Template Studio

Overview

In addition to the **Template Library**, the **Template Studio** is used to create and configure templates to produce reports automatically, on-demand or both. Both report templates and form templates are created in the studio.

A **Report** template is used to create and publish reports automatically according to a schedule or on-demand by a user. It is a workbook with one or more worksheets that contains:

- layout of your report using features such as formatting, formula, and charts
- **Report Names** for the reports produced from the template e.g., *Flow_{MMM}{YY}*
- **Data Connect** to data servers, e.g., real time, history, or relational database
- **Data Management** for advanced processing of the report data
- **On-Demand Designer** settings for on-demand reports
- **Schedule** settings for automatic reports and publishing

A **Data Entry Form** template is used for manual data entry. It is a workbook of one worksheet that contains:

- layout of your form using spreadsheet features such as formatting, formula, and charts
- **Data Link** to a relational database (managed by the **Database Management** tool)

Reports are produced from templates using the proprietary reporting engine which takes workbook templates to Excel, PDF, and HTML reports without using Excel.

For those unfamiliar with Excel terminology here are the basic terms:

- An Excel file is referred to as a **workbook**.
- A **workbook** contains one or more **worksheets**. Each worksheet appears as a tab at the bottom of the workbook.
- A **worksheet** contains **cells**.
- A collection of cells is a **range**.

Studio Options

The studio is available as either a ribbon item in Microsoft Excel or in the **XLReporter** Studio, a stand-alone application.

This is determined in the project settings. To access, from the **Project Explorer** select **File**, **Project Settings**, **Workbook**.
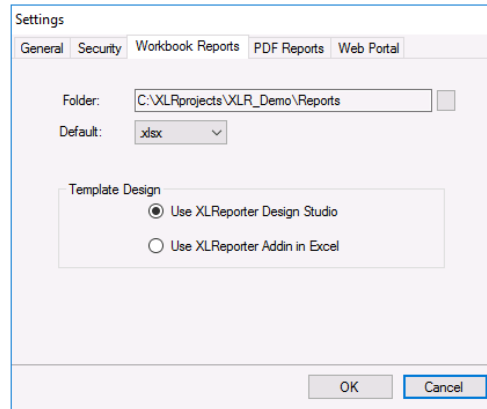

The studio is opened from the **Project Explorer**, under the **Template Design** section by clicking the **Studio** button. It is also opened by double-clicking any template listed on the left.
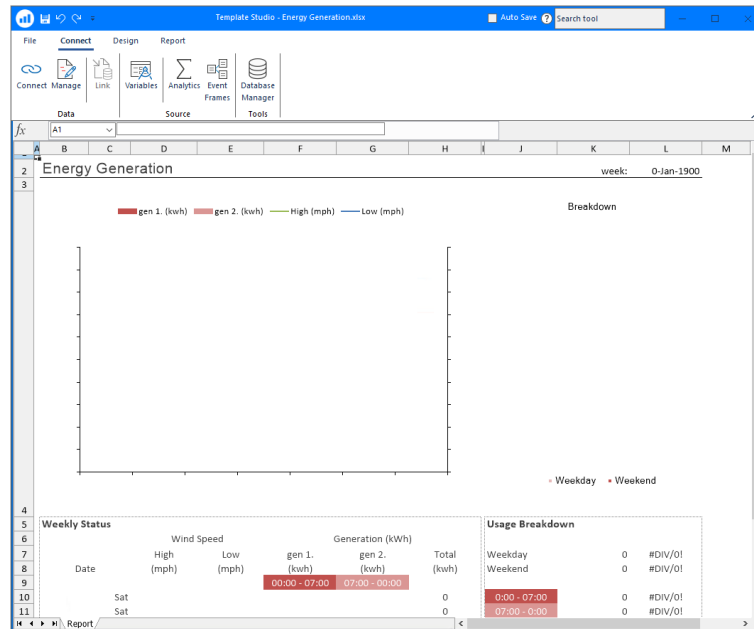
Excel

The Template Studio is built into Microsoft Excel so templates can harness over 400 functions, charts, and formatting capabilities in addition to the **XLReporter** functions that are specifically built for process automation.

