Your Vision, Our Future

MultiView and TubePro

- **Complete Heat Exchanger Tubing Inspection Solution**
- **Acquisition, Analysis, and Reporting**
- **Advanced User-Editable Reporting**
- **Multiple Technology**
- **Easy-to-Use Interface**

Overview

MultiView is a PC-based software application used for data acquisition and data analysis of eddy current, remote field, near field, magnetic flux leakage, and ultrasound IRIS signals. Used in conjunction with the MultiScan MS5800 acquisition unit and TubePro tubesheet mapping-reporting software, it offers a remarkably complete solution package for heat exchanger tubing inspection applications.

MultiView has been drastically improved over recent years. Feedback from customers, continuous enhancement, attention to detail, and dedication to customer satisfaction have contributed to the version currently available on the market.

By distributing the TubePro software application, which supports easy data exchange with MultiView and has several ground-breaking, advanced 2-D and 3-D reporting capabilities, Olympus has redefined reporting for heat exchanger tubing inspection.

Both the MultiView and TubePro software applications are compatible with Windows XP, Windows Vista, and Windows 7, and work equally as well on laptops (for field usage) as they do on desktop computers (for advanced data analysis and reporting).

No other system offers as many capabilities as MultiView, TubePro, and the MultiScan MS5800 system used in conjunction with one another!

Supported Acquisition unit

MultiView performs data acquisition exclusively with the MultiScan MS5800 unit, and can read back data previously recorded with the TC5700 legacy instrument.

MultiView Interface Overview

The latest improvements to MultiView bring data analysis to a whole new level. MultiView's newly redesigned mouse and keyboard controls make data manipulation possible at tremendous speeds. Simplification was adopted for maximum ease-of-use in navigating the multiple technology interface, which boasts a minimal amount of changes and operations for reduced training requirements.
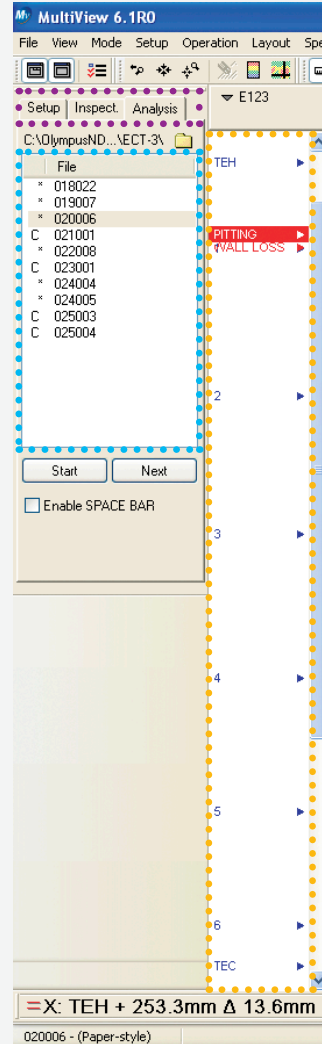
Modes ●

Switch between Setup mode (calibration), Inspection mode (data acquisition), and Analysis mode (data readback).

Tube List ●

Perform data acquisition on the fly, or from a loaded tube list. The list can also be easily generated using TubePro.

Use Analysis mode to read back all recorded tubes.

In addition, recently added new features such as Landmark capability and paper-style strip charts, in addition to reporting improvements, will definitely make MultiView your favorite analysis and reporting software!

Landmarks ●

Evaluate and record indication distance with this powerful and newly introduced feature.

Toolbars and Layouts

Quickly access the most commonly used functions, or customize the screen at your convenience.

Redesigned Controls

Gain unprecedented speed and efficiency during analysis with the completely redesigned mouse controls and keyboard shortcuts.
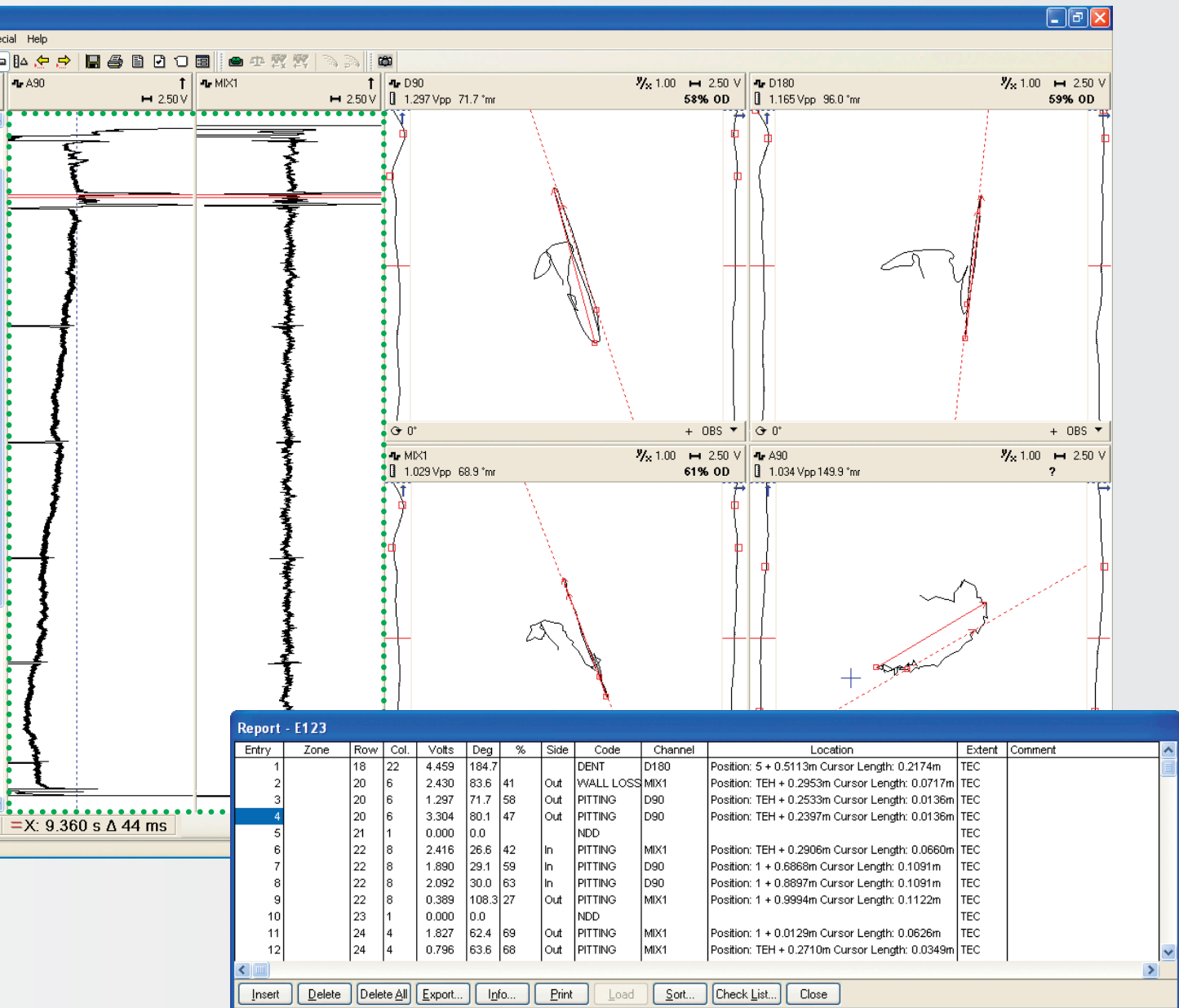
Strip Charts ●

