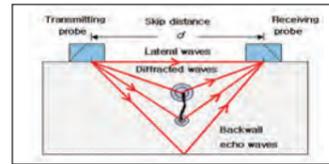
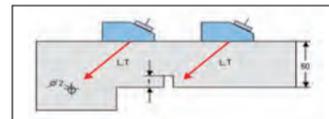


Ultrasonic Testing Technology

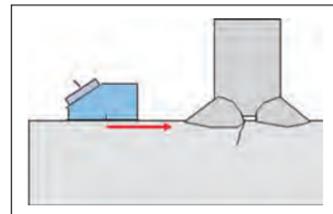
- Multi channel test methods
- A, B, C-Scan methods
- TOFD method using diffracted signals
- Real time imaging methods with phased array
- Angle beam methods with wedges
- Immersion methods using water column and dipping
- C-scan methods using water tank



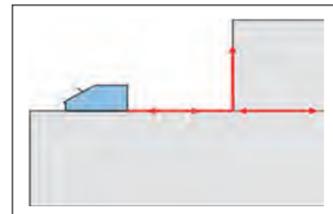
Detecting and sizing flaws by Time of flight diffraction



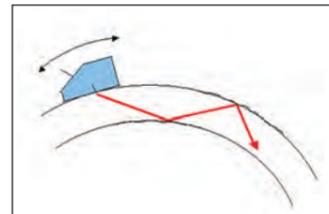
Detecting flaw by using angle beam



Detecting flaw by using Longitudinal Creeping Waves

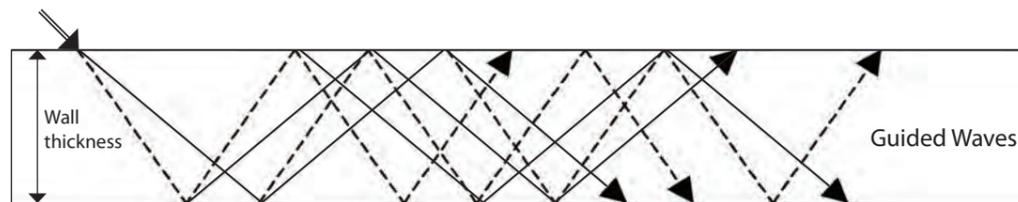


Detecting surface flaw by using Surface waves

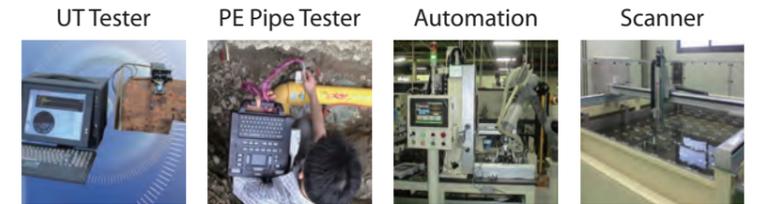


Testing pipe by using Transverse Waves

- Large range inspection method using guided waves
- Multiple reflection take place between boundaries
- Constructive interference generates guided waves(GW)



plus **Robot Design & Control Technology**



INDE SYSTEMS Co., Ltd.

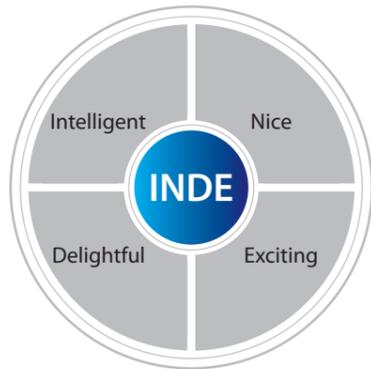
#1609, 224-5 Gwanyang-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea
Tel : +82-70-8250-3160 / Fax : +82-31-696-6970 / e-mail : indesystems@indesystems.com / www.indesystems.com



History

- 1999. INDE SYSTEMS Co., Ltd. Founded
- 2000. A member of the Korean Society for Nondestructive Testing
- 2001. Certified Venture Company based on Technologies
- 2002. Factory Registered at Suwon City
- 2003. CE(CCQS UK Ltd.) certification for Ultrasonic Imaging System (AIM33)
Certified R&D Center by KITA
A member of the American Society for Nondestructive Testing
Certified INNO-BIZ Company
- 2004. Promising Export Company
- 2005. ISO 9001:2000
- 2006. Name change: INDE SYSTEM Co., Ltd. -> INDE SYSTEMS Co., Ltd.
NEP(New Excellent Product) certified by Ministry of Commerce Industry and Energy
- 2007. Being family enterprise of the Gyeonggi small-medium business center
- 2008. Won Prize from Ministry of Knowledge Economy
- 2009. Cooperation agreement with Seogang University
- 2010. Installation of Bore Axle Inspection System for KTX in KORAIL
Move -> New Address : #1609 Daerung Technotown 15th, 224-5 Gwanyang-dong,
Dongan-gu, Anyang-si, Gyeonggi-do, Republic of Korea

For your value creation,



**Innovative
Non-Destructive
Evaluation Systems**

Provides

- Science of Sound
- Ultrasonic Phased Array (PA Imaging) Technologies
- Non-Destructive Testing Systems
- On-line Inspection Systems for Quality Control
- Factory Automation
- Robot Design and Control

Patents

- Apparatus for the ultrasonic inspection of electro-fusion joints for polyethylene pipes for a portable.
- Phased array ultrasonic inspection apparatus having controlling means for focusing parameters.
- Ultrasonic imaging method.
- System and its method for processing digital ultrasonic image.
- Transducer having multiple angle of beam for ultrasonic flaw detection.
- An apparatus for detecting butt joint of pipe using parallel connected transducers and method thereof.
- An apparatus for detecting butt joint of pipe using parallel connected element and method thereof.
- Probe assembly for nondestructive ultrasonic testing.