This option is available for users who have a licensed copy of Excel and are comfortable in this environment. Since Excel is so universally used, any feature that is unfamiliar can be searched for on the internet with hundreds of tips, tricks, and tutorials on how to use it.
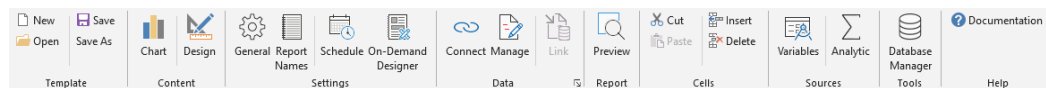
XLReporter Template Studio

The **XLReporter** Template Studio is a stand-alone application where report and data entry form templates are designed. Virtually all the functionality of a workbook is available including functions, charts, and formatting in addition to functions that are specifically built for process automation.

This option is available for users that do not have a licensed copy of Excel or those that are not as familiar with Excel and want an environment that provides that type of functionality but presented in a simpler way.

Offline Development

In many instances, **XLReporter** is installed on a machine on the factory floor where it is too busy to do development.

In this scenario the templates can be developed offline in the comforts of someone's office. If the system where development is done has Excel installed, it can be used as the Design Studio. Then, when it is time to deploy, the project can be copied to the runtime system. If small modifications need to be done, they can be done using either the **XLReporter** Studio or Excel, giving you the best of both worlds.
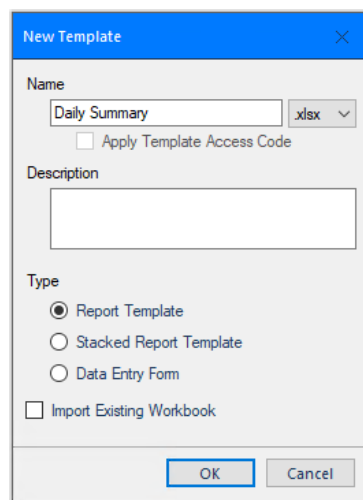
Template

Templates are at the heart of reports. A template is a workbook file containing one or more worksheets that represent the desired report. The content of a template consists of a layout of standard Excel features combined with features provided by **XLReporter** that are specifically for industry.

When a template is "processed", the naming convention configured is used to create a report and the report is populated with the data from the **Data Connections**. After any **Data Management**, the report is saved to XLS, PDF and HTML file formats or sent as an E-mail.

Templates are "processed" from the **Scheduler**, periodically or on events, from pushbutton clicks on an HMI, from VB scripts or on-demand from local or remote workstations. In every case, a report is produced from the template.

New

To create a new template, select **Template**, **New** (Excel) or **File, New** (**XLReporter** Template Studio).

Enter a **Name** using only the characters permitted for a file name and a **Description** (optional). If the project is configured with a **Password**, select whether to set password protection to the template by checking **Apply Template Access Code**. For details on setting the **Password** in the project, see SETUP, **Implement Project Security**.

Set **Template Type** to **Report** (the template is used to create reports automatically according to a schedule or on-demand by a User), **Stacked Report Template** (a report template stacked based on the results of a database query), or **Data Entry** (template is used for manual data entry management).

To start with an existing Excel workbook, check the **Import Existing Workbook** option.

Click **OK** to create the template. If the import option is selected, you are prompted to select a workbook from the file system. Change the layout of the template by using features such as formatting, charts, and formulas.
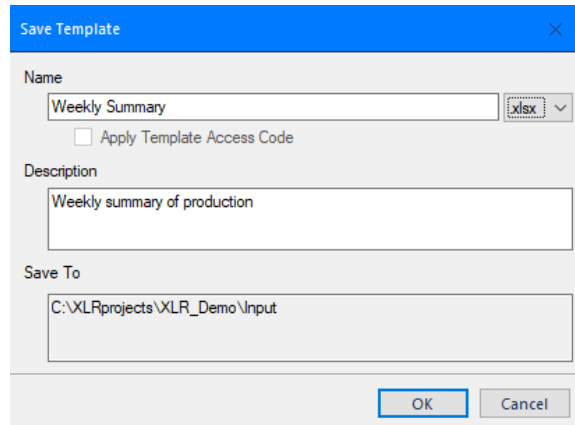
Open

To open an existing template, select **Template**, **Open** (Excel) or **File, Open** (**XLReporter** Template Studio).
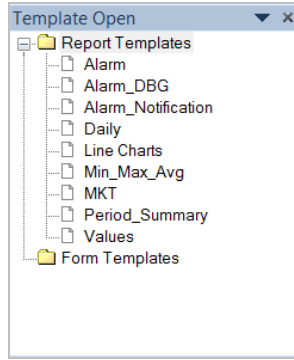
Double-click a template to load.