Newly introduced, real paper-style strip charts will please the most experienced of analysts. In addition, Strip Chart mode can be switched to the previous style.

Analysis Report

Log all analysis results (defects) in a database. The latest improvements include accurate recording of indication distance and indication recall directly from the Report window.

The reporting feature is common for all supported technologies.

MultiView - A Multiple Technology Software

Setup Wizard

Setting up the MS5800 instrument has never been easier than with the latest updated and newly added Setup Wizard menus.

Use the step-by-step guide to enter the appropriate variables for high-quality signals in record time!

As with all other features in MultiView, the Setup Wizard supports the ECT, RFT, NFT, MFL, and IRIS technologies.
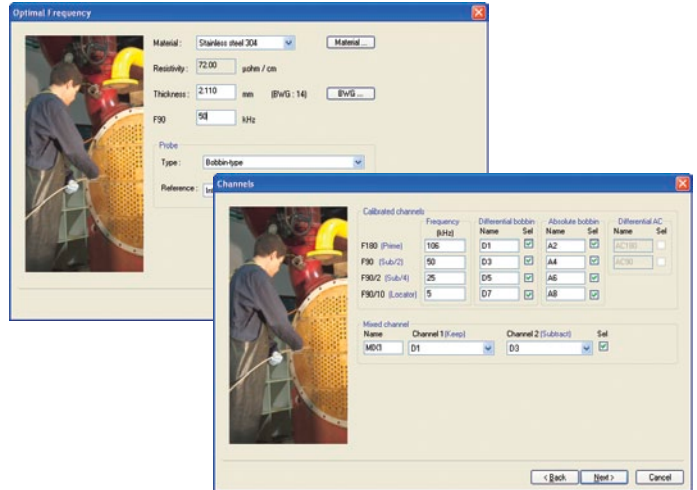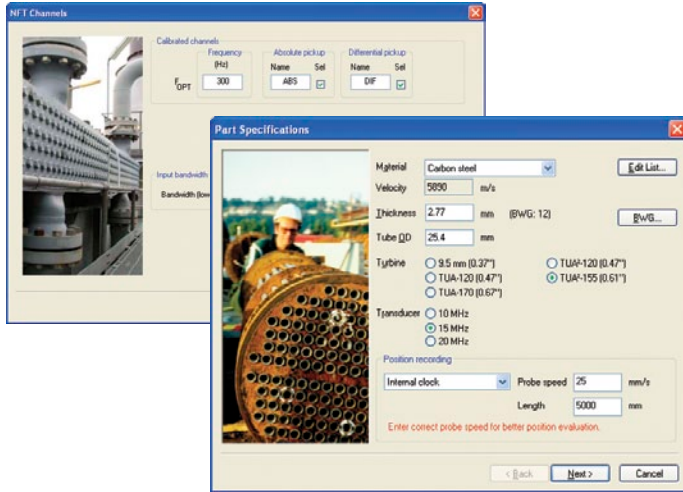
Simultaneous Signal Calibration

With ECT, RFT, NFT, and MFL signals, all defects can be recorded instantly with a tap of the Calibrate button.

Pressing the Calibrate button automatically adjusts (calibrates) all the channels and their depth curves as per the default or recommended settings. Mix-type channels are also automatically adjusted.
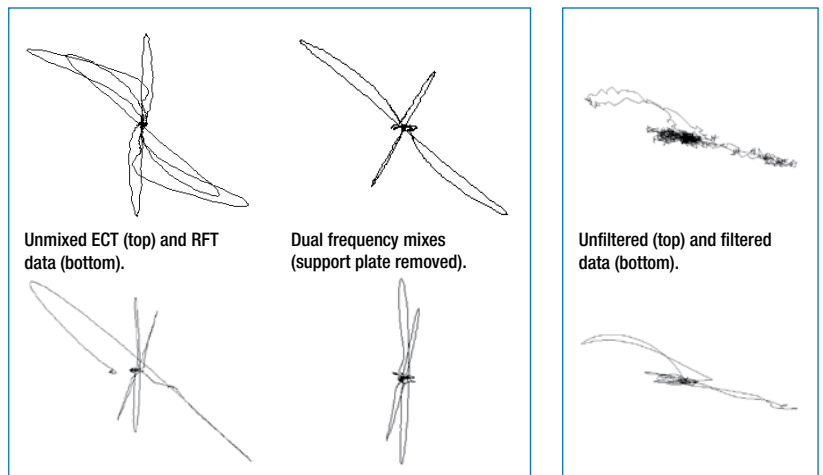
References can be added and associated with the different depth curves in order to maximize the results and gain precision over flaw sizing.

Select and measure each indication with a single click…

…to calibrate all channels and depth curves!
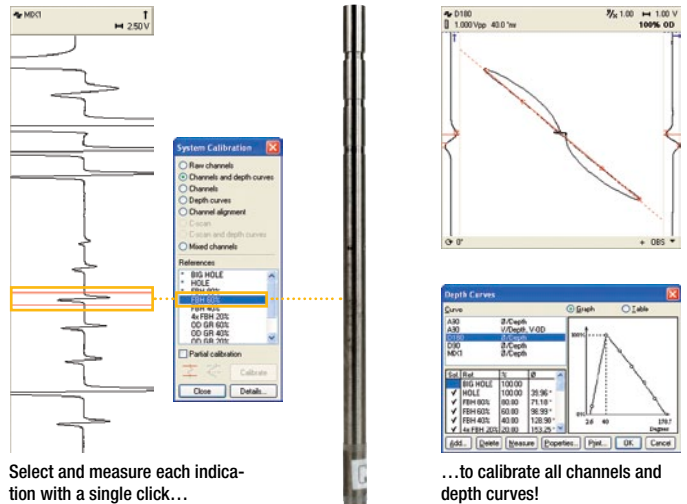
Frequency Mixing and Signal Filters

MultiView allows for a virtually unlimited quantity of Mix-type or Filter-type channels. Mix-type channels are used to suppress undesirable signals such as Support Plate signals with ECT and RFT data, Dents, or internal diameter variation with ECT data.

