

P-scan, Scanners, and Underwater Scanning

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Business Areas

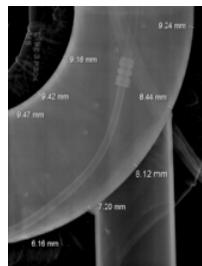
(development, consultancy, training, and services)



Process and automation



Materials technology



Testing technology



Sensors and metrology



Hydro- and aerodynamics



Simulation technology



Energy and environment



Structural integrity

P-scan

- P-scan (PSP-3) to WSRC: 1994
- Automatic Scanner (AWS-5) to WSRC : 1994
- Customized scanners (AMS-1 family) to WSRC: 1999
- P-scan System 4 to Hanford: 2000, 2001, 2004, 2006
- AWS-5D to Hanford: 2000, 2001
- AGS-2 to Hanford: 2004, 2007
- P-scan System 4 to WSRC: 2001, 2004
- Special AMS-1 versions for WSRC: 2001, 2002, 2008
- Knuckle tool add-on for Hanford: 2004
- Eddy Current add-on for WSRC: 2009
- Underwater AMS-1 scanner for WSRC (proposal): 2009

P-scan

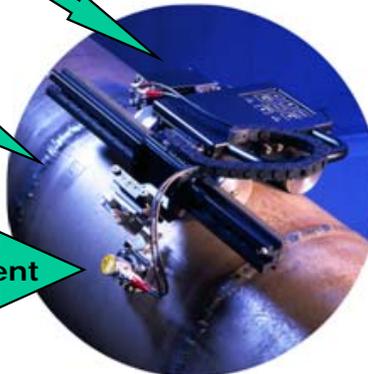
P-scan System 4

A fully integrated UT inspection System



PSP-4+, P-scan Processor

Power Supply



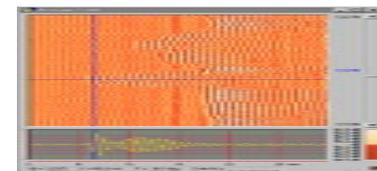
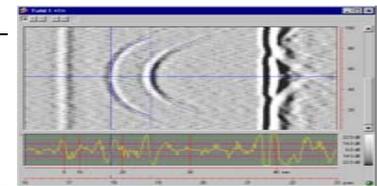
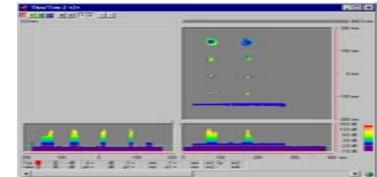
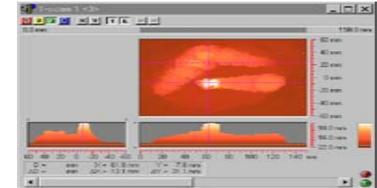
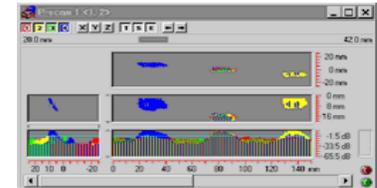
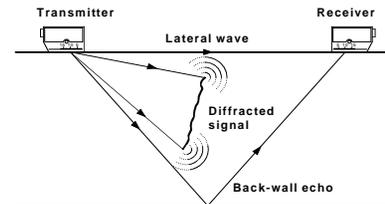
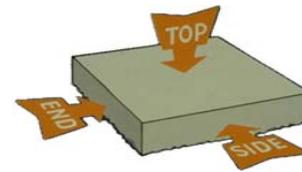
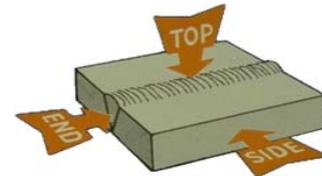
Water couplant pump

Automatic Scanner

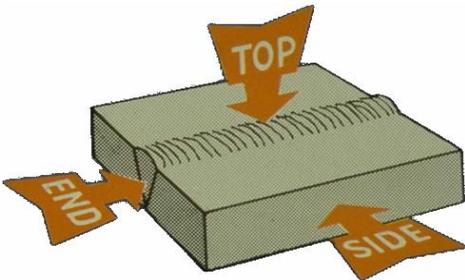
Laptop Computer

Inspection Types

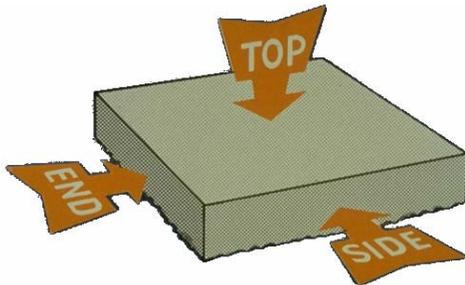
- P-scan for weld inspection
- T-scan for corrosion mapping
- Through Transmission
- TOFD for detection and sizing
- Full A-scan recording for off-line processing



