1. OVERVIEW

1.1 Graphics

PlantTrack Boiler Module uses CAD drawings of boiler sections. Each part can have primary, side and plan views.

The available drawing options for the HEP module include:

- **2D Isometric Models:** Isometric 2D CAD models of the systems are created. The user can enter point, line and area records, but the lengths and elevations are not exact. The example below shows an HEP system with the hanger locations.

The weld, hanger, and other component locations can also be designated as “nodes”. These nodes and their corresponding ID tags can be located/relocated by the user. A sample application with weld nodes is shown below:
• Full 3D System Drawings: These drawings can be rotated and viewed from any angle. Navigation tools also allow quick orthogonal and isometric views.

• Digitized Images: As a low cost option, the scanned/digitized images of systems and components can be used as backgrounds on which the user can locate various components.

More detailed area/details drawings can be included with the main drawing as shown in the example. The records are propagated from the detail drawings to the higher level drawings.
For each detailed area drawing, more detailed drawings can be added as areas, with all the data visually propagated to the higher level drawings.

### 1.2 Record Shapes

Similar to TubeTrack, there are three types of records that can be entered graphically:
- Point records, such as NDE readings
- Line (length) records, such as pipe insulation,
- Rectangular (Area) records, such as records over multiple components.

These record types allow a wide range of piping data, from inspection results to specifications, to be correctly visualized.
The graphical data entry makes accurate record location an easy task. The user can isolate the pipe or component for which a record is to be entered, and the record entry is one or two clicks away, depending on the record type.

If a record is being entered for a “node” such as a weld or hanger, entering just the node ID will automatically locate the record correctly.
1.3 Color-Coded Data Display, Easels

In addition to the displaying single or multiple records from the event tree or grid, the user can display multiple records on the graphics color coded with the user editable filters, called easels. The easels can be saved for future use.

Some typical applications of easels include, but not limited to:

- Materials, coating, insulation information,
- Failure and/or repair records,
- Hanger inspection results,
- Weld inspection and analysis results
- Stress analysis results
- NDE readings, Oxide Thickness, thinning rates, Remaining Life analysis results, etc.

The easels allow to visually identify where the problem areas are and determine impacts of other physical features on the system and component performances which would not be possible with a non-visual database.

The HEP records, such as weld inspections, risk ranking, or stress analysis results can be displayed either as color coded, or with the actual values as shown in color.
1.4 Database to Graphics Connectivity

PlantTrack’s graphical data entry feature not only allows accurate record display, but when multiple records are displayed using easels, the details of individual records can be displayed by just right-clicking on the marks.

Using PlantTrack’s “Isolate” feature, the user can limit the list of records to the selected component or pipe. This feature is useful to quickly obtain a history of inspection, design data, and repair data on the isolated objects.

1.5 Additional Data Selection and Sorting Features

In addition to the “Easels”, and component “Isolation” features, the list of records either in the Event Tree or Event Grid can be sorted by just clicking on the column name. In the Event Grid, there are additional filtering capabilities built in which allow the user to quickly create and apply filters.
These record sorting and filtering features, as well as the graphical filtering features, such as “Easels” and component “Isolation”, provides capable and flexible methods for data mining, creating information and knowledge on plant systems and components.
1.6 Record Types

Typical Boiler module records are:
- Tube specifications (size, material, weld procedures, coating, overlays, metallization, etc.)
- Tube failure and repairs
- Tube inspections (NDE, oxide thickness, etc.)
- Analysis results (remaining life, wall thinning rates, wall thickness projections, gas touched length analysis, etc.)
- Tube replacements, etc.

HEP/Piping module typical records are:
- Pipe specifications (size, material, insulation, coating, lagging, etc.)
- Pipe failure and repair
- Piping inspections
- Weld specifications
- Weld inspections
- Hanger/Support specifications
- Hanger/Support inspections
- Valve specifications
- Valve inspections
- Instrument connection information
- Other piping and component related data

PlantTrack allows editing record types, record details, and menus by the authorized users through an easy-to-use database setup feature.
1.7 Dashboard

The dashboard is the control center of the program. Using the dashboard, the user can:

- proceed to graphical database module
- create custom reports,
- view standard reports,
- create quick lists (transferrable to Excel/Word),
- quick charts (transferrable to Excel/Word),
- add/edit user privileges and roles (administrator)
- setup database configuration (users with setup privileges)
- access the on-line support portal
- create/view reminders and announcements

The main page provide quick access to the inspection status, interactive graphics, as well as direct access to the graphics module. Some of the advanced features could be accessed by clicking on the triangle icon on the left vertical bar:
1.8 Quick Record Lists and Charts

The reports section of the dashboard includes a feature to quickly list, sort and filter records and create trend charts. The listed records and charts then can be copied to spreadsheet and/or word processing programs.