Although the Setup Wizard presets the Mix channels for the most common usages, channels can be edited or added upon data readback in accordance with your data analysis needs.

Unmixed ECT (top) and RFT data (bottom).

Dual frequency mixes (support plate removed).

Unfiltered (top) and filtered data (bottom).

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RFT Voltage Plane

MultiView includes the Voltage Plane view for remote field signals. This view is extremely useful to analysts who must interpret complex signal shapes. The Voltage Plane view enables:

- Depth sizing using phase measurement.
- Multiple curves for Short, Long, or Taper indications.
- Quick and easy signal normalization (shortcut-based).
- Frequency-compensation identification.
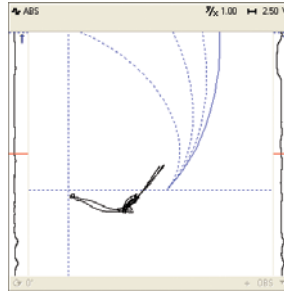
The operating point often shifts due to normal permeability changes between tubes.
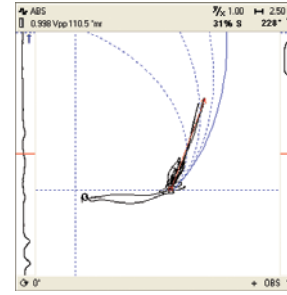
MultiView allows for quick normalization of the operating point on the Voltage Plane Overlay using mouse/keyboard shortcuts.
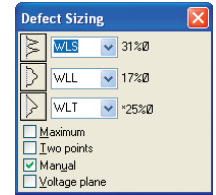
Choose between three curves to correctly estimate depth of Short, Long or Taper defects.
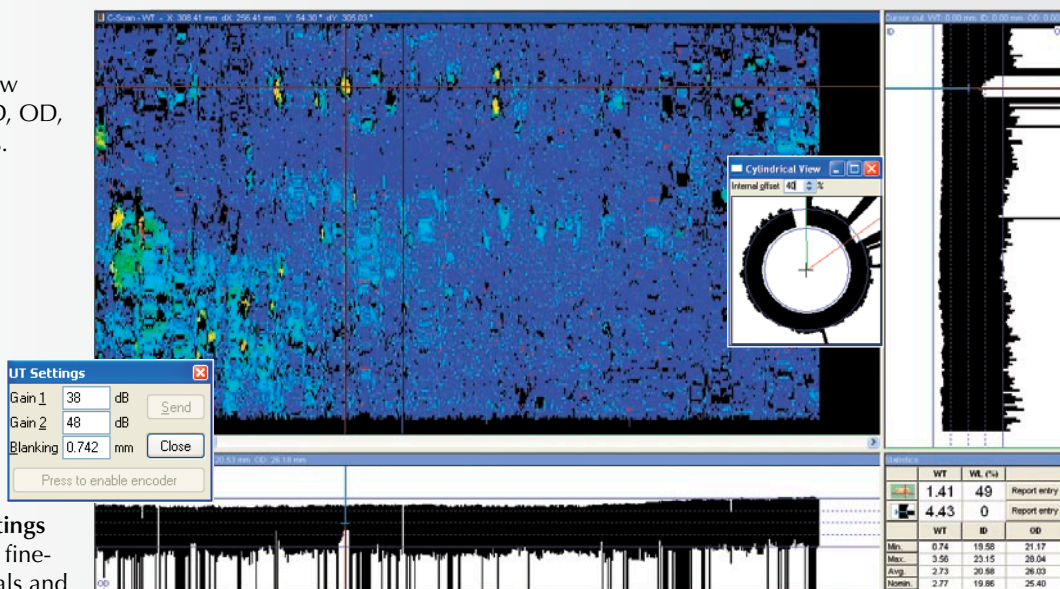
Ultrasound IRIS

MultiView is a unique, powerful tool for IRIS inspection. The MultiView Setup Wizard has been consistently improved for instant, accurate results. The real-time B-scan and C-scan displays are powerful tools that allow for quick identification of defects during inspection. Real-time controls make fine adjustments very easy, while the video A-scan view provides a clear representation of the ultrasound signals for maximum comprehension. Other powerful analysis tools, such as the cylindrical-view, ID, OD, and WT C-scan displays, automatic and manual wall-thickness measurement, and improved mouse controls, make analysis of IRIS data much easier. In addition, the ability to support encoded scanning enables precise reporting of indication distance.

Double-click on the indication to update the **B-scan view.**

The **real-time C-scan** window displays the ID, OD, and WT views.

Real-time settings allow for easy fine-tuning of signals and enabling of encoded scans at the tap of a button.

The **B-scan view** shows the tube cross-section enabling interpretation and measurement of indications, while the cylindrical B-scan view adds clarity.

The Statistics box containing measurement results helps the analyst accurately estimate flaw depth.

The **video A-scan display** provides full details about source ultrasound signals. All parameters can be adjusted within this menu for optimal results.
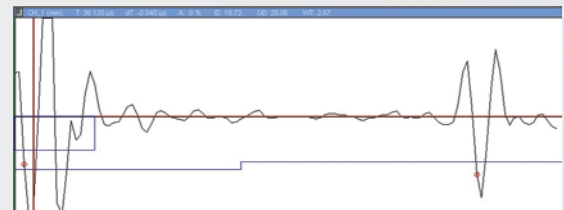
NFT and MFL for Air-Finned Coolers