Save/Save As

To save changes to a template, select **Template, Save** (Excel) or **File, Save** (**XLReporter** Template Studio). To save the template to a different name, select **Template**, **Save As** (Excel) or **File, Save As** (**XLReporter** Design Studio).
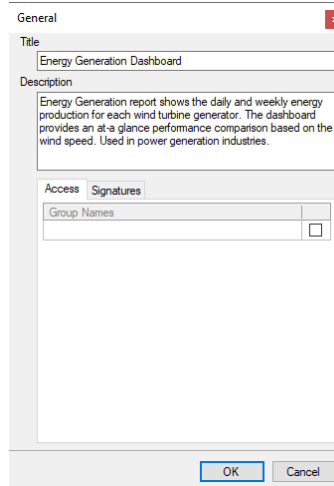

As part of saving the template, any data groups from the original template that contain the name of the template are duplicated, named after the new template, and updated as connections in the new template. For example, if *TemplateA* has a data group named *TemplateA_Daily*, if *TemplateB* is created by doing a save as of *TemplateA*, a data group named *TemplateB_Daily* is created and updated as the connection in *TemplateB*.

In the **XLReporter** Template Studio an **Auto Save** option is available. When checked, the template workbook is saved every few seconds to ensure no work is lost if the application is closed or the machine has an issue. Please note, this option is not enabled by default and the setting is not retained. If you wish to enable auto save, you will have to enable it explicitly every time you open the Template Studio.

Settings

To access the template settings, select the **General** button (Excel) or **File, Settings** (**XLReporter** Template Studio).

The **General** option is to modify the template **Title** and **Description**. If security is enabled, then the user groups permitted to access the template in **On-Demand Reports** are listed and the **Signatures** options are available.

Connect

Data

Connect

The **Connect** option is used to define the data connections for a report template.

For more information, see DESIGN, **Data Connections**.

Manage

The **Manage** option is used to define the management functions for a report template.

For more information, see DESIGN, **Data Management**.

Link

The **Link** option is used to define the relationship between a template and a database for form templates.

For more information, see DESIGN, **Design Manual Data Entry Forms**.

Source

Variable

The **Variable** option opens the **Variable Editor** where variables in the project can be added and modified.

For more information, see DESIGN, **Variables**.

Analytic

The **Analytic** option opens the **Analytic Editor** where analytics can be configured for the project.

For more information, see CONNECT, **Analytic Data Logging and Analysis**.

Event Frames

The **Event Frames** option opens the **Event Frame Editor** where event frames can be configured for the project.

For more information, see CONNECT, **Event Frames**.

Tools

Database Manager

The **Database Manager** option opens the **Database Manager** application which is used to maintain tables and columns in a database.

For more information, see CONNECT, **Manage Relational Databases**.

Design

The **Design** tab provides access to all the tools needed to design the report template with all the workbook and worksheet features you wish.

Themes

The Themes option opens the Theme Builder which is used to maintain report appearance.

For more information, see DESIGN, **Template Themes**.

Content

Insert

This menu is used for inserting things into the template like cells, worksheets, named ranges, pictures, shapes, functions, tables of summary calculations and/or hyperlinks.

