



Mechanical Integrity
Data Management and Reporting System

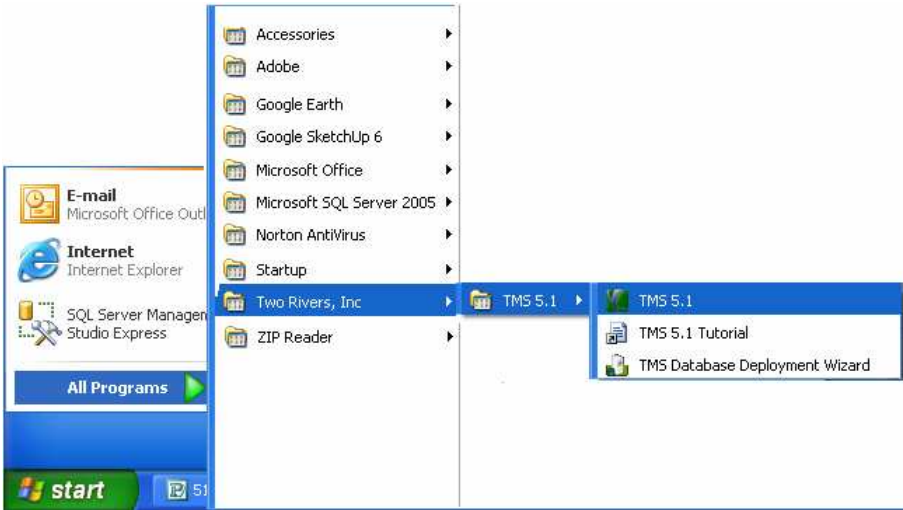
TMS 5.1 Tutorial

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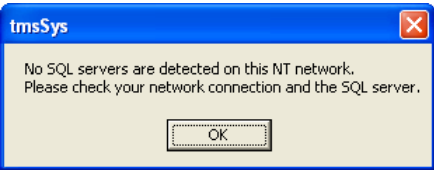
INITIAL STARTUP

- 1. From the **Start Menu** select
Programs
Two Rivers, Inc.
TMS 5.1,
TMS 5.1



- 2. The first time you open TMS 5.1, you may get the message shown below.
Click 'OK' to open the **Select Server** form.

(Note: It may take several seconds for the second form to open.)

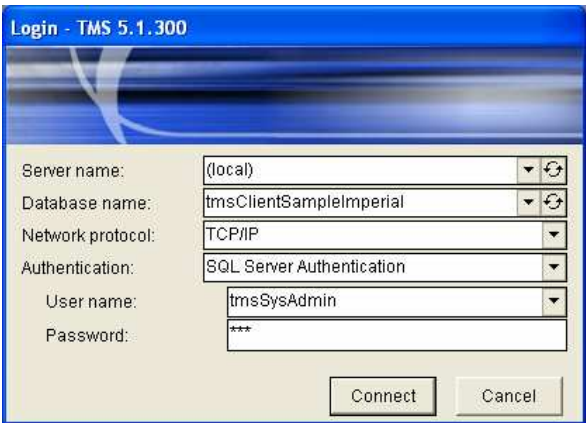


- 3. Follow instructions on the form and click 'OK' to open the **Login** form.

Note: Select "SQL Server Authentication" from the Authentication list

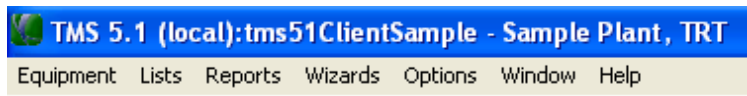
- 4. Type your name and password (or select from the drop down menu) and click 'OK'.

Note: For demo versions, use "tmsAdmin" for User Name and "tms" for the Password. Click 'OK'.



1 FUNDAMENTAL FEATURES

This section will give you an overview of navigation through TMS and discuss some of the fundamental functional features.



Caption

Menu Bar

Caption and Menu Bar

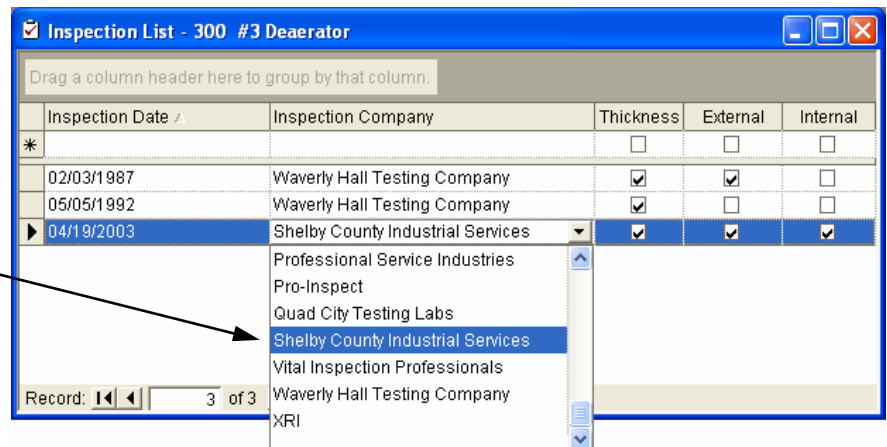
The TMS screen **Caption** shows the SQL Server database server, the TMS database name and the facility currently active .

The **Menu Bar** is the main navigation tool in TMS . It is always active and shown at the top of the screen. The menu headings (**Equipment, Lists, ...**) do not change.

Navigating through TMS is straightforward. Simply select one of the major headings, then click on a menu item to open a related form. If you change from one major heading to another while forms or reports are open, those objects are closed automatically before the new list is opened.

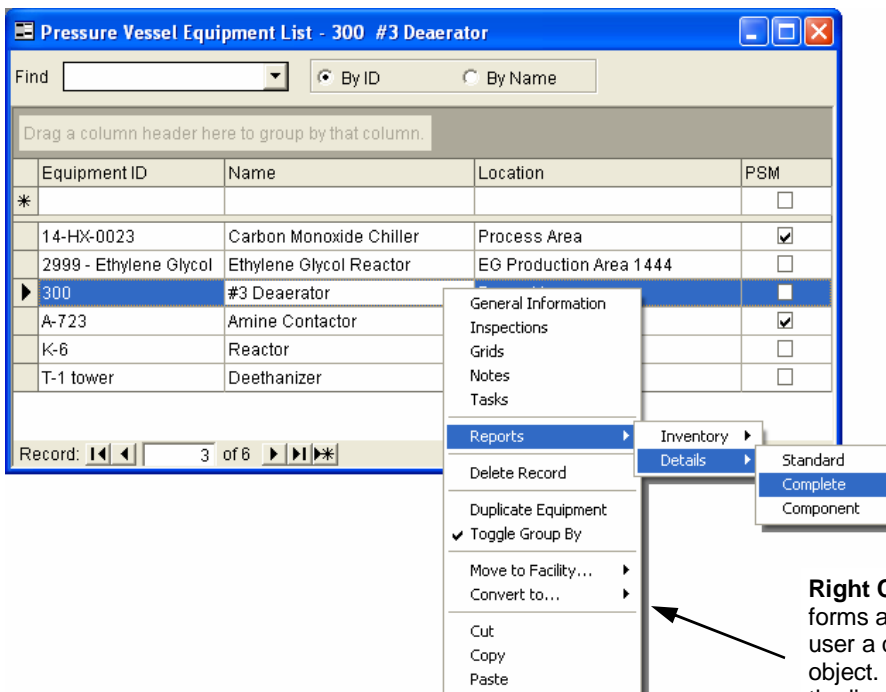
Drop Down Lists

Drop down lists are found on many fields to make data entry easier and more consistent. The drop down list is usually identified by the "down arrow point" on the right side of the field. In some cases, the arrow point is not visible until the user clicks on the field.



Double Click on List Form

In most cases, **double-clicking** (two left mouse button clicks in rapid succession) on an entry on a list form will open a detailed information form pertaining to the selected entry. For example, double-clicking on a piece of equipment on one of the **Equipment List** forms opens the **General Information** form for that piece of equipment.



Right Click Menu

Right Click Menu (RCM) are available on most list forms as well as on many individual fields to allow the user a convenient way to choose a task or open an object. The **RCM** is opened by placing the cursor on the line or field of interest and then pressing the right button on the mouse.

2 EQUIPMENT DATA FORMS

This section is for use with the Sample Plant, TRT data for a quick tour of the equipment data forms.

Fixed Equipment

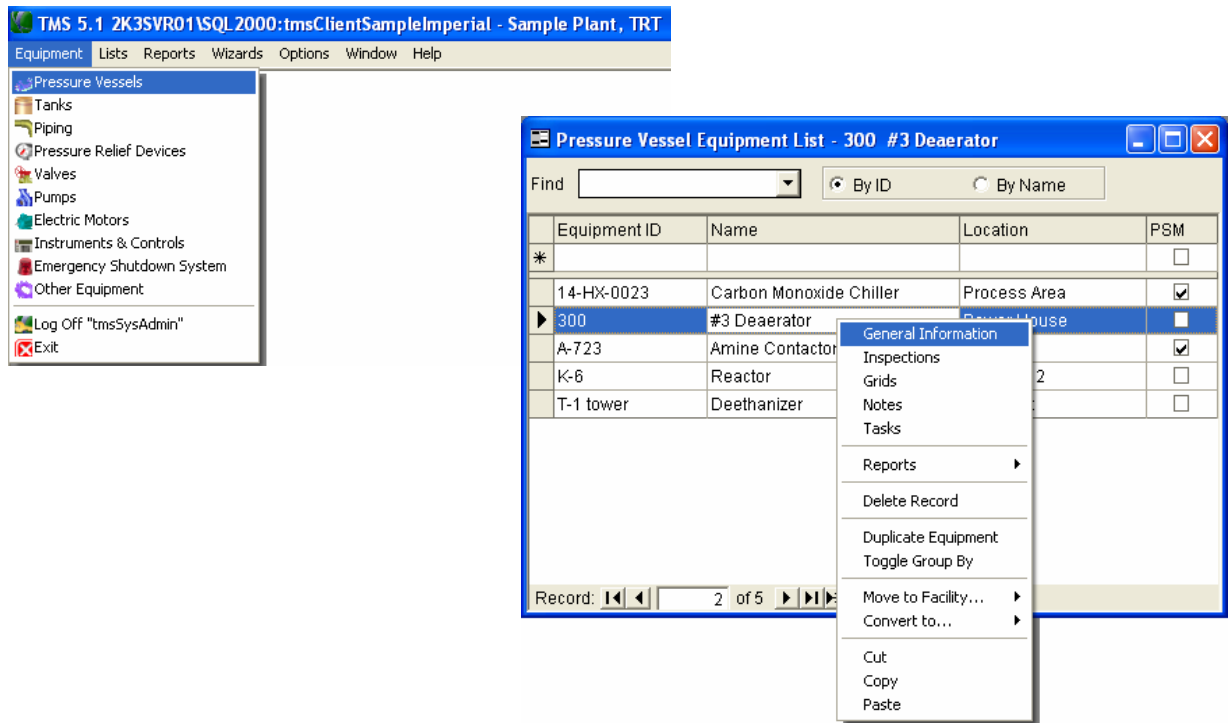
The equipment types in TMS are divided between fixed equipment (pressure vessels / heat exchangers, tanks and piping) and non-fixed equipment (everything else except pressure relief devices—PRDs.) Most TMS users usually will be using the fixed equipment **General Information** and **Inspection Summary** forms and reports for data entry, evaluation and reporting. Many of the exercises in this tutorial will be for pressure vessels; however, the main (upper) part of the **General Information** form for piping and tanks is similar to the pressure vessel form, but specific to the type of equipment. **Structure & Use**, **Components** and **Component Details** forms also vary for each type fixed equipment. Examples of the tank and piping **General Information** forms are shown on pages 13 and 14, respectively.

Equipment List

1. On the Menu Bar, click on 'Equipment', then 'Pressure Vessels' to open the **Pressure Vessel Equipment List**.
2. Select "300 #3 Deaerator" on the **Pressure Vessel Equipment List**.

Note: This pressure vessel will be used as the example for many of the exercises in this section. If you wish, you may minimize the **Pressure Vessel Equipment List** form by clicking on the 'Minimize' button in the upper right corner of the form.

(Don't close the form; it must be open while you are working with any pressure vessel form.)



General Information Form

You now can open the **General Information** form for the selected piece of equipment by either of the following actions

- Right click on the selected line and choose "General Information" from the menu, as shown above, or
- Double click on the selected line.

Note: The **General Information** form may take several seconds to load, depending on the speed of your computer.

Structure & Use

The **Structure & Use** sub-form is visible when the **General Information** form opens. All the values you see may be edited by the user; however, we recommend you don't change them right now.

1. Click the 'Heat Exchanger' check box to activate the 'TEMA Designation' field and the fields on the 'Tube Bundle' sub-form.

General Information - 300 #3 Deaerator

Equipment ID	300	PSM	<input type="checkbox"/>
Name	#3 Deaerator	Class	High Risk
Location	Power House	Stamped	Yes
System		Design Code	ASME Sect. VIII, Div. 1
Content Description	Feedwater	Date Constructed	12/23/1997
Manufacturer	Addison Fabricators	Retirement	01/21/2017
P&ID		Functional Location	
Serial Number		Other Information	
National Board #	71	TEMA Designation	

Attributes | File Links | Images

Structure & Use | Components | Tube Bundle | Inspection Schedule | Related Equip

Heat Exchanger ☒

Configuration: Round, Horizontal

Diameter Type: Inside

Height: 0 ft. .00 in.

Length: 30 ft. .00 in.

Diameter: 12 ft. .00 in.

Normal Capacity: 24000 gallons

Design Pressure: 75.0 psig

Design Temperature: 292 °F

Minimum Pressure: -4.0 psig

Minimum Temperature: °F

Hydro Test Pressure: 100.0 psig

Fluid State: Liquid

Radiograph: Spot

Heat Treatment: ☒

Insulation: ☒

Gaskets: Composite

Support Type: Steel Saddle

Lined: No

Jacketed: No

Heat Exchanger Tube Bundle

General Information - 300 #3 Deaerator

Equipment ID: 300

Name: #3 Deaerator

Location: Power House

System:

Content Description: Feedwater

Manufacturer: Addison Fabricators

P&ID:

Serial Number:

National Board #: 71

PSM: ☐

Class: High Risk

Stamped: Yes

Design Code: ASME Sect. VIII, Div. 1

Date Constructed: 12/23/1997

Retirement: 01/21/2017

Functional Location:

Other Information:

TEMA Designation:

Attributes | File Links | Images

Structure & Use | Components | Tube Bundle | Inspection Schedule | Related Equip

Name:

Type:

Material:

Tubeside Content:

Serial Number:

Length: in.

Tube Diameter: in.

Number of Tubes:

Design Pressure: psig

Design Temperature: °F

Operating Pressure: psig

Operating Temperature: °F

Original Thickness: in.

TMin Governing: in.

Corrosion Allowance: in.

2. Click on the 'Tube Bundle' tab to look at the available fields. Add information if you wish.
3. Move back to the **Structure & Use** sub-form, and uncheck the 'Heat Exchanger' box. Choose "Yes" on both messages.

Heat Exchanger Change

Unchecking this check box will result in the loss of data for the head exchanger!

Are you sure you want to continue?

Yes No

Heat Exchanger Change

You are about to delete all the heat exchanger data for this pressure vessel.

If you click 'Yes,' you will not be able to undo this operation.

Are you sure that you want to continue?

Yes No

Components

1. When you finish looking at the information in the **Structure & Use** sub-form, click on the 'Components' tab.
2. Double click on "E. Head" to open the **Component Details** form.

Name	Order	Type	Material Specification	Original Thk (in.)
E. Head	1	Hemispherical Head	SA-516-70, 1995	0.375
Shell 1	2	Cylindrical Shell	SA-516-70, 1995	0.5
Shell 2	3	Cylindrical Shell	SA-516-70, 1995	0.5
Shell 3	4	Cylindrical Shell	SA-516-70, 1995	0.5
W. Head	5	Hemispherical Head	SA-516-70, 1995	0.375

Component Details

Name	E. Head	Design Pressure	75.0	psig
Type	Hemispherical Head	Design Temperature	292	°F
Diameter Type	Inside	Operating Pressure		psig
Material Specification	SA-516-70, 1995	Operating Temperature		°F
Length	0.00 ft	Joint Efficiency	1.00	
Diameter	12 ft	Original Thickness	0.375	in.
Elliptical Ratio		Tmin Calculated	0.154	in.
Gasket Moment Arm		Tmin Governing	0.154	in.
Operating Bolt Load		Corrosion Allowance		in.
Seating Bolt Load				
Description				

3. Move the cursor to the 'Tmin Calculated' field and right click to open the menu.
4. Select "Tmin Report " to look at the calculation of the Tmin value. (Shown on facing page.)
5. Close the **Tmin Calculation Details Report** form by using the 'Close' button (X) on the form or the 'Close' button on the tool bar.
6. Close the **Component Details** form.

Important Note: TMS calculates the required minimum thickness (Tmin) based on hoop stresses due to internal pressure in accordance with recognized formulae and information entered by the user. These values are calculated only for convenience to get an initial estimate of a reasonable value for 'Tmin Governing'. 'Tmin Governing' is used by TMS in setting up graphs, calculating 'Years to Tmin', etc. The user of the program should always check the value of 'Tmin Governing' to verify that it is appropriate for the intended use.

Many factors affect the determination of the required minimum thickness for any piece of equipment. Due to the significant structural and safety issues involved, such determination should be made only by an experienced qualified engineer.

Tmin Calculation Details

300 #3 Deaerator - E. Head

Component Type Hemispherical Head

Formula
(Reference 1a., p. 34)
$$t_{\min} = \frac{PL}{2SE - 0.2P}$$
 UG-32 (3)

$$L = \text{Crown Radius} = \frac{D}{2}$$

Input Values

Material Specification = SA-516-70, 1995
 Temperature = 292 ° F
 S = Allowable Stress = 17,500 lb/in²
 E = Joint Efficiency = 1.00
 P = Pressure = 75 lb/in²
 D = Diameter = 12 ft. 0.00 in. = 144.00 in.

Tmin Calculation

$$\begin{aligned} L &= \frac{144.00 \text{ in}}{2} \\ &= 72.00 \text{ in} \\ t_{\min} &= \frac{(75 \text{ lb/in}^2)(72.00 \text{ in})}{2(17,500 \text{ lb/in}^2)(1.00) - 0.2(75 \text{ lb/in}^2)} \\ &= 0.154 \text{ in} \end{aligned}$$

Formula reference: ¹ 1998 ASME Boiler & Pressure Vessel Code
 Section VIII Division I "Rules for Construction of Pressure Vessels"

Material reference: ASME Materials, Pt .D, 1995, Pg 18, Ln 23

Reviewed By _____

Date _____

Inspection Schedule

1. Click on the 'Inspection Schedule' tab to view the 'Last Inspection Date', 'Inspection Interval' and 'Next Inspection Date' fields for the different inspection types.