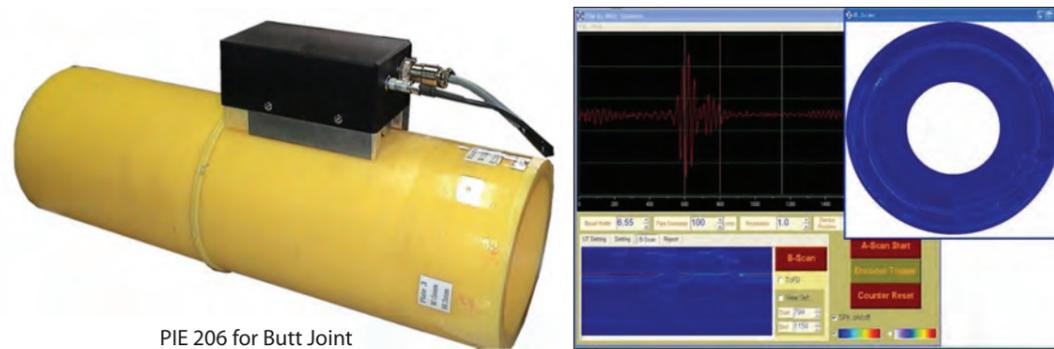
Selective Sales Story

COMPANIES	PRODUCTS or TECHNOLOGIES between 2000~2010
POSCO	Ultrasonic Phased Array System (PAULI-101)
KPS(Korea Plant Service and Engineering)	Stud Bolt Bore Side Inspection System
Halla Climate Control Corporation	Piston Weld Joint Inspection in Production Line
Halla Climate Control Corporation in China	Piston Weld Joint Inspection in Production Line
KOGAS(Korea Gas Corporation)	Ultrasonic testing of Gas Pipe Weld Joints
Korea East-West Power Company	Ultrasonic PA Imaging System
K-Water Research Center(Korea Water Resource Corporation)	Water Pipe Thickness Measurement System(UTCom205)
KGS(Korea Gas Safety Corporation)	Ultrasonic PA Imaging System and PE Piping Butt Joint Inspection System
Korea Southern Power Company	Ultrasonic PA Imaging System
KEPCO KEPRI(Korea Electric Power Research Institute)	Development PA Inspection Technologies for Nuclear Power Plant
KRISS(Korea Research Institute of Standards and Science)	Ultrasonic Beam Field Simulation Module for Piping
Youngjin Fine Chemical	Bladder Thickness Gauging System
KRRI(Korea Railroad Research Institute)	Acoustic signal receiver S/W & Signal Analysis Program
ZHEJIANG SPECIAL EQUIPMENT INSPECTION CENTER in China	Ultrasonic PA Imaging System & PIE206 Ultrasonic system
KICT(Korea Institute of construction technology)	DIPT data management & UT image analysis module Ultrasonic Thickness Monitoring System
KHNP Nuclear Engineering & Technology Institute	Development of Surface Inspection Scanner System for Nuclear Reactor Head Penetrating Pipe
KIMS(Korea Institute of Materials Science)	Ultrasonic c-scanner(7axis)
KORAIL	Bore Axle Inspection System for KTX
Samsung Electronics	Ultrasonic Nondestructive Inspection Testing Method
LG Electronics	Ultrasonic Nondestructive Inspection Testing Method
Kyungdong EVERON	Ultrasonic Nondestructive Inspection Testing Method for Heat Exchanger

Polyethylene with AIM33 & PIE206

Butt Joint Inspection System : PIE206

- A-Scan (Waveform)
- B-Scan (2D cross section)
- Circular B-scan
- PC based Inspection System



EF (electro-fusion) Joint Inspection System : AIM33



AIM33

Nondestructive Testing of EF Joint

Ultrasound Image of EF Joint

Ultrasonic Array System for Real Time Imaging will

- provide high quality ultrasound images of EF joints in real time in real world
- increase the integrity and the service life of PE pipe system
- save cost by reducing maintenance and repair
- reduce the danger of man-made-disaster by preventing gas leakage
- help the research and development of the PE structures

PE (polyethylene) Pipe and Joint Inspection Systems

In General

- Heating wires reflect ultrasound and the wire signals appear in the ultrasound image

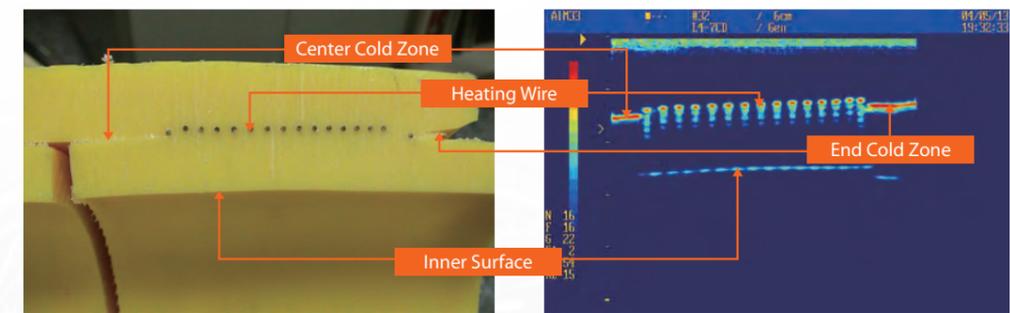
In Good EF Joint

- Ultrasound is transmitted very well through the good fusion joint and the fusion interface will not appear in the ultrasound image
- Ultrasound travels between wires and reflects from inner surface of the pipe

In Imperfect EF Joint

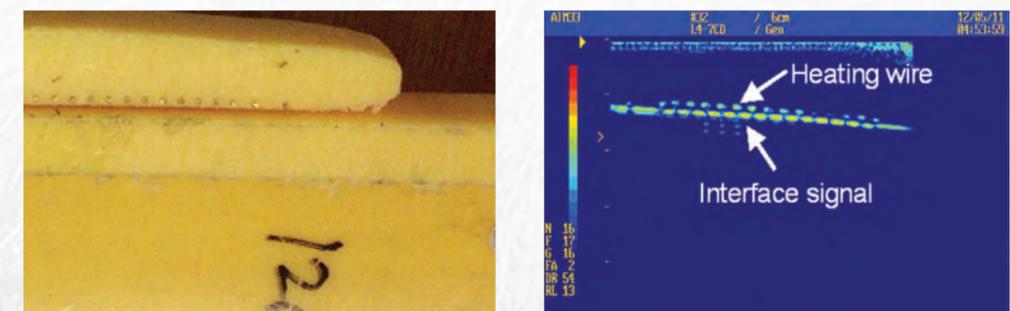
- Imperfect fusion joint reflects ultrasound and the Indications of fusion interface appear in the ultrasound image
- Fusion interface is forming underneath of wires

Example Results

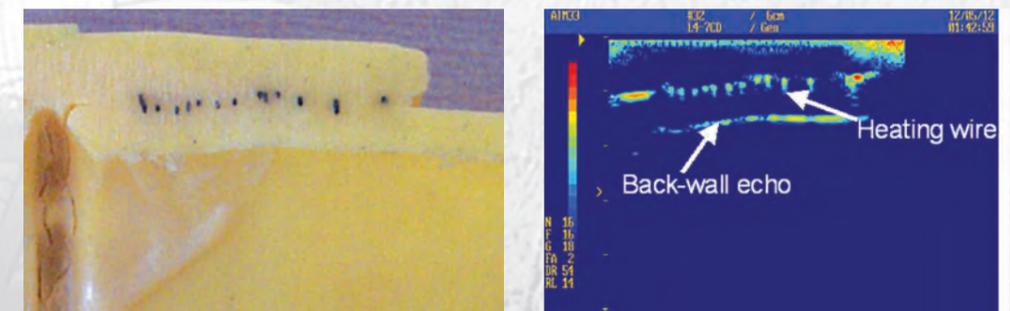


EF Joint Structure

Ultrasound Image(Good Joint)