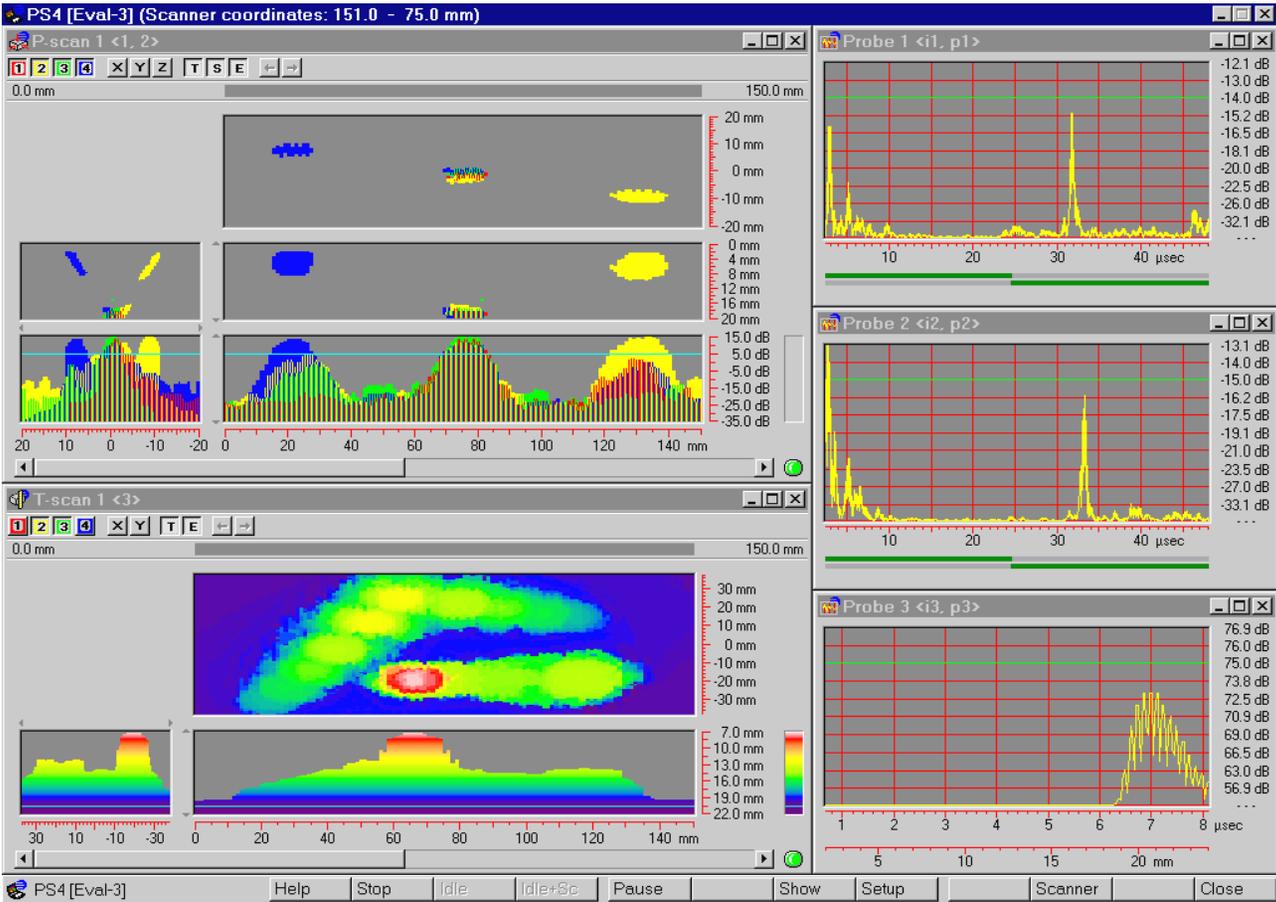
Scanning and data analysis



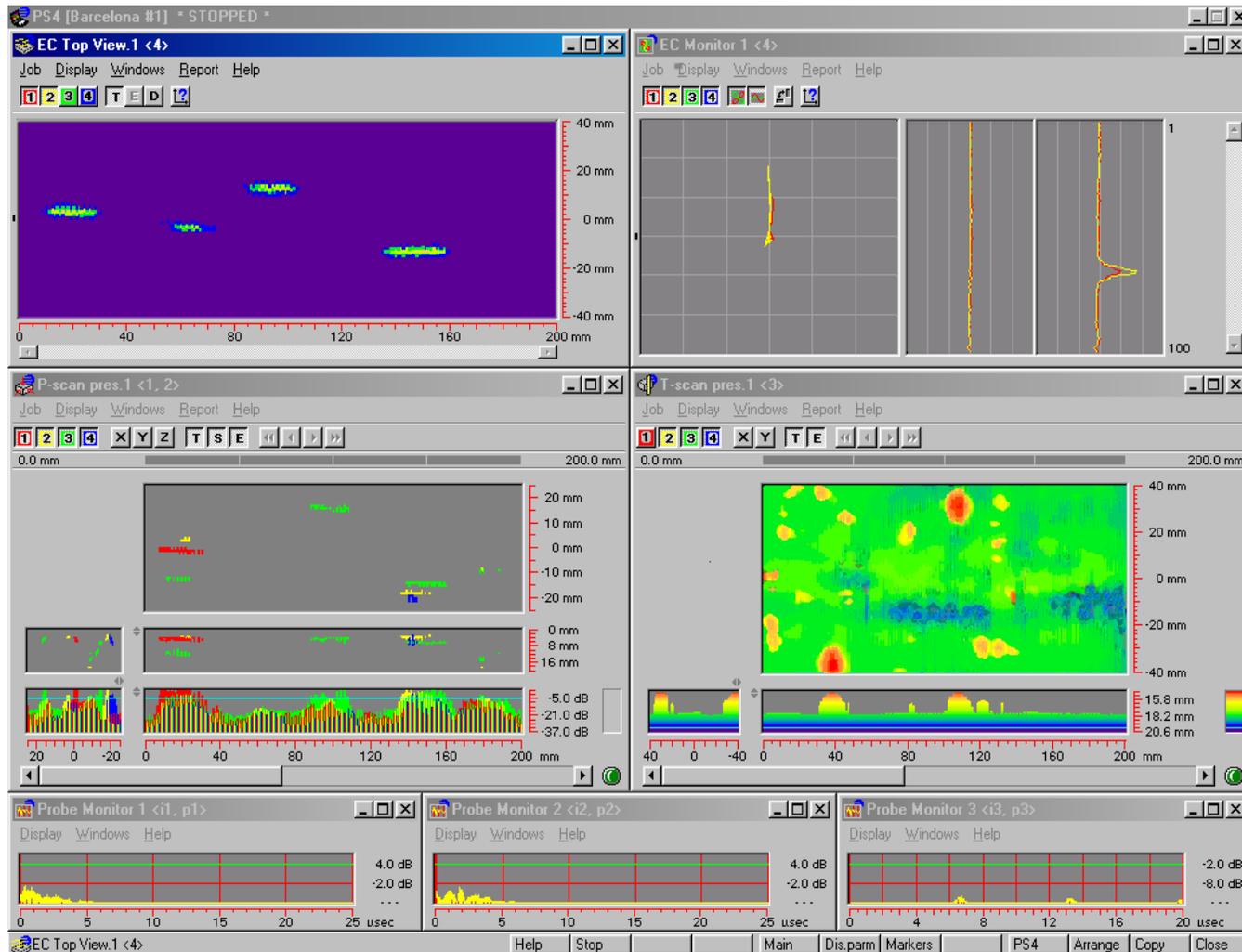
Weld inspection



Corrosion mapping



Simultaneous P-scan, T-scan and Eddy Current scanning





- P-scan imaging
- T-scan imaging
- Through Transmission
- Full A-scan collection
- TOFD
- SAFT (option)

- 8 full channels
- Dynamic range 120 dB
- Bandwidth 30 MHz
- Sampling rate 120 MHz
- Resolution 10 bit
- Built-in scanner controller

- Option: 8-channel Eddy Current module

P-scan 4 Lite



- P-scan imaging
- T-scan imaging
- Through Transmission
- Full A-scan collection
- TOFD
- SAFT (option)

- 4 full channels
- Dynamic range 120 dB
- Bandwidth 20 MHz
- Sampling rate 100 MHz
- Resolution 10 bit
- Built-in scanner controller

- Full battery operation
- Batteries are hot-swappable



PSP-4F

- P-scan imaging
- T-scan imaging
- Through Transmission
- Full A-scan collection
- TOFD
- SAFT (option)
- Eddy Current

- Up to 32 UT channels
- Dynamic range 120 dB
- Bandwidth 30 MHz
- Sampling rate 120 MHz
- Resolution 10 bit
- Up to 32 ET channels (option)