The 'Last Inspection Date' for each type inspection is automatically displayed based on the information contained in the **Inspection List** form shown on the top of the facing page. In the example, the latest inspection date of "04/19/2008" includes 'Thickness', 'External' and 'Internal' inspection types, and all are shown on the 'Inspection Schedule' form.

	Last Inspection Date	Inspection Interval	Next Inspection Date
Thickness	4/19/2008	10 Yrs	04/19/2018
External	4/19/2008	5 Yrs	04/19/2013
Internal	4/19/2008	10 Yrs	04/19/2018

The 'Next Inspection Date' value defaults to the 'Last Inspection Date' value plus the 'Inspection Interval' when one of those two fields is changed. The user can also change the 'Next Inspection Date' manually.

The user can set the Inspection Interval directly or choose to have TMS calculate the inspection interval based on the appropriate API standard.

For pressure vessels, as shown, the next inspection interval for 'Internal' and 'Thickness' inspection is calculated by comparing one-half the remaining life based on thickness measurements and T_{min}, and the maximum recommended interval of 10 years. The "calculated" inspection interval for External is set to the maximum recommended interval of 5 years.

2. To have TMS calculate the inspection interval for the next thickness inspection, place the cursor on the 'Thickness' 'Inspection Interval' field and right click to open the menu.
3. Click "Calculate Inspection Interval" and answer "Yes" to the message boxes (shown on the facing page).

	Last Inspection Date	Inspection Interval	Next Inspection Date
Thickness	4/19/2008	10 Yrs	04/19/2018
External	4/19/2008	5 Yrs	
Internal	4/19/2008	10 Yrs	

Inspection List - 300 #3 Deaerator

Drag a column header here to group by that column.

Inspection Date	Inspection Company	Thic...	Exter...	Int...
02/03/1987	Waverly Hall Testing Company	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
05/05/1997	Waverly Hall Testing Company	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
04/19/2008	Shelby County Industrial Services	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Record: ◀◀ ▶▶ of 3 ▶▶▶▶

TMS 5.1 (local):tmsClientSampleImperial - Sample Plant, TRT

Calculations for inspection interval are based on retirement date. If retirement date is not up to date then the inspection interval may not be correct.

Do you want to calculate retirement date before calculating inspection interval?

Select Yes to calculate retirement date before calculating inspection interval.

Select No to calculate inspection interval based on existing retirement dates.

TMS 5.1 - Two Rivers Technologies

In accordance with API 510 (Eighth Edition) Section 6.3, the system has compared one-half the remaining life (1 years 4 months) with the maximum period between internal or on-stream inspections of 10 years.

Do you want to change the current inspection interval of 10 years 0 months to the calculated inspection interval of 1 years 4 months?

4. Note that both the 'Retirement Date' and the 'Inspection Interval' values have changed.

General Information - 300 #3 Deaerator

Equipment ID	300	PSM	<input type="checkbox"/>
Name	#3 Deaerator	Class	High Risk
Location	Power House	Stamped	Yes
System		Design Code	ASME Sect. VIII, Div. 1
Content Description	Feedwater	Date Constructed	12/23/1997
Manufacturer	Addison Fabricators	Retirement	11/24/2010
P&ID		Functional Location	
Serial Number		Other Information	
National Board #	71	TEMA Designation	

Attributes | File Links | Images

Structure & Use | Components | Tube Bundle | Inspection Schedule | Related Equip

	Last Inspection Date	Inspection Interval	Next Inspection Date
Thickness	4/19/2008	1 Yrs 4 Mos	08/19/2009
External	4/19/2008	5 Yrs	04/19/2013
Internal	4/19/2008	10 Yrs	04/19/2018

Related Equipment

1. Click on the 'Related Equipment' tab.

By using the drop down list, the user may select any number of pieces of equipment to be shown as related to the #3 Deaerator. The drop down list shows the type, Equipment ID and Name for every piece of equipment that has been entered into the TMS data files.

2. Add additional related equipment if you wish and put any comments in the 'Relationship Description' field.

RelatedEquip	Description
PRD - PRD 301 - PRV for #3 Deaerator	Pressure relief valve on east head
Instrument - 6740 - Pressure Transducer	

NOTE: From the **Main Menu**, you can click on 'Options / System Options' to automatically update the corresponding related equipment.

Attributes

1. Click on the 'Attributes' tab.

Attributes are custom fields which may be defined by a Manager or higher level using **Options / Administrative Options / Equipment Attributes**.

2. Once an attribute has been defined, any user except Report User level may add an attribute value. To try this feature, select "Area Supervisor:" from the drop down list and add your name in the 'Attribute' field just to the right of the colon.
3. Use the drop down list to look at other currently defined attributes.

Attribute	Notes
Area Supervisor : Andy Bussey	
Color : Green	

File Links

'File Links' are used to link to documents that are stored in other applications. Linked documents may be text, spreadsheets, drawings, photographs, etc.

The only 'File Links' information stored in the TMS database is the file path and a description, as shown below. Because the linked documents are stored outside the TMS database, there is no limit on the size or number of linked files (other than the capacity of the storage device housing the files.)

Equipment Inspection forms also have a file link feature on the 'Documents' tab so that documents that relate to a specific inspection date can be linked.

NOTE: For network applications, it is important to store the linked files on a central server with a common drive name used by all TMS client computers.

General Information - 300 #3 Deaerator

Equipment ID	300	PSM	<input type="checkbox"/>
Name	#3 Deaerator	Class	High Risk
Location	Power House	Stamped	Yes
System		Design Code	ASME Sect. VIII, Div. 1
Content Description	Feedwater	Date Constructed	12/23/1997
Manufacturer	Addison Fabricators	Retirement	01/24/2023
P&ID		Functional Location	
Serial Number		Other Information	
National Board #	71	TEMA Designation	

Structure & Use | Components | Tube Bundle | Inspection Schedule | Related Equip

Attributes | File Links | Images

File Path	Description
C:\TMS\Training\Dwgs and Photos\ACMETank.dwg	ACAD Dwg
C:\TMS\Training\Dwgs and Photos\ACMETANK.JPG	Photograph of Vessel
C:\TMS\Training\Word Files\Inspection Requirements.doc	Vessel Inspection Requirements

Link File

Look in: Dwgs and Photos

- ACMETank.dwg
- ACMETANK.JPG
- Pipe Internal Corrosion.gif
- X-Ray 1.JPG

File name: Pipe Internal Corrosion.gif

Files of type: All Files (*.*)

Open Cancel

To open an existing file, select the desired file path and click on the Open Folder icon.

To add a new link, select the blank top line then click on the Browse icon to search for the desired file. Once the file path is selected, press 'Enter' to save the path.

Images

The 'Images' feature is used to store some common graphic files (.jpg, jpeg, .gif and .bmp) directly in the database. The two major advantages of using 'Images' rather than 'File Links' to store graphic files are:

- (1) Unlike file links, the images are stored directly in the TMS database, so they can be accessed by any TMS client computer with the appropriate user level, and
- (2) 'Images' graphics can be incorporated into equipment "Complete Details" reports and 'Inspection Details' reports.

We recommend using efficient graphic files such as .gif and .jpg files. It is recommended that .bmp files not be used as they tend to be relatively large. Also, you may want to limit the number of graphic files stored in 'Images' to the most important ones.

General Information - 300 #3 Deaerator

Equipment ID	300	PSM	<input type="checkbox"/>
Name	#3 Deaerator	Class	High Risk
Location	Power House	Stamped	Yes
System		Design Code	ASME Sect. VIII, Div. 1
Content Description	Feedwater	Date Constructed	12/23/1997
Manufacturer	Addison Fabricators	Retirement	01/24/2023
P&ID		Functional Location	
Serial Number		Other Information	
National Board #	71	TEMA Designation	

Structure & Use | Components | Tube Bundle | Inspection Schedule | Related Equip

Attributes | File Links | Images

ACMETANK
Pipe Internal Corrosion
X-Ray 1

Title: X-Ray 1

Description:

Order Number: 3

Save

New Image | Delete Image | Load Image | Export Image

NOTE: The image preview shown in the viewer may be skewed depending on its original proportions. Double click on the preview to open a window to see the image in correct proportion.

To add a new graphic file, first click on the 'New Image' button.

Then click on the 'Load Image' button and browse to select the desired file.

Tank General Information Form

1. On the **Menu Bar**, click on 'Equipment', then 'Tanks' to open the **Tank Equipment List**.
2. Select "EHN-08 White Liquor Storage" on the **Tank Equipment List**.
3. Double click on the selected line to open the **General Information** form.

General Information - EHN-08 White Liquor Storage

Equipment ID	EHN-08	PSM	<input type="checkbox"/>
Name	White Liquor Storage	Class	S-1
Location	Chemical	Design Code	API 650
System	White Liquor	Date Constructed	09/11/2008
Content Description	White Liquor	Retirement	1/1
Manufacturer	Midland Tank Fabricator	Functional Location	
P&ID		Other Information	

Structure & Use | Components | Inspection Schedule | Related Equip | Attributes | File Links | Images

Configuration	Round, Vertical	Specific Gravity	1.00
Height	40 ft. 0.00 in.	pH	10.00
Length		Fluid State	Liquid
Width		Radius	
Diameter	40 ft. 0.00 in.	Joint	
Maximum Level	38.0 ft.	Insul	
Normal Capacity	357187 gallons	Asbe	
Pressure		Gask	
Temperature	120 °F	Line	
Minimum Temperature		Jack	

General Information - EHN-08 White Liquor Storage

Equipment ID	EHN-08	PSM	<input type="checkbox"/>
Name	White Liquor Storage	Class	S-1
Location	Chemical	Design Code	API 650
System	White Liquor	Date Constructed	09/11/2008
Content Description	White Liquor	Retirement	1/1
Manufacturer	Midland Tank Fabricator	Functional Location	
P&ID		Other Information	

Structure & Use | Components | Inspection Schedule | Related Equip | Attributes | File Links | Images

Name	Order	Type	Material Specification	Original Thk (in.)
Roof	1	Fixed Roof	A 285 C	0.313
Shell 5	2	Cylindrical (3rd Course or above)	A 283 C	0.313
Shell 4	3	Cylindrical (3rd Course or above)	A 283 C	0.313
Shell 3	4	Cylindrical (3rd Course or above)	A 283 C	0.375
Shell 2	5	Cylindrical (1st or 2nd Course)	A 283 C	0.8
Shell 1	6	Cylindrical (1st or 2nd Course)	A 283 C	0.438
Floor	7	Bottom	A 283 C	0.25
Drain	8	Nozzle	A 283 C	0.25

4. Select the 'Components' tab.
5. Double click on 'Shell 1' on the Components list form to open the **Component Details** form.

Component Details - EHN-08 White Liquor Storage Shell 1

Name	Shell 1	Temperature	120 °F
Type	Cylindrical (1st or 2nd Course)	Joint Efficiency	1.00
Material Specification	A 283 C	Original Thickness	.438 in.
Height	7 ft. 9.00 in.	Tmin Calculated	0.167 in.
Diameter	40 ft. .00 in.	Tmin Governing	.234 in.
Bottom Elevation	0 ft. .00 in.	Corrosion Allowance	
Description			

NOTE: The **Inspection Schedule**, **Related Equipment**, **Attributes**, **File Links** and **Images** forms are similar for all three fixed equipment types.

Piping General Information Form

- On the Menu Bar, click on 'Equipment', then 'Piping' to open the **Piping Equipment List**.
- Select "01-2899 Ethylene Glycol Transfer Line".
- Double click on the selected line to open the **General Information** form.

General Information - 01-2899 Ethylene Glycol Transfer Line

Equipment ID	01-2899	PSM	<input type="checkbox"/>
Name	Ethylene Glycol Transfer Lin	Date Constructed	01/07/1984
Location	Process	Retirement	08/14/2009
From	Process Plant	Circuit Type	Test1
To	Holding Tank	Design Code	ASME B31.3
System	Product	P&ID	989-776-EGP
Class	Class 1	Functional Location	
Content Description	Ethylene Glycol	Other Information	Critical service

Structure & Use Segments Inspection Schedule Related Equip Attributes File Links Images

Design Pressure	90.0	psig.	Fluid State	Liquid
Design Temperature	100	°F	Radiograph	
Operating Pressure	35.0	psig.	Insulation	
Operating Temperature	75	°F	Asbestos	
Length	422	ft.	Lined	
Joint Efficiency	1.00		Jacketed	

- Select the Segments tab.
- Double click on 'Seg 3' on the **Segments** list form to open the **Segment Details** form.

General Information - 01-2899 Ethylene Glycol Transfer Line

Equipment ID	01-2899	PSM	<input type="checkbox"/>
Name	Ethylene Glycol Transfer Lin	Date Constructed	01/07/1984
Location	Process	Retirement	08/14/2009
From	Process Plant	Circuit Type	Test1
To	Holding Tank	Design Code	ASME B31.3
System	Product	P&ID	989-776-EGP
Class	Class 1	Functional Location	
Content Description	Ethylene Glycol	Other Information	Critical service

Structure & Use Segments Inspection Schedule Related Equip Attributes File Links Images

Name	Order	Description	Material Specification	Schedule	Nom Size (in.)
Seg 1	1	Elbow	A 106 B	40	10
Seg 2	2	45 Bend	A 106 B	40	10
Seg 3	3	Straight	A 106 B	40	10
Seg 4	4	Elbow	A 106 B	40	8
Seg 5	5	Straight	A 106 B	40	8
Seg 6	6	Straight	A 106 B	60	8
Seg 7	7	Straight	A 106 B	80	6

Segment Details - 01-2899 Ethylene Glycol Transfer Line Seg 3

Name	Seg 3	Tmin Pressure	0.024	in.
Type	Straight	Tmin Structural	0.183	in.
Material Specification	A 106 B	Tmin Governing	.183	in.
Joint Efficiency	1.00	Corrosion Allowance		in.
Schedule	40	Radiograph		
Nominal Size	10	Hanger Spacing		ft.
Outside Diameter	10.750	Insulation	<input type="checkbox"/>	
Wall Thickness	0.365	Asbestos	<input type="checkbox"/>	
Description				

NOTE: 'Tmin Pressure' is calculated using internal pressure and hoop stress and 'Tmin Structural' is calculated as a percentage of the standard wall thickness or as a specific thickness set by the user. Tmin Governing defaults to the higher of the two values.

Non- Fixed Equipment

Now that you've gone through the **General Information** forms for fixed equipment, look at some non-fixed equipment by making other selections from the 'Equipment' heading on the menu bar.

In addition to fixed equipment, TMS has 7 categories of non-fixed equipment.

Examples of the **General Information** forms for Pumps and Electric Motors are shown below.

Non-fixed Equipment

The main part of the **General Information** form is very similar among the other types of equipment

General Information - Process Pump 001 Chemical Process

Equipment ID	Process Pump 001	PSM	<input checked="" type="checkbox"/>
Name	Chemical Process	ESD/SCC	
Location	Latex Storage	Date Installed	09/01/1997
System		Inspection Interval	1 Yrs <input type="text"/> Mos
Manufacturer	Ingersoll Dresser Pumps	Last Inspection Date	8/13/2008
Model	2FRBH121	Next Inspection Date	08/13/2009
Serial Number	97-9844	Functional Location	
Type	Chemical	Other Information	

Structure & Use | Related Equip | Attributes | File Links | Images

Casing Material	SA 283 Grade B	Orientation	Horizontal
Capacity	2000.0 gpm	Seal Type	
Head	500 in.	Suction Size	3 in.
Speed	2000 rpm	Discharge Size	2 in.
Pressure	400 psig.	Max. Impeller Size	in.
Temperature	650 °F	Case TMin	in.
Application	Full range of chemical transfer and process liquid services		

General Information - 01-2999 Process Pump Motor #17

Equipment ID	01-2999	PSM	<input type="checkbox"/>
Name	Process Pump Motor #17	ESD/SCC	Emergency Shut Down Dev
Location	Process	Date Installed	02/03/1996
System	Generation	Inspection Interval	4 Yrs <input type="text"/> Mos
Manufacturer	U.S. Electric	Last Inspection Date	9/4/2005
Model	T606	Next Inspection Date	09/04/2009
Serial Number	EM 55421	Functional Location	
		Other Information	

Structure & Use | Related Equip | Attributes | File Links | Images

Power	20.5 Hp	Full Load Torque	ft.-lbs
Speed	3600 rpm	Full Load Amps	
Frame	254T	Volts	460
Orientation	Horizontal	Phase	Single
Inboard Bearing		Frequency	60 Hz
Outboard Bearing			
Application	Ethylene Glycol transfer		

.... but the **Structure & Use** form is specific to each type of equipment.

NOTE: The **Related Equipment**, **Attributes**, **File Links** and **Images** forms are the same for all equipment types.

Parameters

Four types of equipment — Pressure relief devices, Valves, Instruments & Controls and Other' — have a **Parameters** tab that allows the addition of unlimited user-defined information. The 'Other Equipment' **General Information** form is shown here.

General Information - LT 96-007 Warehouse Lift Truck

Equipment ID

LT 96-007

Name

Warehouse Lift Truck

Category

Material Handling

Location

Warehouse

System

Non-critical

Manufacturer

Taylor

Model

THD 120

Serial Number

960886-34

PSM

☐

ESD/SCC

Date Installed

11/06/1996

Inspection Interval

1 Yrs

Last Inspection Date

2/3/2001

Next Inspection Date

02/03/2002

Functional Location

Other Information

Parameters

Related Equip

Attributes

File Links

Images

Name	Value
Capacity	12,000.00
Major Repairs	Motion Industries
Routine Service	In-house

Description

The 'Description' tab is available on the 'Pressure Relief Devices' and the 'Instruments & Controls' **General Information** forms (shown here) . This text field can be used as needed for a detailed description of the piece of equipment.

General Information - 02300122550 PCV 0006 Pigment Dispenser CV

Equipment ID

02300122550 PCV 0006

Name

Pigment Dispenser CV

Location

0083

PRD Type

Conservation Vent

Manufacturer

Groth

Model

1260-02-555-TOO

Size

Inlet 2 in. Outlet 2 in.