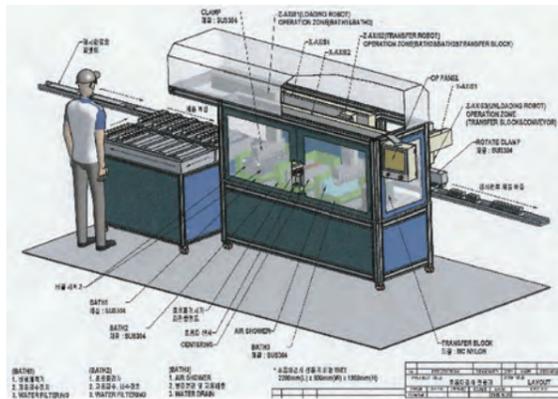


Not good EF Joint



Dislocation of Wires

Automatic Ultrasonic Nondestructive Testing



Quality Testing in Production Line

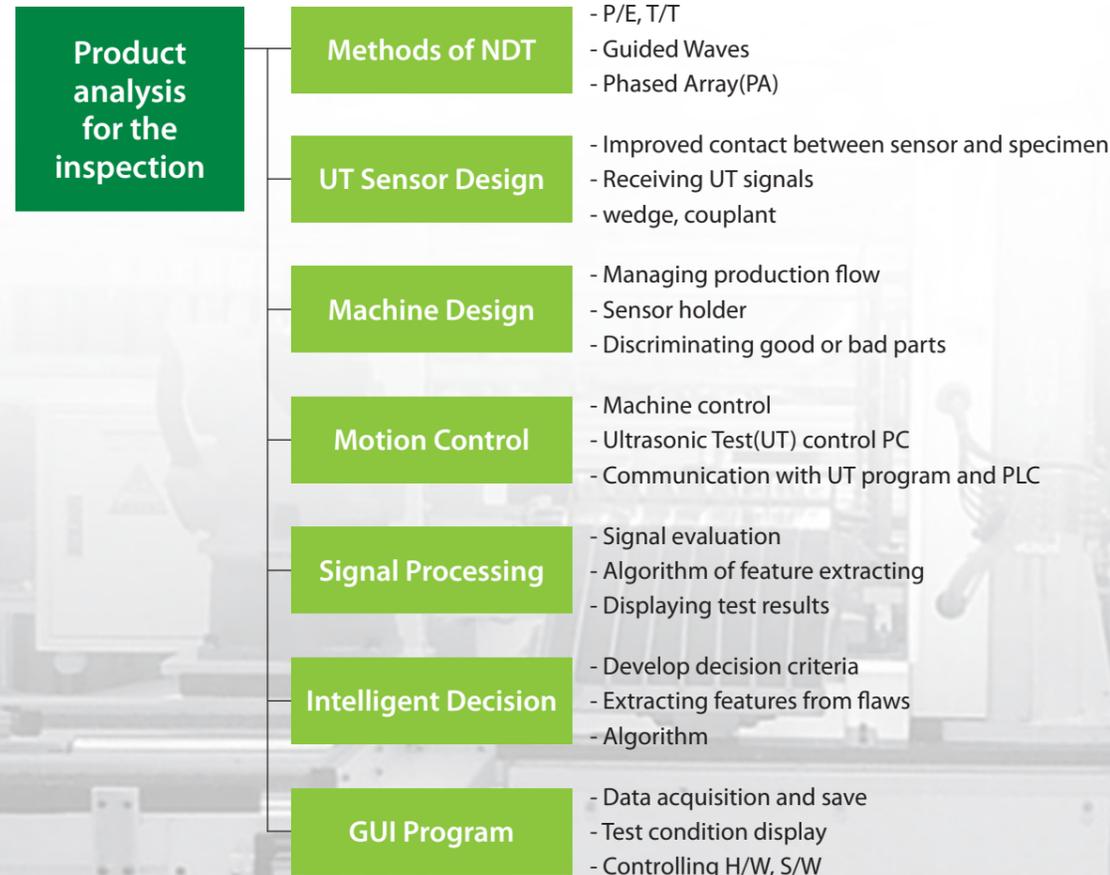
In Line Ultrasonic Testing

- Quick Flaw Detecting
- Intelligent Decision Making
- Efficient Data Management
- Accuracy and Reliability
- Cost-effective
- Reporting

Automatic Nondestructive Testing

evaluates the quality of mass product in production line and determine good or bad parts.

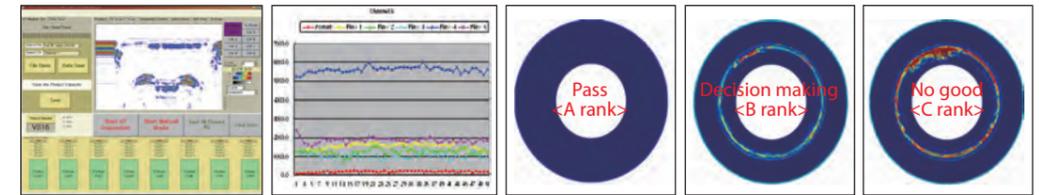
Total Solutions for Quality Testing in Production Line