- Built-in scanner controller

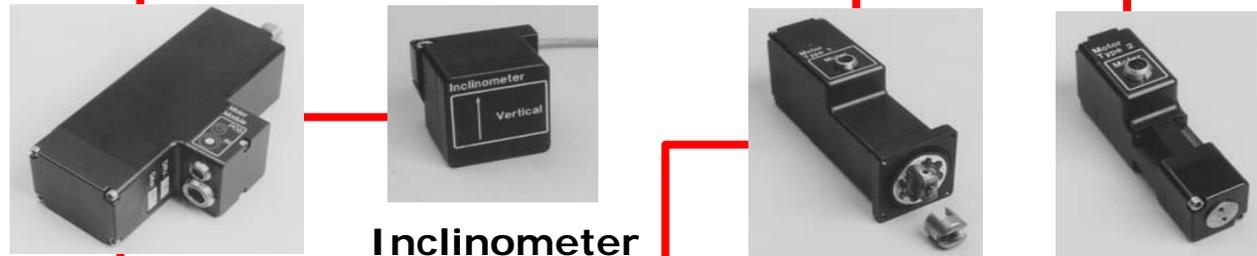
Standard Scanners

Modular System

Control Electronics



Motors and Sensors



70W Motor

Inclinometer

20W Motor

2W Motor

External gears

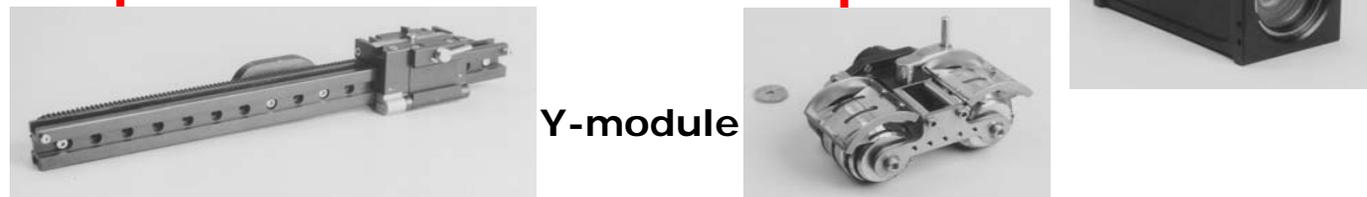


Straight

90 degrees

Zoom Camera

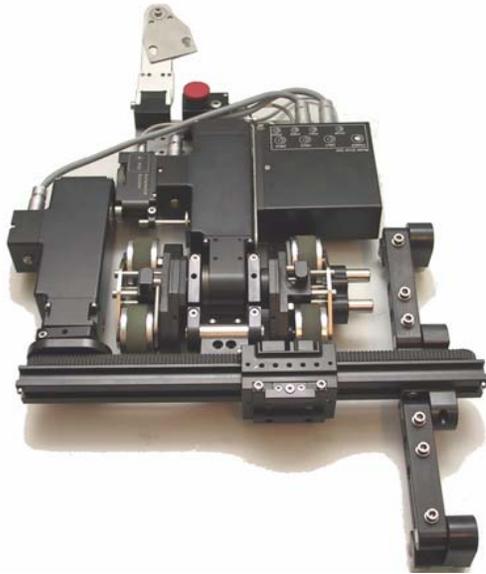
Output



Y-module

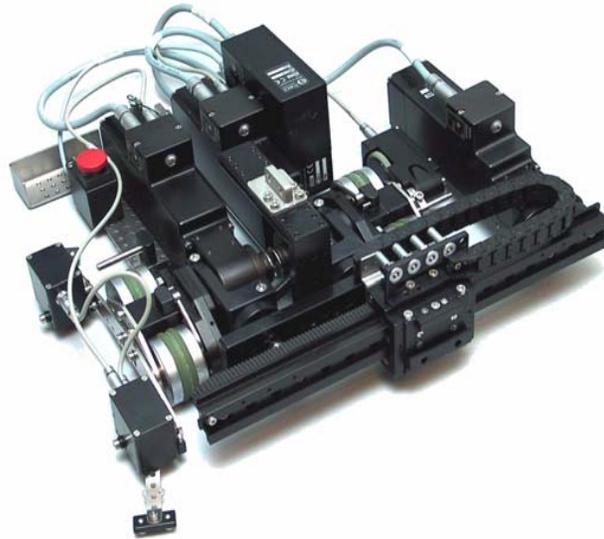
Magnetic wheels

Standard Scanners with magnetic wheels



AGS-1

Min. OD = 75 mm (3 inch)



AGS-2

Min. OD = 75 mm (3 inch)



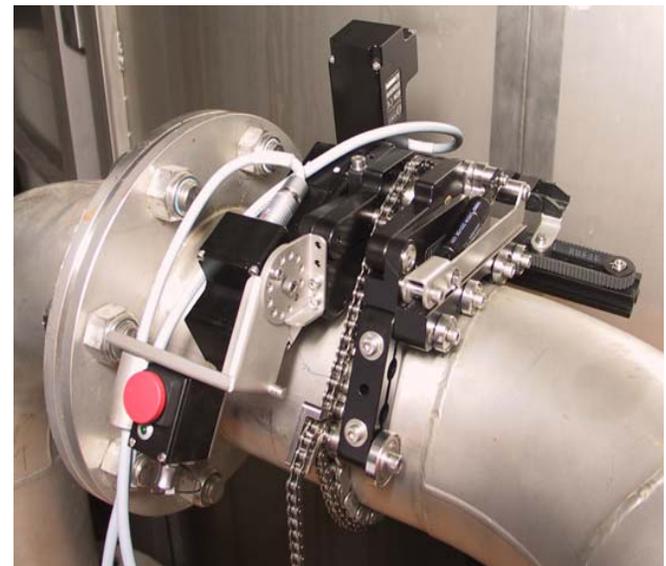
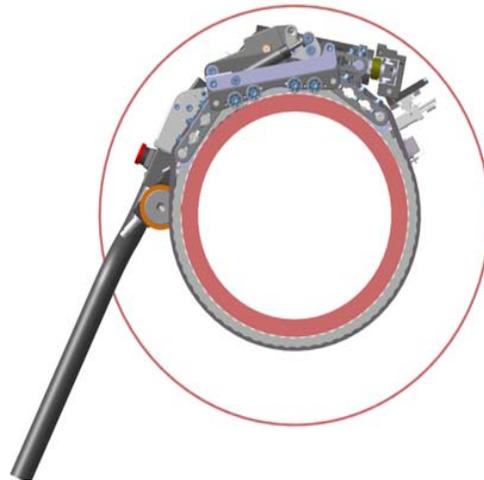
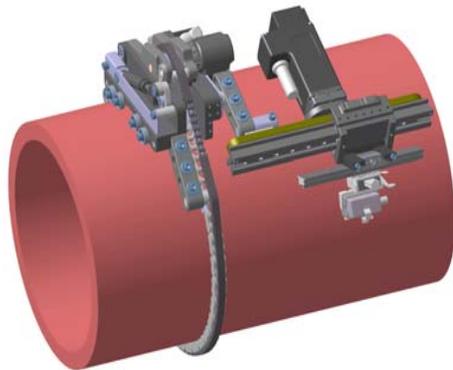
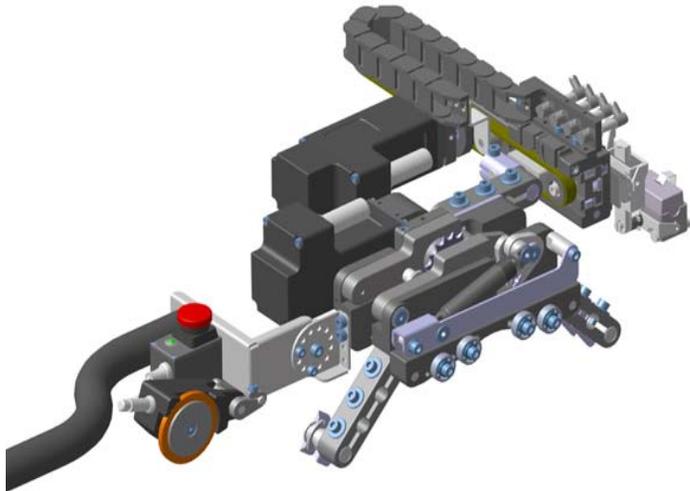
AUS-3