Date Installed

01/01/1995

System

Serial Number

PSM

☐

ESD/SCC

Code/ASME

Functional Location

Other Information

Conservation Vent

Critical & Owner Data

Materials

Parameters

Related Equip

Protected Equip

Installation History

Inspection Schedule

Attributes

Description

File Links

Images

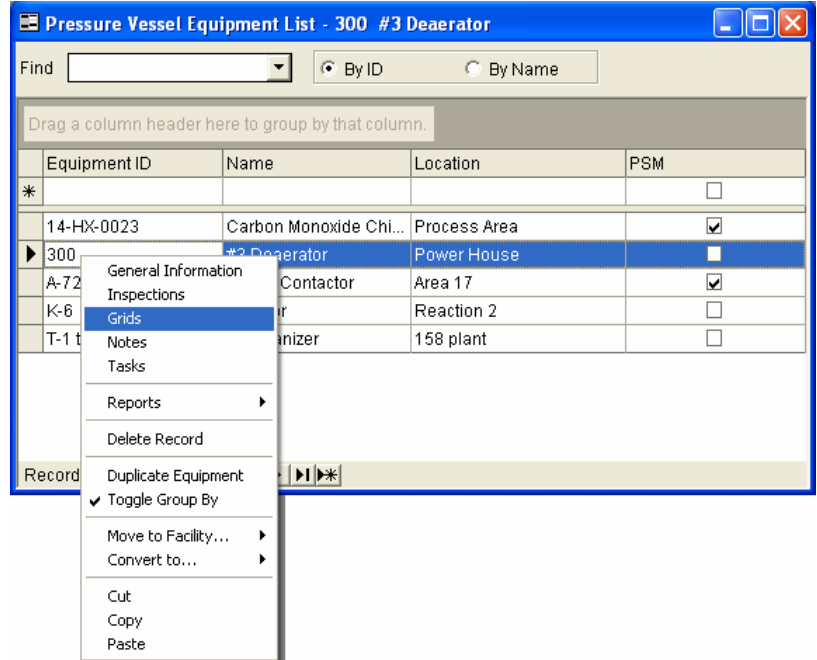
This is a text field that can be used as needed for a detailed description of the piece of equipment. The 'Description' field is available on the Pressure Relief Devices General Information form (shown here) as well as the Instruments & Controls General Information form.

Grids

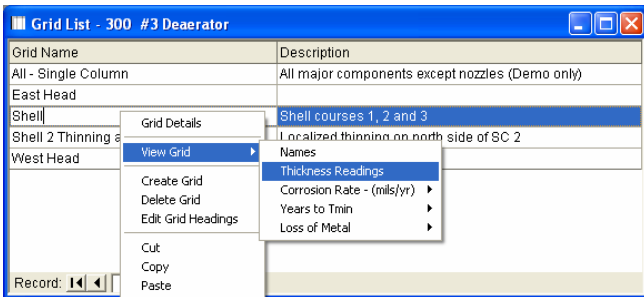
Grids are two dimensional arrays of thickness measurement locations and are a major feature of TMS. Thickness data entry, editing, evaluation and reporting are related back to the grid or grids for a specific piece of fixed equipment. A grid gives a practical and useful view of the thickness data for one or more components of a piece of equipment.

To view grids:

1. On the **Pressure Vessel Equipment List** form, select "300 #3 Deaerator".
2. Right click to show the drop down list and select 'Grids'.

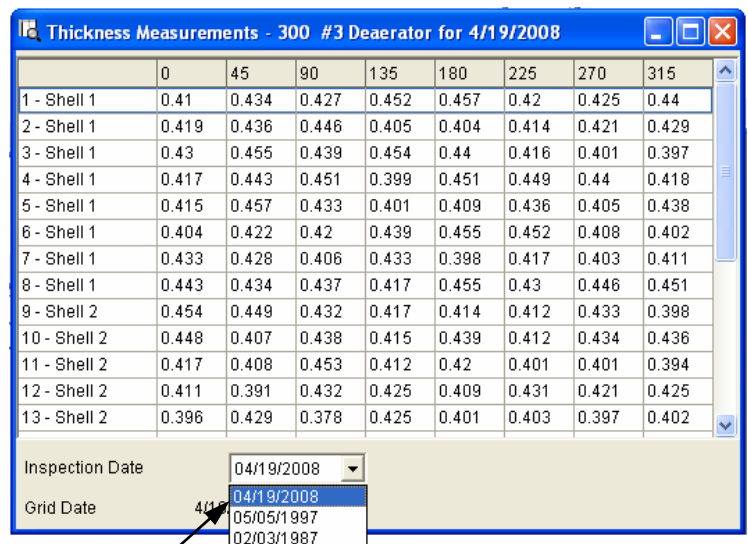


3. On the **Grid List**, select "Shell".
4. Right click to show the drop down list and select 'View Grid', then 'Thickness Readings' to view the **Thickness Measurements** grid form shown below.



Note: Although the form you are viewing is already populated with thickness measurement data, new data can be entered in a grid from the keyboard, imported from an existing file or downloaded directly from a data logger. Also, the existing data can be edited or overwritten. (Don't change it now, however.)

In most cases, you will be entering new thickness data into the grid using the **Inspection Summary** form shown on page 21. The 'Setting up new equipment' exercise beginning on page 40 will lead you through setting up a new thickness grid and entering data from the **Inspection Summary** form.



6. Click on the 'Inspection Date' drop down menu to view thickness measurement data from previous inspections.

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3 INSPECTIONS

Inspection forms are the heart of the TMS 5.1 inspection data entry process. Using these forms, the user is able to enter text data, thickness measurements, checklists, attached documents and cost data, all in one place.

1. Right click on "300 #3 Deaerator" and select 'Inspections' to open the **Inspection List** form.

Equipment ID	Name	Location	PSM
14-HX-0023	Carbon Monoxide Chi...	Process Area	<input checked="" type="checkbox"/>
300	#3 Deaerator		<input checked="" type="checkbox"/>
A-723	Amine Contact		<input checked="" type="checkbox"/>
K-6	Reactor		<input type="checkbox"/>
T-1 tower	Deethanizer		<input type="checkbox"/>

2. Right click on 04/19/2008, Shelby County Industrial Services and select **Inspection Summary**.

Inspection Date	Inspection Company	Thick...	External	Inter...
02/03/1987	Waverly Hall Testing Company	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
05/05/1997	Waverly Hall Testing Company	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
04/19/2008	Shelby County	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

The **Inspection Summary** form is used to capture all the information for a single inspection. Click on each tab to see the corresponding information.

Summary

1. The 'Summary' form is used to enter headings ('Label Name') and written descriptions of inspection, testing and evaluation.
2. Right click on the 'Description' field and select 'Zoom Field' to view the entire description shown below.

Zoom

External Visual Examination: Generally good condition with the following exceptions:

1. A 17" long tear in the insulation was noted on the west head. Repair as normal maintenance.
2. Moderate to severe corrosion on the saddles.

Internal Visual Examination: There is an area of erosion / corrosion on the north side of the middle shell course below

Cancel Save

Order	Label Name	Description
1	Visual Examination	External Visual
2	NDE	Internal UT thi
4	Next Inspection	Based on API
5	Conclusions and Recomme...	It is important

3. Double click on the 'Description' field for the "NDE" label to open the **Standard Inspection Summary Description** form shown to the right.

This form allows the user to store and apply standard descriptive phrases or paragraphs for frequently used descriptions.

Standard Inspection Summary Description

UT thickness readings were taken on the heads and all shell courses every 90 degrees at one foot intervals.

Delete 3 of 7 New Close Apply

Inspection Summary - 300 #3 Deaerator

Inspection Company: Report Number:
 Inspection Date: Report Date:
 Inspection Category: Report Submitted By:
 P. O. Number: Checklist Template:
 Condition: Code: Low Avg
 Inspection Type: Thickness ☒ External ☒ Internal ☒

Grid Name	Date
All - Single Column	04/19/2008
East Head	04/19/2008
Shell	04/19/2008
Shell 2 Thinning area	04/19/2008
West Head	04/19/2008

Grids

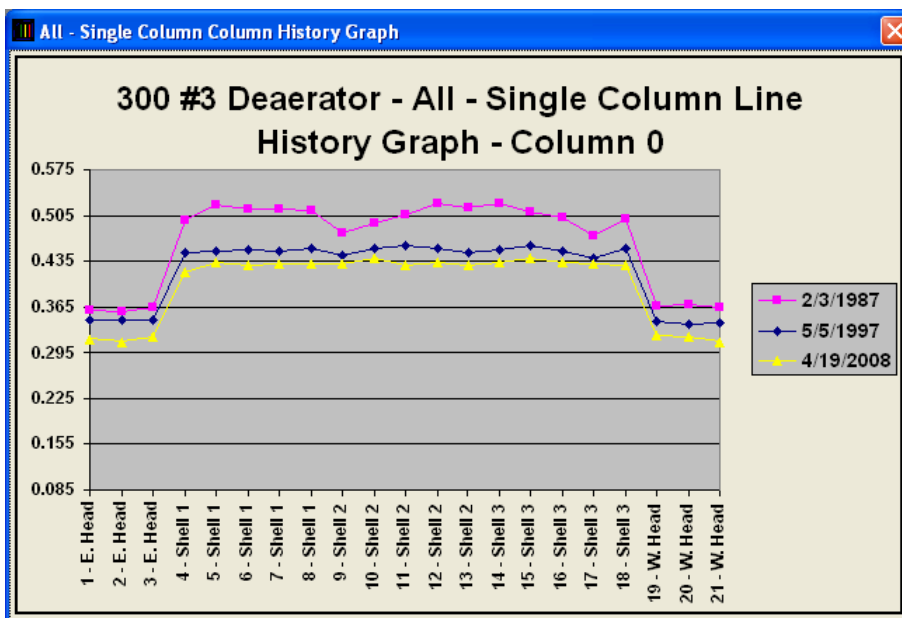
The 'Grids' form is used to select grids used for entering or viewing thickness measurement data.

1. Use the right-click menu or double click to open the "All-Single Column" grid.

2. Use the right-click menu to view the options for importing, exporting and viewing the thickness data.
3. Select 'Column History Graph' to open the graph shown below.

Thickness Measurements - 300 #3 Deaerator for 4/19/2008

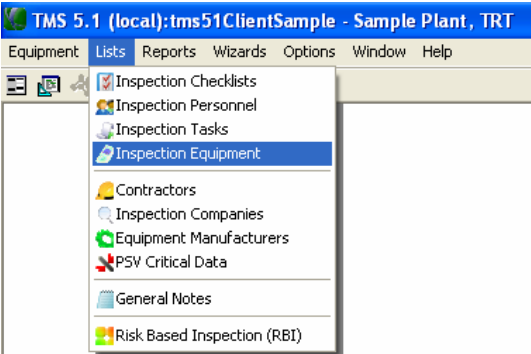
	0
1 - E. Head	0.317
2 - E. Head	0.312
3 - E. Head	0.32
4 - Shell 1	0.418
5 - Shell 1	0.434
6 - Shell 1	0.43
7 - Shell 1	0.431
8 - Shell 1	0.432
9 - Shell 2	0.431
10 - Shell 2	0.441
11 - Shell 2	0.43
12 - Shell 2	0.434
13 - Shell 2	0.43



Thickness Testing Equipment

The 'Equipment' form is used to select UT Thickness measurement equipment from pre-defined lists.

Note: To add equipment to the list, select 'Lists \ Inspection Equipment' from the main menu, as shown below.



Inspection Summary - 300 #3 Deaerator

Inspection Company	Shelby County Industria	Report Number	3342
Inspection Date	04/19/2008	Report Date	04/19/2008
Inspection Category	Recertification	Report Submitted By	Andrew D. Bussey, P. E.
P. O. Number	SCI4453	Checklist Template	Pressure Vessel Extern
Condition	Acceptable	Code:	Low 2 Avg 3.20
Inspection Type: Thickness <input checked="" type="checkbox"/> External <input checked="" type="checkbox"/> Internal <input checked="" type="checkbox"/>			

Summary | Grids | Equipment | Personnel | Documents | Time & Cost | Images

	Manufacturer	Model	Serial Number
Gauge	Panametrics	36 DL Plus	99884
Transducer	Panametrics	D790	32119
Calibration Block	Panametrics	2218E	T003271

Comments

TMS 5.1 works with Krautkramer and Panametrics dataloggers.

Inspection Summary - 300 #3 Deaerator

Inspection Company	Shelby County Industria	Report Number	3342
Inspection Date	04/19/2008	Report Date	04/19/2008
Inspection Category	Recertification	Report Submitted By	Andrew D. Bussey, P. E.
P. O. Number	SCI4453	Checklist Template	Pressure Vessel Extern
Condition	Acceptable	Code:	Low 2 Avg 3.20
Inspection Type: Thickness <input checked="" type="checkbox"/> External <input checked="" type="checkbox"/> Internal <input checked="" type="checkbox"/>			

Summary | Grids | Equipment | Personnel | Documents | Time & Cost | Images

Name	Task	Comments
Elizabeth Hodges	Engineer	Best all around engineer
Thomas Newton	Lead Inspector	Fluid Transfer Specialist

Personnel

The 'Personnel' form is used to select inspection personnel from pre-defined lists.

Note: To add personnel to the list, select 'Lists \ Inspection Personnel' from the main menu.

Documents

The 'Documents' form is the same as 'File Links' on the General Information form, except that it links documents specifically related to the selected inspection date, such as photographs, digitized radiographs, additional reports, etc.

The screenshot shows the 'Documents' tab of the 'Inspection Summary - 300 #3 Deaerator' form. The top section contains metadata fields: Inspection Company (Shelby County Industria), Inspection Date (04/19/2008), Inspection Category (Recertification), P. O. Number (SCI4453), Condition (Acceptable), Report Number (3342), Report Date (04/19/2008), Report Submitted By (Andrew D. Bussey, P. E.), Checklist Template (Pressure Vessel Extern), and Code (Low 2, Avg 3.20). Below these are tabs for Summary, Grids, Equipment, Personnel, Documents (selected), Time & Cost, and Images. The main area is a table with columns 'File Path' and 'Description'. One entry is visible: 'D:\TMS\Training\Dwgs and Photos\X-Ray 1.JPG' with description 'Digitized radiograph'. At the bottom right are icons for a folder and a magnifying glass.

Time & Cost

'Time & Cost' allows the user to enter summary time and cost data for the inspection. This information can be reported in detail or summary form.

The screenshot shows the 'Time & Cost' tab of the 'Inspection Summary - 300 #3 Deaerator' form. It features a table for entering time and cost data:

	Man-Hrs	
Labor	16	\$240.00
Materials		\$0.00
Contractor	4	\$280.00
Other	0	\$35.00
Total		\$555.00

Below the table is a 'Comments' section with a text area containing the text: 'Other cost is rental of blower to remove dust during cleaning and grinding.'

Images

The 'Images' form is the same as 'Images' on the General Information form, except that it contains graphic files specifically related to the selected inspection date, such as photographs and digitized radiographs.

The screenshot shows the 'Images' tab of the 'Inspection Summary - 300 #3 Deaerator' form. It features a table for entering image data:

Title:	Description:	Order Number:
Exit Pipe Internal Corrosion		1

Below the table is a 'Save' button. To the right of the table is a large image showing a close-up of a pipe with internal corrosion. At the bottom are buttons for 'New Image', 'Delete Image', 'Load Image', and 'Export Image'.

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SmartChecklists

One of the most widely used means of data collection is the checklist. The checklist format is effective because it combines a consistent outline of the information to be gathered along with a concise presentation of the results. However, because checklists are typically paper-based documents, the data obtained is not always easy to evaluate and may not even be readily available.

The SmartChecklists feature is used to efficiently obtain and store data from surveys, periodic inspections and other applications where a checklist format is most appropriate. The checklist data is evaluated and reported in a manner that facilitates identifying problems, tracking trends and meeting industry and regulatory reporting requirements.

SmartChecklists are set up in a consistent format, designed for ease of use and functionality. The checklist itself consists of a number of inspection items along with more detailed descriptions or explanations for each item.

A checklist is designed with two or more standard response descriptions along with a corresponding integer value for each response description.

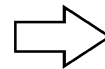
File Path	Description
D:\TMS\Training\Dwgs and Photos\X-Ray 1.JPG	Digitized radiograph



Data Collection

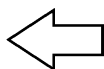
SmartChecklists are designed to make collection simple and easy. Using drop-down menus, each checklist item is assigned a numeric value and a corresponding description. The data can be entered in two ways:

Paper forms —facing page



This is the time-honored method of collecting checklist data and in many cases is still the most effective. The SmartChecklists program allows the user to print out professional looking paper forms for field data collection. The results are then keyed into the SmartChecklist data forms.

Pocket PC.