Summary Table

Use this to insert a table of summary calculations for a given cell range in the worksheet rather than add each formula individually on the sheet.
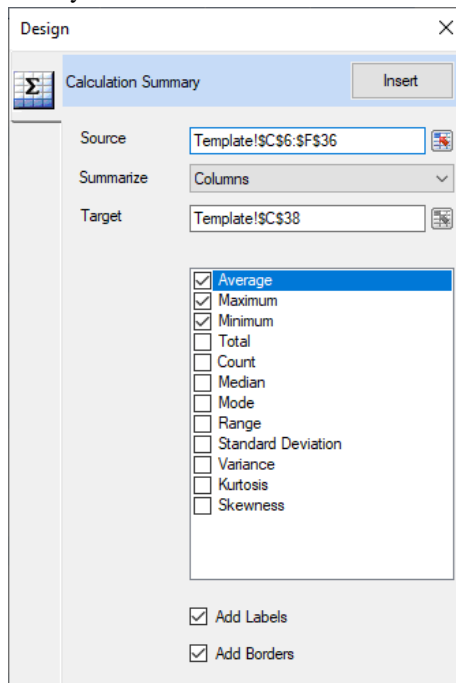
The example above demonstrates how this option can be used to add the *Average*, *Mininum* and *Maximum* formulas for each *Column* from *C:F* between rows *6:36*. The table of summary calculations is put onto the sheet starting cell *C38*.

Source

The cell range containing the values to be calculated. If the number of rows (or columns) of data brought into the report is unknown and the data connection is configured to insert, only the first two rows (or columns) need to be specified. The formulas will automatically adjust as each row (or column) is inserted into the sheet (see the **Understanding Insert Placement** section in DESIGN**, Data Connections**).

Summarize

When summarizing the **Source** values, this can be done by **Columns** or by **Rows**, depending on the direction of the data.

Target

The destination (upper left corner) for the summary table. By default, this will be set to two rows beneath the **Source** range but can be customized.

Calculations

Several basic summary calculations are provided to choose from, all of which can be selected at once. In the worksheet, these will appear in the same order as they do in this list.

Add Labels

If checked, labels for each calculation are placed in the worksheet. If **Columns** is selected for the **Summarize** setting, the labels are placed one column to the left of the **Target** cell. If **Rows** is selected, the labels are placed one row above the **Target** cell.
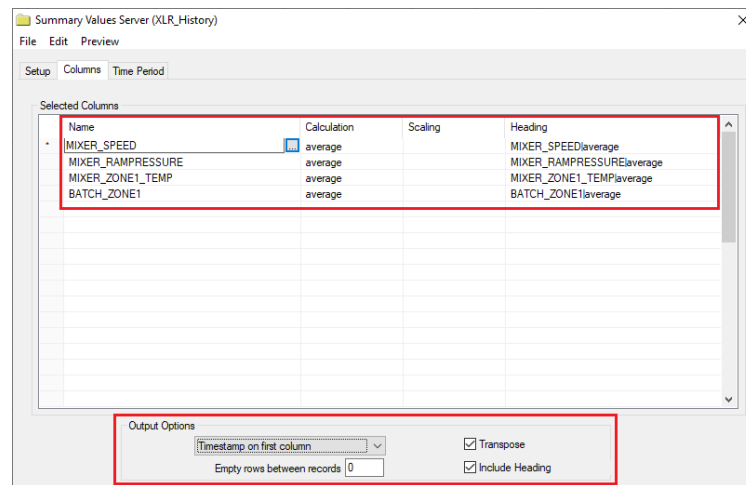
Add Borders

If checked, an outside border is added around the summary table (not including labels).
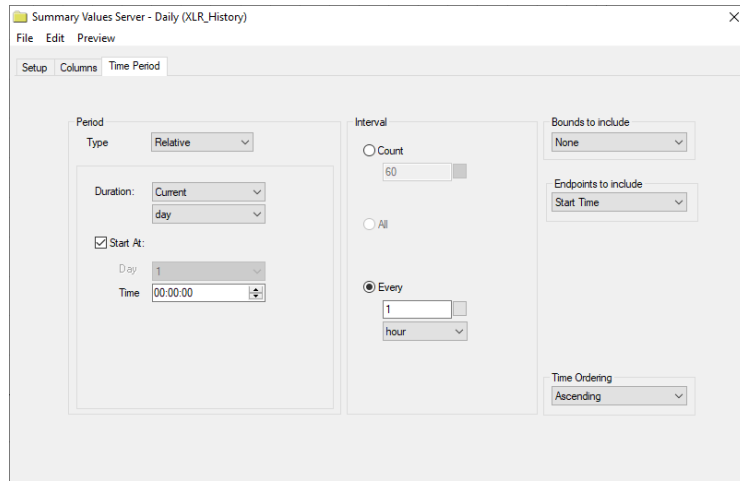
Chart

Anatomy of a Chart

A common usage of charts is to visualize the data collected by **Data Groups**. A Data Group has several components which influence chart configuration.