The users create filters for record selection from the database. The filter can be saved for future use. The image below shows the components of filter creation.
Once a filter is created, the user can then list records, add additional filters based on each field, hide selected columns, and sort based on the column values.

The user can also create pivot tables and charts, as shown below:
1.9 Custom and Standard Reports

PlantTrack has standard report to create users based on the user input for dates, components, and record types. Some report samples are shown below:

### Hanger Inspection Results

<table>
<thead>
<tr>
<th>Date</th>
<th>Hanger No.</th>
<th>As Found</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/14/09</td>
<td>BH-54</td>
<td>Overloaded</td>
<td>ok, inspected by Thiesch</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-55</td>
<td>In Range</td>
<td>ok, inspected by Thiesch</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-56E</td>
<td>In Range</td>
<td>56E ok, inspected by Thiesch</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-56W</td>
<td>In Range</td>
<td>56W OK, inspected by Thiesch</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-SHE</td>
<td>Unbudded</td>
<td>hanger cost side, read off ground, inspected by Thiesch</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-S6</td>
<td>In Range</td>
<td>56E OK, inspected by Thiesch</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-S6W</td>
<td>In Range</td>
<td>56W OK, inspected by Thiesch</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-99</td>
<td>In Range</td>
<td>OK, inspected by Thiesch</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-66W</td>
<td>Bottomed</td>
<td>66W bottomed out, inspected by Thiesch</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-66S</td>
<td>Bottomed</td>
<td>66S bottomed out, inspected by Thiesch</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-01</td>
<td>Bottomed</td>
<td>bottomed out, inspected by Thiesch, no other data</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-02</td>
<td>In Range</td>
<td>hanger OK, inspected by Thiesch</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-83</td>
<td>In Range</td>
<td>OK, inspected by Thiesch, no other data</td>
</tr>
<tr>
<td>12/14/09</td>
<td>BH-84</td>
<td>In Range</td>
<td>OK, inspected by Thiesch</td>
</tr>
</tbody>
</table>

### System: Bleed Steam to Condenser

<table>
<thead>
<tr>
<th>Date</th>
<th>Hanger No.</th>
<th>As Found</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/09/09</td>
<td>TEH-1</td>
<td>In Range</td>
<td>Ok, survey by Thiesch</td>
</tr>
<tr>
<td>12/09/09</td>
<td>TEH-10</td>
<td>In Range</td>
<td>Ok, survey by Thiesch (Horizontal strut)</td>
</tr>
<tr>
<td>12/09/09</td>
<td>TEH-11</td>
<td>In Range</td>
<td>shifted slightly to north, survey by Thiesch</td>
</tr>
<tr>
<td>12/09/09</td>
<td>TEH-12</td>
<td>In Range</td>
<td>Ok, survey by Thiesch</td>
</tr>
<tr>
<td>12/09/09</td>
<td>TEH-13</td>
<td>In Range</td>
<td>support ok, survey by Thiesch</td>
</tr>
<tr>
<td>12/09/09</td>
<td>TEH-2</td>
<td>In Range</td>
<td>Ok, survey by Thiesch</td>
</tr>
<tr>
<td>12/09/09</td>
<td>TEH-4</td>
<td>Topped</td>
<td>Ok, survey by Thiesch</td>
</tr>
<tr>
<td>12/09/09</td>
<td>TEH-5</td>
<td>In Range</td>
<td>Ok, survey by Thiesch</td>
</tr>
<tr>
<td>12/09/09</td>
<td>TEH-6</td>
<td>In Range</td>
<td>Ok, survey by Thiesch</td>
</tr>
<tr>
<td>12/09/09</td>
<td>TEH-7</td>
<td>In Range</td>
<td>Ok, survey by Thiesch</td>
</tr>
<tr>
<td>12/09/09</td>
<td>TEH-8</td>
<td>In Range</td>
<td>Ok, survey by Thiesch</td>
</tr>
<tr>
<td>12/09/09</td>
<td>TEH-9</td>
<td>In Range</td>
<td>Ok, survey by Thiesch</td>
</tr>
</tbody>
</table>

### System: High Pressure Turbine Exhaust Steam

- **Unit 3**
- **Unit 1**
- **Unit 2**
SI can create additional custom reports based on user specifications.
1.10 PlantTrack Database
The PlantTrack database is based on MS SQL Server. SQL database offers significant technical advantages in terms of reporting, data mining, and sorting. There will be standard database designs for boiler and piping modules. These can be modified to incorporate client's information tracking needs, if necessary.

A typical Boiler module contains drawings and records the following parts:
- Furnace waterwalls,
- Screen tubes
- Extended walls,
- Backpass walls and other Steam Cooled Walls,
- Roof tubes,
- Superheaters,
- Reheaters,
- Economizers
- Spacer tubes.

