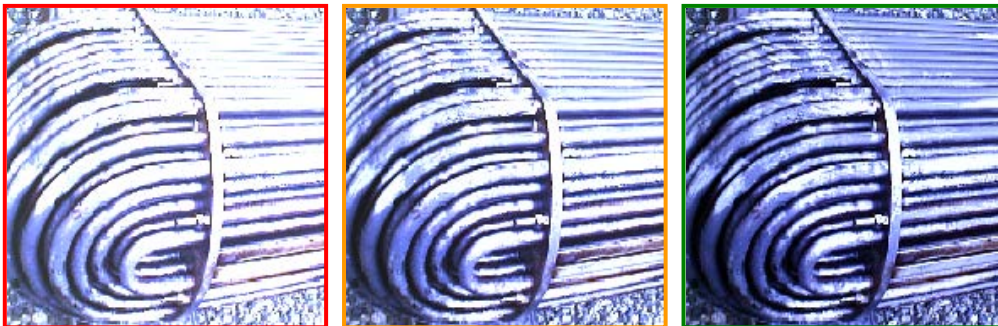


T-MIC

Maintenance Inspection Control System for Heat Exchanger Tubes



***Powerful exchanger tubes tracing and management system!
T-MIC is maintenance personnel's long-awaited work history management .***

Summary

The corrosion trend management of heat exchanger tubes is one of the major maintenance work items in petroleum refinery, petrochemical and chemical plants where a large number of heat exchangers are used. JGC JAPAN CORPORATION had targeted to realize a precision maintenance of exchanger tubes and developed T-MIC.

T-MIC is capable to manage and analyze any information and data that are deemed necessary for controlling exchanger tubes such as design data, tube layout, inspection history, making an appropriate inspection plan and schedule for each method; *) tube bisecting, eddy current test, ultrasonic test, and monitoring corrosion trend. Another advantage by using T-MIC is a manpower saving with the functions of issuing "Inspection Order " and "Work Order", and importing automatically the data collected at site.

*) "Tube bisecting" is a destructive inspection to split tube longitudinally and measure the wall thickness over the entire length of tube.

Major Function

1. Exchanger Master

Design data, tube layout and tube passes are the basic data for individual exchanger.

The tube layout is so easily illustrated as to filling Excel spreadsheet.

2. Inspection Planning

T-MIC is capable to make inspection plans for each method; tube bisecting, ultrasonic testing (UT), and eddy current testing (ECT).

As for inspection plan, not only "Time Based Maintenance (TBM)" timing, but also "Condition Based Maintenance (CBM)" intervals can be scheduled by calculating corrosion rate and tube remaining life. Then, a smart inspection plan can be obtained.

Further, a hardcopy of "Inspection order sheet" in which tubes to be inspected or replaced are highlighted in the tube layout figure is available.

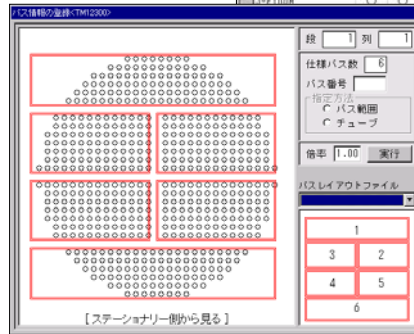
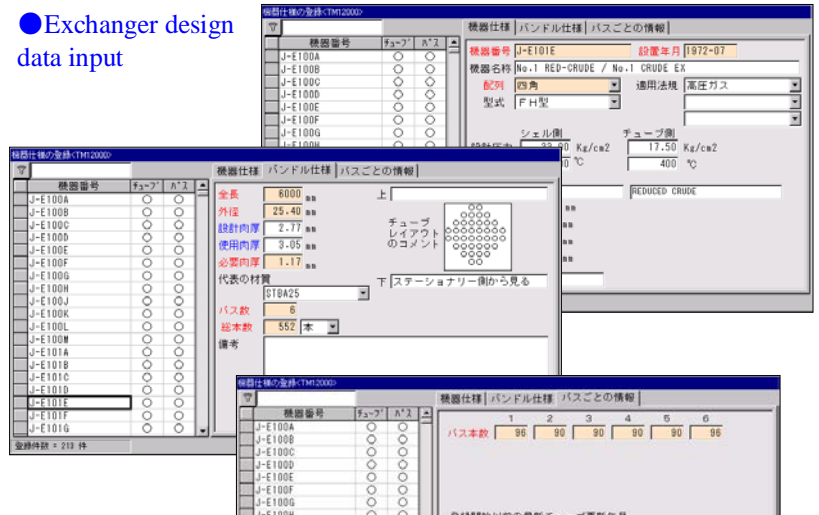
3. Work History

Results of different inspection methods and work description are recorded as a historical data.