Min. OD = 70 mm (2.8 inch)
Min. OD = 40 mm (opt.) (1.6 inch)

APS-6 Automatic Pipe Scanner 6

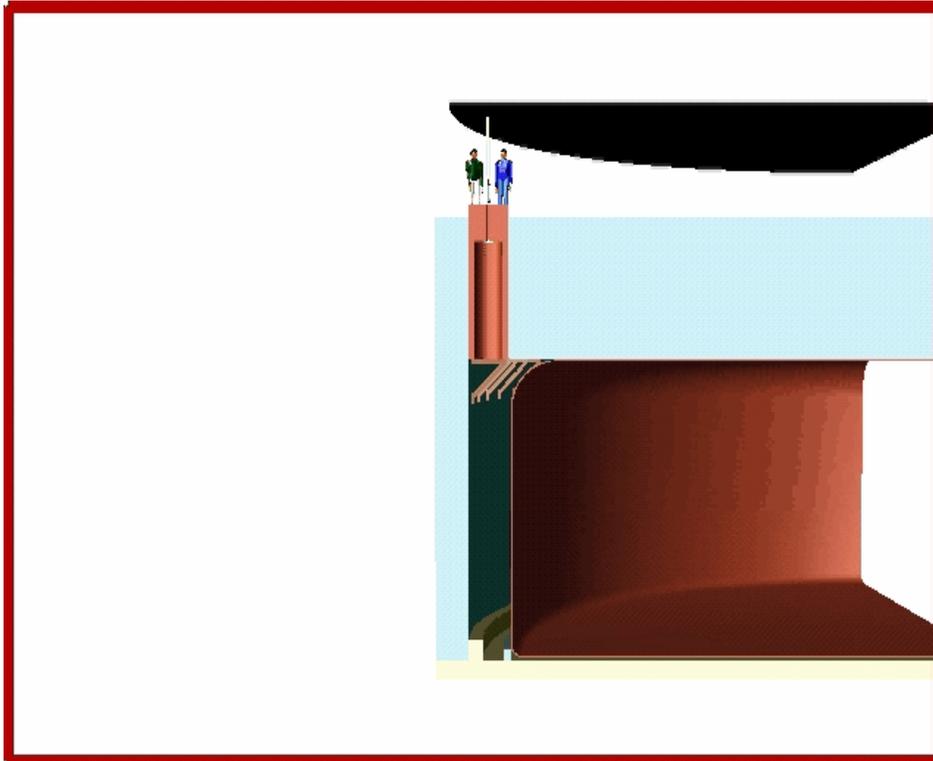


- XY scanner for non-ferromagnetic pipes
- Low profile
- Geometrical flexibility
- Stable
- Pipe OD down to 100 mm (4 inch)

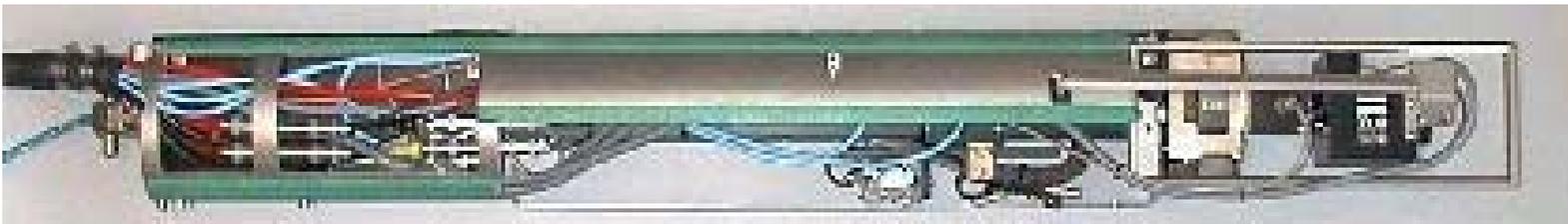


Customized Scanners for Special Applications

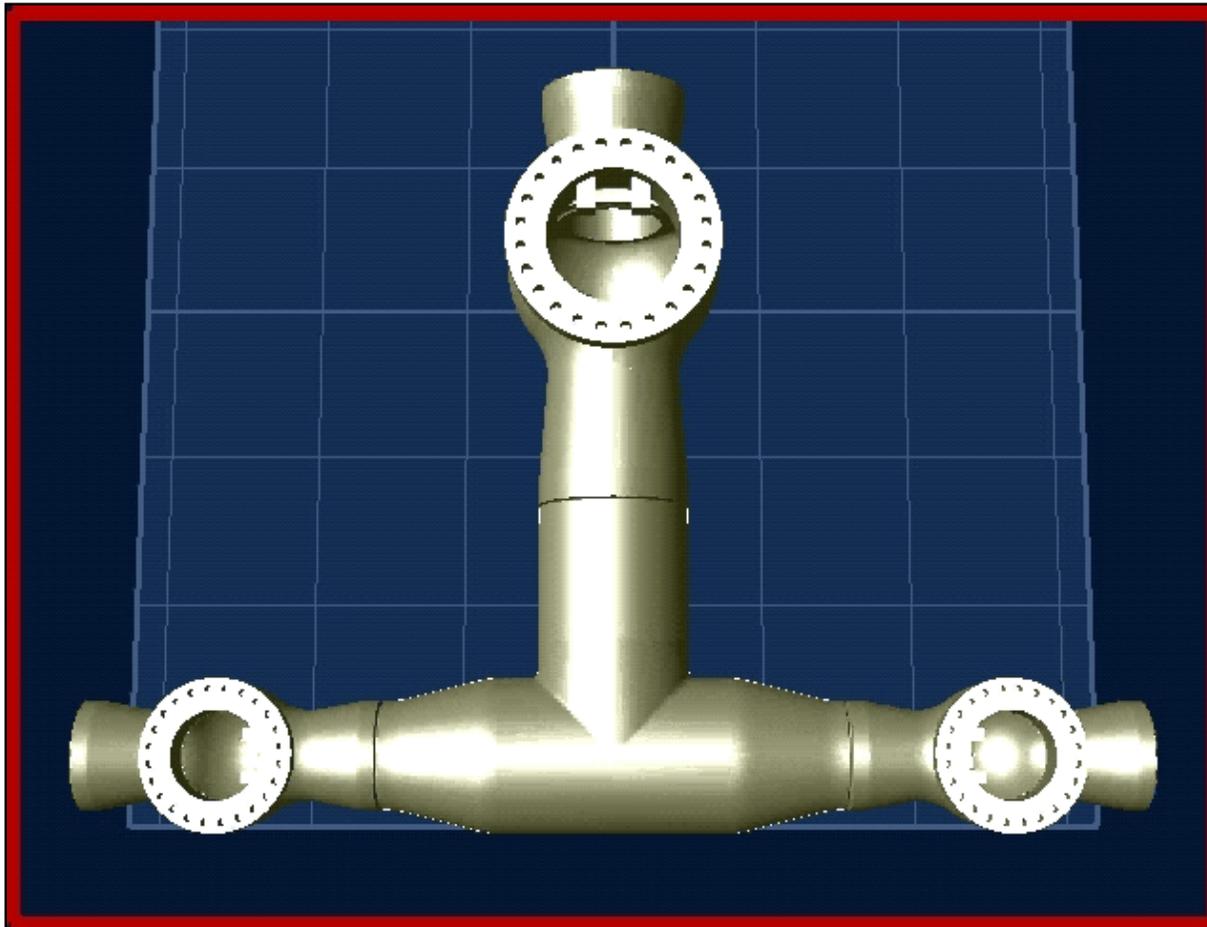
Special Application Scanner AMS-1T



- AMS-1T. Dedicated scanner for remote weld inspection and corrosion mapping of underground storage tanks.
- Can be deployed through a 5" hole by use of special deployment tool.
- Equipped with small video camera and angle sensor connected to control system for easier remote operation.
- Integrated pneumatic operated release system.