SmartChecklists can be uploaded to a PDA for use by interviewers or inspectors. After the checklists are completed, the results can be download directly to the PC

Category	Item
NAMEPLATE/LABELING	Nameplate condition.
	NFPA diamond / HMIS label.
FOUNDATION AND SUPPORTS	Condition.
	Anchor bolts.
CONTAINMENT AREA	Standing water.
	Drain valves secured.
	Debris or fire hazards.
	Containment dike.
EXTERNAL SHELL	

Preview Instructions

Preview Blank Checklist

✓ Show Instructions

API-510 External / Internal

Equipment ID: _____ Equipment Name: _____

Location: _____ Date: _____ By: _____

Legend: Condition Codes

Code	Condition Description
3	Satisfactory
2	Minor problems
1	Unsatisfactory
0	N/A

Inspection Item	Code	Comments
NAMEPLATE/LABELING		
Nameplate condition.	<input type="checkbox"/>	_____

NFPA diamond / HMIS label.	<input type="checkbox"/>	_____

FOUNDATION AND SUPPORTS		
Condition.	<input type="checkbox"/>	_____

Anchor bolts.	<input type="checkbox"/>	_____

CONTAINMENT AREA		
Standing water.	<input type="checkbox"/>	_____

Drain valves secured.	<input type="checkbox"/>	_____

Debris or fire hazards.	<input type="checkbox"/>	_____

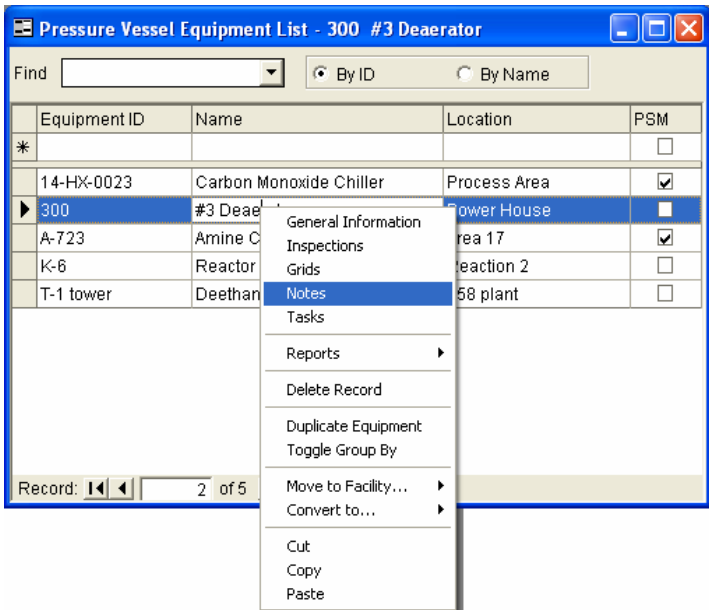
Sample Plant

Page 1 of 4

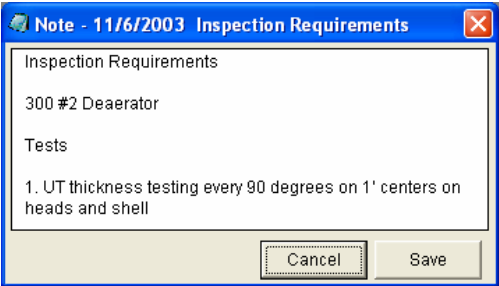
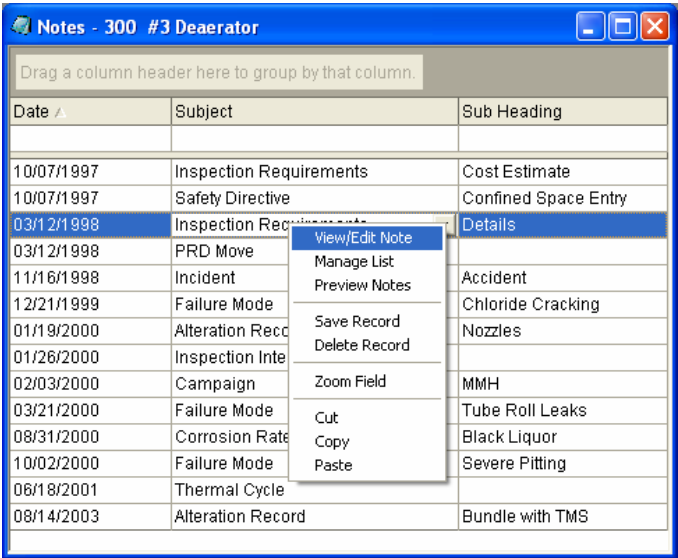
TRT

Notes

The **Notes** form is a simple to use and powerful information storage and retrieval tool. Text information may stored either by direct entry from the keyboard or by "cutting and pasting" from another text document. Use the 'Subject' and 'Subheading' fields to develop your own filing system for notes.



- 1. On the **Vessel Equipment List** form, right click on "300 Deaerator".
- 2. On the menu, select 'Notes' to open the **Notes** list form.
- 3. Right click and choose View/Edit Note (or just double click on the line) to enter or edit data.



Tasks

The Tasks form is a versatile tool that allows the user to schedule any sort of task at a future date. The task may be a special inspection, such as the eddy current test shown in the example, or maintenance, adjustment, repair, etc.

1. To create a new task, right click on the piece of equipment and select 'Tasks' to open the **Tasks** form.
2. Next, enter the desired data for 'Date Due', 'Type' and 'Contractor' in the 'New Record line', then press 'Enter'.

Equipment ID	Name	Location	PSM
* 14-HX-0023			<input type="checkbox"/>
300		Power House	<input type="checkbox"/>
A-723		Area 17	<input checked="" type="checkbox"/>
K-6		Reaction 2	<input type="checkbox"/>
T-1 tower		158 plant	<input type="checkbox"/>

Date Due	Completed	Type	Contractor
01/12/2009	01/20/1999	Eddy Current Test	Waverly Hall Inspection Cor
01/25/1999		Tube Maintenance	<Not Specified>
04/25/2003		Signage	<Not Specified>
12/23/2003		Exterior Inspection	<Not Specified>
01/25/2004		Repair	<Not Specified>

3. Right click or double click on the line you just entered to open the **Task Details** form.
4. Enter as much detail as is needed in the 'Description' window.

Once a task is complete, fill in the 'Date Completed' field in the top part of the form, along with any additional comments or descriptions of the work. The record is then part of the task history for the piece of equipment.

Type: Eddy Current Test | Order Number: | Assigned: Elizabeth Hodges | Contractor: Waverly Hall Inspect

Date Due: 01/12/2009 | Date Complete: / /

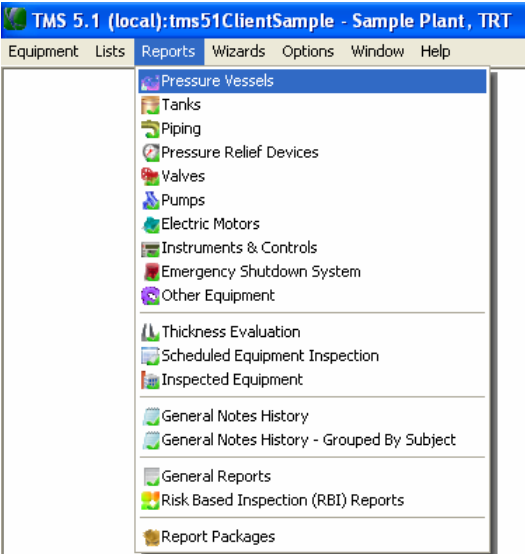
Description: Use a new generation Eddy Current system that will store all test information on a CD or DVD. Electronic test results to be delivered along with a written summary within 2 days after completion of testing.

There is also a Time & Cost form similar to the one previously discussed for inspections.

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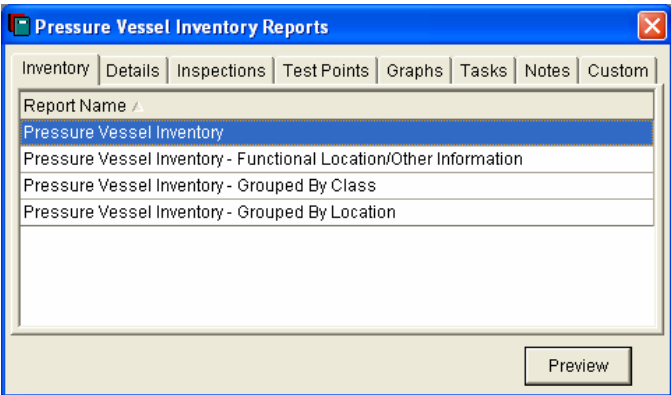
4 REPORTS

There are well over 200 standard reports in TMS 5.1. Most of these reports have associated filter forms that allow the user to focus on specific information. This section will review a few of the most widely used reports and filters.

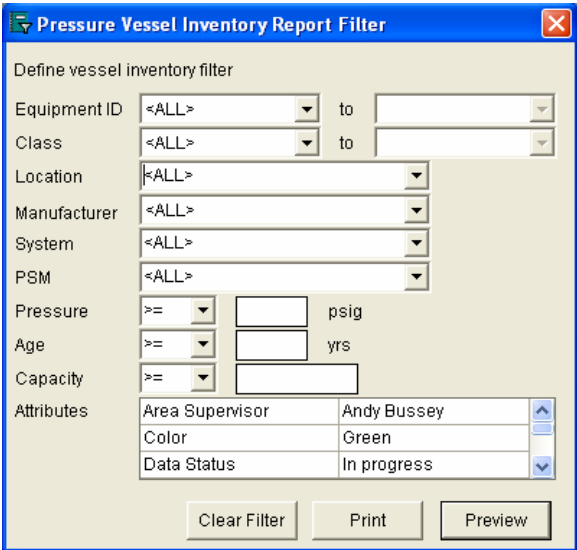


Inventory

Inventory reports are lists of the same type equipment that can be sorted, filtered and/or grouped by selecting various fields and/or attributes from the appropriate Filter form as shown below.



Note that the unfiltered report requires 51 pages.



Pressure Vessel Inventory

Equipment ID	Equipment Name	Equipment Location	Class	PSM	Pressure (psig)	Temperature (°F)	Age (yrs)	Normal Capa
1D-100	Tower, Light Ends	821	2	<input checked="" type="checkbox"/>	77	300	9	g
1D-101	Tower, Light Ends	821	2	<input checked="" type="checkbox"/>	110	254	31	g
1D-103A	Tower, Heavy Ends	821	2	<input checked="" type="checkbox"/>	75	230	47	g
1D-103B	Tower, Heavy Ends	821	2	<input checked="" type="checkbox"/>	65	230	47	g
1D-103C	Tower, Heavy Ends	821	2	<input checked="" type="checkbox"/>				g
1D-104A	Heavy Ends Tower	821	2	<input checked="" type="checkbox"/>	84	300	12	g
1D-104B	Heavy Ends Tower	821	2	<input checked="" type="checkbox"/>	84	300	12	g
1D-105	Wingtack Feed Preparation Tower	821	2	<input checked="" type="checkbox"/>	86	300	12	g

Pressure Vessel Inventory Report Filter

Define vessel inventory filter

Equipment ID: <ALL> to

Class: <ALL> to

Location: <ALL>

Manufacturer: <ALL>

System: <ALL>

PSM: <ALL>

Pressure: >= 150 psig

Age: >= 25 yrs

Capacity: >=

Attributes:

Area Supervisor	Andy Bussey
Area Supervisor	Mark Davis
BMP	

Clear Filter Print Preview

The unfiltered query in the example on the previous page produced a report of all the pressure vessels entered in the database and required 51 pages.

The filter on the left is set to select only those vessels that have a design pressure of 150 psig or more and are 25 or more years old. The resulting report shown below gives the reader the desired information and requires only 6 pages.

Pressure Vessel Inventory Report

Pressure >=150 and Age >=25

Equipment ID	Equipment Name	Equipment Location	Class	PSM	Pressure (psig)	Temperature (°F)	Age (yrs)	Normal Capa
1D-206	Tower, Solvent Clean-up	821	2	<input checked="" type="checkbox"/>	150	500	41	g
1D-207	Tower, Solvent Wash	821	2	<input checked="" type="checkbox"/>	150	500	41	g
1D-209	Tower, 1D-201 OH Wash	821	2	<input checked="" type="checkbox"/>	150	500	41	g
1D-303	Column, TRAY 22 WaterWas	821	2	<input checked="" type="checkbox"/>	292	160	47	g
1E-101A	Reboiler, LightEndsSE	821	2	<input checked="" type="checkbox"/>	175	415	33	g
1E-101B	Reboiler, LightEndsNE	821	2	<input checked="" type="checkbox"/>	175	415	33	g
1E-101C	Reboiler, LightEndsNW	821	2	<input checked="" type="checkbox"/>	175	415	33	g
1E-102A	Preheater, Feed	821	2	<input checked="" type="checkbox"/>	150	250	32	g
1F-102R	Preheater, Feed	821	2	<input checked="" type="checkbox"/>	150	250	32	g

Inventory reports also can be accessed from the Equipment List form by right clicking on any piece of equipment, as shown on the right. There are no filtering capabilities with this method; however, the equipment can be sorted by class or location.

Tank Equipment List - 01-2899 Ethylene Glycol Storage

Find: By ID By Name

Equipment ID	Name	Location	PSM
* 01-2899	Ethylene Glycol Storage	Area 55	<input checked="" type="checkbox"/>
33-9903	Kerosene Storage		<input type="checkbox"/>
62-0430	White Liquor Storage		<input type="checkbox"/>
AA-040901	Anhydrous Ammonia		<input type="checkbox"/>
EHN-08	White Liquor Storage		<input type="checkbox"/>
HCS 80-003	Fuel Oil Storage Tank		<input type="checkbox"/>

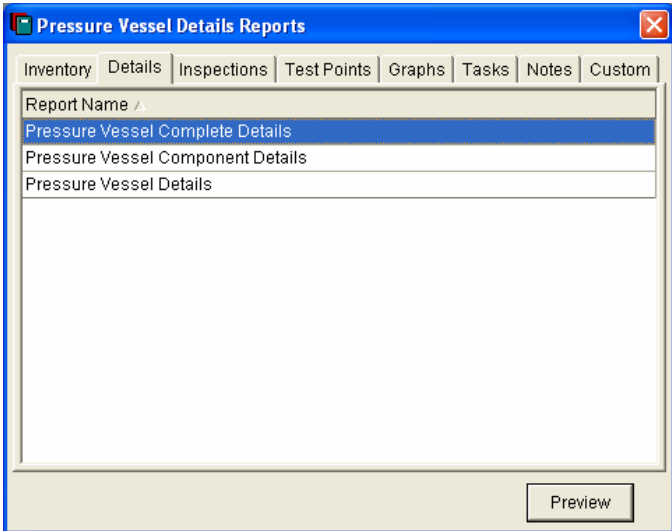
Record: 1 of 6

Right-click context menu:

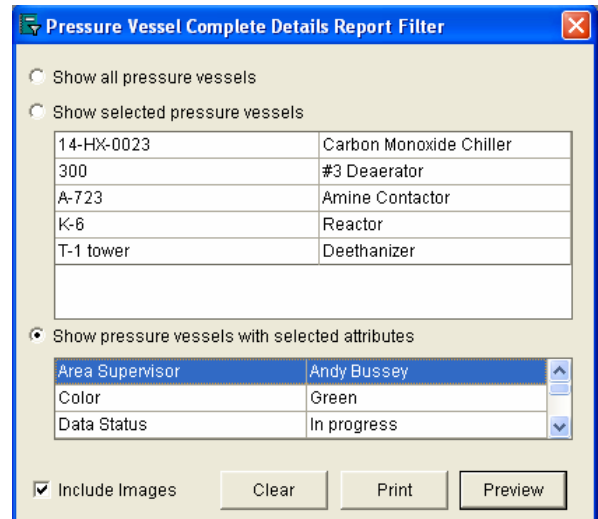
- General Information
- Inspections
- Grids
- Notes
- Tasks
- Reports
 - Inventory
 - Standard
 - Grouped by Class
 - Grouped by Location
 - Details
- Delete Record
- Duplicate Equipment
- Toggle Group By
- Move to Facility...
- Convert to...
- Cut
- Copy
- Paste

Details

A Details report allows one of three levels of information for one or more pieces of equipment. The report also allows the user to print all the Images associated with the equipment.



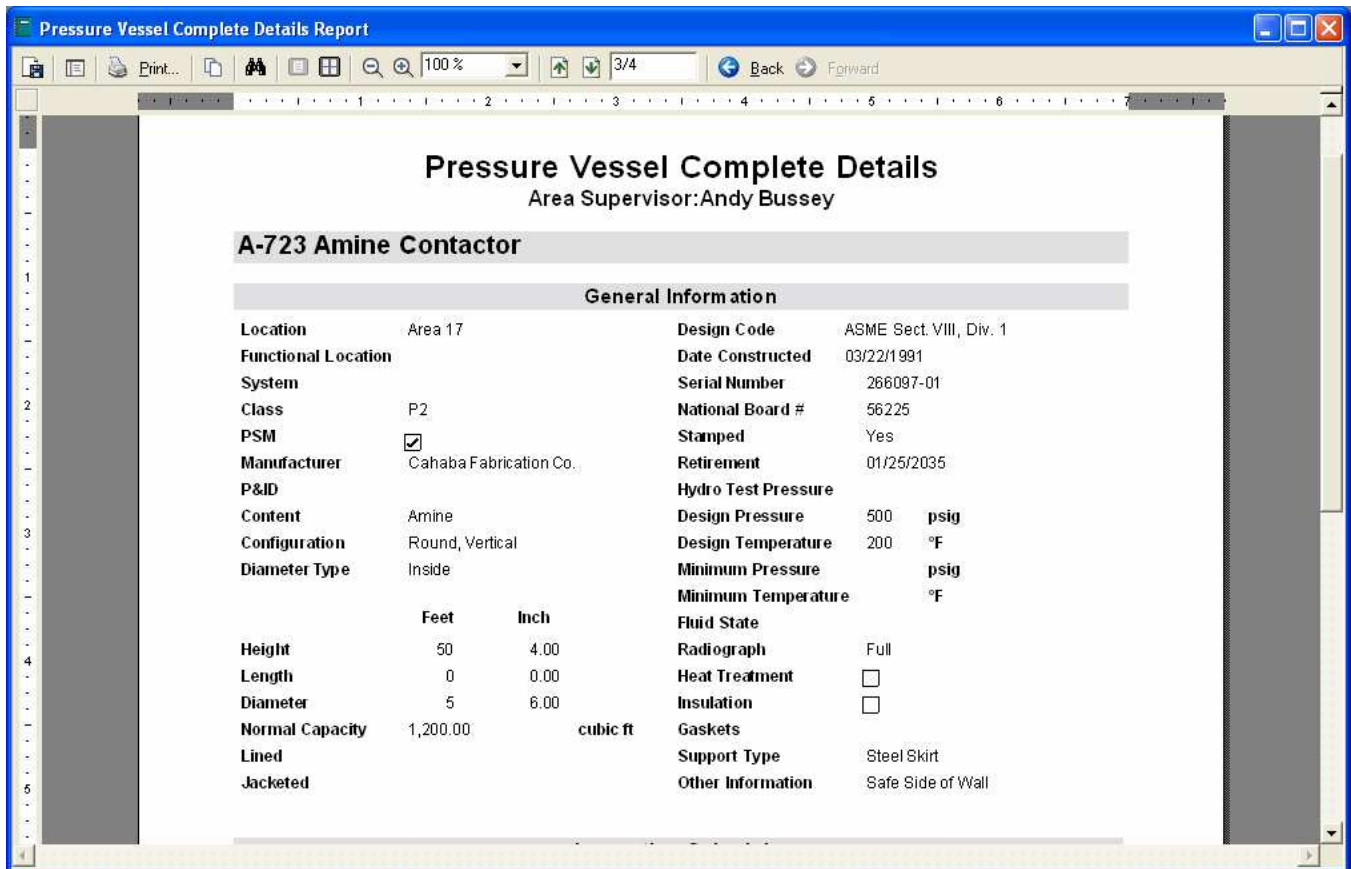
The 'Pressure Vessel Details Reports' dialog box features a tabbed interface with 'Details' selected. It contains a list box for 'Report Name' with three options: 'Pressure Vessel Complete Details' (selected), 'Pressure Vessel Component Details', and 'Pressure Vessel Details'. A 'Preview' button is located at the bottom right.