The locations of and tube routings at the burners, SOFA panels, access doors, observation doors and sootblowers are included in these drawings. Where the burner corner and sootblower identifications are available, they will be included as part of the drawing. Side sectional drawings of each unit are also included as visual menus.

Future versions of the Boiler module will allow display of records on the structural elements, spacers, lugs, sootblowers, etc.

A typical HEP module will include drawings for:
- Main Steam System
- Hot Reheat System
- Cold Reheat System

An extended Piping module may include the following in addition to the HEP module:
- Feedwater Piping
- Condensate Piping
- Bleed Steam/Feedwater Extraction Steam Piping
- Steam Piping to Deaerator
- Steam Piping to Evaporator
- Deaerator Circulation Piping
- Steam Seal System Piping
- Auxiliary Steam Piping
- Burner Piping
- Sootblower Piping
- Other Piping Systems

1.11 Database Setup
PlantTrack allows users with setup privileges to edit the database configurations. They can add, delete or edit:
- Event groups
• Events (record types)
• Templates (field designations for each record type)
• Menus

PlantTrack database setup feature is one of the major improvements over the legacy TubeTrack:
• The Event Groups allow grouping events/records with similar detail configuration together. For example, all the Tube Failure events can be grouped as “Tube Failure” group. The user can select the group when creating a report or a filter, instead of specifying each event individually.
• There are no limits to the:
  o number of record types,
  o number of fields for each record type,
  o the size of text fields,
  o number of menus or,
  o number of items in a menu.
• A new field type is included. The “List” field allows multiple selections from a menu.

1.12 File Manager, Document Attachment
The File Manager feature allows users to create and manage drawing and document resources on the web server. The documents can be any reports, photos, reference drawings, forms, etc. The drawings can also be used as background images for component locations and record displays. A document can be attached to several records or components, and a record or component can have multiple attached documents.
1.13 Analytical Tools and Services
SI provides a wide range of support and engineering services to traditional fossil and combined cycle power plants. A detailed list of SI Power Plant Services can be found at our web site: www.structint.com.

Some of our engineering services are listed below:

- Economics-based risk assessment method for boiler tube failures
- Customized plant chemistry assessment program
- Metallurgical Laboratory for Evaluations
- Vindex, a semi quantitative risk analysis program for HEP systems
- PGTLA (Probabilistic Gas Touch Length Analysis) for Superheater and Reheater Remaining Life Assessments
- Piping Stress Analysis
2. NAVIGATING INTERACTIVE GRAPHICS (BOILER)

This section provides “How to” perform tasks in the interactive graphics for the “Boiler/HRSG” module.

2.1 Open the drawing of a part

In the Plants/Units widget, select boiler part and press “Open Interactive Drawing”. The image on the Interactive Graphics widget will change based on the selected boiler part. You can simply click on the image to open the drawing module.

Once the graphics module is started, the select the part from the navigation menu:
In order to open another part drawing, right click at the current browser tab and select “Duplicate”.

2.2 Navigate the list of records
The “Records Info” panel lists the records associated with the selected part. The records are grouped by the Event type by default.

The groups of records can be expanded by clicking on the little triangle in front of the group. To condense the list, the triangular shape needs to be clicked again. Once a group of events is selected, the records are also listed in the grid view below the screen.
The user can group the records by moving the list column names into the grouping area:
For the HEP module, the records can also be grouped by component types:

2.3 Manipulating Records in Grid View

In the grid view, the user can:
- Sort the list based on any column
- Hide any columns
- Change the order of columns
- Change the column size
- Create simple filter based on single column values
- Create complex filters based on multiple columns
- Group using column headers

Select the “Show Column Chooser” option and drag a column header to the Column Chooser to hide that column:

Select the “Show Group Panel” option and drag a column header to the Grouping Panel to Group by that column:

Sort ascending/descending by clicking on column header.

Click on the column header and drag to change the order of columns.

Right click on any column header, and display menu for column manipulation.

Drag Column header to group by that column.
To stop grouping, just drag the column header from the grouping panel back to the column.

Use the Filter Editor option menu to create more complex filters. Multiple fields can be included with various logical operators.

2.4 Display Selected Records, Filters/Easels

The user can display a record on the drawing by clicking on the record in the record list. Multiple records can be displayed by selecting records in the grid view and using a combination of CTRL-Click and Shift-Click.
When there are too many records to be displayed by clicking, or if a color coding scheme is preferred to display records, PlantTrack’s filter/easel feature can be used.

In order to apply an existing filter (easel), the user may click on the filter icon on the toolbar, or use Edit/Filter option from the menu.