Weld Joint Inspection Systems



Inspection of Friction Stir Weld Joint in Pistons



Control Interface

Quality Evaluation

Test Results : Decision Making Using Artificial Intelligence

Inspection of Welding Area

Ultrasonic Scan of Weld Area for the Evaluation of Quality Acceptances



C-Scan Test Results for Projection weld

Pass

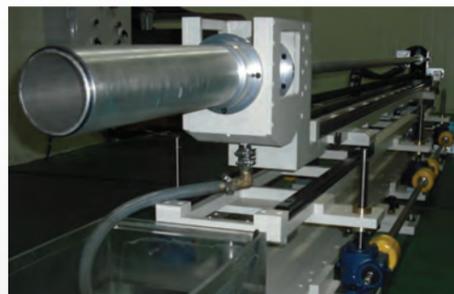
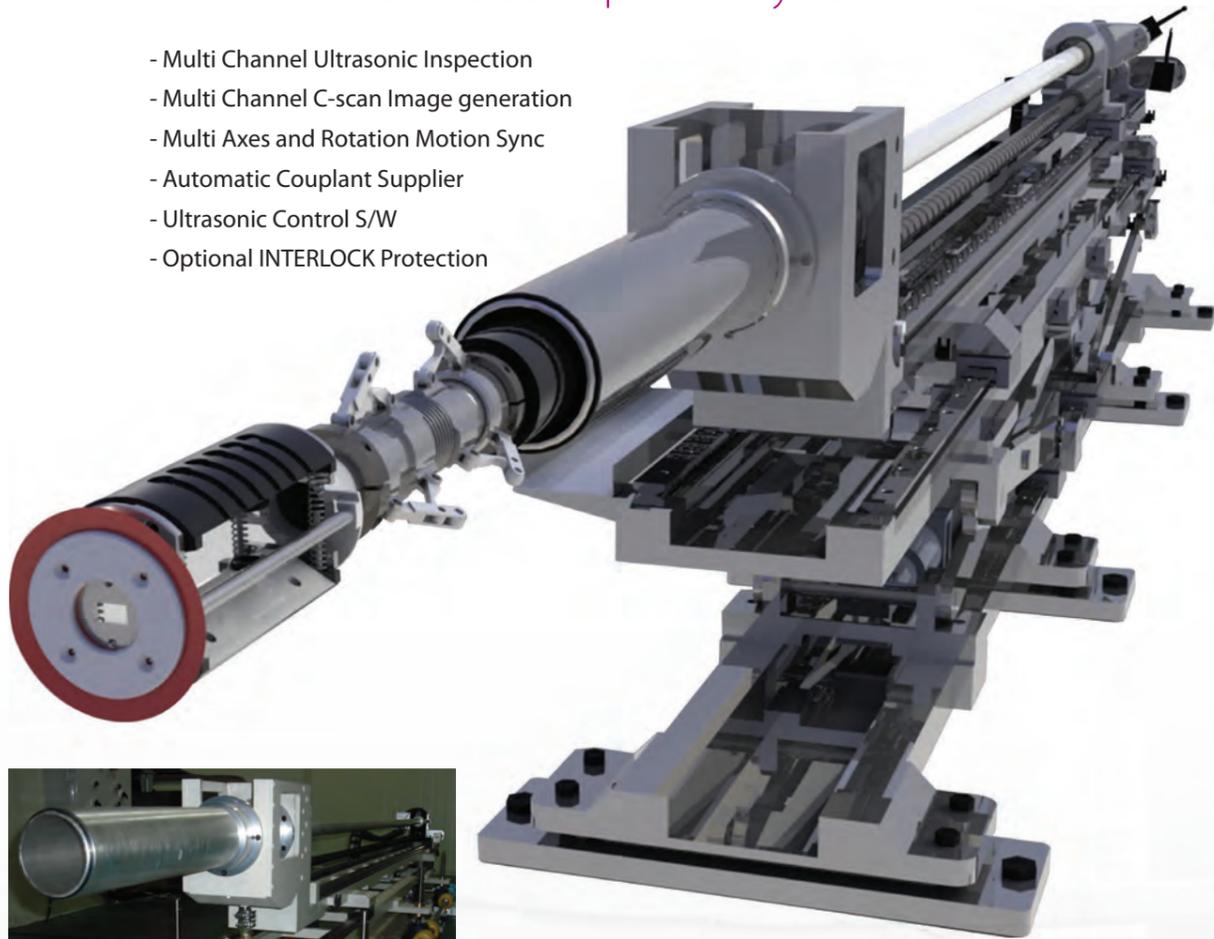
No Good