The 'Pressure Vessel Complete Details Report Filter' dialog box has three radio button options: 'Show all pressure vessels', 'Show selected pressure vessels', and 'Show pressure vessels with selected attributes' (selected). The 'Show selected pressure vessels' section contains a table with two columns: ID and Name. The 'Show pressure vessels with selected attributes' section contains a table with two columns: Attribute and Value. At the bottom, there are checkboxes for 'Include Images' and buttons for 'Clear', 'Print', and 'Preview'.

ID	Name
14-HX-0023	Carbon Monoxide Chiller
300	#3 Deaerator
A-723	Amine Contactor
K-6	Reactor
T-1 tower	Deethanizer

Attribute	Value
Area Supervisor	Andy Bussey
Color	Green
Data Status	In progress



The 'Pressure Vessel Complete Details Report' window displays a detailed report for the 'A-723 Amine Contactor'. The report is organized into sections: 'General Information' and 'Dimensions'. The 'General Information' section includes fields for Location, Functional Location, System, Class, PSM, Manufacturer, P&ID, Content, Configuration, Diameter Type, Design Code, Date Constructed, Serial Number, National Board #, Stamped, Retirement, Hydro Test Pressure, Design Pressure, Design Temperature, Minimum Pressure, Minimum Temperature, Fluid State, Radiograph, Heat Treatment, Insulation, Gaskets, Support Type, and Other Information. The 'Dimensions' section includes fields for Height, Length, Diameter, Normal Capacity, Lined, and Jacketed.

General Information	
Location	Area 17
Functional Location	
System	
Class	P2
PSM	<input checked="" type="checkbox"/>
Manufacturer	Cahaba Fabrication Co.
P&ID	
Content	Amine
Configuration	Round, Vertical
Diameter Type	Inside
Design Code	ASME Sect. VIII, Div. 1
Date Constructed	03/22/1991
Serial Number	266097-01
National Board #	56225
Stamped	Yes
Retirement	01/25/2035
Hydro Test Pressure	
Design Pressure	500 psig
Design Temperature	200 °F
Minimum Pressure	psig
Minimum Temperature	°F
Fluid State	
Radiograph	Full
Heat Treatment	<input type="checkbox"/>
Insulation	<input type="checkbox"/>
Gaskets	
Support Type	Steel Skirt
Other Information	Safe Side of Wall

	Feet	Inch
Height	50	4.00
Length	0	0.00
Diameter	5	6.00
Normal Capacity	1,200.00	cubic ft
Lined		
Jacketed		

Details reports also can be accessed from the Equipment List form by right clicking on the desired piece of equipment and selecting one of the three available reports.

Pressure Vessel Inspections Reports

Inventory | Details | **Inspections** | Test Points | Graphs | Tasks | Notes | Custom

Report Name /

- Pressure Vessel Inspection Checklist
- Pressure Vessel Inspection Checklist Code Summary
- Pressure Vessel Inspection Checklist History
- Pressure Vessel Inspection Cost History Detail
- Pressure Vessel Inspection Cost History Summary
- Pressure Vessel Inspection Cost History Summary - Grouped By Inspection Co...
- Pressure Vessel Inspection Dates - Grouped By Class
- Pressure Vessel Inspection Dates - Grouped By Location
- Pressure Vessel Inspection Details
- Pressure Vessel Inspection Details with Critical TMLs**
- Pressure Vessel Inspection Details With Thickness Summary
- Pressure Vessel Inspection History
- Pressure Vessel Inspection History - Grouped By Inspector

Preview

Inspections

There are more Inspections reports than any other type. On this page and the next are a couple of the most commonly used, but all are useful. (Take a look at the Inspection Checklist and Inspection History reports as well.)

The **Inspection Details with Critical TMLs** is available for tanks and piping as well as pressure vessels. It gives the reader a comprehensive look at the inspection summary and the most critical TMLs (those with the shortest time to TMin.)

Images can be printed with the report as well.

Pressure Vessel Inspection Details with Critical TMLs Report Filter

☐ Show inspection details for all equipment

☒ Show inspection details for selected equipment on last inspection date

14-HX-0023	Carbon Monoxide Chi...
300	#3 Deaerator
A-723	Amine Contactor
K-6	Reactor

☐ Show inspection details for selected equipment on selected inspection dates

14-HX-0023	Carbon Monoxide ...	06/15/1996	Waverly Hall Testing...
300	#3 Deaerator	03/17/1998	Shelby County Indus...
A-723	Amine Contactor		
K-6	Reactor		

☐ Show inspection details in range between <ALL> to

☐ Show inspection details for inspection dates between to

☐ Show inspection details for tanks with selected attributes

Area Supervisor	Andy Bussey
Color	Green
Data Status	In progress

☒ Include Images

Clear Print Preview

TMS 5.1 (local):tms51ClientSample - Sample Plant, TRT - [Pressure Vessel Inspection Details with Critical TMLs Report]

Equipment | Lists | Reports | Wizards | Options | Window | Help

Print... 100% 1/2 Back Forward

Pressure Vessel Inspection Details with Critical TMLs

300 #3 Deaerator

Inspection Date	04/19/2008	Inspection Company	Shelby County Industrial Services
Inspection Category	Recertification	Report Number	3342
Condition	Acceptable	P. O. Number	SCI4453
Inspection Type	Thickness <input checked="" type="checkbox"/> External <input checked="" type="checkbox"/> Internal <input checked="" type="checkbox"/>		

Inspection Summary


Visual Examination

External Visual Examination: Generally good condition with the following exceptions:

1. A 17" long tear in the insulation was noted on the west head. Repair as normal maintenance.
2. Moderate to severe corrosion on the saddles.

Internal Visual Examination: There is an area of erosion / corrosion on the north side of the middle shell course below the supply inlet. (See attached photograph as well as thickness measurement grids.)

The **Inspection Dates** report is available for all types of equipment. In this example, the report shows internal inspection dates due within a specified time period.


Pressure Vessel Inspection Dates - Grouped By Location Report Filter



☐ Show all inspections

☐ Show all inspections due within the next Months

☒ Show all inspections due between and

☒ Include Past Due Inspections

Equipment	<input type="text" value="<ALL>"/>	to	<input type="text"/>									
Class	<input type="text" value="<ALL>"/>	to	<input type="text"/>									
Location	<input type="text" value="<ALL>"/>											
Inspection Type	<input type="text" value="<ALL>"/>											
PSM	<input type="text" value="<ALL>"/>											
Pressure	<input type="text" value=">="/> <input type="text"/>	psig										
Temperature	<input type="text" value=">="/> <input type="text"/>	° F										
Age	<input type="text" value=">="/> <input type="text"/>	yrs										
Capacity	<input type="text" value=">="/> <input type="text"/>											
Attributes	<table> <tr> <td>Area Supervisor</td> <td>Andy Bussey</td> <td><input type="button" value="▲"/></td> </tr> <tr> <td>Color</td> <td>Green</td> <td><input type="button" value="▲"/></td> </tr> <tr> <td>Data Status</td> <td>In progress</td> <td><input type="button" value="▼"/></td> </tr> </table>			Area Supervisor	Andy Bussey	<input type="button" value="▲"/>	Color	Green	<input type="button" value="▲"/>	Data Status	In progress	<input type="button" value="▼"/>
Area Supervisor	Andy Bussey	<input type="button" value="▲"/>										
Color	Green	<input type="button" value="▲"/>										
Data Status	In progress	<input type="button" value="▼"/>										


Pressure Vessel Inspections Reports


Inventory | Details | **Inspections** | Test Points | Graphs | Tasks | Notes | Custom

Report Name ^
Pressure Vessel Inspection Checklist
Pressure Vessel Inspection Checklist Code Summary
Pressure Vessel Inspection Checklist History
Pressure Vessel Inspection Cost History Detail
Pressure Vessel Inspection Cost History Summary
Pressure Vessel Inspection Cost History Summary - Grouped By Inspection Co...
Pressure Vessel Inspection Dates - Grouped By Class
Pressure Vessel Inspection Dates - Grouped By Location
Pressure Vessel Inspection Details
Pressure Vessel Inspection Details with Critical TMLs
Pressure Vessel Inspection Details With Thickness Summary
Pressure Vessel Inspection History
Pressure Vessel Inspection History - Grouped By Inspector

Preview

Note: A report for all upcoming inspection dates for all types equipment can be set up by selecting **Options / System Options** from the main menu, then clicking on the 'Inspection' tab.

The report may be set to automatically open on startup of TMS. It also can be viewed by clicking on **Reports** from the main menu and selecting 'Scheduled Equipment Inspection' from the list.

Pressure Vessel Inspection Dates - Grouped By Location Report							
Pressure Vessel Inspection Dates - Grouped By Location							
Inspections due between 11/20/2008 and 1/31/2010, including past due items and Inspection Type: Internal							
Power House							
Internal							
Equipment ID	Equipment Name	Class	PSM	Inspection Interval yr mo		Last Inspection Date	Next Inspection Due Date
300	#3 Deaerator	High Risk	<input type="checkbox"/>	1	6	04/19/08	10/19/09
Process Area							
Internal							
Equipment ID	Equipment Name	Class	PSM	Inspection Interval yr mo		Last Inspection Date	Next Inspection Due Date
14-HX-0023	Carbon Monoxide Chiller	P1	<input checked="" type="checkbox"/>	10		03/17/99	03/17/09
A-723	Amine Contactor	P2	<input checked="" type="checkbox"/>				12/23/09
T-1 tower	Deethanizer	P2	<input type="checkbox"/>	5		02/24/03	02/24/08 PastDue
Reaction 2							
Internal							
Equipment ID	Equipment Name	Class	PSM	Inspection Interval yr mo		Last Inspection Date	Next Inspection Due Date
K-6	Reactor	P3	<input type="checkbox"/>	5		10/29/04	10/29/09

Test Points

The Test Points tab allows the user to choose either 'Test Points' or 'Test Points Details' reports. Each type can be extremely helpful (and save lots of time, especially if you have a large number of TMLs to analyze.)

Test Point Filter

Equipment: 62-0430 White Liquor Storage
Grid: Shell 1
Grid Type: Thickness Readings
Inspection Date: 04/08/2002

☐ Print Thickness Readings in Color
☒ Highlight Thickness Readings Below 0.3 (in)

Print Preview

You can view TML thickness or any of the other options shown in the Grid Type drop down list shown in the filter form to the right.

Values above or below a specified value can be printed in a different color or highlighted (as shown in the example below.)

Test Point Filter

Equipment: 62-0430 White Liquor Storage
Grid: Shell 1
Grid Type: Thickness Readings
Inspection Date: Test Point Names
Thickness Readings
Corrosion Rate
Years To TMin
Loss of Metal
Ratio of Thickness to Tmin

☐ Print Thickness Readings in Color
☒ Highlight Thickness Readings Below 0.3 (in)

Print Preview

Shell 1 Thickness Measurements - 04/08/2002 62-0430 White Liquor Storage Report

Print... 100% 1/1 Back Forward

1 2 3 4 5 6 7 8 9 10

Shell 1 Thickness Measurements - 04/08/2002
62-0430 White Liquor Storage

	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345
1 7'8" - Ring 1	0.294	0.268	0.272	0.273	0.286	0.28	0.277	0.269	0.27	0.268	0.266	0.268	0.267	0.263	0.27	0.264	0.29	0.285	0.288	0.267	0.269	0.266	0.299	0.307
7' - Ring 1	0.304	0.289	0.278	0.285	0.302	0.289	0.292	0.297	0.291	0.296	0.279	0.290	0.281	0.264	0.270	0.262	0.288	0.269	0.287	0.275	0.270	0.276	0.329	0.336
6' - Ring 1	0.316	0.324	0.305	0.326	0.326	0.306	0.317	0.316	0.303	0.316	0.302	0.300	0.295	0.256	0.250	0.256	0.317	0.302	0.310	0.301	0.285	0.299	0.362	0.329
5' - Ring 1	0.350	0.349	0.335	0.346	0.350	0.337	0.344	0.343	0.327	0.344	0.313	0.312	0.323	0.280	0.254	0.280	0.336	0.348	0.337	0.319	0.305	0.320	0.373	0.359
4' - Ring 1	0.393	0.373	0.354	0.349	0.368	0.361	0.369	0.359	0.345	0.383	0.360	0.348	0.356	0.294	0.256	0.319	0.361	0.366	0.365	0.335	0.331	0.331	0.375	0.370
2 3' - Ring 1	0.385	0.386	0.365	0.372	0.383	0.371	0.383	0.394	0.377	0.389	0.362	0.370	0.357	0.351	0.331	0.362	0.380	0.390	0.380	0.354	0.337	0.352	0.394	0.376
2' - Ring 1	0.408	0.396	0.384	0.392	0.402	0.399	0.399	0.406	0.399	0.404	0.389	0.400	0.397	0.383	0.370	0.384	0.410	0.412	0.411	0.387	0.371	0.379	0.409	0.402
1' - Ring 1	0.432	0.423	0.428	0.428	0.424	0.420	0.419	0.428	0.414	0.423	0.407	0.408	0.408	0.422	0.412	0.436	0.421	0.411	0.404	0.410	0.395	0.412	0.428	0.426
0' - Ring 1	0.427	0.436	0.430	0.430	0.429	0.423	0.431	0.434	0.435	0.435	0.405	0.410	0.418	0.433	0.428	0.432	0.417	0.420	0.435	0.432	0.424	0.430	0.452	0.449

Graphs

The Graphs tab allows the user to choose any of four thickness graphs.

Note: The Settlement Graph is available only for tanks.

Group Surface Graph Filter

Equipment

62-0430 White Liquor Storage

Grid Name

Shell 1

Inspection Date

04/08/2002

Preview

Tank Graphs Reports

Inventory

Details

Inspections

Test Points

Graphs

Tasks

Notes

Custom

Report Name

Tank Graph - Line

Tank Graph - Line History

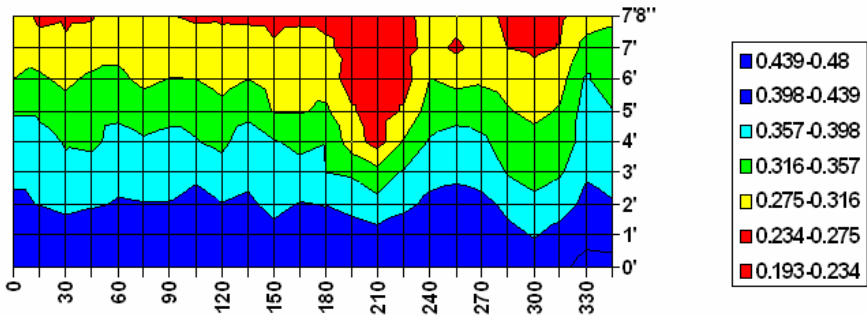
Tank Graph - Settlement

Tank Graph - Surface

Tank Graph - Test Point History

Preview

Shell 1 Surface Graph
 62-0430 White Liquor Storage dated 04/08/2002



Note: Thickness Readings are in units of inches.

Tasks

1. Select the Tasks tab.
2. Select the report title and click 'Preview' to open the **Report Filter** shown below.
3. Using the drop down lists, select "14-HX-0023" to "14-HX-0023" and press 'Preview' to view the report shown below right.

Pressure Vessel Tasks Reports

Inventory | Details | Inspections | Test Points | Graphs | **Tasks** | Notes | Custom

Report Name /

- Pressure Vessel Task Cost History Detail
- Pressure Vessel Task Cost History Summary
- Pressure Vessel Task Cost History Summary - Grouped By System
- Pressure Vessel Task Dates
- Pressure Vessel Task Dates Details
- Pressure Vessel Task History

Preview

Vessel Task Dates Details Report Filter

Define pressure vessel task dates details filter below

Equipment ID: 14-HX-0023 to 14-HX-0023

Date Due: to

Type: <ALL>

Location: <ALL>

Assigned: <ALL>

Contractor: <ALL>

Clear Filter Print Preview

Pressure Vessel Task Dates Details

14-HX-0023 Carbon Monoxide Chiller

Type	Repair
------	--------

Date Due 01/25/2004

Date Completed

Location	ProcessArea
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
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87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

Description

Replace corroded foundation bolts.

Type	Signage
------	---------

Date Due 04/25/2009

Date Completed

Location	ProcessArea
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
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95	95
96	96
97	97
98	98
99	99
100	100

Description

Place hazardous warning signs as required by OSHA before next turnaround.

Type	Eddy Current Test
------	-------------------

Date Due 09/16/2009

Date Completed

Location	ProcessArea
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
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89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

Description

Use a new generation Eddy Current system that will store all test information on a CD or DVD. Electronic test results to be delivered along with a written summary within 2 days after completion of testing.

Pressure Vessel Notes Reports

Inventory | Details | Inspections | Test Points | Graphs | Tasks | **Notes** | Custom

Report Name ▾
Pressure Vessel Notes History

Preview

Notes History

Note that this report can be searched by key word

Vessel Notes History Report Filter

Equipment: 300 ADB Metric to 300 ADB Metric

Date: to

Subject: Safety Directive

Sub Heading: <ALL>

Keyword:

☐ Show one note per page

Clear Filter Print Preview

Pressure Vessel Notes History

Equipment ID: 300 ADB Metric and Subject: Safety Directive

300 ADB Metric Deaerator

Date 01/09/2009

Subject Safety Directive

Sub Heading

PERMANENT SAFETY DIRECTIVE
DATE: JANUARY 02, 2009

TO: ALL PLANT MANAGERS, SAFETY MANAGERS,
MAINTENANCE ENGINEERS
FROM: CORPORATE COUNSEL

SUBJECT: STORAGE TANK AND PRESSURE VESSEL CONFINED SPACE ENTRY

In no case shall any outside vendor be allowed to enter a storage tank, pressure vessel or any other enclosure which has been designated a "confined space" under OSHA regulations for any purpose unless he or she can present written documentation of completion of Confined Space Entry training within the previous 6 months. This documentation may be from an outside agency on the Company's approved list, from the plant Safety Director or from the Vendor's chief safety officer. Any failure to follow this policy will result in the suspension of the Company employee authorizing such entry.

5 SETTING UP NEW FIXED EQUIPMENT

- Click on the Equipment menu.
- Select 'Pressure Vessels' to open the **Pressure Vessel Equipment List**.
- Click on the 'New Record Line' and enter the following values:

Equipment ID "091771-ANB"
 Name "Deaerator"
 Location "Power House" (Use the drop
 down list or just start typing.)

- Press 'Enter'
- Right click on the new record and select 'General Information.'