Once a filter is selected, and the Apply button is clicked, the selected records in the filter will be displayed.
2.5 Create Filters (Easels) for Color Coded Record Display

In order to create new easels, the following steps should be followed:

- Click on the filter icon, open the Filters dialog box
- Click on Add to start creating a new filter
- A new line “New Filter/Easel” will be displayed. Select the new easel and click on Modify.
- Once the Filter Details panel is displayed, the filter can be renamed, mark size can be defined, and size of the marks specified.
- To add conditions, click on “Add”
Let’s say we want to create an easel to select all tube failure records with repair type “Pad weld”. We add a condition and make the changes shown as below:

Before the “event” is selected, the event group “Tube Failures” is chosen. Then we select all the failure events, and set the menu item “Repair” to “Pad Weld”. Complex filters can be developed by adding additional logical criteria. The result of applying the test filter is:

Easel/Filter creation for the HEP module has been further improved by additional capability to display values, as well as adding filter conditions using component specifications.
2.6 Drawing Manipulation

2.6.1 Drawing orientation

Most of the boiler drawings in PlantTrack can be viewed from different directions. The main view is usually the side view as seen on the unit side sectional drawing.
2.6.2 Zoom In/Out

Zooming on the drawing can be done in several ways:
- Click in the drawing area, and zoom in and out by the mouse wheel,
- Pressing left mouse button, click and drag to zoom in a selected area of the drawing,
- Use zoom in/out icons in the toolbar,
- Use View/Zoom from the Menu

2.6.3 Panning/Moving the Drawing

- Click on the drawing area, move the mouse while pressing the left button,
- Or use the direction buttons on the toolbar,
- Or use View/Move from the Menu

- In order to go back to the Original Size use the corresponding icon:

2.6.4 Selection of Drawing Features to Display
The user has an option to turn on or off certain features of the drawing:
- Drawing text
- Reference Lines
- Headers

In certain cases, like waterwalls, the drawing may look too crowded and becomes too difficult to view details and print. The user has the option of not displaying all the tubes.

Below is a sample of showing all tubes, every 2nd, 5th and 10th tube:

The user has also the option of displaying a frame around the drawing.

2.7 Setting Drawing Preferences

By selecting View/Drawing Preferences option from the menu bar, the user can edit:
Mark sizes can be modified from tiny to large size, as well as user specified size:

The line thickness can also be changed in the toolbar:
2.8 Viewing a Specific Assembly or Tube (Boiler Module)

PlantTrack allows isolating an assembly and/or a tube to list and display records specific to the isolated component.

Boiler parts like superheaters, reheaters, and economizers consist of assemblies/elements. When viewed from the side, all the assemblies are stacked on each other, even though the assemblies may have different tube configurations. By isolating an assembly, individual assembly shapes can be displayed and the display of records can be limited to the isolated assembly.

In order to isolate an assembly, one method is to select View/Details/Isolate from the menu bar:

The user can also isolate an assembly by rotating the part, and using the mouse CRTL-Left Click on the selected assembly.
In addition to isolating assemblies, tubes can also be isolated. In order to differentiate between assembly and tube isolation, the term “HIGHLIGHTING” is used for tubes. A tube can be “Highlighted” similar to assemblies by selecting View/Details/Highlight from the menu. Another way is bring the cursor on the tube to be highlighted and use CTRL-Left Click.
2.9 Adding a New Record (Boiler Module)

In order to add a new record, right click on the selected boiler part, and select the “Add Record” option.

Once the “Add Record” panel is displayed, select the type of record from the first line. The list of fields corresponding to the record type will be displayed in the right side of the panel. The user can now fill in the fields, which could contain numerical, menu, multiple selection, or text values.

The user can also enter the location information, such as elevation, tube number, horizontal distance, assembly number/z-distance, depending on the part type.

There are three types of records in PlantTrack: Point, line and rectangular (area) records. It is recommended that you isolate the assembly and tube before the “Add Record” method is started. How to enter each type of record is described below:
2.9.1 Adding a Point Record Graphically

- Isolate the assembly (if there are assemblies) and highlight the tube on which a record is to be located.
- Right click on the boiler section and select “Add Record”.
- In the Add Record panel, click on “Locate Graphically”.

- Select Point Record option
- Move cursor on the tube at the right elevation.
- Click on the tube and press the Insert key to locate the point record. A blue circle will be displayed where the record will be located.
- You could use the Insert key again to modify the location, or just edit the text box.

- Once you are done with the location, press “OK”, then proceed with entering the record details.

2.9.2 Adding a Line Record Graphically

- Follow the steps as in entering a point record, but select Line Record option.
- Move cursor on the tube to the first end of the line record.
- Click on the tube and press the **Insert** key to locate the point record. A blue circle will be displayed where the record will be located.
- Move the cursor to the location where the line record end, and press the **End** key.
- You could use the Insert and End keys again to modify the location, or just edit the text box.