No Good

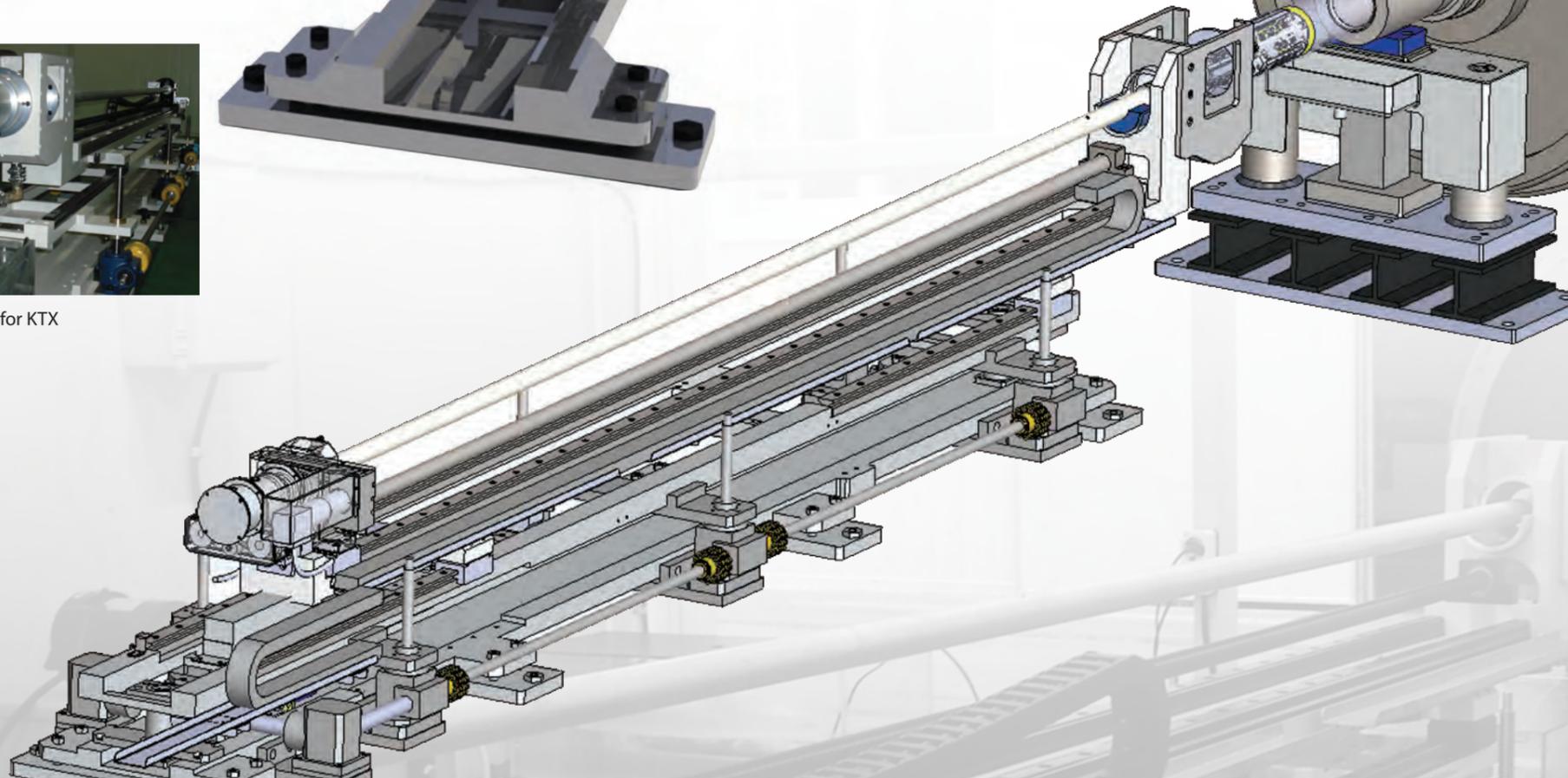
BoreUTscanner

Hollow Axle bore Side Inspection System

- Multi Channel Ultrasonic Inspection
- Multi Channel C-scan Image generation
- Multi Axes and Rotation Motion Sync
- Automatic Couplant Supplier
- Ultrasonic Control S/W
- Optional INTERLOCK Protection



In service for KTX



Hollow Axle Inspection

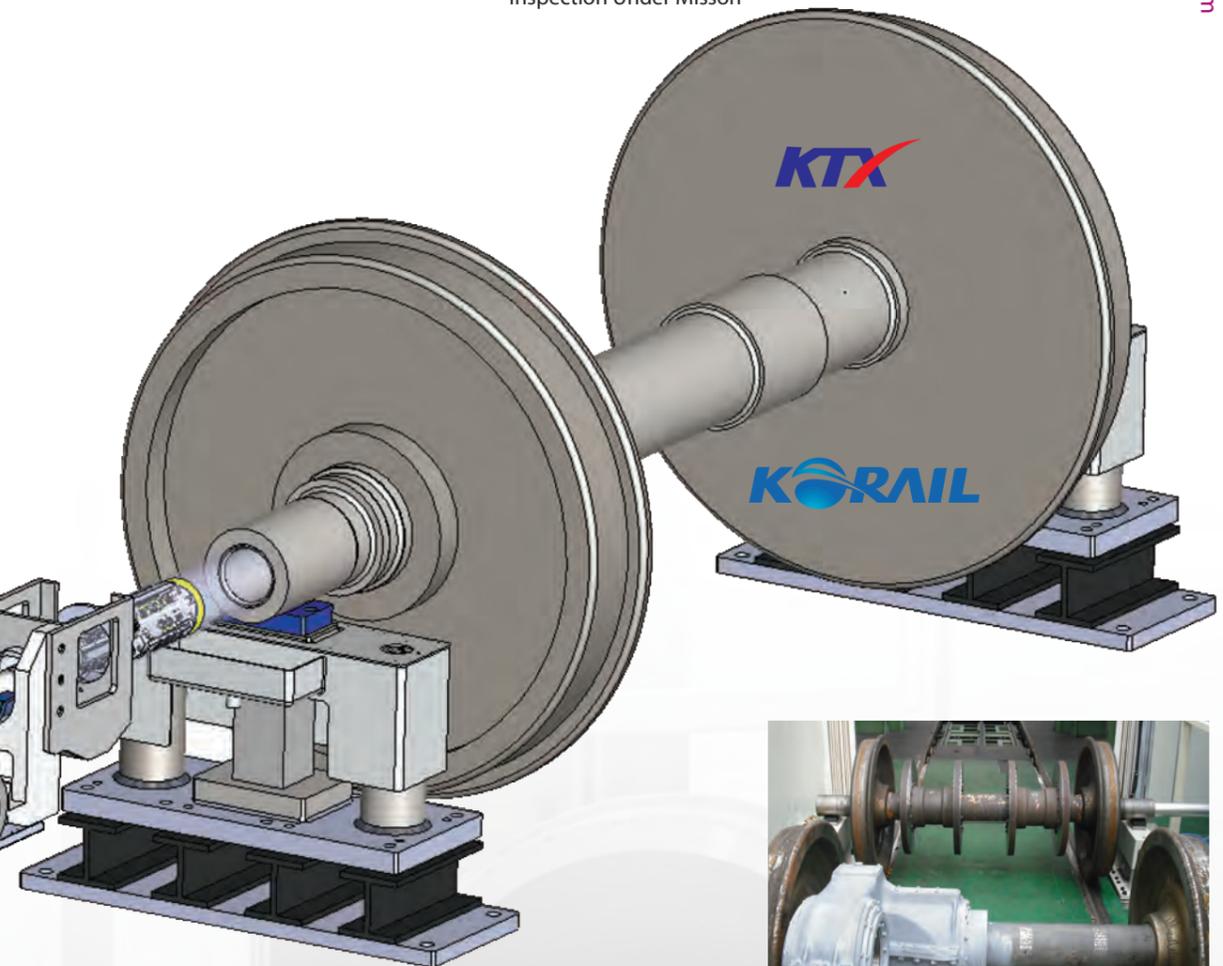
High Speed Train Wheels for KTX

BoreUTscanner

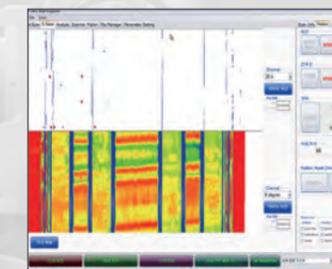
- Basic A-scan and C-scan(2D Scan)
- Optional 3D Scan
- Efficient Data Managements S/W
- Ultrasonic Testing Data Analyzer