Special Application Scanner AMS-5



AMS-5: T-joint scanner

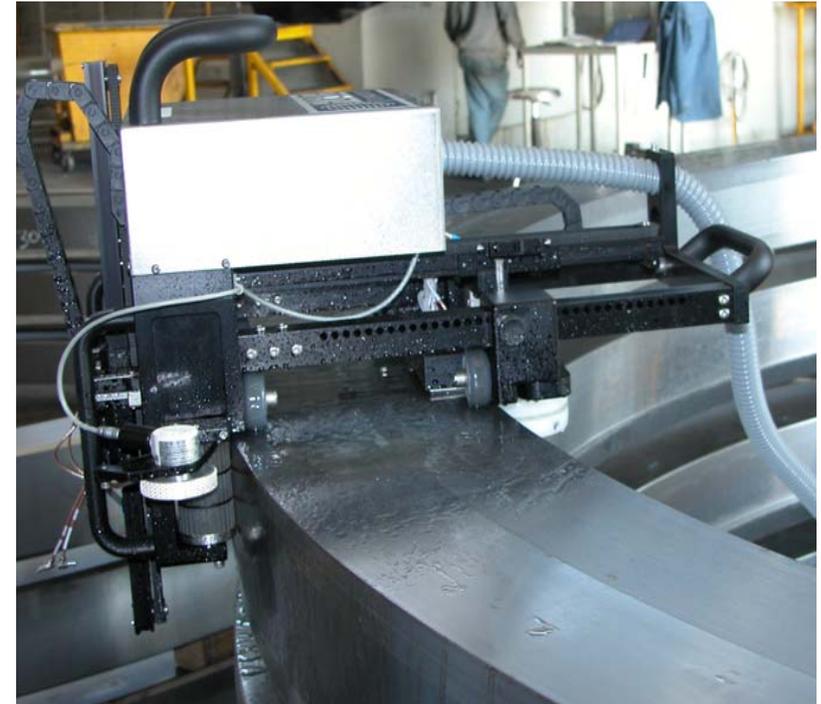
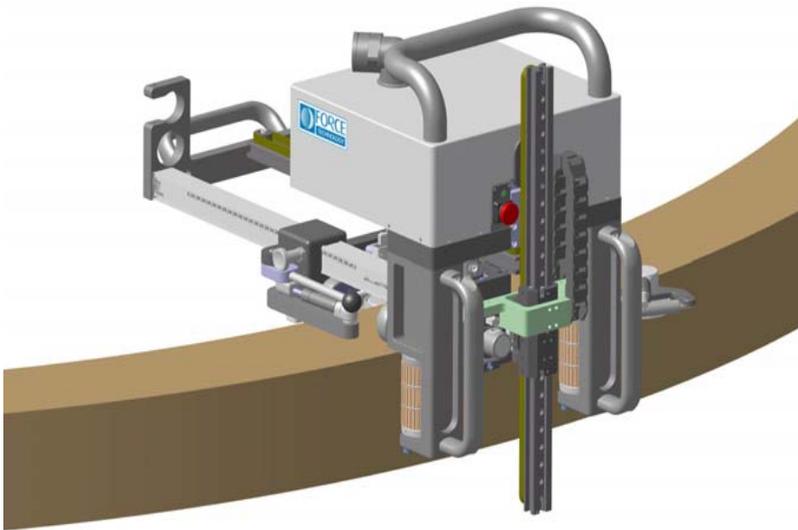
Special Application Scanner AMS-4



Automated ultrasonic inspection of a seamless rolled rings

Material: steel, aluminum, titanium and alloys

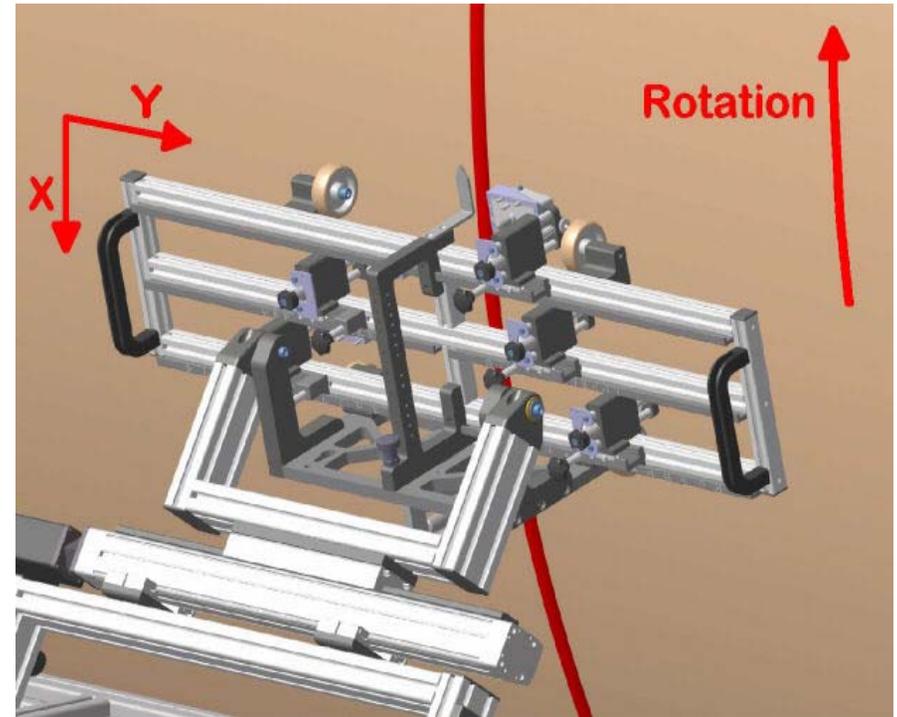
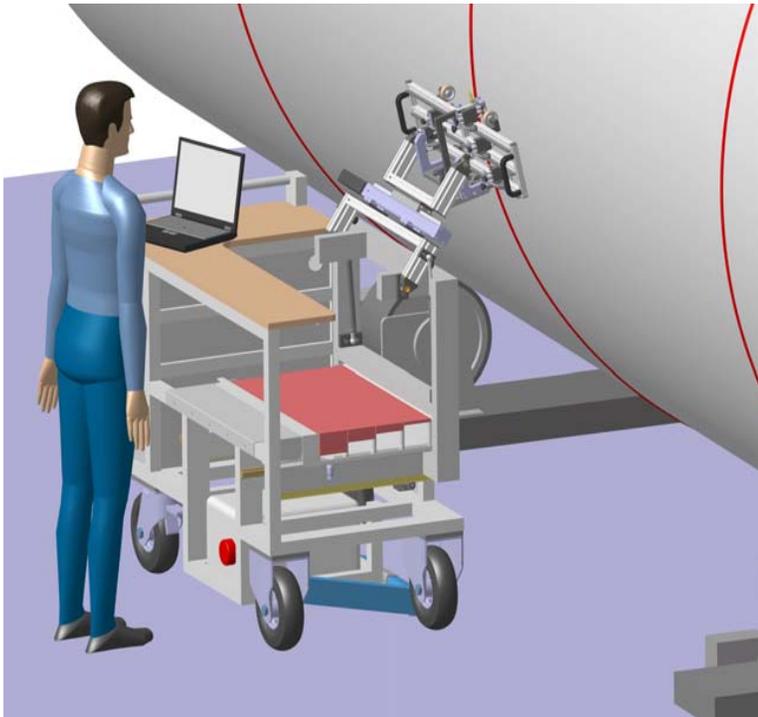
Special Application Scanner AMS-37