- A blue line between two circles will be shown to display the line record location.
- Once you are done with the location, press “OK”, then proceed with entering the record details.
2.9.3 Adding a Rectangular (Area) Record Graphically

- Since multiple tubes are to be included in the record, there is no need to highlight a tube. If the record will be for a specific assembly, then that assembly needs to be isolated.
- Follow the steps as in entering a point record, but select Rectangular Record option.
- Move cursor to the location to be first corner of the rectangle.
- While pressing the SHIFT+CTRL keys, press both buttons of the mouse and drag the cursor to the opposite corner of the rectangle. Release the mouse buttons first and then the SHIFT+CTRL keys.
- You could repeat the above step again to modify the location, or just edit the text box.

To enter multiple records, see Section 4.11.
3. NAVIGATING INTERACTIVE GRAPHICS (PIPING)

This section provides “How to” perform tasks in the interactive graphics for the “piping” module with scanned in images.

3.1 Open the Drawing of a System

After selecting the system from the navigation pane, click on the interactive graphics. You can also select the “Drawings” option in the menu to start the graphics module.

Once the graphics module is started, the select the part from the navigation menu:

In order to open another part drawing, you could either go back to the Dashboard and select “Drawings” again, or right click at the current browser tab and select “Duplicate”.
3.2 Navigate the list of records

The “Records Info” panel lists the records associated with the selected part. The records are grouped by the Event type by default.

The groups of records can be expanded by clicking on the little triangle in front of the group. To condense the list, the triangular shape needs to be clicked again. Once a group of events is selected, the records are also listed in the grid view below the screen.

The user can group the records by moving the list column names into the grouping area.
For the HEP module, the records can also be grouped by component types:

### 3.3 Manipulating Records in Grid View

In the grid view, the user can:
- Sort the list based on any column
- Hide any columns
- Change the order of columns
- Change the column size
- Create simple filter based on single column values
- Create complex filters based on multiple columns
- Group using column headers

---

**Instructions:***
- Sort ascending/descending by clicking on column header.
- Click on the column header and drag to change the order of columns.
- Right click on any column header, and...
Select the “Show Column Chooser” option and drag a column header to the Column Chooser to hide that column:

Select the “Show Group Panel” option and drag a column header to the Grouping Panel to Group by that column:

To stop grouping, just drag the column header from the grouping panel back to the column.

Use the Filter Editor option menu to create more complex filters. Multiple fields can be included with various logical operators.

Once the Horizontal Grid fields are configured, the user can save the configuration in user’s profile.
3.4 Adding New Background Image

The user can add (or change) an image as the background for a system or an area.

First select the system or area by clicking on it, then right click to display short cut menu.

Select “Attach Image” option from the Menu. If the system/area has already an image attached, it will display a warning message.

Once you continue, “Upload Resource” dialog box will be displayed.

Click to browse and select the image to be attached, then “upload” and “OK”.

3.5 Adding New System/Area/Component

Users with “read/write” access privilege, can add new systems, areas, or components. After selecting the level, right click and select the option to add new system, area, or weld/spool/support node. If a system or area is added, you can then proceed to attach an image. If a new weld/spool/support node is added, you can then proceed to locate it on the image.
3.6 Renaming and Locating Nodes and Labels

When a new node (weld, support, etc.) is added, it will be displayed as a new component in the specification panel, where it can be renamed.

It will also be located on the upper left corner of the image as a new component. The node and the label can be now relocated by using the corresponding menu items under “Edit”.

Once the relocation and move items are checked, move the node mark first, and then the label. After the relocation is completed, make sure that the menu items are unchecked to be able to select nodes on the image to display its records.
3.7 Change Node and Label Sizes

Node and labels can be resized by using the corresponding slides on the toolbar.

3.8 Moving Components between Systems/Areas

It could be sometimes necessary to move components from a system or area to another system area. For example, if it is decided to include a more detailed area to a system, some of the components may need to be moved to the new area.

First under the Edit menu, select “Drag and Drop” option.

Next select the components to be moved. You may use a single component or multiple items using the mouse left button with control and shift keys. Then drag the selection to the area to move to.
While the “Drag and Drop” is on, you will not be able to navigate to other systems or areas to be displayed. A red warning text is displayed on the status line to indicate this.

To continue navigating, you will need to uncheck “Drag and Drop” option.

3.9 Display Selected Records, Filters/Easels

The user can display a record on the drawing by clicking on the record in the record list. Multiple records can be displayed by selecting records in the grid view and using a combination of CTRL-Click and Shift-Click.
When there are too many records to be displayed by clicking, or if a color coding scheme is preferred to display records, PlantTrack's filter/easel feature can be used.

In order to apply an existing filter (easel), the user may click on the filter icon on the toolbar,

or use Edit/Filter option from the menu.

Once a filter is selected, and the Apply button is clicked, the selected records in the filter will be displayed.
In order to clear the filter, click on the icon in the toolbar.