The number of **Selected Columns** influences the number of series in the chart.

The **Output Options** for **Timestamp on first column** and **Include Heading** influence the charts category axis and series names.

The number of rows collected into the report by the Data Group also influences the chart configuration. In the above example, data is returned at a *1 hour* **Interval** over the **Period** of the **Current Day**, therefore 24 rows are returned.
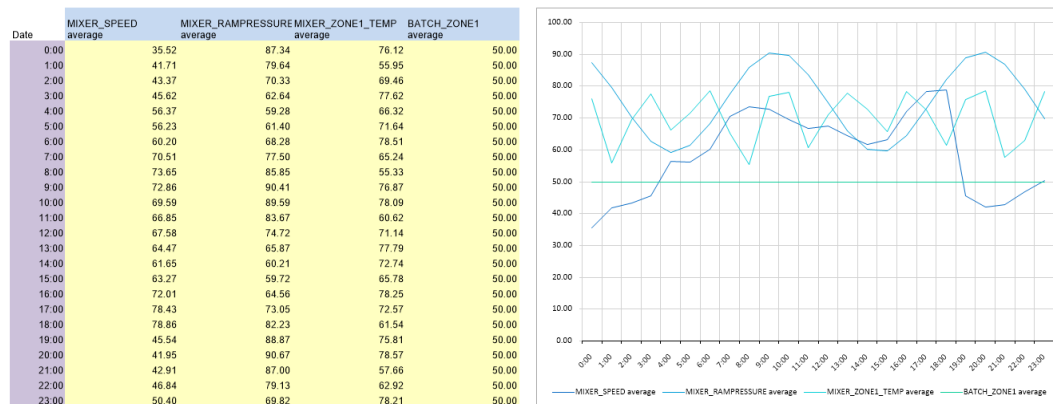
In the above diagram, the data from the example Data Group is mapped onto a line chart.

The **Category Column** containing the timestamps in purple is displayed as the horizontal axis labels.

The **Series** values are displayed as the 24 rows of tag data.

The **Header rows** returned by the headings included in the Data Group in blue are used in the legend.

Empty Chart

This option is only available in the **XLReporter** Template Studio.

When selected, an empty chart is added to the worksheet at the currently selected cell. From here the chart can be configured by either right-clicking it or by selecting the **Design** and **Format** options in the **Chart** area of the ribbon. For details, see the **Chart Configuration** section below.

Express Chart

This option is available in the **XLReporter** Template Studio by selecting **Express Chart** under the **Chart** button (or clicking the **Chart** button itself). In Excel, this option is available by clicking the **Chart** button.

Before selecting this option, it is recommended to highlight the range of cells to apply to the chart. By doing this ahead of time, in most cases, in the **Express Chart** all that needs to be selected is the chart type itself.
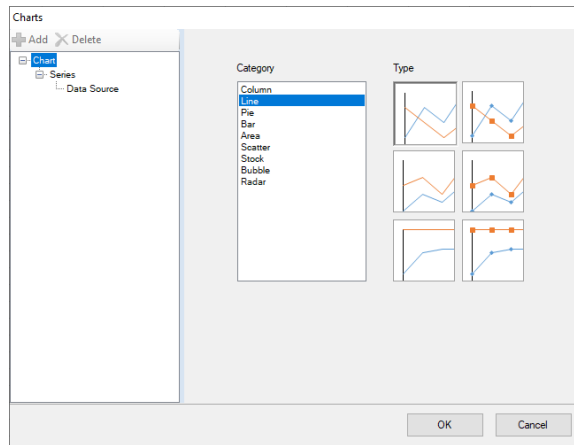
The **Chart** branch on the left displays a list of every available chart to configure. When a **Category** is selected, each **Type** of chart for it is displayed. Hover over any **Type** to see a description of the chart type.