Near field testing (NFT) and magnetic flux leakage (MFL) are the perfect screening technologies for air-finned cooler tubing. MultiView fully supports both technologies with its improved Setup Wizard, which automatically sets all the parameters for instant access to the best possible results. Additionally, the latest preset layouts and automatic measurement options make data analysis easier than ever.
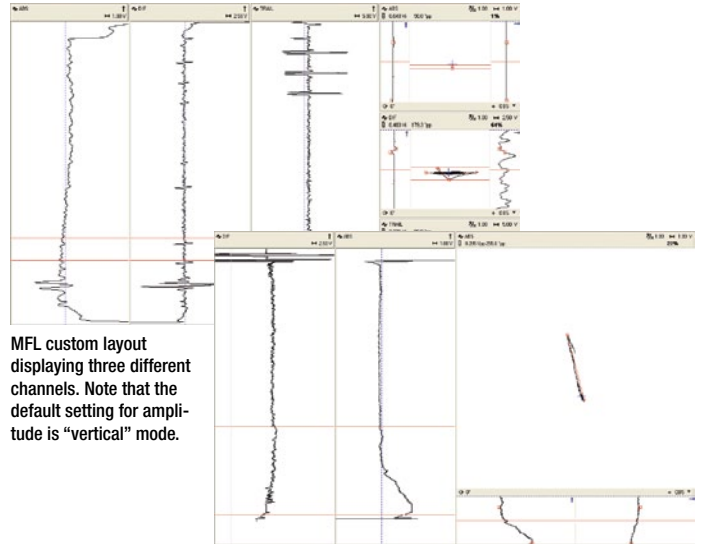
MFL custom layout displaying three different channels. Note that the default setting for amplitude is "vertical" mode.

NFT screen with its Depth measurement.

C-scans and Customizable Layouts

Array probes enable better coverage (probability of flaw detection) and imagery for improved signal analysis. MultiView, in conjunction with the MultiScan MS5800, supports C-scan 2-D and 3-D (isometric) views for ECT, RFT, NFT, and MFL array data using encoded scan, or free-running (clock-based) configuration. Rotary surface detectors and raster scanning are also supported for high-quality C-scan display generation.

Layouts can be created in MultiView with near-endless possibilities for combinations, including impedance planes, 2-D and 3-D C-scans, and strip charts. Just press Create Layout and start editing!

The improved controls in **C-scan view** enable you to instantly select any indication.
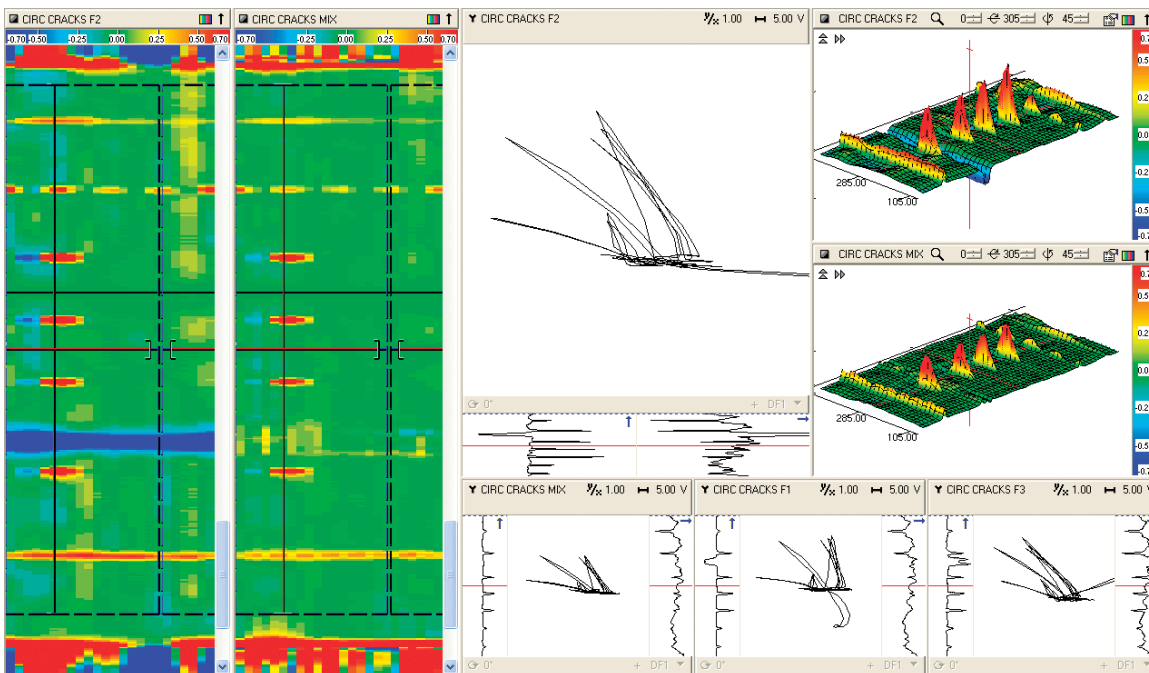
Set up attractive **3-D views** and modify their parameters or color palettes.

Right-click to instantly add **processing** to your **C-scan data**. The processes feature includes:

- Several filters
- Mixes and subtraction
- Interpolation (smoothing)
- Calibration Array (normalization)

Create **custom layouts** featuring XY planes, strip charts, C-scans, or 3-D views using the Layout toolbar.

# Inspection with MultiView and TubePro

MultiView is designed to perform data acquisition with the Multi-Scan MS5800, and record data for each tube inspected. Acquisition can be performed using keyboard shortcuts, or a remote footswitch to start and stop data recording. If the list of tubes to record is relatively short, it can be generated on-site within MultiView.

However, for standard lists users can quickly select tubes in the TubePro software and send the list to MultiView. This step can be performed prior to the inspection, or on-site if needed.

