsea Engineering Exhibition, Aberdeen, 29-31 October 1996

IOCE has a reputation for attracting senior engineers and managers from the hydrocarbons industry. The EU will once again participate at this event with a stand featuring innovative technologies developed by five European companies.

Further details from Jane Kennedy at PSTI [Tel: +44 (0) 1224 706600].

5th EU Hydrocarbons Symposium: The Strategic Importance of Oil and Gas Technology, Edinburgh, 26-28 November 1996

The 5th EU Oil and Gas Symposium will present the latest technologies for the exploration, production and transport of oil and gas which have been developed in Europe. The event will also be used as a forum to examine the future of the hydrocarbons energy sector. For a copy of the 1st Announcement contact Jane Kennedy at PSTI [Tel: +44 (0) 1224 706600]

JOULE-THERMIE Programme

The JOULE-THERMIE (1995-1998) Programme aims to improve the EU's energy security by supporting innovative technologies which will ensure durable and reliable energy services at affordable costs and conditions. In addition, emphasis is placed on technologies which reduce the environmental impact of energy production and use, particularly in relation to CO₂ emissions.

The THERMIE part of the programme includes support for demonstration projects as well as other activities such as strategy, dissemination, preparatory, accompanying and support measures, concerted actions and technology stimulation for SMEs. A total budget of 577 MECU is allocated for THERMIE demonstration activities.

In the hydrocarbons part of the programme attention will focus on oil exploration, production, transport and natural gas. Specific emphasis within these broad categories is detailed in the THERMIE Information Brochure. Copies can be obtained from:

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