3.10 Create Filters (Easels) for Color Coded Record Display
In order to create new easels, the following steps should be followed;

- Click on the filter icon, open the Filters dialog box
- Click on Add to start creating a new filter
- A new line “New Filter/Easel” will be displayed. Select the new easel and click on Modify.
- Once the Filter Details panel is displayed, the filter can be renamed, mark size can be defined, and size of the marks specified.
- To add conditions, click on “Add”
Let’s say we want to create an easel to display where the UT inspections were done. We add a condition and make the changes shown as below:

Before the “event” is selected, the event group “Inspections” is chosen. Then we select Inspections record type, and set the menu item “Method” to “UT”. Complex filters can be developed by adding additional logical criteria. The result of applying the test filter is:

Easel/Filter creation for the HEP module has been further improved by additional capability to display values, as well as adding filter conditions using component specifications:
3.11 Adding Records

There are several ways of adding records to piping nodes.

To add additional conditions using component specification fields, select this tab.

To display the values, select the record type and field here.
3.11.1 Adding Single Record

After you select the node for which a new record to be entered, right click and select Add Record option.

A “Record Entry” form will open, the details of the record can then be entered. There is no need to fill any location data, as the record is being entered for a node.
A single record can also be entered in the dashboard, however, the details of the record need to be updated later.

3.11.2 Adding Multiple Records

The most effective way to enter multiple records is to use the PlantTrack add-in for Excel. Once you log-in, you will need to select the system/area to add records to.
Then you select the record type, for this sample weld Inspections record type is selected.

All the nodes as well as the record fields will be listed. You can now proceed with entering records. The menu fields are transferred from PlantTrack to the Excel add-in. Once completed, click on the “Upload Data” button to load records into PlantTrack database.

If you do not have access to the PlantTrack add-in for Excel, you can still use the multiple record feature from the dashboard.
First open the side menu by clicking on the little triangular icon on the left side bar and select “Record Entry” option.

Next select the record type and components for which new records to be entered:

Step 2 will create an Excel spreadsheet with the selected nodes and record type fields:

Once the data is entered and the Excel file is save, you could go to Step 3 and load the contents of the Excel into PlantTrack database.
4. NAVIGATING DASHBOARD

The Dashboard is the screen the user is directed to once the login is completed, and it is the launching pad for other features, as well as a summary of recent activities.

4.1 Dashboard Features

The layout of the dashboard is application specific, and can be customized by the users. It contains widgets to perform certain functions as well as links to more advanced and administrator features. A typical dashboard is shown below:

These features are described below in more detail.

4.2 Navigation Pane

In this panel, the user can select a plant/unit/system to display information about. Once a system/area or boiler part is selected, a simplified image of the part is displayed on the
Interactive Graphics pane. If the drawing for the selected part is desired to be selected, user can simply click on the “Open Interactive Graphics” button, or simply click on the

If a weld is selected in the navigation tree, the recent and upcoming inspections are displayed in the corresponding pane.

4.3 Interactive Graphics Pane

This widget allows sliding view of the system/area graphics in the application. The user can click on the image and display it on the Interactive Graphics module.

4.4 Latest Documents Pane

This pane lists the latest ten documents uploaded to the application. User can just click on the document title to view. The pane also displays the component(s) the document is attached to. Additional documents can be listed by selecting the “More..” button and launching the File Manager widget. The documents can be attached to records, to components, such as welds, and pipe supports, or plants, units, and systems. The documents can be attached to components in either the File Manager or in the Interactive Graphics as explained in the previous chapters.
4.5 Quick Lists and Charts

This widget allows user to display lists of selected fields quickly. The layout of the lists can be configured by the user and saved for future use. The lists can then be exported to Excel for reporting purposes.

The widget in the main dashboard just provides a list of available filters. The user can open up the advanced dashboard to access full Quick List feature.

A sidebar menu will be displayed which includes Quick Lists and Charts option, as well as other advanced features.

The Quick Lists and Charts feature allows users to quickly create lists of records by either using already created filters or creating a new filter. The steps below describe how to create filters to list selected Risk Ranking (Vindex) results:
- Press the “Add New Filter” button, and give the filter a name.
- Enter start and end dates for record selection. Both fields need to be entered.
- Select the plant, units, and parts to be included in the search,
- Select the Event group, such as inspections, analysis, tube failures, repairs, etc.
- Select the desired event type or failure mechanisms to be listed,
- Select the fields (type of information being tracked for the selected event group,
- If component specification fields are to be listed, also select the corresponding fields.
- Press the “Save” button. And it will be listed in the filter list.
- For the boiler module, you may include the “Location Info” option to display the record coordinates, as well as the tube and assembly numbers.
- Press the Save button to save the Quick List filter.

The user will then be directed back to the List of Quick List filters.
- Now select the filter by clicking on the check box on the left and select the “Show Grid” option.
- If you do not want to list any of the columns, click on the Show/Hide Columns and drag the unwanted field column headers into the Field Chooser box. These fields can always be dragged back to column are for inclusion.
- The order of the columns can be rearranged by dragging the column name to the desired location.
- The column contents can be sorted by just clicking on the column name. Subsequent click reverses the sort order.
- Filters can be applied at column level by clicking on the “funnel” icon below the column name.

