

JME ADVANCED INSPECTION SYSTEMS

NDT CASE STUDY



**DXB RTR
PIPELINE RADIOGRAPHY**
NATIONAL INSPECTION SERVICES



DXB:1
DIGITAL X-RAY BUGGY

PROUDLY SUPPLYING THE NDT INDUSTRY FOR OVER 35 YEARS



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

PORTABLE X-RAY SOLUTIONS

DXB:1

DIGITAL X-RAY BUGGY

JME would like to present our newest product, the **DXB:1 Digital X-Ray Buggy**; designed to produce high-quality panoramic digital radiographs of circumferential welds in applications such as new pipelines. As a versatile and configurable system, it can also be utilised in various non-pipeline applications, such as the inspection of tank walls or other ferrous metal structures.

This digital system is a replacement for traditional film radiography; so no more chemical processing, dark rooms, or flaws associated with conventional radiography. The **DXB** includes a high-definition digital panel for instant verification of image quality and system settings. Images are digitally stored, preventing the need for film storage. These can be backed up via USB or using a Network connection, allowing the images to be sent to an off-site Radiographer seconds from acquisition.

JME's **DXB** system also communicates and integrates with our entire **CR2** Pipeline Crawler Range. This allows 2-way communication between the Pipeline Crawler and **DXB**, giving configuration of key crawler X-Ray parameters from the **DXB** control tablet. This integration also allows commencement of inspection with the push of a single button. The **DXB** operator is able to control, adjust and view the status of the **CR2** crawler at all times during an inspection task.

With a rapid magnetic deployment system, the **DXB:1** can be positioned by a single person in less than a minute. The system is attached using permanent magnets, meaning in the event of a loss of power the unit will remain firmly attached to the pipe. This quick and efficient deployment dramatically increases productivity on-site as there is no need for welding bands to be deployed and relocated between each inspection.



DXB:1 SOFTWARE SUITE

The DXB Software Suite allows for real-time X-Ray image acquisition, along with viewing, image processing and archiving of images. The Pipeline Crawler and X-Ray source settings can be controlled directly from within the software without the need for other control devices. X-Ray images are stored in DICONDE data format and saved to the current project, along with any additional photographs, notes, inspection date, time and GPS co-ordinates. Using the JME stitching algorithm, a single image can be viewed in real-time, with the full weld stitched upon completion of the weld acquisition.



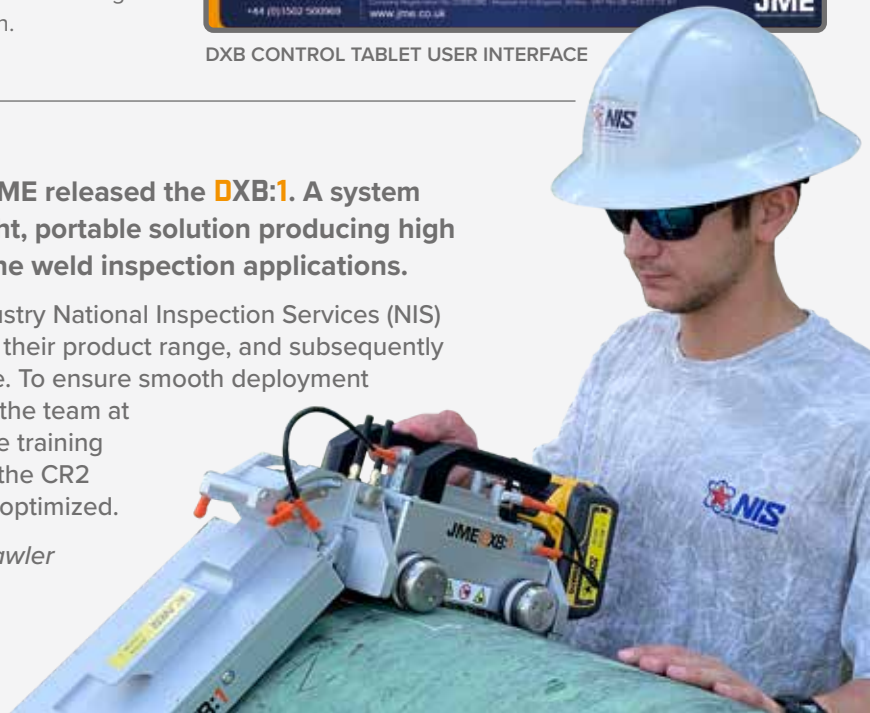
DXB CONTROL TABLET USER INTERFACE

INTRODUCTION

In 2021, after years of design and development JME released the **DXB:1**. A system introduced into the market to provide a light-weight, portable solution producing high quality digital Imaging for pipeline and stand-alone weld inspection applications.

Due to their desire to remain at the forefront of the industry National Inspection Services (NIS) based in Louisiana, USA brought the **DXB:1** system into their product range, and subsequently Digital Radiography into the list of services they provide. To ensure smooth deployment in the real-world environment JME worked closely with the team at National Inspection from the offset to provide one to one training on the equipment to ensure that all functions including the CR2 Pipeline Crawler integration were fully understood and optimized.

*The team at NIS are experienced JME CR2 Pipeline Crawler operators, having completed many projects in the past, they are now able to benefit from the efficiencies offered by the **DXB:1** system.*



PROUDLY SUPPLYING THE NDT INDUSTRY FOR OVER 35 YEARS

PROJECT OVERVIEW

In early 2023 NIS engaged on a project in Carlsbad, New Mexico. A project requiring a short deployment but an aggressive production rate of 1,500 welds on a 16" mainline over a period of 14 days on both SCH10 and SCH20 using Digital Radiography / RTR.

