JME ADVANCED INSPECTION SYSTEMS

NDT CASE STUDY

OFFSHORE BETATRON

IN ASSOCIATION WITH
AXESS GROUP

PROUDLY SUPPLYING THE **NDT** INDUSTRY FOR OVER **35 YEARS**

35TH ANNIVERSARY
EST. 1986

X-RAY TUBES ▪ BETATRON PORTABLE X-RAY ▪ X-RAY GENERATORS ▪ TROLLEY SYSTEMS

PORTABLE X-RAY SOLUTIONS

JME ADVANCED INSPECTION SYSTEMS

PXB:7.5

PORTABLE X-RAY BETATRON

JME Portable X-Ray Betatron (PXB) systems are compact circular electron accelerators producing a high energy directional X-Ray beam. They are capable of producing radiographs of very high contrast, sensitivity and resolution, allowing operators to meet the tightest inspection standards. Betatron systems are easy to assemble, operate and maintain, containing no moving parts or cooling liquids. So maintenance required on the systems is minimal.

JME's PXB:7.5 Betatron has a maximum energy of 7.5MeV, with a variable output from 2Mev through to the maximum energy, adjustments can be made in 0.1MeV increments. The systems offer cost savings and a greater degree of portability when compared with Linac generators and provide greater flexibility for more mobile inspection tasks.

PXB:7.5 TECHNICAL SPECIFICATION

Peak X-ray Output	2 to 7.5 MeV
Dose Rate at 1m (3.3ft)	>5R/minute
Focal Spot Size	0.3 x 3.0 mm
Duty Cycle Radiation Beam	75% per hour
Beam Coverage	250 x 250mm @ 1m
Radiographic Sensitivity	1%
Supply Voltage	Single-phase, 110V or 220V, 50/60Hz
Power Consumption	3.0kW (13.6A @220V, 27A @ 110V)
Single or Three Phase available upon request	

FEATURES

- Completely Portable
- Output energy selectable up to 7.5MeV
- Excellent sensitivity and resolution
- Penetrates upto 39.37 inch's (1m) concrete 11.81 inch's (300mm) of steel.*

*Dependent upon grade of Material

MORE SPECIFICATIONS ARE AVAILABLE AT WWW.JME.CO.UK

PROUDLY SUPPLYING THE **NDT** INDUSTRY FOR OVER **35 YEARS**

35TH ANNIVERSARY EST. 1986

JME ADVANCED INSPECTION SYSTEMS

CALL OUR SALES TEAM FOR MORE INFORMATION

+44 (0)1502 500969

JME LTD. ELECTRON HOUSE, OLD NELSON STREET
LOWESTOFT, SUFFOLK NR32 1EQ UNITED KINGDOM

FIND JME ONLINE...

www.jme.co.uk

/JMElimited | @JME_NDT | jme-advanced-inspection-systems

NDT CASE STUDY

BETATRON 7.5MeV IN AN OFFSHORE ENVIRONMENT

PROJECT OVERVIEW

It was identified that part of a heavy wall pipe, in relation to an offshore wellhead, failed/collapsed during a routine drilling operation. Additionally, a drilling tool had become lodged inside the tubing due to a breakage and is stuck in the well.

After initial evaluation, it was decided that the best 'product' solution for the project was through Radiography using the JME High Energy Portable Betatron system (PXB 7.5MeV). This equipment could be used to detect where the pipe had collapsed and confirm the area in which the tool was stuck so it could be removed and the pipes repaired.

REPAIR AND POST REPAIR INSPECTION

The project would include a complex well operation to expand the collapsed pipe and remove the tool that was lodged in the pipe. Once the tool had been removed, additional Radiography with the Betatron system would be required to ensure the repair was successful and operation of the pipelines could continue.

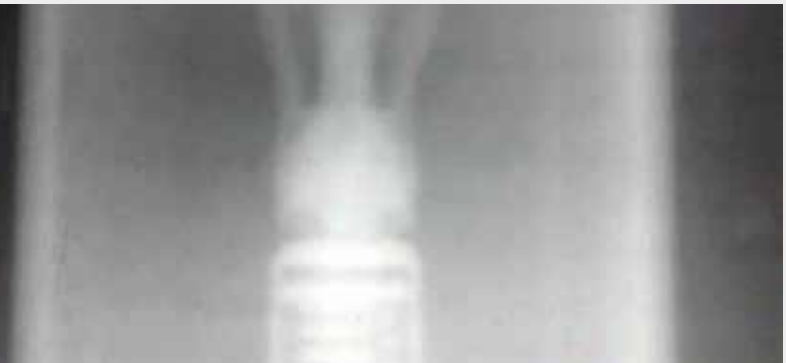
THE SOLUTION

The JME Betatron system was used along with Film Radiography to monitor inside the pipe between the repair operations. Due to the expense associated with downtime on an offshore platform, the customer needed to verify that the operation proceeded and progressed as planned. The plan of operation was to conduct a radiography shot with the Betatron, before, during and after the repair procedure was completed. This ensured that the full scope of the project could be completed as quickly and efficiently as possible with the minimum of disruption.

The inspection measure was simple, before the well could be put into operation, the criteria was to prove if there was a 2" solid steel bar inside the 7" casing. During well operation, radiography was conducted from different angles to ascertain the direction of the collapse in the 7" casing. A final radiograph was taken after well operation to prove that the 2" solid steel bar was removed.

CHALLENGES

The main challenge with this project was radiation protection for the operators, in what was a relatively small, yet open area with lots of machinery present. The requirement was to shield enough of the radiation and keep them at low enough levels to fulfill the requirements of 'radiation protection'. The majority of exposures were done after the main day shift was over, this minimized the amount of people around the exclusion zone and in areas close by. All exposures performed with the Betatron system were done so the emission direction was pointing towards the sea and not in the direction of other rig modules.



The well consists of five casings, dimensions as follows:
32" Pipe - 25.4mm thickness
20" Pipe - 16.1mm thickness
13 3/8" Pipe - 13.1mm thickness
10 ¾" Pipe - 13.8mm thickness
7" Pipe - 10.4mm thickness (production pipe)

The total thickness to be penetrated with the Betatron system was 1576mm, along with the potential of having accumulated water between each pipe wall. The required exposure time was between 25 to 30 minutes with 7.5MeV to achieve the required film sensitivity on AFGA D7 film.

In relation to the inspection criteria, there were no challenges associated with the use of the Betatron system. The machine was very easy to set up and operate, especially with its intuitive control panel to set all of the radiograph parameters.

RESULT OF INSPECTION

Before the well operation was conducted, the 2" solid steel bar was located and proven to be within the 7" pipe.

During the well operation, the direction of the collapsed 7" pipe was proved, making the repair operation simpler.

The customer found the radiographs very helpful during the well operation and are hoping that the Betatron system will be available for future complex well operations.

www.jme.co.uk

/JMElimited | @JME_NDT | jme-advanced-inspection-systems

JME Ltd, Registered Office: Electron House, Old Nelson Street, Lowestoft, Suffolk NR32 1EQ UK
Company Registration No 2056386 - Registered in England & Wales - VAT No GB 443 0172 87

JME
ADVANCED INSPECTION SYSTEMS
V1108.22