

46570 *Neffgen, J.M.*

New developments in the inspection and monitoring of flexible pipes

Subtech '89. Fitness for Purpose. Proceedings of an International Conference, Aberdeen, Scotland (United Kingdom) 7-9 Nov. 1989. pp. 23-36. Kluwer Academic Publishers (1990)

Steel reinforced flexible pipes, made of laminated polymeric materials, find a wide variety of applications in the offshore oil and gas industry structures. The paper aims to explore the stress profiles of such complex and little understood items. The need to develop new international design and construction codes is identified as those which apply to rigid pipes are entirely inappropriate, and flexible pipes are becoming more widely used. One company, has identified two types of defects, those which lead to leakage and those which cause changes in pipe cross-sections. Those have been used to draw up an inspection programme. A survey of nondestructive testing companies revealed a variety of techniques which could be used to detect defects in flexible pipes including thermography, real-time radiography, ultrasonics, acoustic emission radioactive leak tracing and some optical and impedances methods, each offering access to particular defect types.

45083 *Hopkins, P.*

The results of a round-robin exercise on pressure vessel defect assessment

International Journal of Pressure Vessels and Piping, Vol. 42, No. 3, pp. 333-351 (1990)

A full scale fatigue test on a 3.66-m diameter, 25-mm wall thickness, 11.38-m-long pressure vessel containing defective welds has been carried out by British Gas. A 'round-robin' exercise was organised in which five organisations conducted fatigue assessments on defects in the vessel. This round-robin and a report on the vessel test, are presented in this paper. The major conclusion of the 'round-robin' exercise was that the analysis of pressure vessel defects requires a high degree of skill and judgement and there is a need for a documented, generally accepted, pressure vessel defect assessment procedure.

44472 *Atherton, D.L.*

Developments in magnetic inspection techniques for pipelines

CSNDT Journal, Vol. 11, No. 1, pp. 28-35, (Jan.-Feb. 1990)

Magnetic flux leakage inspection techniques are described in this paper as a means of nondestructively testing the vast lengths buried gas transmission pipelines in environmental and safety, reasons but also as a means of determining maximum operating pressure and throughput and stabilizing economic considerations. A circumferential array of magnetic flux leakage anomaly detectors is fitted in a pipeline device called a "pig" for in-service inspections, which responds to defects, such as corrosion, in the pipe wall. Stress is highlighted as a dominant parameter governing magnetic behaviour in the steel pipe walls.

44250 *Davis, R.S.*

Remote visual inspection in the nuclear, pipeline and underwater industries

Materials Evaluation, Vol. 48, No. 6, pp. 797-803 (Jun. 1990)

Remote-viewing (RV) finds many applications in a variety of industrial settings, the nuclear, petrochemical and underwater oil extraction industries in particular, anywhere where access and or human safety are risk factors. This paper examines a number of current uses of RV. RV equipment offers flexibility, accuracy, reliability and safety.

44139 *Browne, W.*

Advances in Sub-sea Ultrasonic imaging

Proceedings of the International Conference on Advances in Underwater Inspection and Maintenance, Aberdeen (United Kingdom), 24-25 May 1989. pp. 155-172 Graham & Trotman (1990)

Ultrasonic sub-sea imaging is used here to detect corrosion, weld defects and chemically-induced cracks in pipelines used to transport oil from the North Sea. The "time-of-flight diffraction" (TOFD) technique, developed at Harwell Laboratory provides a reliable and accurate alternative to conventional pulse-echo techniques for defect sizing. The use of Zipscan, which provides high signal-to-noise discrimination for TOFD measurements is described. Colour graphic imaging using a remote, automatic device called Nautilus is also evaluated. The author concludes by stress the importance of intelligent use of data.