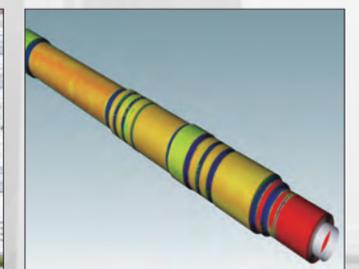
Inspection Under Mission



AXLE Inspection for both Locomotive and Passenger cars



Axle - 2D Ultrasonic Scan

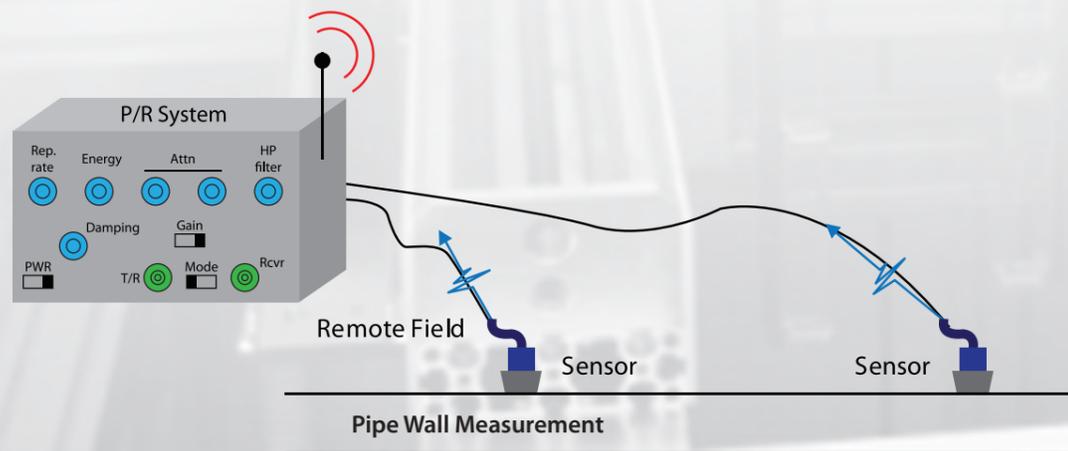
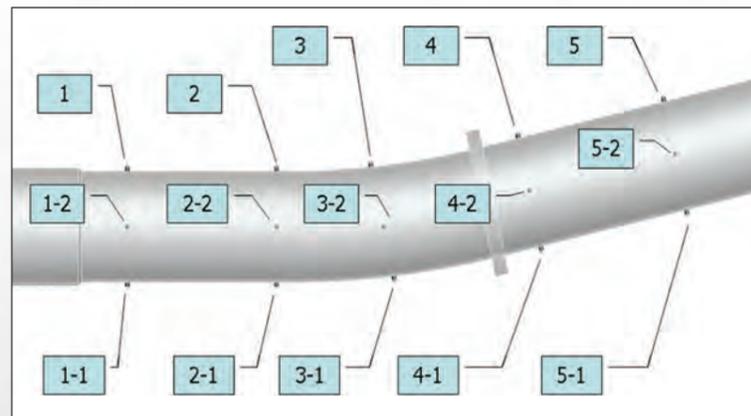


Axle - 3D Ultrasonic Scan

Precursive Damage Monitoring and Prediction

On-line Remote Field Measurements

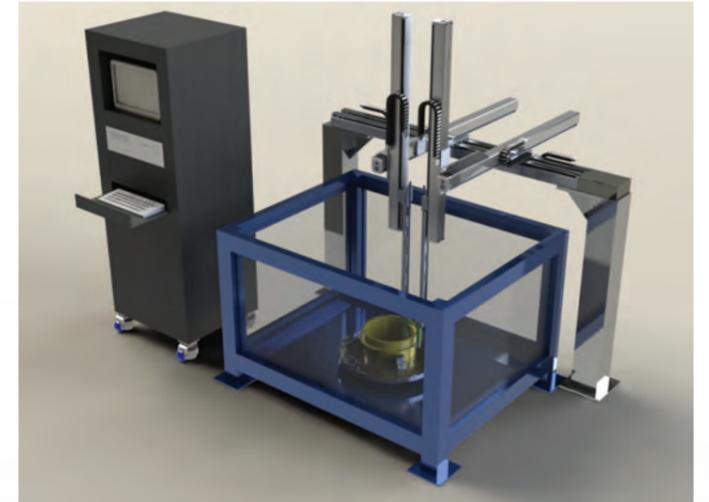
- Scattered Sensor Network
- Multi Point Measurements
- Real Time Periodic Measurements
- Automatic Multi Point Monitoring
- Ultrasonic Measurements of Thickness
- Data Acquisition and Transmission
- Data Analysis at Office
- Periodic Report Generation



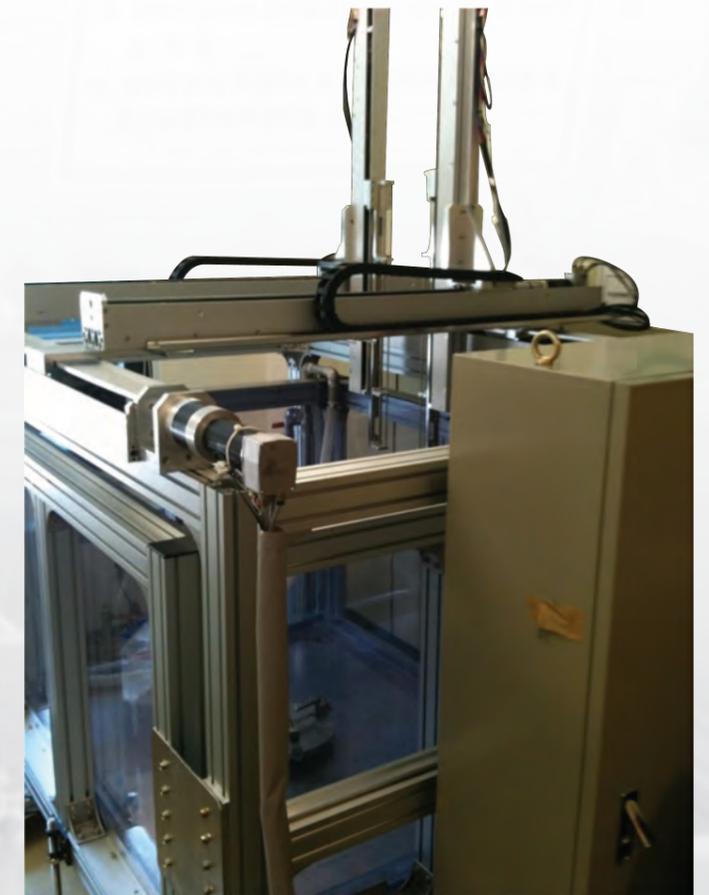
Ultrasound Scanner (C-Scan)

2D Ultrasonic Imager

- Ultrasonic Driver
- Digital Data Acquisition
- Inspection Setup Control
- Multi axis Scanner
- Motion Control
- Joystick Control
- C-scan with Amp/TOF
- Selection of Region of Interest(ROI)
- Histogram Analysis
- Histogram-(Accumulative) Amplitude
- Indication Ratio in ROI
- Section Profile (Optional)
- Color Palette Control
- Binary Image Construction
- Data Manager
- Report Generation
- Zoom IN and OUT
- Various Image Format (JPG, BMP, GIF...)
- Measurement : Angle, Distance