The input data are; inspection summary, actual thickness value of individual tube, result of the extreme value distribution analysis, tube replacement (material alteration), plugging, and so on.

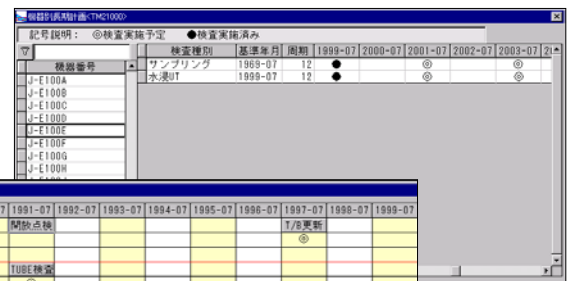
The corrosion rate and the remaining life are calculated automatically using these input data.

● Exchanger design data input



● Pass data input

● Inspection plan for each exchanger



● Review of inspection history

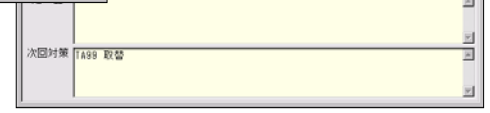


● Review of measurement data



● List of replaced tube

● Review of inspection result

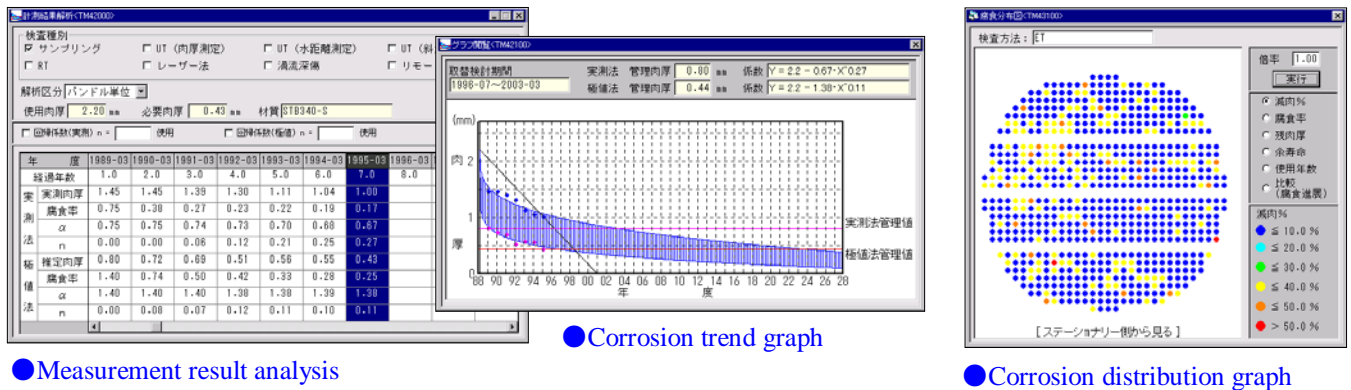


4. Data Analysis

Further to evaluating for a single year, T-MIC can provide reliable maintenance oriented information in visualized “Corrosion trend graph” in which the historical thickness data and the result of extreme value distribution analysis are displayed.

Thus, you may see the current condition at a glance.

Likewise, groups of thickness reduction rate of individual tube obtained by the eddy current test are characterized by color in a tube layout sheet that is called “Corrosion distribution graph”.

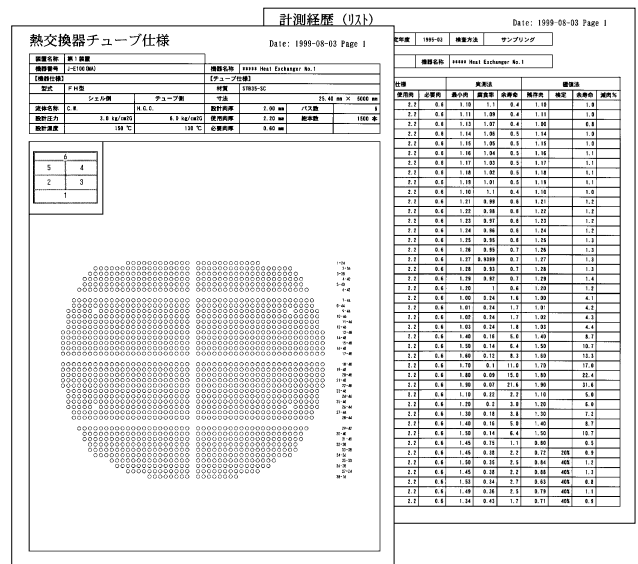


5. Reporting

More than 20 kinds of reporting forms that will meet all of your demands.