Generate the list of tubes to record within MultiView, or speed up the process using TubePro.
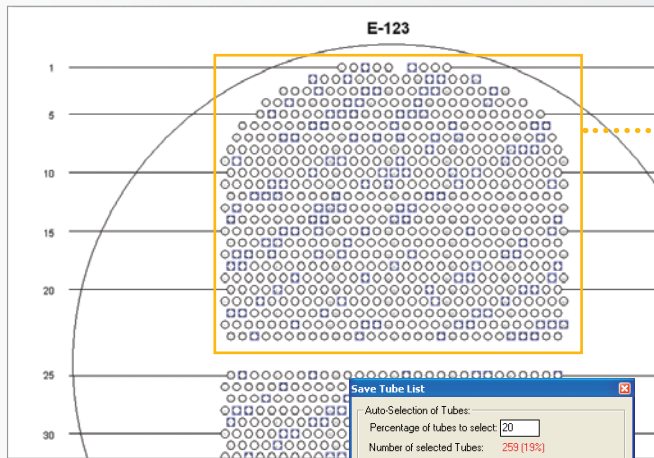
TubePro provides several options for selecting tubes for inspection.
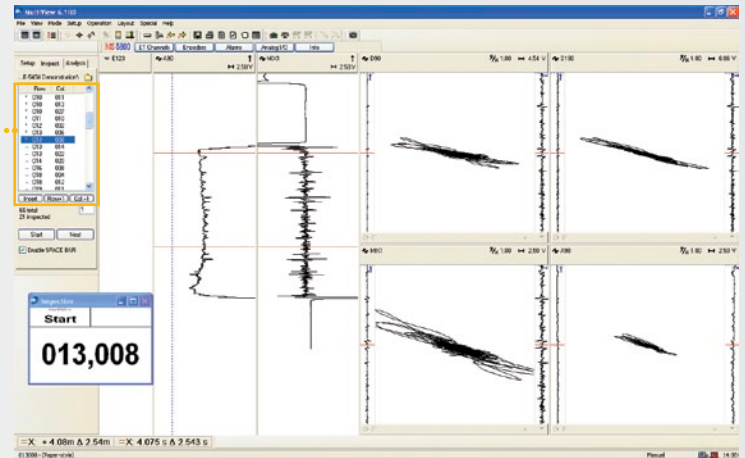
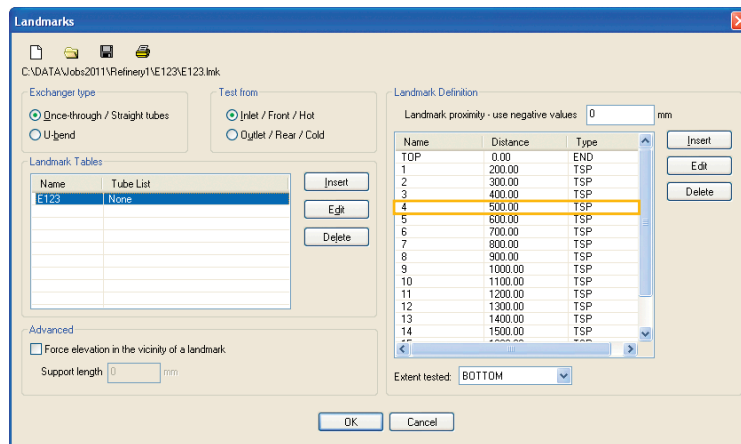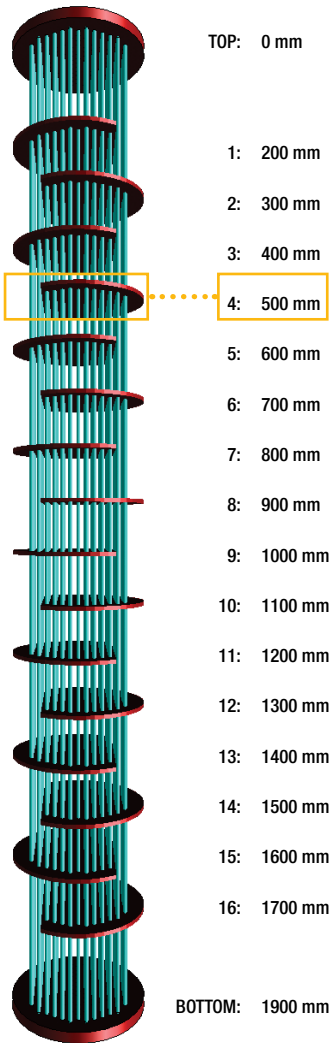Monitoring the current tube under inspection is easy with the oversized Digits window.

Tubes can be recorded using the space bar or an external footswitch. Footswitches provide interesting options for single-user operation with features such as configurable buttons, resulting in significant time savings.

Analysis and Reporting Using MultiView

Report Indication Distance using Landmarks

In today's competitive environment with increasing requirements for higher quality inspection results, inspection and service companies are often asked to provide information on a flaw's exact location or distance within the inspected heat exchanger. While position recording devices (encoders) are always an option, use of manual scanning (probe pulling) is still common practice in the petrochemical industry.

MultiView offers a newly added Landmarks feature that can be used to report an indication's distance. In heat exchangers, landmarks are the tubesheets and supports. Because most landmarks are clearly visible in ECT, RFT, NFT, and MFL data, they can be identified in the strip charts. MultiView uses the distances logged in the Landmark Table to provide an accurate distance estimation for the selected indication using interpolation to compensate for inevitable changes in the pulling speed.

TOP:	0 mm
1:	200 mm
2:	300 mm
3:	400 mm
4:	500 mm
5:	600 mm
6:	700 mm
7:	800 mm
8:	900 mm
9:	1000 mm
10:	1100 mm
11:	1200 mm
12:	1300 mm
13:	1400 mm
14:	1500 mm
15:	1600 mm
16:	1700 mm
BOTTOM:	1900 mm

1 Build a Landmark Table in MultiView, or use TubePro to automatically generate it from a 3-D model.

The table should include the Heat Exchanger start and finish distance. Add supports for greater distance accuracy when reporting an indication.

3 Select the indication, analyze it, and then, with a single click, enter it into the Report database. The indication's distance will also be logged into the Report database.

Note that the indication's position is interpolated from adjacent landmarks.

With a single click, report the indication in the XY plane window.
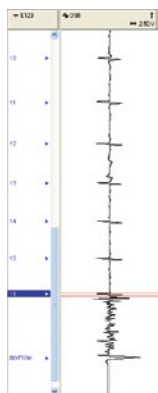
Indication Entry in Report Database

2 Quickly identify the necessary landmarks using one of the following three methods:

- Only tube ends (recommended for NFT and MFL).
- Tube ends and the closest landmarks to the indication.
- All landmarks from the table.

Entering landmarks is quick and easy with mouse and keyboard shortcuts.
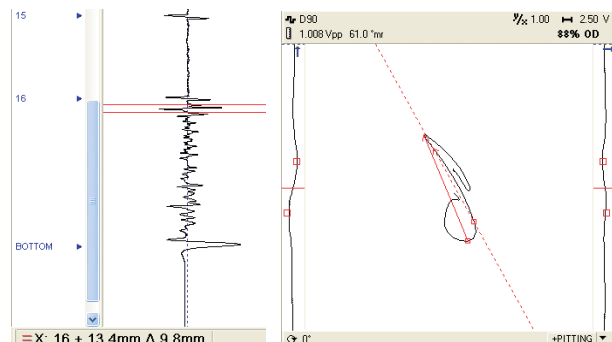
Instantly Recall Reported Indications

Reported indications can be quickly recalled from the Report window. The signal and analysis vector are displayed exactly as they appeared at the time the indication was recorded.