AMS-37 Automatic scanner for scanning of forged rings.

OD of ring \geq 1000 mm. Height \leq 300 mm. Thickness \leq 400 mm.
(40 inch) (12 inch) (16 inch)

Special Application Scanners AMS-41

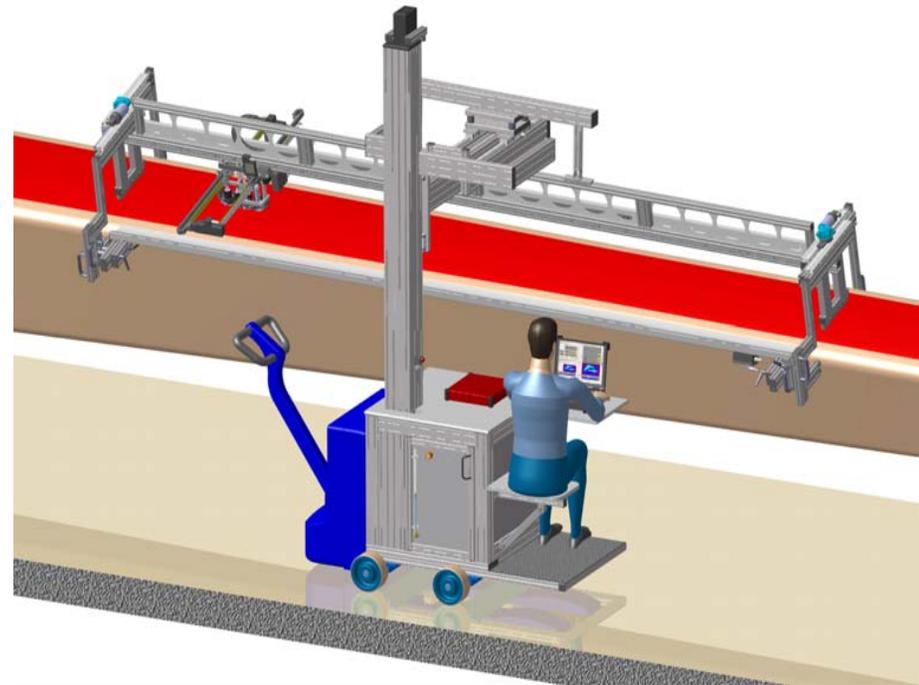
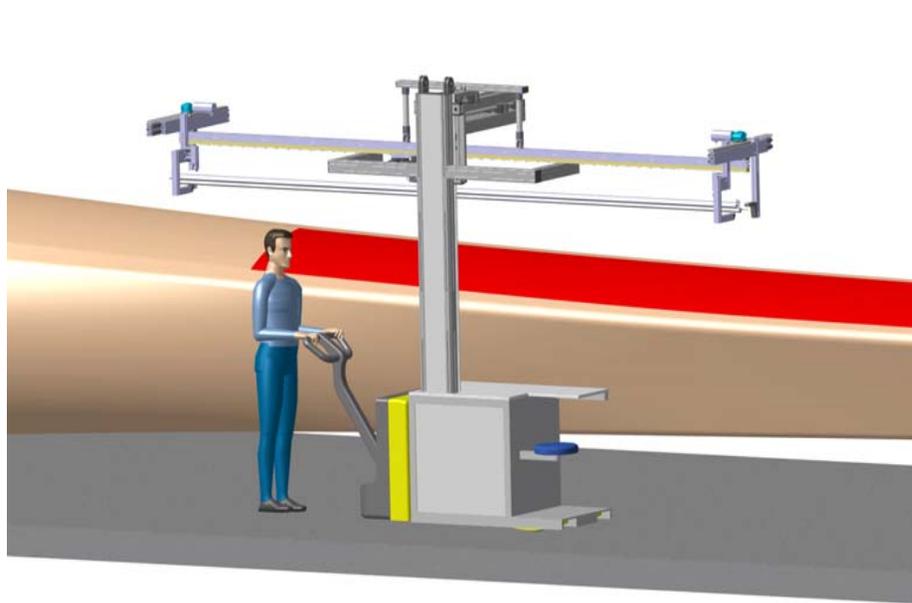


Wind Turbine Tower Scanner

Automated ultrasonic inspection of circumferential welds on wind turbine towers or similar constructions

Special Application Scanners

AMS-40



Wind Turbine Blade Scanner

Automated ultrasonic inspection of carbon fibre component

Battery operated system

Underwater Scanning

Immersion Tank (AMS-30)



Immersion tank for inspection of objects under water

5 axes manipulator + turntable.

Optional "lance" probe for inside inspection of pipes.

Scan Path can be programmed from CAD file of object.