Extra Length Y axis
3 axis (X, Y, Z) C-Scanner

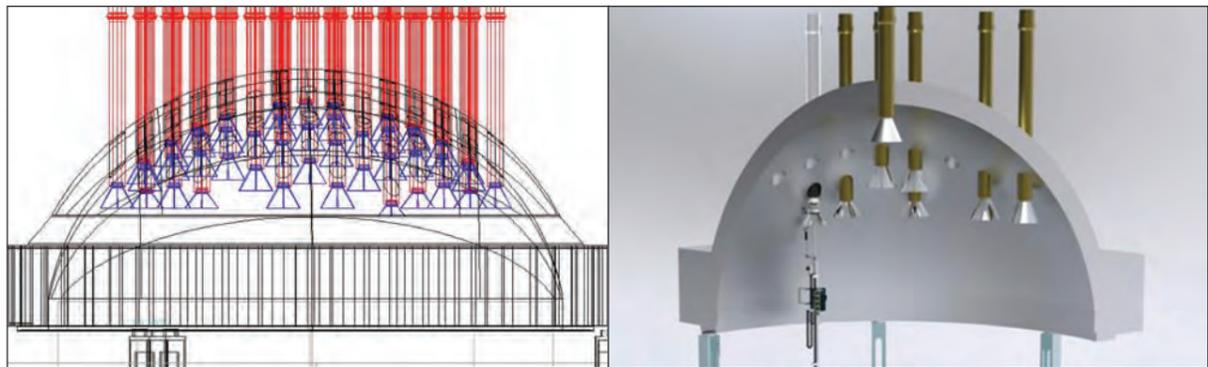


7 axis C-Scanner
Dual XYZ and Rotation

Robot Sync between Simulation and REAL Field

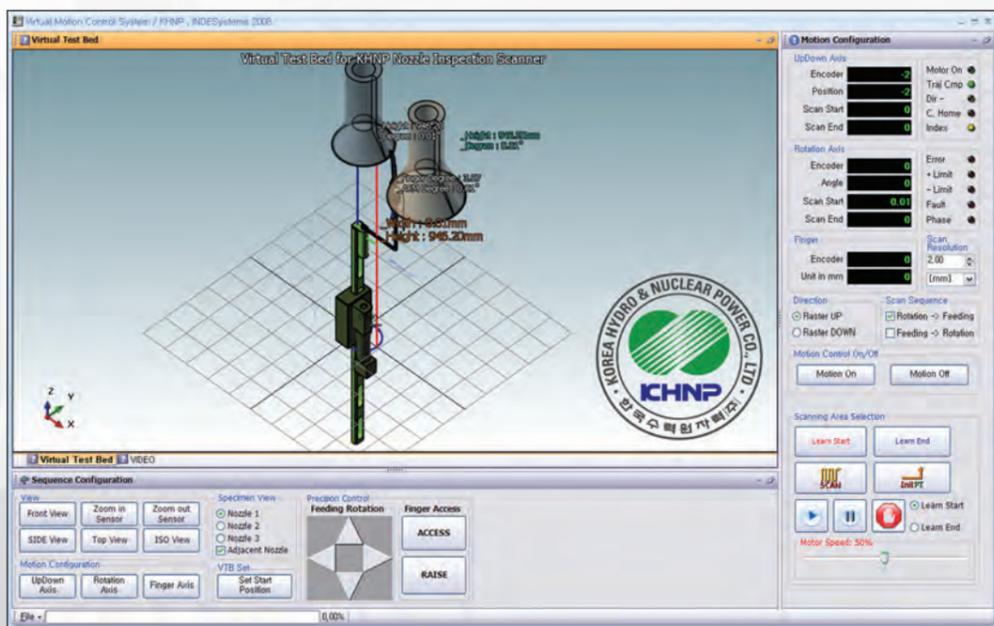
Virtual Machine and Virtual Structure

- Sync Between Virtual Robot and Real Robot
- Sync Between Virtual Structure and Real Structure
- Motion Simulation with Virtual Robot in Virtual Structure
- Programmable Motion Sequence
- Remote Field Joystick Control



CAD(Reactor Dome)

Virtual Robot in Virtual Reactor Dome



Real Robot Control in Virtual Space

Nuclear Reactor Scanner

Penetration Pipe Scanning End Effector

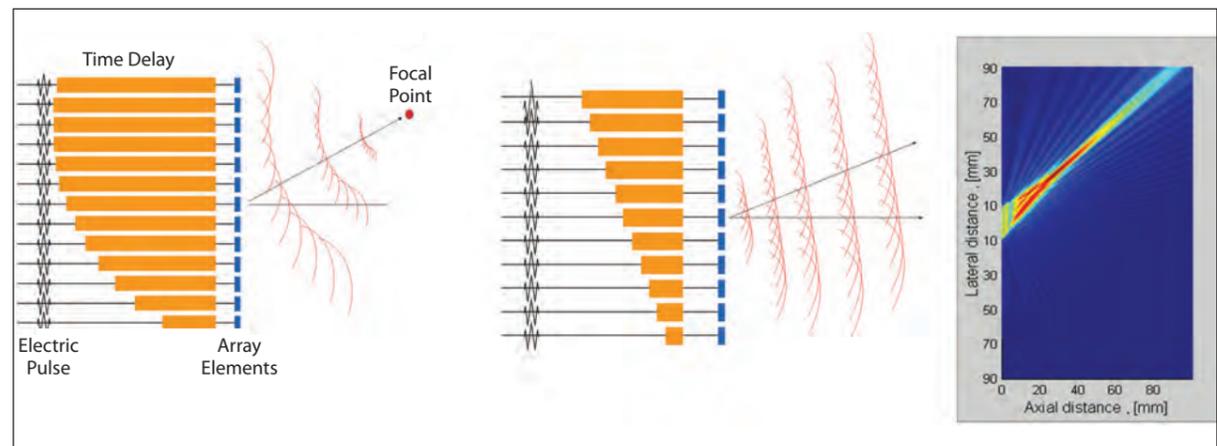
- Smart Robot Motion
- Programmed Scan
- Remote Field Control
- Flexible Finger Sensor
- Data Acquisition