To configure the series for the chart, on the left, select the **Series**, **Data Source** branch.
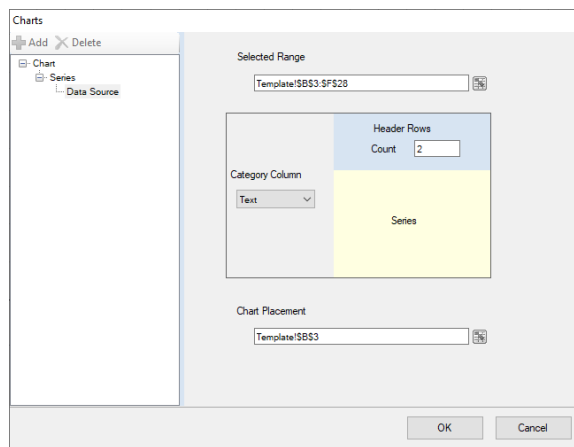
Header Rows defines how many rows, if any, at the top of the **Selected Range** are used as labels for the chart data series.

Category Column specifies whether or not the left-most column in the **Selected Range** is added as a series on the Category axis of the chart (if the selected **Chart Type** supports a category axis).

Some chart types, like line charts, support a category type like *Date* or *Text* to define the type of data the category axis is comprised of. If the column contains dates (without times), the category can be set to *Date*, for anything else (include dates with times), this should be set to *Text*. Other chart types do not have this level of configuration in which case this can set to *Yes* to treat the leftmost column of the **Selected Range** as the Category axis or *No* to treat the leftmost column as the first series of the chart.

Placement is the cell where the upper left corner of the chart appears initially. The chart can be moved and resized after it is added.

Once the chart is added, in Excel it can be modified and manipulated by using the options available in the **Chart Design** and **Format** ribbon options that appear when the chart is selected.

In the **XLReporter** Design Studio, the chart can be modified and manipulated by either right-clicking it or by selecting the **Design** and **Format** options in the **Chart** area of the ribbon. For details, see the **Chart Configuration** section below.

Chart Configuration

The following options are available in the **XLReporter** Template Studio when a chart is selected.

Data Series

This option is avaiable from the right-click menu or from the **Design** button in the ribbon.
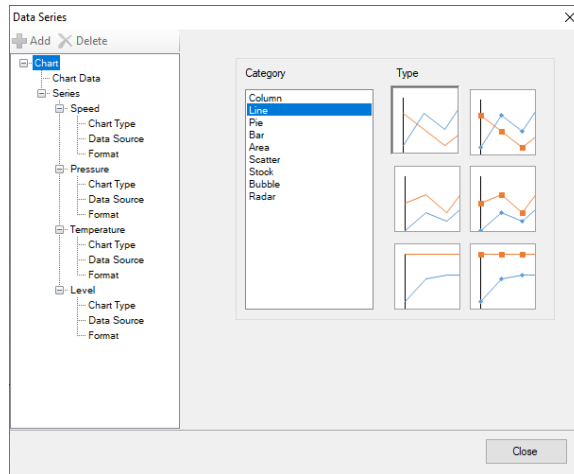

From the **Chart** branch the overall chart type can be changed by selecting the **Category** and **Type**.

Each series in the chart is displayed as a branch under **Series** on the left. A new series can be added by selecting the **Series** branch and clicking the **Add** button. A series can be deleted by selecting the specific series branch and clicking the **Delete** button.