The project required inspection in accordance with API 1104 with all welds audited 100% by an ANT Level III Technician.

THE SOLUTION

National Inspection Services opted to deploy 100% back-up on the project, ensuring they could demonstrate a significantly reduced risk of downtime, and providing the client with assurance of maintaining project deadlines.

CONSISTING OF:

- 2 x JME 10:CR2 Pipeline crawler systems
- 2 x c•met 300P X-Ray tubes
- 2 x JME DXB:1 Digital Radiography systems

Implementing the use of Duplex Penetrometer for Daily verification of Spatial Resolution and Sensitivity, and the use of ASTM Wire Type IQI for validation of sensitivity through the weld.

PRE PROJECT-DEPLOYMENT

Prior to site work commencing the weld qualification process was undertaken to verify that radiographs captured by the systems were within code requirements.

At this stage the NIS team could begin to utilise how the DXB:1 and CR2 crawler systems integrate seamlessly and use the control tablet for the DXB to provide real time feedback/adjustment of all parameters on the Crawler and DXB, making adjustments and system monitoring simple and intuitive, streamlining the pre-qualification process.

PROJECT DEPLOYMENT

Once the project commenced the 3-man team were able to complete between 90 and 110 welds per day, even identifying days in which it would have been possible to achieve a production rate in excess of 120 welds with the DXB:1 system while even encountering several dust storms, in temperatures ranging from 30°F (-1°C) – 90°F (32°C). A 4.5-minute transition from one weld to next was also verified.

Another key gain in productivity would be the ability of the system to view images wirelessly to the control tablet in real time, and once complete transferring the fully stitched images via USB, HDD, or the internet / Server so the QM / Inspector / Level III could instantly review/approve as required. Also enabling instant Back up.

This provided the ability to rapidly identify defects including Inadequate Penetration, Incomplete fusion, Inadequate cross penetration, Internal Concavity, Incomplete fusion, Burn-through, Slag Inclusions, Porosity, Cracks, Undercutting, Accumulation of Imperfections and Pipe or Fitting Imperfections. With the resolution, clarity, and sensitivity on the captured radiographs maintained throughout the project.

THE RESULT

The Project and resulting X-Ray work was successful in identifying multiple discontinuities and defects and repairs were made to remedy the defective welds.

Furthermore, during the project the DXB:1 was able to identify a defect to the seam on the parent material. It was agreed by the NIS team that identification of this defect would have been impossible to see using conventional radiography.

The project was delivered in a timely manner and in line with the end customers requirements. This activity provided confirmation of the ability of the NIS operatives to confidently operate a completely integrated solution to consistently achieve a production rate of more than 100 welds per day.



“ During the project the DXB:1 was able to identify a defect to the seam on the parent material. It was agreed by the NIS team that identification of this defect would have been impossible to see using conventional radiography.

*Gabriel Hollier: Vice President / CRSO / ASNT LV III
National Inspection Services*

DXB:1 EXAMPLE WELD IMAGE

Example of the exported, stitched, Diconde Images produced by the DXB:1 Digital X-Ray System.

OVERALL SYSTEM SPECIFICATIONS

Buggy width	220 mm
Min. pipeline diameter	10" (254mm)
Average scan speed	15 mm/s (including imaging time and movement between images)*
Required Radial clearance from pipe surface	> 205mm from pipe surface
Image quality	Image quality class B acc. ISO19232-5, ISO 10893-7, ISO 17636-2
Image format	DICONDE compliant data export, via network or USB
System weight	Buggy, Detector and Battery - < 44.1 lbs (< 20Kg)
Dimensions (mm)	Overall Package Kit 2 Cases - 690(L) x 530(W) x 290(H)
Positioning	Manually positioned directly onto pipe cut back with no bands
Operating temperature	-20°C to +60°C
Power consumption	< 50W
Imaging X-Ray energy	Up to 300kV
Internal image storage	Capacity 500+ Images @ 36" pipe (+USB Drive Storage)

* DEPENDING UPON PIPE SCHEDULE

DXB SYSTEM IS SUPPLIED IN 2 RUGGED FLIGHT CASES

IMAGING

Resolution	100 µm
Technology	CMOS
Image stitching	Uses image feature matching algorithm

CONTROL TABLET SPECIFICATIONS

Display	10.1" 10-point capacitive multi touch screen, LED backlit for daylight visibility + Waterproof digitizer pen for improved ease of use
Certification	MIL-STD-810G certified IP65 certified sealed all-weather design
Power option	Li-ion 11.1 V, 4200 mAh - Comes with 2 battery types
Dimensions (mm)	269(L) x 188(W) x 20(H)
Weight	2.4 lbs (1.09Kg)
Operating system	Windows® 10 Pro

BUGGY POWER OPTIONS

Battery Specifications (DeWalt FLEXVOLT)	18/54V (6/2Ah)	Available upon request = 125 shots* (18" Pipe)
	18/54V (9/3Ah)	
	18/54V (12/4Ah)	

*Average shots - dependent upon system settings

CONTROL SOFTWARE

User Interface	Touch-screen use within user interface to improve user functionality. Image viewing functions for on-site checking of acquired images prior to formal interpretation.
Image acquisition	Automatic acquisition process, controlled by user
Crawler control	Full crawler control integration, to synchronise crawler operations and image acquisition
Additional functionality	Software includes functionality from the JME CR2 handset for Pipeline Crawler and X-Ray source control
Image control	Acquired images are stitched together within the control software
Image ID	All images are tagged with GPS co-ordinates



All specifications correct at time of printing - Please check for alterations before purchase