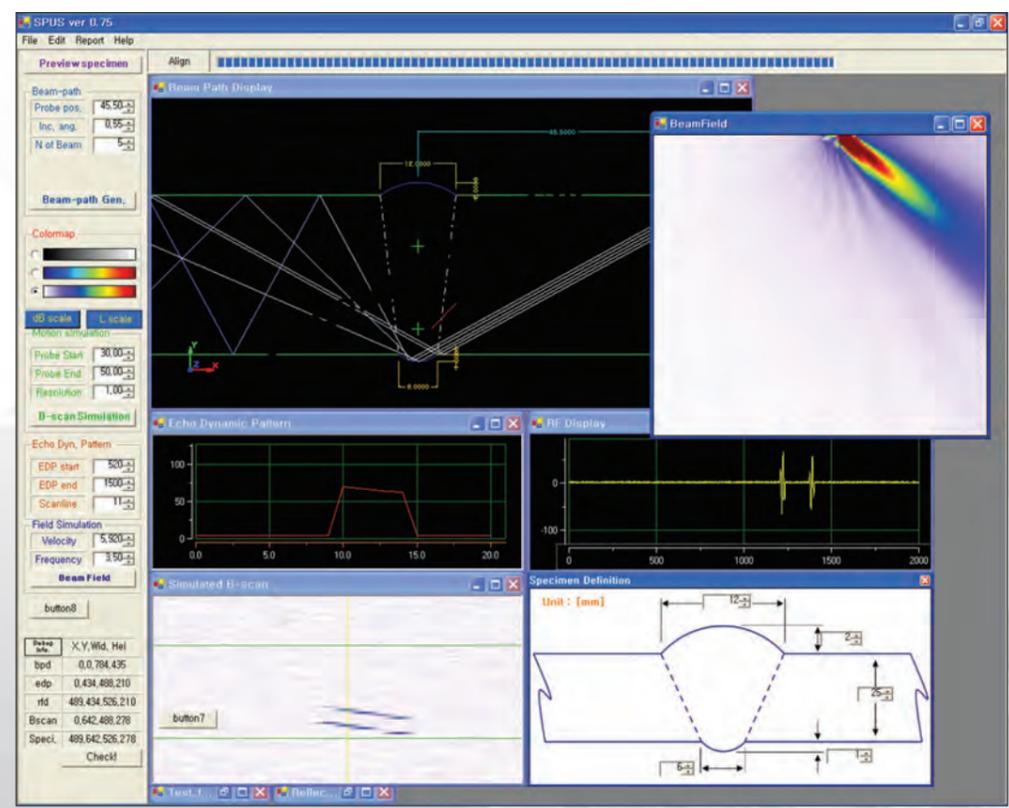
Precision Inspection Scan

Beam Field Simulation

Phased Array Ultrasound



Phased Array Electronic Focusing & Steering



Ultrasonic Beam Path Simulation

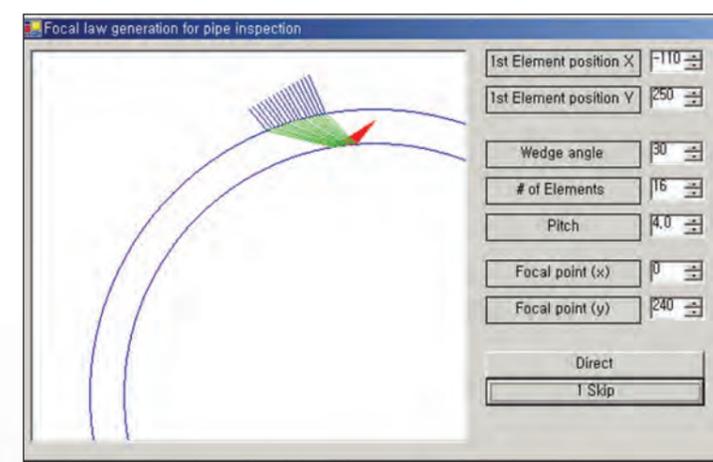
Phased Array (PA) Technologies

Developments

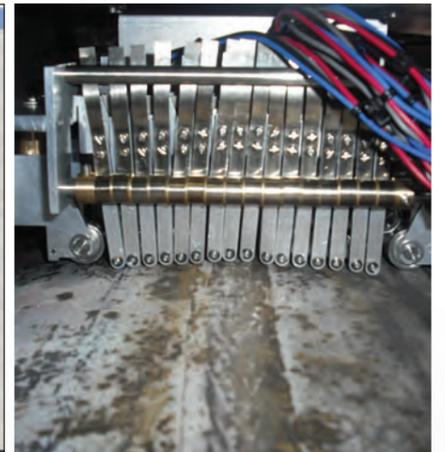
- Electronic Scanning
- Sectorial Scan
- Linear Scan
- Beam Focusing
- Noise Reduction
- Real Time Images
- Intuitive Inspections



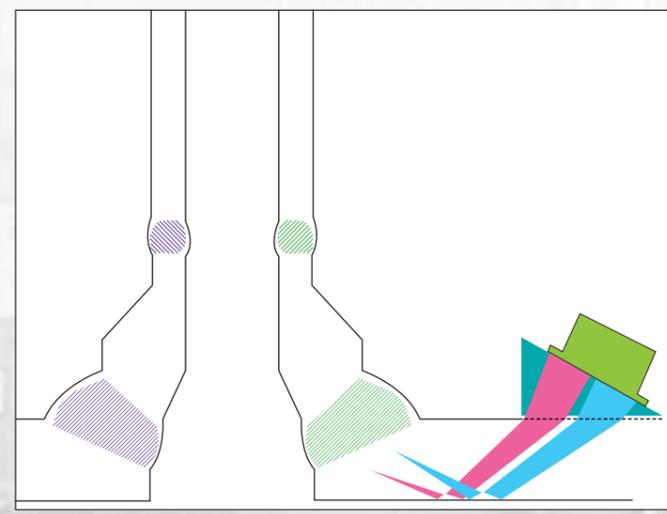
Bore PA Sensor



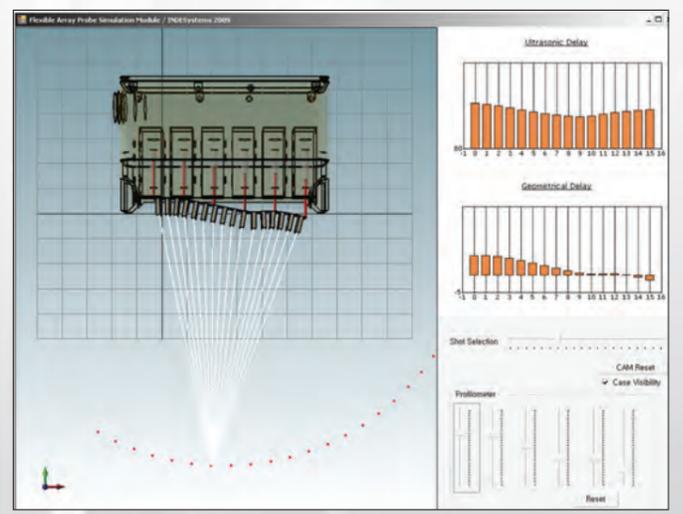
Phased Array Focal Law Generator



Flexible PA Probe



Reflection of PA



Flexible PA Probe Beam Forming