You can also group by any column by dragging the column header to the grouping area. The following figure shows where the records are grouped by Unit and System.
- The size of the columns are also adjusted in a similar way to expand Excel spreadsheet columns, by clicking on the line dividing the columns and moving left or right.
- Once the layout is configured, it can be saved by using SaveLayout button, so next time the list is opened, it does not need to be configured again.
- Now the list can be exported to Excel.
- When there are sufficient records to create trend charts, select the filter again and press the Show Pivot Grid button. This example shows charting tube failure mechanisms against plant/unit/system, or date.

- Now you can drag the columns to/from the left and top of the grid to change the chart view. For example, you can drag “PlantName” to the top line, drag “Date Year” to left,
and “UnitName” to above the grid as shown below

- The chart can be copied (right click below the legend, select copy) and pasted in Excel or Word (Paste Special, bitmap).
- The grid can be exported to Excel or PDF format by selecting the corresponding button.
4.7 Standard Reports

This option allows display and printing of pre-designed Standard reports from PlantTrack. This should be confused with the “Reports” attached to the application which are included as part of the Latest Documents/Attachments.

In the dashboard, just click on the View button in front of the Report to be displayed.

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vindex Chart</td>
<td></td>
</tr>
<tr>
<td></td>
<td>San Jose Plant Active Units</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vindex Report</td>
<td>List of Welds order by Risk</td>
</tr>
<tr>
<td></td>
<td>Hanger Inspection (San Jose)</td>
<td>In Yellow immediate attention</td>
</tr>
<tr>
<td></td>
<td>Summary by Weld</td>
<td>2009 Unit 1 MS</td>
</tr>
<tr>
<td></td>
<td>Summary by Inspection Method</td>
<td>2009 Unit 1 MS</td>
</tr>
</tbody>
</table>

To list more reports not included in this widget, the user can click on “More...” or the triangular icon on the left side bar and select “Standard” in the reports section. Now more reports will be available for selection.
The reports can be developed by Structural Integrity to meet client needs, or through additional training on Report Designer, the users can create new report designs.

The Standard Reports can be edited to change the date ranges, components and events to include. First click the right arrow on the report toolbar:

The report filter edit window will be displayed on the left:

![Report Filter Edit Window](image)

You can now make any changes and even add more complex filters on the record details, and press apply.
4.8 Additional Dashboard Features

Additional features can be accessed by clicking on the triangular icon on the left side bar.

- Select “Drawings” to launch the graphics module.
- Use File Manager to add documents (reports, drawings, images, etc.) to the resource library at the server. These could be used to link as attachments.
- Select the Record Entry option to create an Excel Spreadsheet template for multiple date entry for “Nodes”.
- Select Reports option to view and print pre-developed reports. You may add filters to specify units, parts, dates, event types, and details to be included. This also includes quick data lists, and grid tables and charts.
- If you have administrative privileges, you may use the Users option to add users and assign privileges, as well as defining roles.
- Again if you have administrative rights, you can make modifications to the database, including new events, templates, and menus.
- You can also configure component specifications.

4.9 Starting Interactive Graphics Module

In addition to the widgets on the Main Dashboard, this option allows accessing the graphics module.

4.10 File Manager

File manager allows uploading documents to the PlantTrack server. Documents can be attached to records and/or each level of components/systems. The attachments can also be URLs or links to documents on the intranet or WAN/LAN server. The file manager is only for the documents stored on the PlantTrack server.

The list includes attachments made in the graphics module, as well as the ones uploaded using the File Manager. To upload a new document, simply use “browse”, and when the file is located, press the “Upload” button.
The View option will allow display of the document, and the Edit option will allow deleting and linking the document.

The following grid shows components and records where the resource is attached:

2M$\text{SH}1$-$9$, 1M$\text{SH}1$-$9$

<table>
<thead>
<tr>
<th>#</th>
<th>Component/Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>2M$\text{SH}1$-$9$</td>
<td></td>
</tr>
<tr>
<td>1M$\text{SH}1$-$9$</td>
<td></td>
</tr>
</tbody>
</table>

The components to which the document is attached to are shown, and the user can detach the document from any of these components. The largest list allows attaching the document to any component or system.
4.11 Multiple Record Entry

There are two methods to enter multiple records.

The first method is **copy/multiply/paste** method:
- In the horizontal grid, select the record to be copied. Right click and select Copy.
- Paste the copied record in Excel
- Clear the Record ID at the end
- Copy the row for as many records as desired and make changes.

In this sample, only the tube numbers are changed.
- Select and copy records to be input into PlantTrack.
- Right Click on the boiler part and select **Paste Special**

The records will then be entered.