This very unique and useful feature can be used by senior analysts to review preliminary analyses. All reported indications are saved into each data file and displayed upon readback.

Report - E123

Entry	Zone	Row	Col.	Volts	Deg	%	Side	Code	Channel	Location	Extent	Comment
7		22	8	2.416	26.6	42	In	PITTING	MIX1	Position: TEH + 0.2906m Cursor Length: 0.0660m	BOTTOM	
8		22	8	1.890	29.1	59	In	PITTING	D90	Position: 1 + 0.6868m Cursor Length: 0.1091m	BOTTOM	
9		22	8	2.092	30.0	63	In	PITTING	D90	Position: 1 + 0.8897m Cursor Length: 0.1091m	BOTTOM	
10		23	1	0.000	0.0			NDD			BOTTOM	
11		24	4	0.796	66.5	64	Out	PITTING	MIX1	Position: TEH + 0.2710m Cursor Length: 0.0349m	BOTTOM	
12		24	4	1.827	62.4	69	Out	PITTING	MIX1	Position: 1 + 0.0129m Cursor Length: 0.0626m	BOTTOM	
13		24	5	1.624	67.3	83	Out	WALL LOSS	A90	Position: TEH + 0.2655m Cursor Length: 0.0452m	BOTTOM	
14		24	5	0.000	0.0	99		OBSTRUCTE	A90		1	Obstructed past Support 1.
15		25	3	0.000	0.0			NDD			BOTTOM	
16		25	4	0.000	0.0			NDD			BOTTOM	
17		28	14	1.008	61.0	88	Out	PITTING	D90	Position: 16 + 0.0134m Cursor Length: 0.0098m	BOTTOM	

[Insert] [Delete] [Delete All] [Export...] [Info...] [Print] [Load] [Sort...] [Check List...] [Close]
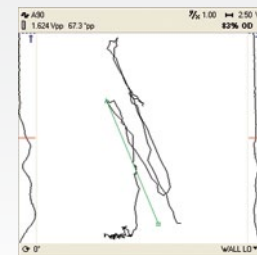
Double-click on the report entry to instantly recall reported indications exactly as they were recorded.
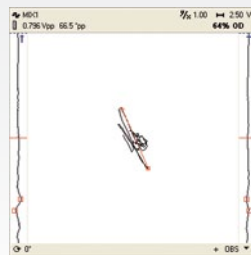
Report entry 11
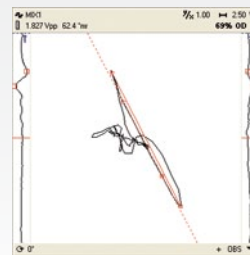
Report entry 12

Report entry 13

Report Output

Report output is available in several formats. MultiView includes a basic analysis report template that can be either printed or exported into several common file formats. All inspection results can be easily sent to the TubePro tubesheet mapping software, which displays the results in 2-D and 3-D, in addition to showing the heat exchanger and a whole lot more!
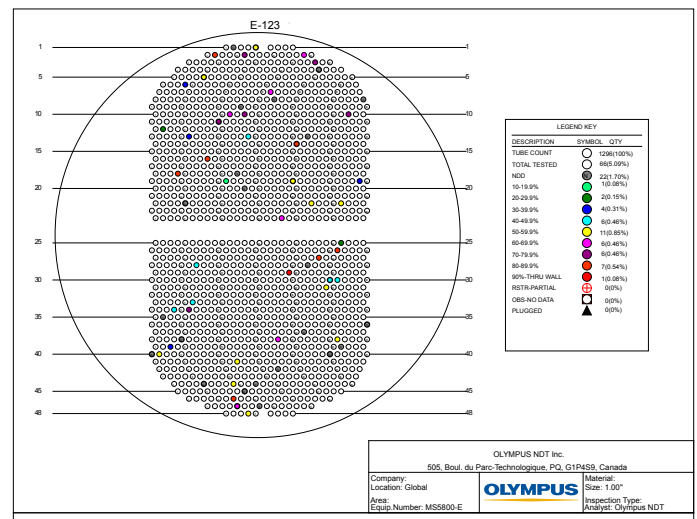
Print the report directly from MultiView

Or, export it in any of the following formats:

- .txt
- .csv
- .rpt
- .rtf
- .xml
- .htm

Or, send it to TubePro for a world-class, customizable report!

World-Class Reporting Using TubePro

TubePro 2-D and 3-D tubesheet mapping-reporting software is the ideal companion to MultiView, and can be used to produce complete, fully customizable, multiple-page reports as per company standards and your customers' needs. This software features a modern, easy-to-use Tube Map Editor capable of generating virtually any type of exchanger imaginable. In addition, MultiView inspection results can be easily dropped into the TubePro software, where the results can be displayed as user-editable color codes. In fact, all the features available in TubePro are fully editable, and can be saved as template files for later use. Last but not least, the phenomenal 3-D module will definitely impress your customers with its ability to display defects in 3-D.
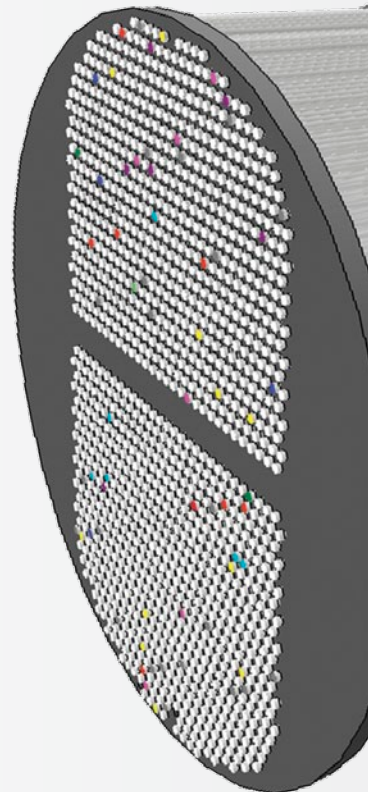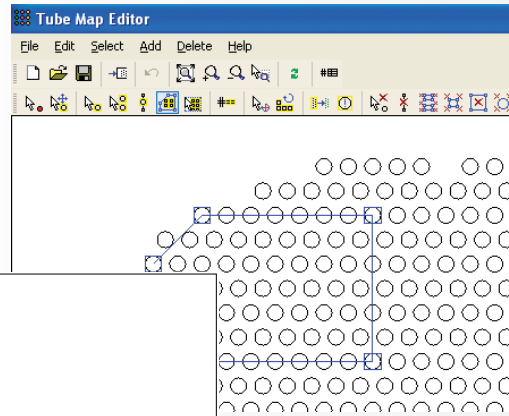
Tube Map Editor

The Tube Map Editor is part of the 2-D program, and offers the following features:

- Multiple sections.
- Supports 30°, 45°, 60°, 90°, triangular, rectangular, circular, and radial tube patterns.
- Several selection, tube creation, and deletion tools.
- Rotate, mirror, move, and other functions!