Equipment ID	Name	Location	PSM
091771-ANB	Deaerator	Power House	<input type="checkbox"/>
14-HX-0023	Carbon Monoxide Chiller	Process Area	<input checked="" type="checkbox"/>
300	#3 Deaerator	Power House	<input type="checkbox"/>
300 ADB Metric	Deaerator	Power House	<input type="checkbox"/>
A-723	Amine Contactor	Area 17	<input checked="" type="checkbox"/>
K-6	Reactor	Reaction 2	<input type="checkbox"/>
T-1 tower	Deethanizer	158 plant	<input type="checkbox"/>

- Fill in the information from the "Pressure Vessel Complete Details" report shown on the facing page.

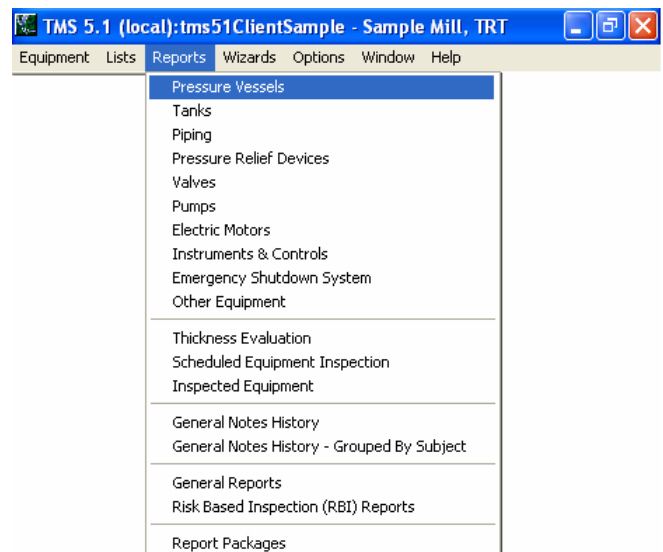
Note: Once you have entered information on the top part of the **General Information** form and the **Structure & Use** subform , click on the **Components** tab.

- Enter the information for each component in the order shown on the report. (Note that for each new line, the Type, Materials Specifications and Original Thk will autofill with information from the last line entered.)
- Open the **Components Details** form for each of the components by right - clicking or double clicking on the line. Enter a joint efficiency of 1.0 for each head component and 0.85 for each shell component.

- From the main menu, click on 'Reports' then select 'Pressure Vessels'.
- On the **Pressure Vessel Reports** form, select the 'Details' tab, then click on "Pressure Vessel Complete Details".
- Press the 'Preview' button to open the **Pressure Vessel Complete Details Report Filter** form. Click on the 'Show selected pressure vessels' radio button, select "091771-ANB" and press 'Preview' to check your work.

The report should look just like the one on the facing page.

NOTE: You can also view the report by right clicking on '091771-ANB' on the **Pressure Vessel Equipment List**, then selecting 'Reports' / 'Details' / 'Complete'.



Pressure Vessel Complete Details

091771-ANB Dearator

General Information

Location	Power House	Design Code	ASME Sect. VIII, Div. 1
Functional Location		Date Constructed	12/23/1997
System		Serial Number	
Class	High Risk	National Board #	71
PSM	<input type="checkbox"/>	Stamped	Yes
Manufacturer	Addison Fabricators	Retirement	
P&ID		Hydro Test Pressure	100 psig
Content	Feedwater	Design Pressure	75 psig
Configuration	Round, Horizontal	Design Temperature	292 °F
Diameter Type	Inside	Minimum Pressure	psig
		Minimum Temperature	°F
	Feet	Inch	Fluid State
Height	0	0.00	Liquid
Length	30	0.00	Radiograph
Diameter	12	0.00	Spot
Normal Capacity	24,000.00	gallons	Heat Treatment
Lined	No		<input checked="" type="checkbox"/>
Jacketed	No		Insulation
			<input checked="" type="checkbox"/>
		Gaskets	Composite
		Support Type	Steel Saddle
		Other Information	

Inspection Schedule

	Last Inspection Date	Inspection Interval	Next Inspection Date
Thickness		10 Years Months	
External		5 Years Months	
Internal		10 Years Months	

Vessel Components

Name	Type	Material Specifications	Diameter		Orig. Thk. (in)	Min. Thk. (in)
			(ft)	(in)		
E. Head	Hemispherical Head	SA-516-70, 1995	12.0	0.000	0.375	0.154
Shell 1	Cylindrical Shell	SA-516-70, 1995	11.0	0.000	0.500	0.334
Shell 2	Cylindrical Shell	SA-516-70, 1995	12.0	0.000	0.500	0.364
Shell 3	Cylindrical Shell	SA-516-70, 1995	12.0	0.000	0.500	0.364
W. Head	Hemispherical Head	SA-516-70, 1995	12.0	0.000	0.375	0.154

Setting up Test Point Grids

1. Select 'Pressure Vessels' from the Equipment menu to open the **Pressure Vessel Equipment List**.
2. Click on "091771-ANB" and right click to open the RCM.
3. Click on 'Grids' to the **Grid List** form.
4. Right click on the **Grid List** form and select 'Create Grid'.

The screenshot shows a window titled "Grid List - 091771-ANB Deaerator". It contains a table with two columns: "Grid Name" and "Description". Below the table is a "Create Grid" button. At the bottom, there is a status bar that says "Record: 1 of 0".

The screenshot shows the first step of the "Test Point Setup Wizard". It prompts the user to "Enter a Grid Name and select method for test point setup below". The "Grid Name" field contains "Heads & Shell". There are two radio buttons: "Create test point labels manually" (selected) and "Create test point labels from spreadsheet".

The screenshot shows the second step of the "Test Point Setup Wizard". It prompts the user to "Select the format for columns below". The "Column Format" section has a radio button for "Enter number of columns" which is selected, with a value of 4 entered in the adjacent field.

The screenshot shows the third step of the "Test Point Setup Wizard". It prompts the user to "Enter number of rows". The "Row Format" section has a radio button for "Enter number of rows" which is selected, with a value of 21 entered in the adjacent field.

The screenshot shows the fourth step of the "Test Point Setup Wizard". It prompts the user to "Select the format of the column labels below". The "Label columns automatically" radio button is selected. There are fields for "Start numbering with" (0) and "and increase by" (90). There is also an "Include Prefix" checkbox which is unchecked.

The screenshot shows the fifth step of the "Test Point Setup Wizard". It prompts the user to "Select the format of the row labels below". The "Label rows automatically" radio button is selected. There are fields for "Start numbering with" (1) and "and increase by" (1). The "Include Prefix" checkbox is checked, and the "Include Suffix" checkbox is unchecked. A "Sample" section shows a list of row labels: "TML-1", "TML-2", "TML-3", and "TML-4". At the bottom, there is a text box that says "Please select the row label format for the grid." and buttons for "Cancel", "<Back", "Next>", and "Finish".

4. On the **Test Point Setup Wizard**, select the first option button 'Create Test Point Labels Manually'
 5. In the Grid Name field, enter "Heads & Shell" and click 'Next'
- Note:** Try to keep grid names short, about 12 characters max.

6. Select the first option button 'Enter number of columns'
7. Enter "4" and click 'Next'

8. Select the first option button 'Enter number of rows'
9. Enter "21" and click 'Next'

10. Select the first option button
11. Enter "0" and "90" and click 'Next'

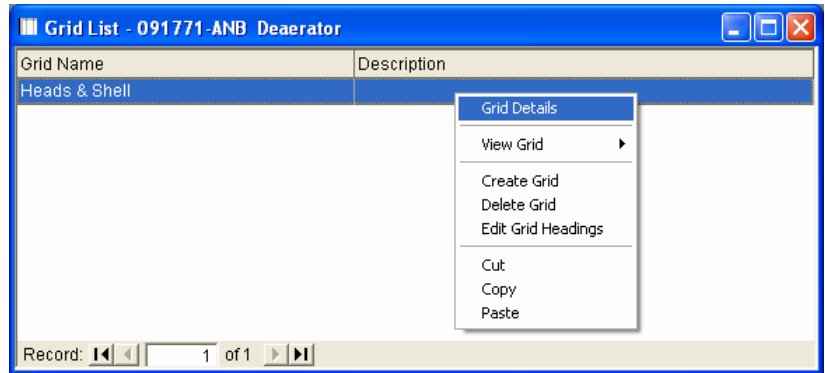
12. Select the first option button
13. Enter "1" and "1".
14. Check the 'Include Prefix' check box and enter "TML-".
15. Press 'Tab' to look at the sample row labels on the form.
16. Click 'Finish'

The screenshot shows a message box titled "TMS 5.1 - Two Rivers Technologies". It contains an information icon and the text "Test Point Names table created successfully.". There is an "OK" button at the bottom.

17. Click 'OK'

Assign Components to Grids

1. Right click (or double click) on "Heads & Shell" on the **Grid List** form to open the **Test Point Grid Details** form.



2. In the 'Component' field for TML-1, type or choose "E. Head" from the drop down list. Repeat for TML-2 and TML-3.
3. For TML-4 through TML-8, choose "Shell 1".
4. For TML-9 through TML-13, choose "Shell 2".
5. For TML-14 through TML-18, choose "Shell 3".
6. For TML-19 through TML-21, choose "W. Head".
7. Check the box 'Use component original thickness and Tmin for grid scale'
8. Click 'Lock'.

NOTE: For an alternative and sometimes quicker way to assign components, see the Short Cuts section of this Tutorial.

Comments on setting up Grids

General layout

Always keep in mind that for circular pieces of equipment (almost everything), a grid "column" may be thought of as a line perpendicular to the circumference of the equipment (or of a component) and a "row" as a line parallel to the circumference. It does not matter if the piece of equipment has a horizontal or a vertical orientation.

Be consistent in setting up grids. Think about how your thickness measurement locations will be laid out and design grids accordingly. It is best to have some written guidelines for grid configuration and naming conventions. Here are some suggestions:

- Typical grid layouts – Single column or 2 dimensional grid.
- Column names – Examples are degrees, compass headings, Top, Btm, clock position, etc.
- Row names – Sequential numbers (with or without prefix and/or suffix) or distances.

How many grids per piece of equipment or piping?

Although TMS 5.1 allows the user to set up any number of grids per piece of equipment, in general, the fewer the better. For example, In the example just completed, the grid "Heads & Shell" covers the main structure of the vessel, rather than creating 5 separate grids for "E. Head", "Shell 1", etc. For additional components, such as nozzles, another grid could be created.

Why assign components to the grids?

Assigning components to the grid tells the program what values to use for each row. For example, when TMS is calculating Retirement date for a piece of equipment, it uses the Tmin governing value for each component. In addition, assigning components makes it easy to find the test point locations on the various thickness reports and graphs.

Make grid, component, row and column names as short as possible.

The grid reports in TMS 5.1 are designed to get as much useful data on a page as possible while still being easy to read. As a result , the combined row names and assigned component names are limited to a total of about 14 characters.

Inspection Summaries - Fixed equipment

1. Close all forms except the **Pressure Vessel Equipment List**.
2. Right click on "091771-ANB" and select 'Inspections'.
3. On the **Inspection List** form New Record, click on the down arrow in the 'Inspection Date' field and select today's date on the calendar. Then type in "Shelby County Industrial Services" in the 'Inspection Company' field.
4. Check the 'Thickness' and 'Internal' check boxes, and press 'Enter'.

Inspection Date	Inspection Company	Thickness	External	Internal
07/07/2008	Shelby County Industrial Services	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Right click on the line you entered and select 'Inspection Summary' (or double-click) to open the **Inspection Summary** form.

Descriptive summary - The **Summary** sub-form is used to enter descriptive text. You can easily customize this section by developing specific label names and standard paragraphs for inspection reports. Each 'Description' field can be as long as needed.

6. The 'Summary' tab will be selected when the 'Inspection Summary' form opens. (If not or if you changed it, click on it now.)
7. Place the cursor on the 'Label Name' field in the New Record line.
8. Click on the down arrow and open the drop down list, then select or enter "NDE".
9. Press 'Enter'.

Order	Label Name	Description
	NDE	

10. Click on the 'Description' field on the line you just entered, then double click to open the **Standard Inspection Summary Description** form shown to the left.
11. Use the navigation button (right arrow) to move to the 3rd description.
12. Click 'Apply' to enter the standard description shown, then click 'Close'.

Inspection Summary - 091771-ANB Deaerator

Inspection Company: Report Number:

Inspection Date: Report Date:

Inspection Category: Report Submitted By:

P. O. Number: Checklist Template:

Condition: Code: Low Avg

Inspection Type: Thickness ☒ External ☐ Internal ☒

Summary | Grids | Equipment | Personnel | Documents | Time & Cost | Images

Order /	Label Name	Description
	<input type="text" value="Training"/>	
1	NDE	UT thickness readings were taken on the floor, roof and all shell

13. Click on the new record line again and type in "Training" in the 'Label Name' field.
14. Press 'Enter'.
15. Place the cursor on the 'Description' field on the line you just entered and write your own description.

16. If you need more room to see what you're typing or want to make changes, right click on the 'Description' field and select 'Zoom Field' to open the **Zoom** form shown below.
17. When you are finished with the **Zoom** form, click 'Save'.

Inspection Summary - 091771-ANB Deaerator

Inspection Company: Report Number:

Inspection Date: Report Date:

Inspection Category: Report Submitted By:

P. O. Number: Checklist Template:

Condition: Code: Low Avg

Inspection Type: Thickness ☒ External ☐ Internal ☒

Summary | Grids | Equipment | Personnel | Documents | Time & Cost | Images

Order /	Label Name	Description
1	NDE	UT thickness readings were taken on the floor, roof and all shell
2	Training	This is a wonderful training class and I am learning a lot.

Save Record
 Delete Record
Zoom Field
 Create Critical Recommendation Task Due...
 Cut
 Copy
 Paste

Zoom

If this training class has been helpful so far, please comment on what you like best. Also please point out any issues that could have been better.

Grids

The **Grids** sub-form is used to enter thickness measurements for the selected inspection date.

1. Select the 'Grids' tab.
2. Open the drop down list in the 'Grid Name' field and select "Heads & Shell" .

Note: The 'Grid Date' always defaults to the same date as the inspection date.
3. Press 'Enter'.
4. Double click or right click on the "Heads & Shell" record to open the 'Thickness Measurements' grid form.

Inspection Summary - 091771-ANB Deerator

Inspection Company: Shelby County Industria
 Inspection Date: 07/07/2008
 Inspection Category:
 P. O. Number:
 Condition:
 Inspection Type: Thickness ☒ External ☐ Internal ☒
 Report Number:
 Report Date:
 Report Submitted By:
 Checklist Template:
 Code: Low Avg

Summary | **Grids** | Equipment | Personnel | Documents | Time & Cost | Images

Grid Name / Date
 Heads & Shell

	0	90	180	270
TML-1 - E. Head				
TML-2 - E. Head				
TML-3 - E. Head				
TML-4 - Shell 1				
TML-5 - Shell 1				
TML-6 - Shell 1				
TML-7 - Shell 1				
TML-8 - Shell 1				
TML-9 - Shell 2				
TML-10 - Shell 2				
TML-11 - Shell 2				
TML-12 - Shell 2				

Note that the grid is empty.

Thickness measurement data can be entered in three ways:

First, by typing the measurements directly into the grid.

Second, by importing the readings from an existing Excel or Lotus spreadsheet file, or from a data logger file.

NOTE: (TMS 5.1 imports from Panametrics 36DL Plus and 37 DL Plus files, and from Krautkramer-Branson DMS and DMS 2 files.)

Third, by importing directly from one of the data loggers listed above.

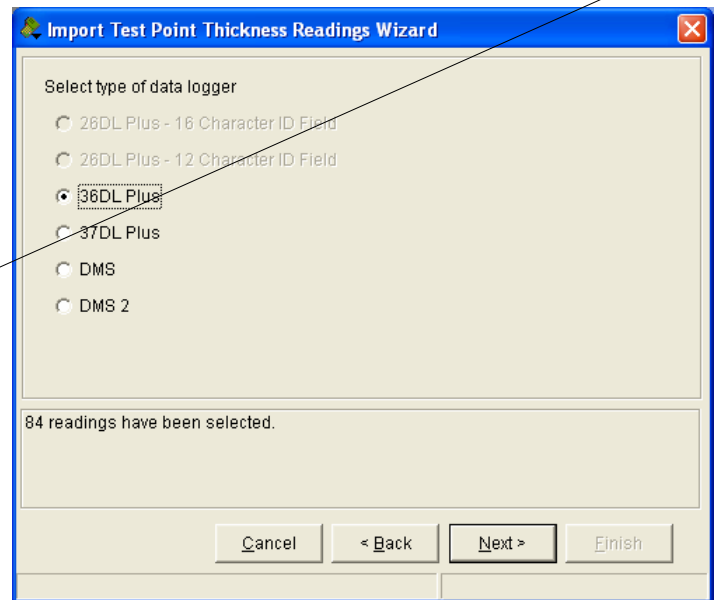
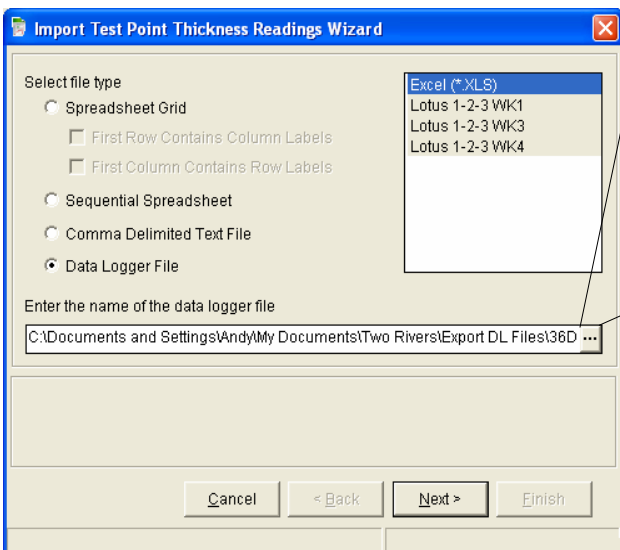
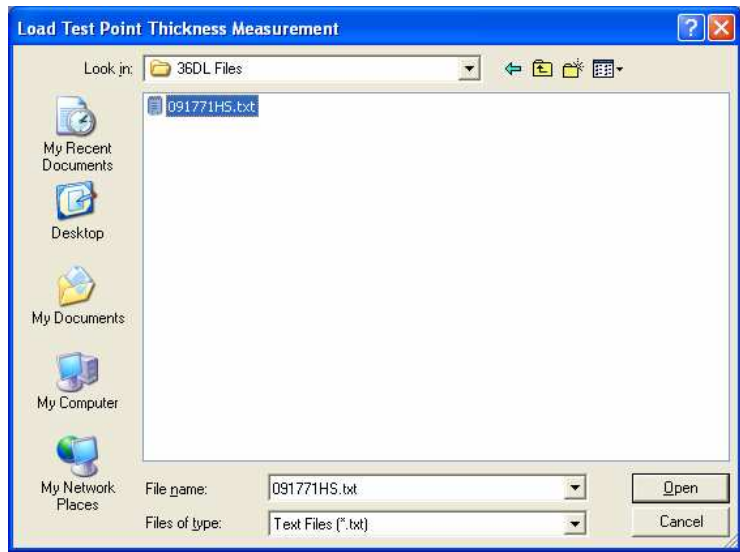
5. Click on one of the blank fields on the grid form, then right click to view the drop down menu.
6. Select 'Import Test Points from File' to open the **Import Test Point Thickness Readings Wizard**.