This method can also be used to edit multiple records. Similarly, select and copy records to be modified from the Horizontal Grid. Paste into Excel, and make desired changes. Make sure that
you do not delete/clear the record IDs, as they are necessary to edit. If the records IDs are deleted, the records will be entered as new records.

While this method is quick and simple, the menus are not carried to the Excel file.

The other method to enter multiple records is using Excel add-in for PlantTrack. Once the add-in is installed, the SQL connection string needs to be setup (Configuration) for the application. The user then logs in (PlantTrack Login) by using PlantTrack credentials.

Next the user selects:
- Plant
- Unit
- Boiler Section
- Event

If the Update Records box is not checked, then the program creates the columns needed for the record location, as well as the fields for the selected Event.
Once you enter the records, Click on Upload Data, and they will be uploaded into the database. You may need to use the Refresh button above the Navigation Panel in the graphics module, in order to list the new records.

In order to edit existing records, simply check the Update Records check box. The program will list the existing records. Again make sure that the Record IDs at the last column are not deleted or cleared.

Again Upload Data will replace the existing records with the revised ones.

For the Piping Module, the component specifications can be entered or edited using Excel add-in.
### 4.12 Component Specifications (HEP Module)

This feature allows quick entry of specifications for piping components like welds and pipe supports.

![Diagram of component specifications]

<table>
<thead>
<tr>
<th>#</th>
<th>System</th>
<th>Type</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hot Reheat</td>
<td>Spools</td>
<td>1HRAS3</td>
<td>Horizontal Straight Pipe</td>
</tr>
<tr>
<td>2</td>
<td>Hot Reheat</td>
<td>Welds</td>
<td>1HRRAW10s</td>
<td>Horizontal to Inclined Sweep (partial) to Horizontal to Inclined Sweep (partial)</td>
</tr>
<tr>
<td>3</td>
<td>Hot Reheat</td>
<td>Hangers/Supports</td>
<td>1HRHEAST-2</td>
<td>VARIABLE SPRING</td>
</tr>
<tr>
<td>4</td>
<td>Hot Reheat</td>
<td>Spools</td>
<td>1HRAS39</td>
<td>Horizontal Sweep (partial)</td>
</tr>
<tr>
<td>5</td>
<td>Hot Reheat</td>
<td>Welds</td>
<td>1HRRAW216</td>
<td>Vertical Straight Pipe to Vertical Straight Pipe</td>
</tr>
<tr>
<td>6</td>
<td>Hot Reheat</td>
<td>Welds</td>
<td>1HRAS626</td>
<td>Horizontal Straight Pipe</td>
</tr>
<tr>
<td>7</td>
<td>Hot Reheat</td>
<td>Welds</td>
<td>1HRRAW18s</td>
<td>Horizontal to Vertical Sweep (partial) to Horizontal to Vertical Sweep (partial)</td>
</tr>
<tr>
<td>8</td>
<td>Hot Reheat</td>
<td>Welds</td>
<td>1HRRAW26f</td>
<td>Vertical to Horizontal Sweep (partial) to Horizontal Straight Pipe</td>
</tr>
<tr>
<td>9</td>
<td>Hot Reheat</td>
<td>Welds</td>
<td>1HRRAW194s</td>
<td>Vertical Straight Pipe to Vertical Straight Pipe</td>
</tr>
<tr>
<td>10</td>
<td>Hot Reheat</td>
<td>Welds</td>
<td>1HRRAW17f</td>
<td>Horizontal Straight Pipe to Horizontal to Vertical Sweep (partial)</td>
</tr>
</tbody>
</table>
You may add new components in the list, or enter multiple components and their specifications from an Excel file. There are templates listed at the top of the page. You may start with one of these templates and create a list as shown below:

Once the Excel file is ready, browse to locate it and use the Upload option to load the specifications into the database.

Again, the preferred way of entering/editing component specifications is the Excel PlantTrack add-in option.

4.13 Adding Users and Permissions

The program administrator can add users and assign permissions to the users. The permissions are based on locations/applications, as well as read/write functionalities.

The user’s role is assigned by selecting a role from the menu below:
Each role’s permissions are then designated by clicking on the Role Name.

The application administrator can add/edit/delete Plants, Units, Systems/Parts, Event Groups, Events, Templates and Menus.
The systems option is used to add/edit or delete boiler parts and piping systems.

### 4.14 Database Configuration

In PlantTrack the collection of information (fields) stored for each event is called a template. The events which share the same template design are grouped into Event Groups. The figure below show how the Event Groups can be edited.
New events can be created or existing events can be edited by clicking on the Events tab:
Figure below shows how templates are created/edited:
The menus can be created or edited by selecting the Menus tab:
4.15 Component Configuration

PlantTrack allows user with Administrative privileges to add and edit systems and areas by using the component configuration option.