Special Application Scanners AUS-4

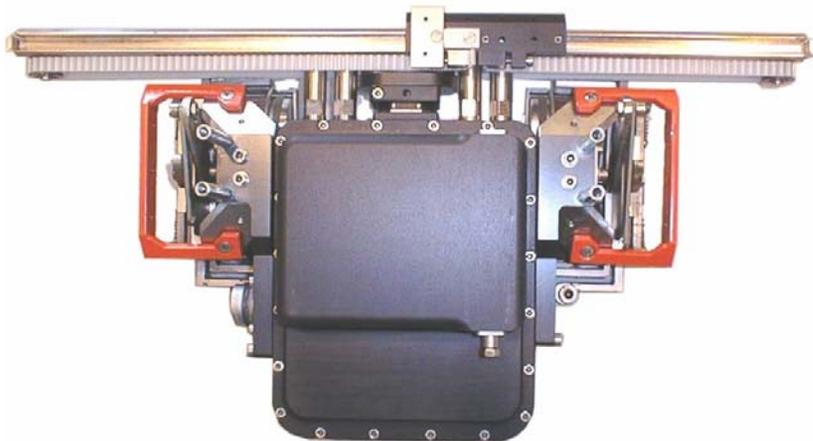


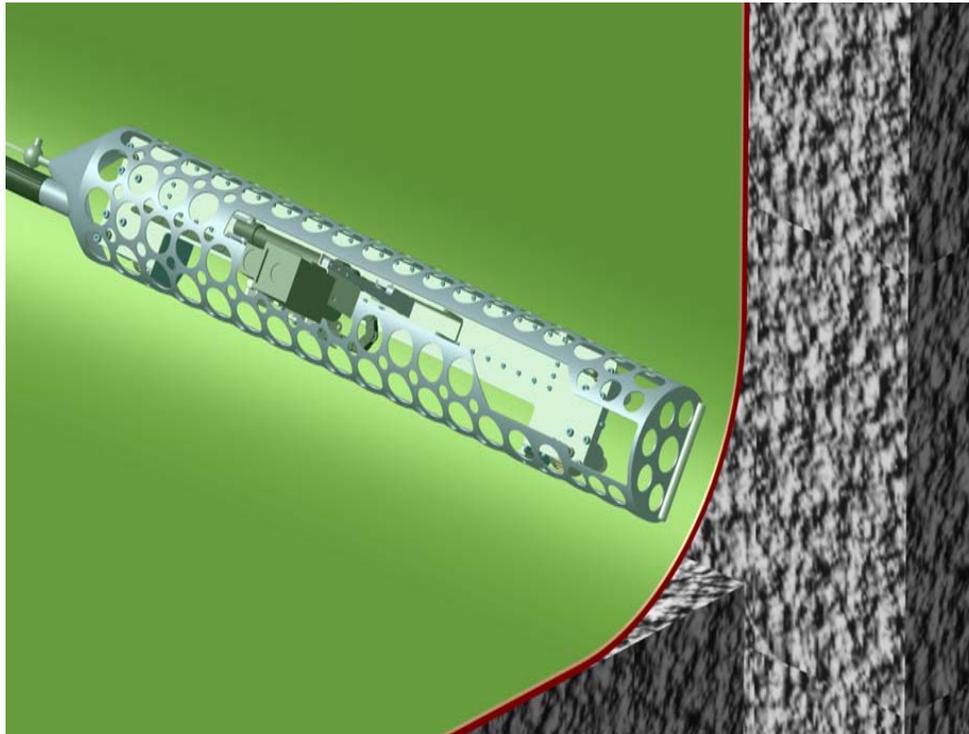
AUS-4 Subsea Scanner

Rugged, magnetic wheel scanner for underwater scanning of ferritic pipes and structures down to 400 m (1300 ft) water depth (1000 m option (3200 ft)).

Versions available for handling by use of ROV or divers.

Integrated scanner body with three motors, angle sensor and control electronics with interface to P-scan 4 UT system.





Scanner for internal inspection of fluid filled waste tanks.
Designed in stainless steel and based on AMS-1TM and AMS-28 design.

P-scan 3D

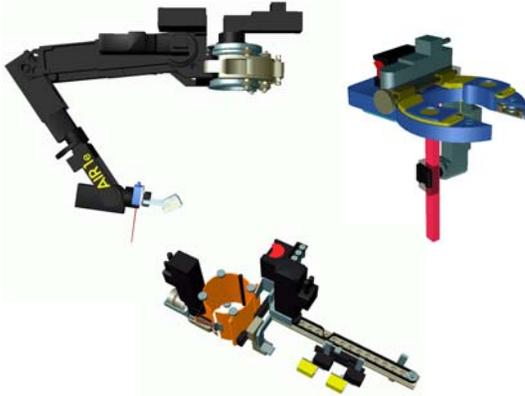
UT inspection of complex shapes and geometries

- Complete, PC-based software suite
- Takes full advantage of the P-scan System 4 data acquisition and scanner control capabilities
- Reads CAD STEP Files

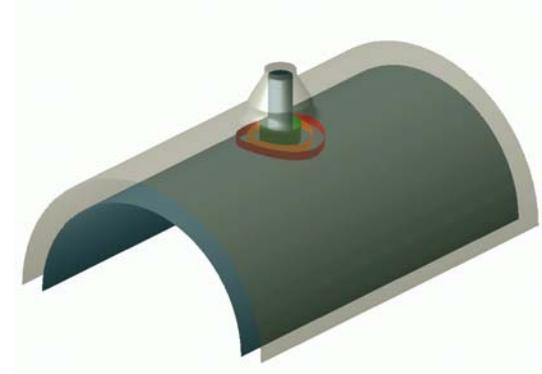
P-scan 3D provides the operator with 3D visualization of P-scan data during:

- Preparation
- Scanning (inspection)
- Evaluation
- Reporting

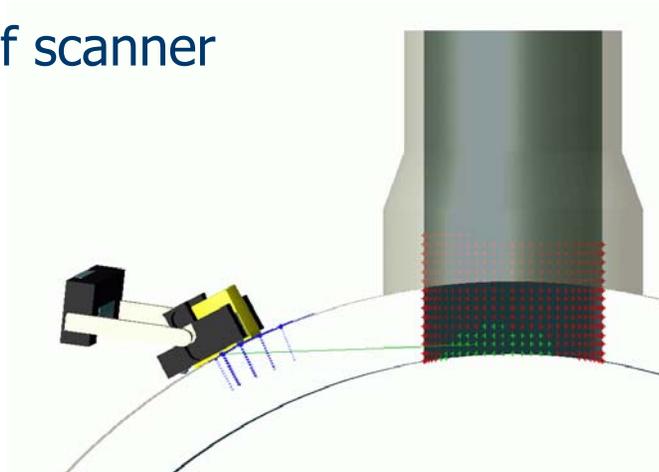
Preparation of inspection



Model of scanner

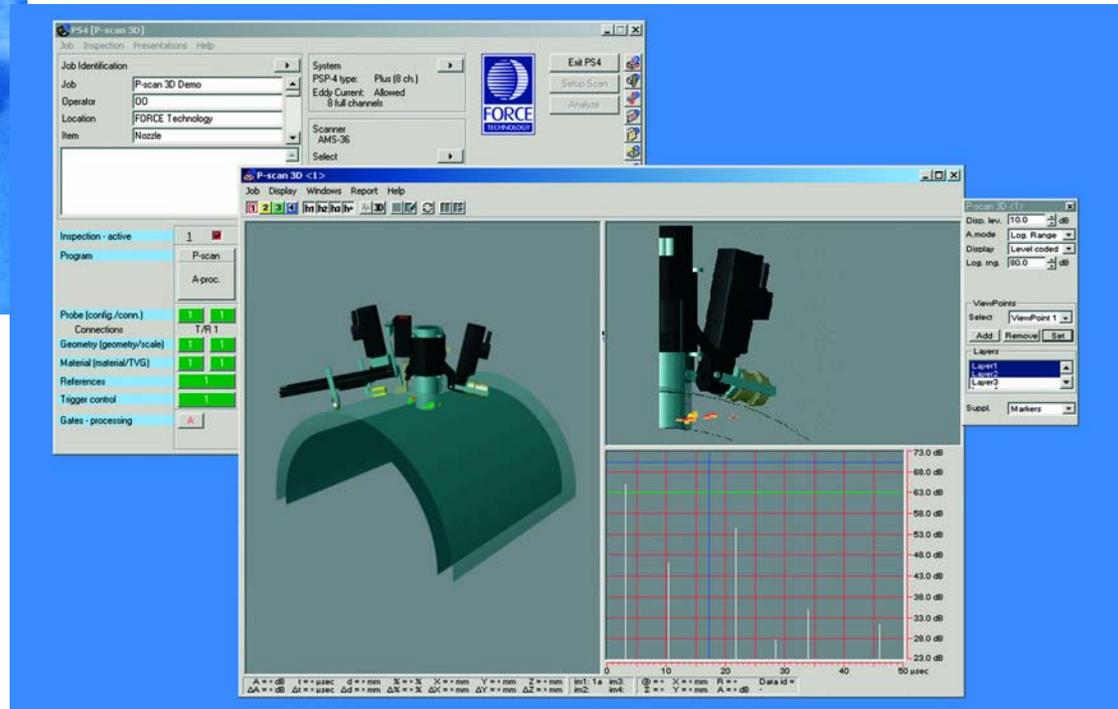
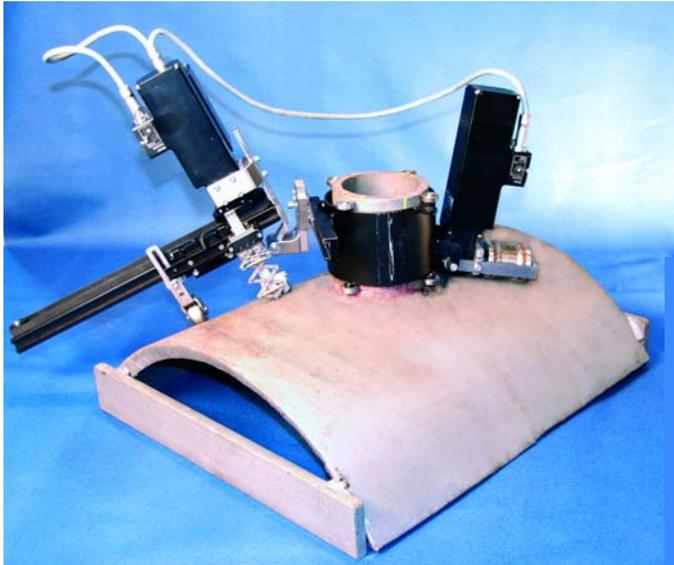


Model of object

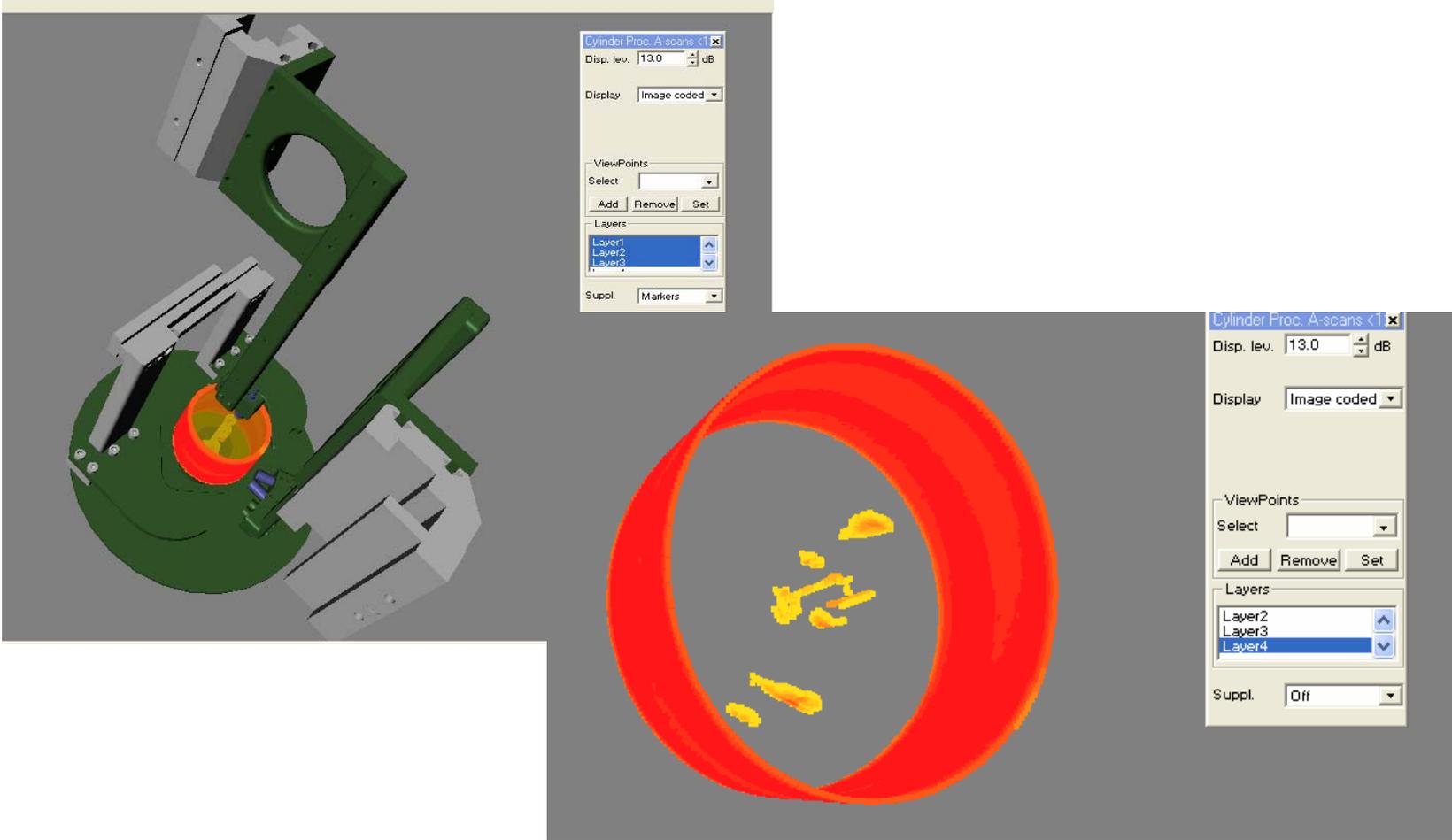


Simulation

Scanning (inspection)



Evaluation



Reporting

P-scan Job : Nozzle

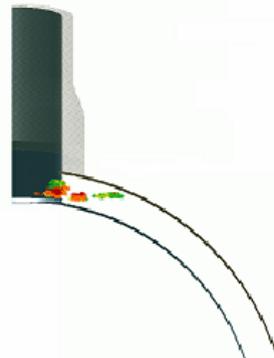
PS4 3D

Defect No. 1

X_Start.: 230,0°

Positioned at radius.: 185,1 mm

Length.: 53,2 mm



Y-position.: -8,0 mm

Extend in Y-direction.: 5,4 mm



Z-position : 3.3 mm

Extend in Z-direction : 9,6 mm

Faster T-scan?

Faster T-scan?



- Scanning Step Size (0.04 inch -> 0.1 inch)
- Scanning Speed (4 inch/sec -> 6 inch/sec)
 - Redesign/modify scanner
- Increase number of T-scan Probe
 - Optimize data set for speed
- Change scanning strategy
 - Detect areas for re-scan with large scanning step
 - Re-scan with smaller steps

Important for all these suggestions

- Best possible signal quality
- Optimized T-scan parameters

www.forcetechnology.com

www.p-scan.com

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