Thickness Measurements - 091771-ANB Deerator for 7/7/2008

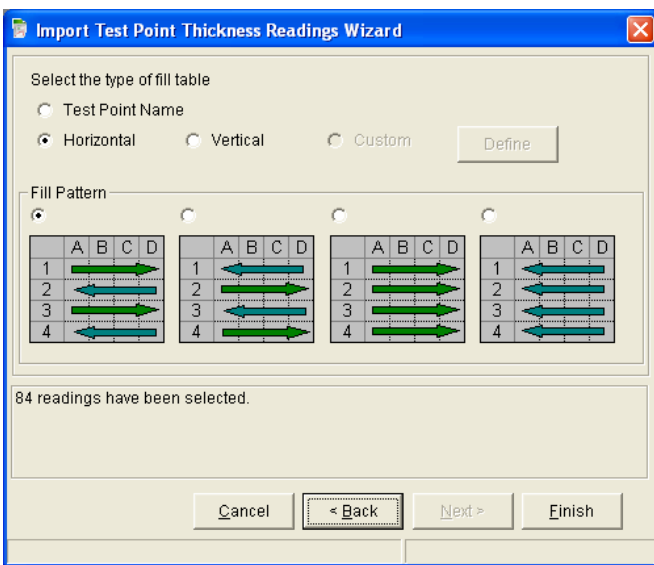
	0	90	180	270
TML-1 - E. Head				
TML-2 - E. Head				
TML-3 - E. Head				
TML-4 - Shell 1				
TML-5 - Shell 1				
TML-6 - Shell 1				
TML-7 - Shell 1				
TML-8 - Shell 1				
TML-9 - Shell 2				
TML-10 - Shell 2				
TML-11 - Shell 2				
TML-12 - Shell 2				

- Surface Graph
- Line Graph across Rows
- Line Graph down Columns
- Row History Graph
- Column History Graph
- Test Point History Graph
- Test Point Notes
- Export Grid to Excel
- Open Grid Report
- Import Test Points from File**
- Data Logger Download & Import
- Data Logger Upload

7. Select the 'Data Logger File' option on the **Import Test Point Thickness Readings Wizard**.
8. Click on the "open folder" icon and browse to the location of the 36DL data logger file "091771SH.txt". (If you are in a training class, browse to the 'Training' folder in the same location as TMS 5.1 — typically My Documents\Two Rivers).
9. Double click on the file name or click on it once and then on the 'Open' button to select. Notice that the complete file path is now displayed on the wizard form.
10. Click 'Next'.



11. Select the '36 DL Plus' option and click 'Next'.



12. Select 'Horizontal' and the first 'Fill Pattern' option, then click 'Finish'.

	0	90	180	270
TML-1 - E. Head	0.286	0.293	0.276	0.287
TML-2 - E. Head	0.297	0.29	0.292	0.275
TML-3 - E. Head	0.301	0.303	0.292	0.303
TML-4 - Shell 1	0.407	0.401	0.429	0.408
TML-5 - Shell 1	0.41	0.404	0.406	0.412
TML-6 - Shell 1	0.425	0.403	0.412	0.421
TML-7 - Shell 1	0.402	0.429	0.408	0.417
TML-8 - Shell 1	0.401	0.429	0.429	0.412
TML-9 - Shell 2	0.412	0.4	0.409	0.418
TML-10 - Shell 2	0.427	0.425	0.414	0.407
TML-11 - Shell 2	0.4	0.401	0.428	0.401
TML-12 - Shell 2	0.407	0.428	0.41	0.424
TML-13 - Shell 2	0.401	0.424	0.423	0.43

13. Click 'OK'.



Additional Inspection Data

The description and visual summary of the inspection are complete, and the thickness measurements have been imported into the grid. There are five more tabular forms that are used to record data for this inspection.

It is unlikely that all seven tabular forms will be used for every inspection; however, you should be familiar with them.

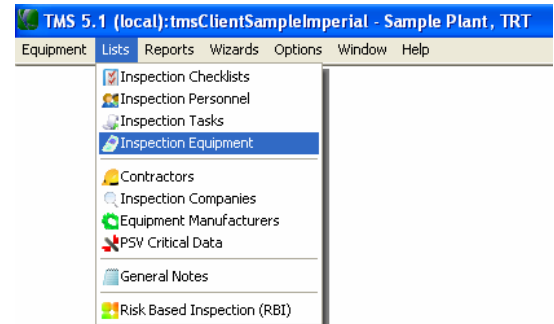
For the exercises below, refer to the text and screens shown on pages 23 and 24.

Inspection Equipment and Inspection Personnel

Both the **Inspection Equipment** and **Inspection Personnel** sub-forms are populated using drop-down lists (except for the 'Comments' fields). The data for these lists must first be entered into the **Inspection Equipment**, **Inspection Personnel** and **Inspection Tasks** forms, respectively.

Enter new inspection equipment

1. On the Main Menu, select 'Lists\'Inspection Equipment' to open the **Test Equipment** form.
2. On the new record line for each type equipment, enter the following information:



	Model	Manufacturer	Serial Number
Test Equipment	37 DL Plus	Panametrics	TE 03-11789
Transducers	250-043-CR	Krautkramer	T 11020113
Calibration Blocks	118-540-310	Krautkramer	T CB-12365

Add calibration dates and intervals of your choice.

Enter new inspection personnel

3. On the Main Menu, select 'Lists' / 'Inspection Personnel' to open the **Inspection Personnel** form.
4. Put your own name on the New Record line and press 'Enter'. Then double click on your name to enter information about yourself.

Enter new inspection tasks

5. On the Main Menu, select 'Lists' / 'Inspection Tasks' to open the **Inspection Tasks** form.
6. Add the task "Neutron Infusion" on the New Record line and press 'Enter'.
7. Open the inspection form for "091771-ANB" and select the equipment, personnel and task data you just created.

Documents, Time & Cost and Images

8. Click on the 'Documents' tab and link to a MS Word or other text document. Then open the file on the same form.
9. Click on the 'Time & Cost' tab and enter 8 man-hrs of time and a cost of \$320.. Also add \$75 for materials
10. Click on the 'Images' tab and link to a graphic file such as a .jpg or .tif file. Then open the file on the same form.

Using SmartChecklists on the Inspection Summary Form

Inspection Summary - 091771-ANB Deaerator

Inspection Company: Shelby County Industria

Inspection Date: 01/10/2009

Inspection Category:

P. O. Number:

Condition:

Report Number:

Report Date:

Report Submitted By:

Checklist Template: API-510 External / Internal

Code: API 570-1, API 570-2, API-510 Checklist, API-510 External / Internal, API-570 Checklist, API-570 Piping Inspection, API-653, API-653 Checklist (1)

Inspection Type: Thickness ☒ External ☐ Internal ☐

Summary | Grids | Equipment | Personnel | Documents | Time & Cost | Images

Order	Label Name	Description

1. Select a checklist template from the drop down list.
2. After the template is selected, right click on the Checklist Template field, then select 'Inspection Checklist'.

Inspection Summary - 091771-ANB Deerator

Inspection Company: Shelby County Industria

Inspection Date: 01/10/2009

Inspection Category:

P. O. Number:

Condition:

Inspection Type: Thickness ☒ External ☐ Internal ☒

Report Number:

Report Date: / /

Report Submitted By:

Checklist Template: AP-510 External / Intern

Code: Low

Inspection Checklist

Delete Inspection Checklist

Preview Inspection Checklist

Order	Label Name	Description

Code	Condition Description	Comments
3	Satisfactory	

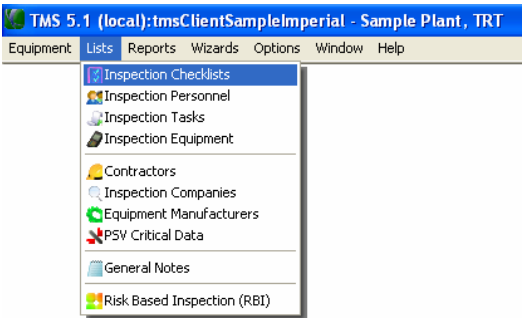
Category	Item	Code	Condition Description	Comments
NAMEPLATE/LABELING	Nameplate condition.	3	Satisfactory	
	NFPA diamond / HMIS label.	3	Satisfactory	
FOUNDATION AND SUPPORTS	Condition.	3	Satisfactory	
	Anchor bolts.	3	Satisfactory	
CONTAINMENT AREA	Standing water.	2	Minor problems	3. Click on the item, then s Description
	Drain valves secured.	3	Satisfactory	
	Debris or fire hazards.	3	Satisfactory	
	Containment dike.	1	Unsatisfactory	
EXTERNAL SHELL	Paint.	2	Minor problems	
	Corrosion.	2	Minor problems	
	Distortion.	0		
	Welds.	3	Satisfactory	
	Body flanges.	2	Minor problems	
	Insulation.	1	Unsatisfactory	
EXTERNAL HEADS		0	N/A	
	Paint.			
	Corrosion.			
	Distortion.	0		

- Click on the 'Code' field for the appropriate item, then select the Code / Condition Description from the list.

Creating a new checklist

Checklists are most valuable when they reflect the way you do your work, so the user has the option to create as many custom checklists as needed.

- 1. On the Main Menu , select **Lists** then 'Inspection Checklists' to open the **Checklist Wizard** form.
- 2. On the **Checklist Wizard** form, select 'Add'.
- 3. On the **Organize Checklist** form, select the 'Add New' button.
- 4. Enter checklist name and description and click 'Next'.

A screenshot of the 'Organize Checklist' dialog box. The 'Add New Checklist' tab is active. It contains two radio buttons: 'Add New' (selected) and 'Add New from Existing'. Below the radio buttons are two text input fields: 'New Checklist Name' with the value 'Tank Out of Service' and 'New Checklist Description' with the value 'API 653 Tank Out-of-Service'. At the bottom are three buttons: 'Cancel', '< Back', and 'Next >'.

Organize Checklist

Add New Checklist

☒ Add New

☐ Add New from Existing Annual SPCC Inspecti

New Checklist Name New Checklist Description

Tank Out of Service API 653 Tank Out-of-Service

Cancel < Back Next >

- 5. Type in the first item category label, "C.2.1 OVERVIEW" in the available field. (Highlight the word "Category" and replace it with the actual label.)
- 6. Press 'Tab' to move to the next line.

NOTE: The first line of a checklist always must be a category.

A screenshot of the 'Organize Checklist' dialog box, 'Checklist Editor' tab. It features a table with columns: 'Or...', 'Category', 'Item', and 'Instruction'. The first row has '1' in the 'Or...' column, a checked checkbox in the 'Category' column, and the word 'Category' in the 'Item' column. Below the table are buttons for 'Insert', 'Delete', 'Move Up', 'Move Down', and 'Codes'. At the bottom are buttons for 'Save', 'Cancel', '< Back', and 'Finish'.

Organize Checklist

Checklist Editor

Or...	Category	Item	Instruction
1	<input checked="" type="checkbox"/>	Category	

Insert Delete Move Up Move Down Codes

Save Cancel < Back Finish

7. Enter the categories and items from the information on page 52.
8. Enter a detailed description for each item if necessary. Occasionally click the 'Save' button.

Note: The 'Instruction' field is used to more completely describe an inspection item or to give detailed instructions. The instructions can be viewed on the computer screen, on a handheld device or on a hard copy 'Instructions' report as required.

After you have entered a few lines, the **Organize Checklist** form should look like the form below.

Note that the form can be resized by clicking and dragging on the form boundaries as well as on the column and row dividers.

To make a line into a Category heading, just check the box in the first column.

Or...	Category	Item	Instruction
<input checked="" type="checkbox"/>	C.2.1 OVERVIEW		
<input type="checkbox"/>		a. Check that tank is clean and safe for entry.	Check that the tank has been cleaned, is gas free, and safe for entry
<input type="checkbox"/>		b. Check that the tank is completely isolated.	Check that the tank is completely isolated from product lines, all electrical power and steam lines.
<input type="checkbox"/>		c. Check that the roof is adequately supported.	Check that the roof is adequately supported, including fixed roof structure and floating roof legs.
<input type="checkbox"/>		d. Check for presence of falling object hazards.	Check for presence of falling object hazards, such as corroded-through roof rafters, asphalt stalactites and trapped hydrocarbons in unopened or plugged equipment or appurtenances, ledges, etc.
<input type="checkbox"/>		e. Inspect for slipping hazards on the bottom and roof decks.	Inspect for slipping hazards on the bottom and roof decks.

Code	Condition
5	New Condition
4	Satisfactory
3	Maintenance/ Minor Repair
2	Major repair
1	Failure
0	N/A

9. When you have finished entering all the categories, items and instructions for this checklist, click on the 'Codes' button and assign 'Condition' descriptions.

Note: The numeric codes will increment automatically beginning with "1". Just type in the descriptions in order and press 'Enter'.

10. When you are totally done, click the 'Finish' button.
11. On the Checklist Wizard form, right click on the name of the checklist you just created, the right click and select 'Display'.

Tank Out-of-Service

Inspection Item	Instruction
C.2.1 OVERVIEW	
a. Check that tank is clean and safe for entry.	Check that the tank has been cleaned, is gas free, and safe for entry.
b. Check that the tank is completely isolated.	Check that the tank is completely isolated from product lines, all electrical power, and steam lines.
c. Check that the roof is adequately supported.	Check that the roof is adequately supported, including fixed roof structure and floating roof legs.
d. Check for presence of falling object hazards.	Check for presence of falling object hazards, such as corroded-through roof rafters, asphalt stalactites and trapped hydrocarbons in unopened or plugged equipment or appurtenances, ledges, etc.
e. Inspect for slipping hazards on the bottom and roof decks.	Inspect for slipping hazards on the bottom and roof decks.
f. Inspect structural welds on accessways and clips.	Inspect structural welds on accessways and clips.
g. Check for areas that need additional cleaning.	Check surfaces needing inspection for a heavy-scale buildup and check weld seams and oily surfaces where welding is to be done. Note areas needing more cleaning, including blasting.
C.2.2 TANK EXTERIOR	
a. Inspect appurtenances opened during cleaning.	Inspect appurtenances opened during cleaning such as lower floating swing sheave assemblies, nozzle interiors (after removal of valves.)
b. Hammer test or ultrasonically inspect the roof.	Hammer test or ultrasonically inspect the roof.
c. Enter and inspect the floating roof pontoon compartments.	Enter and inspect the floating roof pontoon compartments.
C.2.3 BOTTOM INTERIOR SURFACE	
a. Visually inspect and hammer test the entire bottom.	Using a flashlight held close to and parallel to the bottom plates, and using the bottom plate layout as a guide, visually inspect and hammer test the entire bottom.
b. Measure and describe pitting.	Measure the depth of pitting and describe the pitting appearance (sharp edged, lake type, dense, scattered, etc.)
c. Mark areas requiring patching or further inspection.	Mark areas requiring patching or further inspection.
d. Mark locations for turning coupons for inspection.	Mark locations for turning coupons for inspection.
e. Inspect all welds for corrosion and leaks.	Inspect all welds for corrosion and leaks, particularly the shell-to-bottom weld.
f. Inspect sketch plates for corrosion.	Inspect sketch plates for corrosion.
g. Locate and mark voids under the bottom.	Locate and mark voids under the bottom.
h. Record bottom data on a layout sketch.	Record bottom data on a layout sketch, using the existing bottom plates as a grid. List the number and sizes of patches required.

Appendix

Conventions, standards and protocols for TMS 5.1

TMS 5.1 is designed to provide a good combination of structure and flexibility for the user. An important part of making the program effective and efficient is for each organization to develop its own standards to be used consistently throughout the operation. Some time spent planning will pay off in consistency and ease of use.

Many drop-down lists are included within TMS to help avoid misspellings and slightly different descriptions. Use the drop-down lists as much as possible. (Many of the lists also provide an auto-complete feature.)

Specific Forms

Listed below, generally grouped by form name and tab name, shown in bold, are some of the key fields to think about along with some recommendations and examples.

Equipment List (Basic Equipment Information)

Category – be careful choosing the category; for example, don't put a pressure vessel in the Tank category just because its name includes "tank".

Equipment ID – must be unique within a category.

Equipment name

Location

General Information (Equipment Details – varies by equipment type)

Main portion (top)

Content

Class

Design Code

Type (Note: Will be replaced by "System" in TMS 5.0)

Components or Segments tab (Fixed equipment only)

Name

Type (use the initial types in the drop down list whenever possible)

Material Specifications – New materials can be set up by typing directly in this field or completely set up using the **Material Specification List** in the appropriate table found under Options/Administrative Options/Pressure Vessel (or Tank or Piping) Materials.

This is very important. The terms used need to be consistent with published specifications and consistent with usage. For example, the human user knows that “SA-283-C”, “A 283 Grade C”, and even “SA283c” all refer to the same material. To the database, those are all different materials. (A large portion of data conversion is spent in cleaning up old data.) Also realize that 304, SS, 316L are not real specs, even though most people will know they all refer to some sort of stainless steel. If that is all that is known, you should establish a standard for even stuff you’re not sure about.

Properties of Materials – (Pressure vessels and piping) This form is opened by double-clicking on a material name on the **Material Specification List**. Enter strength parameters versus temperature. TMS will use this strength data in calculating Tmin for certain shapes. Be very careful to enter the correct data.

Suggestions:

For pressure vessels use ASME Section II – Part D, Materials – Properties designations and format, such as “SA-240-316L “

For tanks and piping, use ASTM type format, such as A-283-C and B-337. Those specs normally don’t use the dashes, but it helps in maintaining spacing.

You should establish conventions for additional material information such as Alloy Designation, Class, year of specification, etc.

Reference – use to record where the material information was obtained. Again, be consistent.

Since most facilities have a few standard materials that are used, it would be wise to designate one individual to populate the material spec forms so there is a single point of contact for questions. All users should be instructed to select materials from the drop down list and contact the designated individual if something new needs to be added.