Tubesheet Mapping

Use the many tools and options available to quickly generate multiple-section tubesheet maps and drawings.

Report Output

Produce multiple-page, user-customizable, high-quality reports. Print the reports directly, or export them into a PDF document. The Report package in TubePro is Excel-compatible, and also supports pictures, external files (drawings), and Word documents. Nothing else offers as many possibilities!

Save report sections or your entire report in template files for quick reference at a later date.

Database Management

The TubePro Database Management System offers centralized storage and retrieval of information related to customers, testing equipment, instruments, drawings, reports, and inspection data.

TubePro uses the database management system to store inspection reports, drawings, 3-D models and tube defect data. For example, you can store every inspection performed for a particular client in the database. This database can then be transmitted to the end customer, who can open and view all the reports and drawings in the free Project Viewer.

Impressive 3-D Drawings

Turn 2-D drawings into 3-D representations at the press of a button. Quickly create complete 3-D drawings by adjusting a few dimension parameters, such as tube length and number of supports. Drawings can be freely rotated, or displayed with perspective effect. Show or hide any components of the drawing, or make them transparent to place emphasis on particular areas.

With TubePro 3-D, you can use MultiView inspection results that include the indication distance and length (with the help of landmarks) to display reported indications in 3-D, pleasing the most demanding of customers.
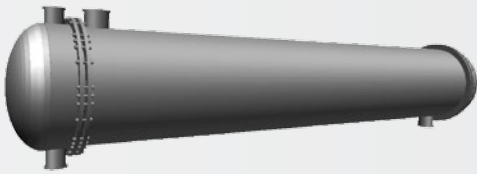
A full drawing.
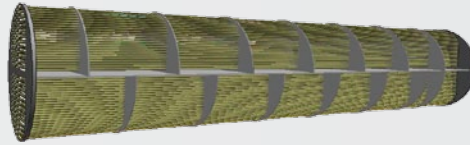
Shell, Nozzles, and End Channels hidden.
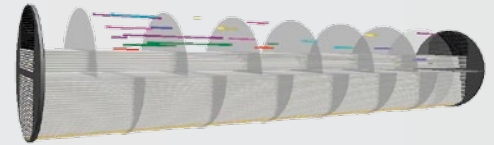
Tubes and supports rendered transparent, with certain rows hidden.

Defect ID#: 80
Zone:
Row #: 2
Column #: 14
Percent: 45 %
Defect Code: WLL
Extent: 29.56
Location: 44.83
Side: O.D.
Volts:2.132
Degrees:83
Channel :A90
File name :013005.dat
Comment :(None)
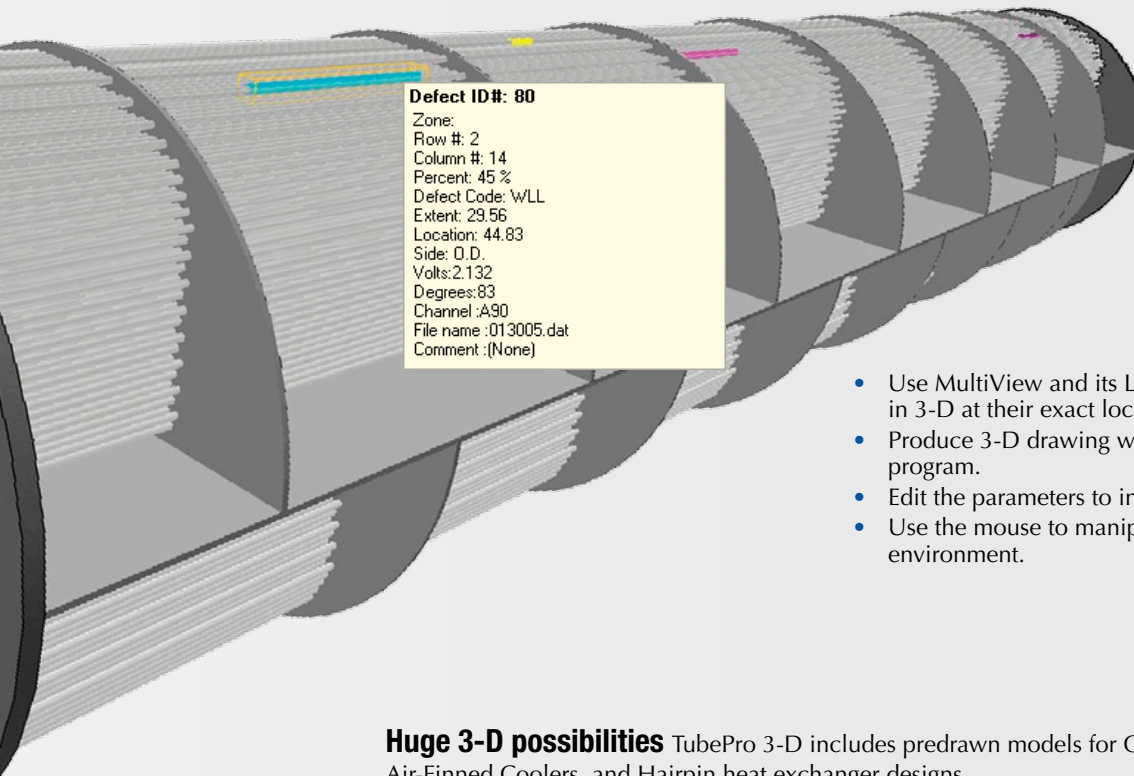
- Use MultiView and its Landmark capability to display defects in 3-D at their exact locations.
- Produce 3-D drawing with a single click within the 2-D program.
- Edit the parameters to instantly regenerate the 3-D drawing.
- Use the mouse to manipulate drawing in the real-time 3-D environment.