42615 *Cary, J.B.; Liss, J.B.*

Automated system monitors refinery pipe corrosion

Oil and Gas Journal, Vol. 87, No. 37, pp. 37-42 (11 Sep. 1989)

An American oil company has designed and implemented a computer

based system to monitor pipe corrosion at one of its refineries which collects thickness data on all its pipework. Points are identified on the inspectors various routes around the refinery and assigned attributes such as material type, operating temperature and pressure, thickness when new and when due for retirement, etc. These are compared to actual measurements of thickness made by the inspector. Data is then stored and analysed. The implementation of this system has led to improved accuracy, safety and reliability of the data and so benefited the plant generally.

42614 *Hamilton, J.C.*

Statistical model

Oil and Gas Journal, Vol. 87, No. 37, pp. 42-43,45-46 (11 Sep. 1989)

This article offers a statistical model which should allow pipe inspection devices to be assessed for effectiveness. The model assumes that if a defect zone is big enough to contain multiple resolution elements, the detection probability is increased if sensor elements cover a large part of the defect zone. Resolution elements are taken to be contiguous.

42610 *Gujit, J.; Robertson, K.*

Corrosion control and monitoring of Troll wet gas pipelines

Noroil, Vol. 17, No. 9, p. 41 (Sep. 1989)

The use of a new generation of intelligent pigs, based on ultrasonic sensors, to provide condition monitoring and glycol corrosion control has made the use of carbon steel acceptable for pipes used to transport wet, corrosive Troll gas. This article describes the reasons why corrosion inhibitors are needed and details about the new pigs are detailed.

42544 *May, I. L.; da Silveira, T.L.; Monteiro, S.N.*

Inspection, damage assessment and failure prevention in petrochemical plant

International Journal of Materials and Product Technology, Vol. 3, No. 3-4, pp. 349-358 (1988)

Materials problems that occur in petrochemical plants are discussed, together with inspection and damage assessment procedures. Some recent developments are mentioned, and specific examples relating to damage assessment are reviewed for pipelines and high-temperature plant after extended service. It is emphasized that planned maintenance and inspection are essentials to ensure continuing safety, and a fitness-for-purpose approach must be undertaken in any assessment.

42492 *Atherton, D.L.*

Magnetic inspection is key to ensuring safe pipelines

Oil and Gas Journal, Vol. 87, No. 32, pp. 52,53,56,58,61 (7 Aug. 1989)

This paper considers the advantages and limitations of two magnetic techniques for inspecting buried natural gas pipelines. The safety and economic considerations are also covered. Magnetic flux leakage anomaly detectors offer in-service inspection via inspection pigs. These are excellent for detecting corrosion but offer little sensitivity to cracks. Allowance must be made for stress to ensure accuracy. Remote field eddy current techniques allow stress-corrosion cracks to be detected. Operation limitations of each technique are noted and some existing solutions detailed.

42033 *Goedecke, H.; Krieg, W.; Krieg, G.*

Ultrascan, an ultrasonic pig system for detecting damage in pipelines. (In German)

KfK-Nachrichten, Vol. 21, No. 1-2, pp. 37-41 (1989)

"Pig" is the oil industry's name for devices carried in the flow inside a pipeline and serving e.g. to monitor the condition of the pipe. "Intelligent pigs of the 2nd generation" should be capable of recording the positions of flaws and also giving a quantitative description of them. This article reports on a prototype of this sort, developed jointly by the Karlsruhe Nuclear Research Centre (KfK) and Pipetronix GmbH.

41954 *Botten, S.F.*

Prevention of catastrophic failure using acoustic emission monitoring

Journal of Acoustic Emission, Vol. 8, Nos. 1-2, pp. 5330-5333 (Jan. - Jun. 1989). Special Supplement - Extended Summaries of Papers to be presented at the World Meeting on Acoustic Emission, Charlotte, North Carolina, USA, 20-23 Mar. 1989

Acoustic emission monitoring was used to detect crack growth in a petroleum industry outlet pipe and if possible predict pending failure, with its economic losses. The study aimed to discover if repairs could be postponed for six months until scheduled shut down of the plant. So successful was the exercise that the saving, in not shutting the plant down earlier than scheduled was 400 times the cost of the acoustic emission monitoring equipment.