List of outputs of T-MIC

Output for each exchanger	Printed outputs
Desgin data	List of plant
	Exchanger list
	Exchanger desgin data / Tube layout
	Tube specification(Each pass)
Result, History	List of inspection result
	Measurement history (Layout)
	Measurement history (List)
	Measurement history(Inspection result)
	Work history
	Trend table
	Corrosion distribution graph
	Remaining thickness distribution graph
	Thickness reduction distribution graph
	Year of use distribution graph
Planning	Tube replacement plan
	Tube inspection order sheet (Layout)
	Tube inspection order sheet (List)
	Tube replacement order sheet (Layout)
	Tube replacement order sheet (List)
	Inspection plan for long-period



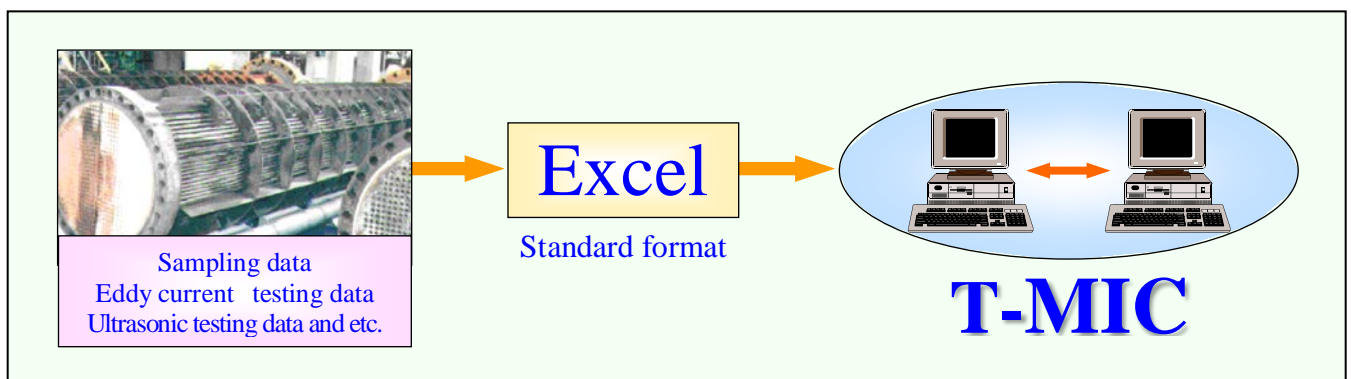
6. Interface

A huge amount of data collected in tube bisecting, eddy current test, and ultrasonic test must be processed in exchanger inspection.

T-MIC can import these data in Excel spreadsheet. Then, T-MIC gives an advantage of eliminating manual data inputting work and will increase productivity of inspection work.

The thickness data obtained by using our “***) Tube Sampling System” can be forwarded to T-MIC.

**) “Tube Sampling System” is a trademark of JGC JAPAN CORPORATION.



Data Capacity

Specification Data

Number of plant unit	999,999
Number of Exchanger	999,999
Tube layout	200 steps × 200 rows
Pass	20 passes

Historical Record

Number of inspection	99,999 times
Summary	2,000 letters
Inspection result	All tubes (mm, thickness reduction in %, Extremal Value Distribution analysis)
Work description	For individual tube; i.e. tube replacement (alteration of material, thickness), plugging and etc.

Operating Environment

Hardware Requirements (Recommendation)

Server (With Network)	CPU : 3GHz (x86 x64)
	Memory : 4GB or more
Client	CPU : 2~3GHz (x86 x64)
	Memory : 4GB or more
	Display : 1024×768 or more
Stand-Alone	CPU : 2~3GHz (x86 x64)
	Memory : 4GB or more
	Display : 1024×768 or more

OS/DBMS Environment

Oracle Database		11.2	12.1	12.2
Network	Server	Windows 2008 (x64)	Windows 2008 (x64)	Windows 2012 (x64)
		Windows 2012 (x64)	Windows 2012 (x64)	Windows 2016 (x64)
	Client	Windows 7 Pro (x86 x64)	Windows 7 Pro (x86 x64)	Windows 7 Pro (x86 x64)
			Windows 8.1 Pro (x86 x64)	Windows 8.1 Pro (x86 x64)
Windows 10 Pro (x86 x64)	Windows 10 Pro (x86 x64)			
Oracle Personal Edition		11.2	12.1	12.2
Stand-Alone	Windows 7 Pro (x86 x64)	Windows 7 Pro (x64)	Windows 7 Pro (x64)	
		Windows 8.1 Pro (x64)	Windows 8.1 Pro (x64)	
		Windows 10 Pro (x64)	Windows 10 Pro (x64)	

※Additional meetings are required in order to discuss computer-mediated environment such as network protocol.

※The system architecture and the specifications may change without prior announcement.

※Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

※Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

Operating Support

■ System Support Group

Your requests and inquiries are highly appreciated.

Specialized staffs will assist your operation of A-MIS and related systems.

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<https://www.jgc.com/en/> System Site : <https://www.a-mis.com/enUser/>

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