Remember, the above are only suggestions. The important thing is to be consistent and clear within your operation (each facility and within the company if multiple sites are using the database.)

Attributes tab

Attributes

Attributes name (part before colon) must be set up by an Administrator level user

Attribute value (part after colon)

File Links tab

File Path – It is recommended that the user develop a filing protocol for attached documents so that if the link is erased or written over, it is easy to find.

Description

Parameters tab (PRDs, Valves, Instruments & controls, and Other Equipment categories)

Parameter

Value – This is a text field. If you will be entering numerical values, enter the value with as many leading zeros as necessary for proper filtering and sorting. For example, if you have entered a parameter of “Pressure” with a maximum value of 9999 psi, then a value of 500 would be entered as 0500 and a value of 50 would be entered as 0050.

Notes

Subject

Subheading

[Keyword] The Notes filter form allows searching by key word so a well-structured group of key words can give the user a third level of search capability

Maintenance & Repairs

Type

Grid List

Name

Description

Test Point Setup Wizard (New grid)

Typical grid layouts (single row; single column; or 2 dimensional grid)

Column names – Examples are degrees (best), compass headings, Top, Bottom, clock position, etc.

Row names – Sequential numbers (with or without prefix and/or suffix), distances, etc.

Inspection Summary

Summary tab

Label Name

Standard Inspection Summary (double click on Description field to open)

In addition to the above, it would be very helpful to establish one or more standard inspection report formats. For example establish a format that always uses 5 (or 6 or 9 or whatever) specific label names in a specific order. The description field for each label would contain standard information and may or may not use standard paragraphs. The advantage of standard reports is that they can be specified for any inspector, whether plant personnel or an outside contractor, to provide a consistent, easy to follow format.

Documents tab

Same as File Links tab

Checklists tab

Since checklists can be customized, agree on which checklist will be used for a specific inspection. In TMS 5.1 there can be only one checklist per inspection.

Data logger Upload (from grid or wizard)

Need to make sure grid file names are easily identifiable (8 characters max)

Piping Structural TMin

Located under the Options menu bar (Options/Administrative Options/Piping T-Min Options) this feature allows the user to select a convention for specifying a "structural Tmin for piping by choosing a fraction of the original wall thickness or a specific thickness for a range of pipe sizes.

General Practice

Capitalization – As much as possible, decide to use proper capitalization. Many people like to use all caps because it is easier. However, this practice makes reading the finished product more difficult. If multiple people have entered data with a variety of capitalization styles, reports can be very ugly.

Quotes – As a general rule, don't use single quotes (') and double quotes ("). They are difficult software code to handle. In TMS 5.1 particularly, don't use them in Equipment Name, Equipment ID or Location, in the names of components, Notes subjects, maintenance and repair task types, etc. About the only place to feel free to use them in TMS 5.1 is in the row names in Grids, such as 7'10". The code has been written to recognize them in that instance.

Thickness Data Entry and Evaluation Chart

The chart on the facing page is intended to help make sure you have everything you need for certain activities that involve thickness measurement storage and evaluation.

Read down the left side of the list to find the task you want to accomplish. Then make sure that all the information and/or tasks required for that activity have been completed.

Note: If you are unsuccessful when you try to calculate 'Retirement Date' or 'Inspection Interval', there are a couple of other things to check in addition to the items on the chart.

1. One or more of the thickness measurements on the latest inspection is below the value of 'Tmin Governing' (shown on the **Component Details** or **Segment Details** form). This means that the retirement date would be prior to the date of the latest inspection.
2. All the thickness measurement values on the latest inspection are equal to or above the Original Thickness value for the assigned component(s). (This occurs only when you have just one set of thickness measurements. If you have two or more sets of measurements, the original thickness is not used.)

	Equipment Setup	Grid(s) Setup	Inspect Date(s) Setup	Date Constructed	Thk Data in Grid for one or more Inspct Date	Thk Data in Grid for 2 or more Inspct Dates	Components Created	Orig Thk on Components	Tmin on Components	Components assigned to Grid(s)	Class Assigned (Pipe Only)
Enter Thk Readings	X	X	X								
Calc Thk/Tmin Ratio	X	X	X	X		X		X	X		
Calc Metal Loss											
Using Orig Thk	X	X	X	X		X	X			X	
Using 2 thk rdgs	X	X	X		X						
Calc Corr Rate											
Using Orig Thk	X	X	X	X		X	X			X	
Using 2 thk rdgs	X	X	X		X						
Calc Retire Date											
Using Orig Thk	X	X	X	X		X	X	X	X	X	
Using 2 thk rdgs	X	X	X		X	X		X	X	X	
Calc Next Insp Date											
Using Orig Thk	X	X	X	X		X	X	X	X	X	X
Using 2 thk rdgs	X	X	X		X	X		X	X	X	X

Administrative Options

The number of Administrative Options decreases from all TMS options available to the System Administrator level down to none for the User level. An individual's administrative will depend on his or her user level assigned by the System Administrator.

The following screen shots give a brief overview of the list of available administrative options.

TMS 5.1 (local):tms51ClientSample - Sample Plant, TRT

EquipmentListsReportsWizardsOptionsWindowHelp

Select Current Facility

Administrative Options

System Options

Download/Upload Options

Change Password

Event Log

Data Logger Port Setup

Handheld Port Setup

Facilities

Users

Equipment Attributes

Pressure Vessel Materials

Tank Materials

Piping Materials

Piping T-Min Options

Grid Name Label Defaults

Risk Based Inspection (RBI) Options

Checklist Code/Category Items

Thickness Colors Setup

Test Point Report Highlight Colors Setup

Calculate Equipment Retirement

Complete Facility TMin Recalculation

Complete Facility Checklist Code Recalculation

Backup Database(s)

Restore Database(s)

Load Database Script

DTS Package Deployment

Current Database Users

System Administrator

Facilities
Users
Equipment Attributes
Pressure Vessel Materials
Tank Materials
Piping Materials
Piping T-Min Options
Grid Name Label Defaults
Risk Based Inspection (RBI) Options
Checklist Code/Category Items
Thickness Colors Setup
Test Point Report Highlight Colors Setup
Calculate Equipment Retirement
Complete Facility TMin Recalculation
Complete Facility Checklist Code Recalculation
Current Database Users

Administrator

Equipment Attributes
Pressure Vessel Materials
Tank Materials
Piping Materials
Piping T-Min Options
Grid Name Label Defaults
Risk Based Inspection (RBI) Options
Checklist Code/Category Items
Thickness Colors Setup
Test Point Report Highlight Colors Setup
Calculate Equipment Retirement
Complete Facility TMin Recalculation
Complete Facility Checklist Code Recalculation
Current Database Users

Manager

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Short cuts

Assign Grid components

Grid Details - 091771-ANB Deaerator

Name

Heads & Shell

Starting Point

TMin

Original Thickness

Number of Columns

4

Number of Rows

21

Use component original thickness and Tmin for grid scale

☒

Component

Description

Row Label

Component

TML-1

TML-2

E. Head

TML-3

Shell 1

TML-4

Shell 2

TML-5

Shell 3

W. Head

1. Select 'E. Head' from the drop down list.

Grid Details - 091771-ANB Deaerator

Name

Heads & Shell

Starting Point

TMin

Original Thickness

Number of Columns

4

Number of Rows

21

Use component original thickness and Tmin for grid scale

☒

Component

Description

Row Label

Component

TML-1

E. Head

TML-2

TML-3

TML-4

TML-5

Lock

2. Press and hold the CTRL key to select the entire line.

Grid Details - 091771-ANB Deaerator

Name

Heads & Shell

Starting Point

TMin

Original Thickness

Number of Columns

4

Number of Rows

21

Use component original thickness and Tmin for grid scale

☒

Component

Description

Row Label

Component

TML-1

E. Head

TML-2

TML-3

TML-4

TML-5

Lock

Grid Details - 091771-ANB Deaerator

Name: Heads & Shell

Starting Point:

TMin: Original Thickness:

Number of Columns: 4 Number of Rows: 21

Use component original thickness and Tmin for grid scale ☒

Component	Description
Row Label	Component
TML-1	E. Head
TML-2	
TML-3	
TML-4	
TML-5	

Lock

- Without releasing the CTRL key, click and hold the left mouse key and drag down to highlight the first three lines.

- Release the mouse key and the warning message will appear. Then release the CTRL key.
- Click 'Yes'.

Grid Details - 091771-ANB Deaerator

Name: Heads & Shell

Starting Point:

TMin: Original Thickness:

Number of Columns: 4 Number of Rows: 21

Use component original thickness and Tmin for grid scale ☒

Component	Description
Row Label	Component
TML-1	E. Head
TML-2	
TML-3	
TML-4	
TML-5	

Lock

TMS 5.1 (local):tms51ClientSample - Sample Mill, TRT

Warning, you are about to change rows:
'TML-1' to 'TML-3'
to the Component: E. Head

Are you sure that you want to make this change?

Yes No

Grid Details - 091771-ANB Deaerator

Name: Heads & Shell

Starting Point:

TMin: Original Thickness:

Number of Columns: 4 Number of Rows: 21

Use component original thickness and Tmin for grid scale ☒

Component	Description
Row Label	Component
TML-1	E. Head
TML-2	E. Head
TML-3	E. Head
TML-4	
TML-5	

Lock

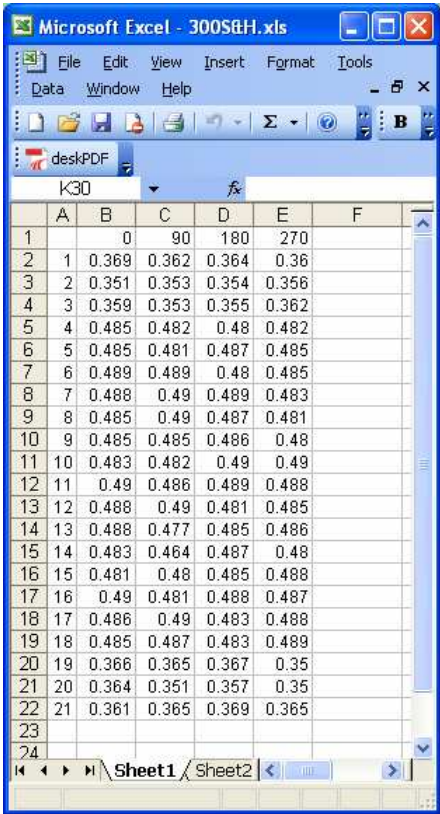
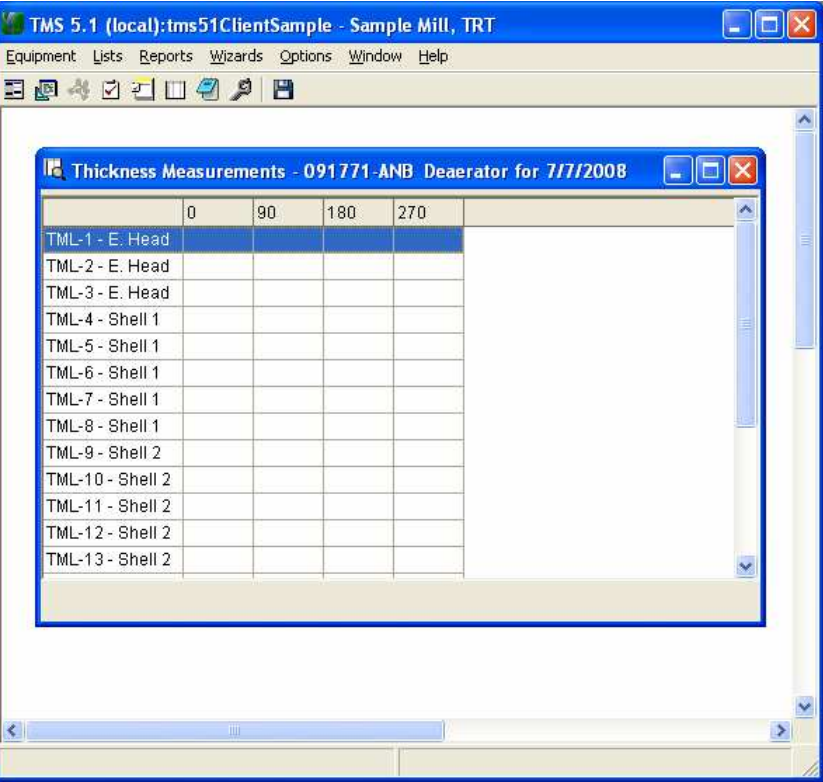
- Move to the next blank line (TML-4) and repeat the process.

NOTE: When selecting a group of rows that includes lines not initially shown, drag the cursor down slowly.

Import Thickness Measurements from MS Excel



NOTE: This method is especially useful for moving existing spreadsheet data that may be embedded in another document.

- 1. To begin, resize both TMS 5.1 and MS Excel so both applications fit on your computer screen. (Use the 'Restore down' button and adjust the size.)

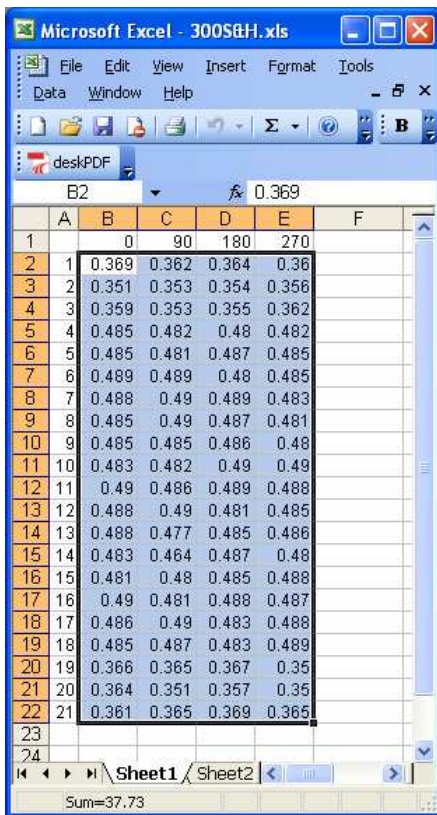


- Highlight the thickness measurements you want to import by holding down the left mouse button and dragging over the area to import.

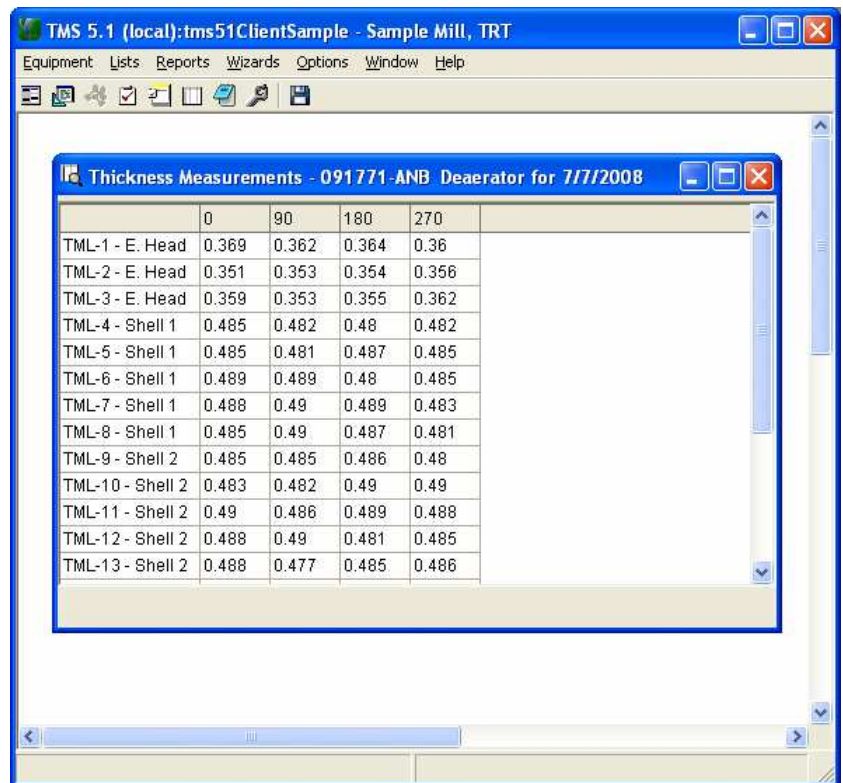
NOTE: Highlight only thickness measurements.

- Release the mouse button and move the cursor to the edge of the highlighted area until the plus sign  changes to the move symbol .
- Press the left mouse button, drag the arrow over to one of the thickness grid cells and release the button to populate the grid.

IMPORTANT! The area you select from the spreadsheet will populate the TMS thickness grid beginning in the upper left hand cell. Therefore you must make sure that the grid and the spreadsheet layouts match exactly.



		0	90	180	270
1					
2	1	0.369	0.362	0.364	0.36
3	2	0.351	0.353	0.354	0.356
4	3	0.359	0.353	0.355	0.362
5	4	0.485	0.482	0.48	0.482
6	5	0.485	0.481	0.487	0.485
7	6	0.489	0.489	0.48	0.485
8	7	0.488	0.49	0.489	0.483
9	8	0.485	0.49	0.487	0.481
10	9	0.485	0.485	0.486	0.48
11	10	0.483	0.482	0.49	0.49
12	11	0.49	0.486	0.489	0.488
13	12	0.488	0.49	0.481	0.485
14	13	0.488	0.477	0.485	0.486
15	14	0.483	0.484	0.487	0.48
16	15	0.481	0.48	0.485	0.488
17	16	0.49	0.481	0.488	0.487
18	17	0.486	0.49	0.483	0.488
19	18	0.485	0.487	0.483	0.489
20	19	0.366	0.365	0.367	0.35
21	20	0.364	0.351	0.357	0.35
22	21	0.361	0.365	0.369	0.365
23					
24					



	0	90	180	270
TML-1 - E. Head	0.369	0.362	0.364	0.36
TML-2 - E. Head	0.351	0.353	0.354	0.356
TML-3 - E. Head	0.359	0.353	0.355	0.362
TML-4 - Shell 1	0.485	0.482	0.48	0.482
TML-5 - Shell 1	0.485	0.481	0.487	0.485
TML-6 - Shell 1	0.489	0.489	0.48	0.485
TML-7 - Shell 1	0.488	0.49	0.489	0.483
TML-8 - Shell 1	0.485	0.49	0.487	0.481
TML-9 - Shell 2	0.485	0.485	0.486	0.48
TML-10 - Shell 2	0.483	0.482	0.49	0.49
TML-11 - Shell 2	0.49	0.486	0.489	0.488
TML-12 - Shell 2	0.488	0.49	0.481	0.485
TML-13 - Shell 2	0.488	0.477	0.485	0.486