Huge 3-D possibilities TubePro 3-D includes predrawn models for Once-Through, Multi-Pass U-bends, Air-Finned Coolers, and Hairpin heat exchanger designs.
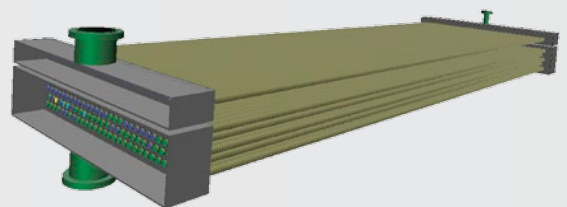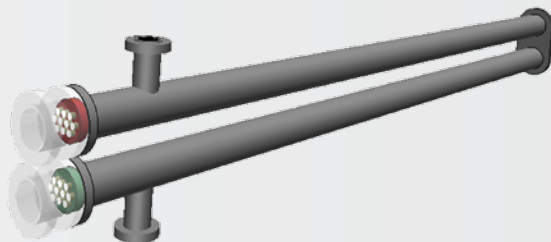
MultiView Specifications

Setup (calibration) mode

Technology compatibility:
Tube testing, conventional probes: ECT, RFT, NFT, MFL, and IRIS.
Tube testing, array, and specialty probes: ECT arrays, ECT rotating surface pancake probes, RFT arrays, NFT arrays, MFL arrays, and hybrid probes. Surface and raster scanning also supported.

Setup creation: Improved step-by-step Setup Wizard menus for tube testing: ECT, RFT, NFT, MFL, and IRIS.

Simultaneous calibration: Calibrate channels (voltage and phase), depth curves, and Mix-type channels all at once, or separately with ECT, RFT, NFT, MFL, or arrays; IRIS A-scan view for optimal signal comprehension.

Acquisition (data recording) mode

Instrument compatibility: MultiScan MS5800 only.

Recording possibilities: Manual mode with space bar operation to start and stop acquisition.
External footswitch (TA-FSW-001) for configurable functions.
MPP04-01 "airgun" special ECT scanner device that synchronizes the acquisition with MultiView, and records the actual probe position.

Recording list: List of tubes that are editable in MultiView, or which can be imported from TubePro.

Analysis (readback) mode

Interface: Drastically improved mouse and keyboard interface with shortcut operation for maximum efficiency.

Data compatibility: R/D Tech TC4700 and TC5700 data, MultiScan MS5800.

Vector analysis: Instant automatic vector analysis in XY planes with manual angle measurement.

Depth sizing: Automatic phase and voltage curves (ECT, RFT, NFT, and MFL) with a virtually unlimited quantity of curves; RFT voltage plane display with the option of short, tapered, and long flaws; IRIS actual measurement of wall thickness with a resolution of 0.03 mm (0.001 in.).

Indication position recording: Advanced landmark-based feature that interpolates position between a minimum of two known locations (ECT, RFT, NFT, and MFL); clock-based or encoder-based for IRIS and arrays.

Layouts (data display): Impedance planes, voltage planes (RFT), strip charts with actual paper-style displays, landmark (code) window, 2-D and 3-D C-scan views (with configurable color palette); all above window-types are available in useful preset layout arrangements, or can be configured in a virtually unlimited number of ways. IRIS layouts are managed separately, and include real-time B-scan and C-scan displays (one or two C-scans).

Data processing: Real-time tube testing processes include: mixes (virtually unlimited quantity), filters (high-pass, low-pass, average); C-scan (array) processes include all of the above, plus normalization, derivative, median filter, subtraction, and interpolation.

Data readback: Reported indications are saved in data files in real time, which is useful for future readback.

Reporting

Report database (analysis report): Logs all analysis calls; supports all previously mentioned technologies. Features tube ID (zone/row/column), vector analysis results (volts/phase), % wall loss, side (ID/OD), editable report code, channel, extent tested, comments, and accurate indication location and length recording.

Compatibility: The report can be exported to TubePro, or exported into several common formats, including: .pdf, .txt, .xls, .doc.

Screen capture: The included screen capture tool can be used to capture any subwindow or adjustable range.

Indication recall: Instant access to any recorded indication from the report window.

TubePro Specifications

2-D version

Inclusions: Tubesheet mapping-drawing program with user-friendly interface, full reporting capability that supports MultiView tube lists and report results, template support, Legend Editor, and database management system.

Exclusions: 3-D drawings and features.

Tube Map Editor: Multiple-section, freely editable - rotates each section separately; supports 30°, 45°, 60°, 90°, triangular, rectangular, circular, and radial tube patterns; mirror and copy feature.

Inspection results: Edit results directly in TubePro, or import them from MultiView.

Legend Editor: Customizable Legend for any combination of color, %, code, or symbol change.

Reporting: Fully editable, Microsoft Excel-compatible, multi-page report generation that supports external documents.

Database management: Manage inspection reports, drawings, 3-D models, and tube defect data.

Template system: Save template files for reports, tube maps, and Legend files for quick reference in the future.

3-D version

Inclusions: 3-D drawing capability, inspection results display (3-D defects), Legend Editor, and database management system.

Exclusions: Tubesheet mapping-drawing program (2-D), full reporting capability that supports MultiView tube lists and report results, and template support.

3-D heat exchangers: Supports multiple-section once-through (straight) heat exchangers, multiple-section U-bend heat exchangers, air-finned coolers, and Hairpin-type heat exchangers. All drawings are premade with easy, parametric, customizable variables (i.e. number of supports, shell size, etc.).

3-D drawing: Display any desired heat exchanger component; rotate and pan drawings using the user-friendly interface.

3-D notes: Add 3-D notes to drawings.

Output: Export 3-D images, or copy images to the clipboard (for use in the 2-D program, etc.).

Minimum computer requirements

Operating System: Microsoft Windows XP Pro with SP3, Microsoft Windows Vista (32 & 64 bits), Microsoft Windows 7 (32 & 64 bits)

Processor: Intel Core 2 Duo

RAM: 2 GB

Disk Space: 300 GB recommended (especially for IRIS files)

Display and Video card: 1280 x 800

Ethernet adaptor: 100Base-T

Framework: Microsoft .NET 3.5 Framework or higher is required for TubePro

Ordering Information

Part Number	Item Number	Description
MV6-AT-USB	U8142007	MultiView "AT" option (acquisition and analysis); used for data acquisition, analysis, and reporting. The most common configuration, it includes IRIS C-scan.
TP-2D	U8142025	TubePro 2-D program. Excludes 3-D features.
TP-3D-UPG	U8142026	3-D features addition for TubePro 2-D (required).
TP-2D3D	U8142027	TubePro 2-D and 3-D programs; referred to as the "full" TubePro configuration, and it is also the most common.
MV6AT-TP2D3D	U8142028	MultiView AT, and Tubepro 2-D & 3-D on the same USB key.

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