The specific series branch displays general settings based on the chart type.
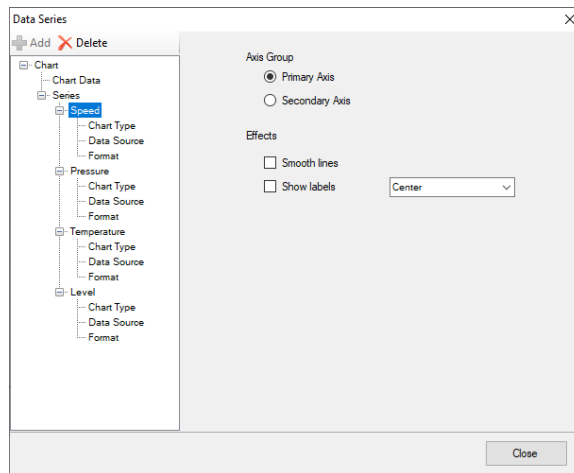
The **Chart Type** branch provides the option to the change the type of the specific series selected rather than every series in the chart.
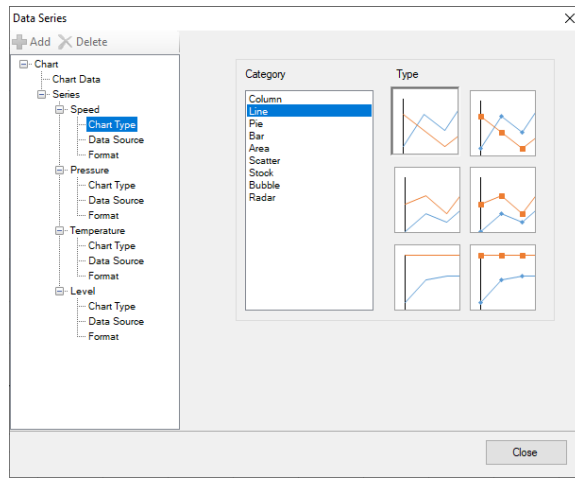
Use this option to configure combination chart such as a chart some series are shown as columns and others are shown as lines.

The **Data Source** branch displays where the data for the series comes from.
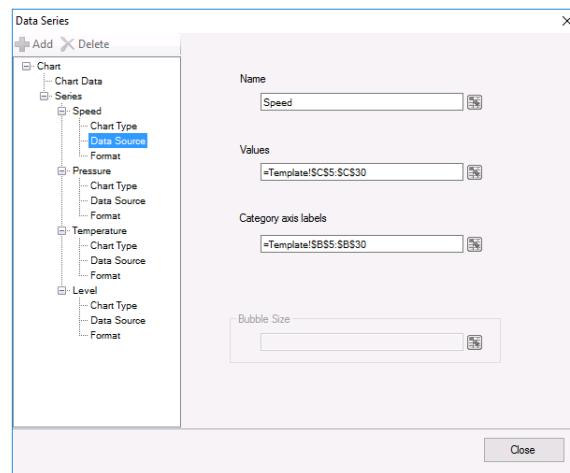
The **Name** can be a fixed name or a cell reference. **Values** is the series values and **Category axis labels** are the X-axis.
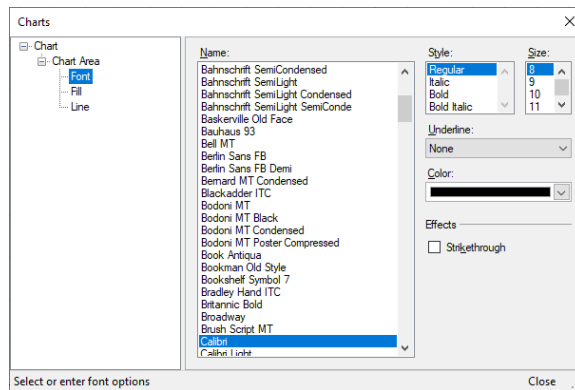
The **Format** branch displays information about how the series is formatted on the chart.
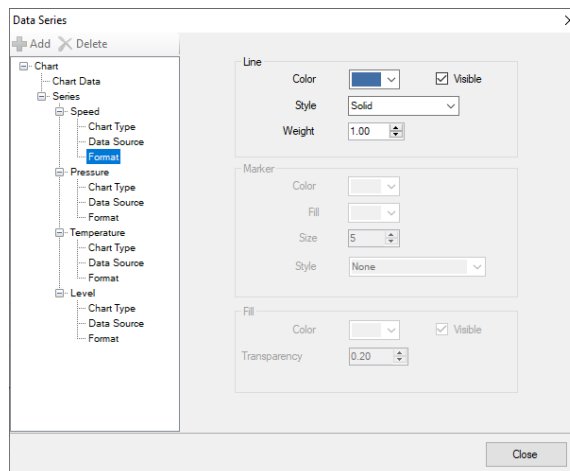
The settings displayed are based on the **Chart Type** of the series. From here things like styles and colors can be configured to customize the look of each series.
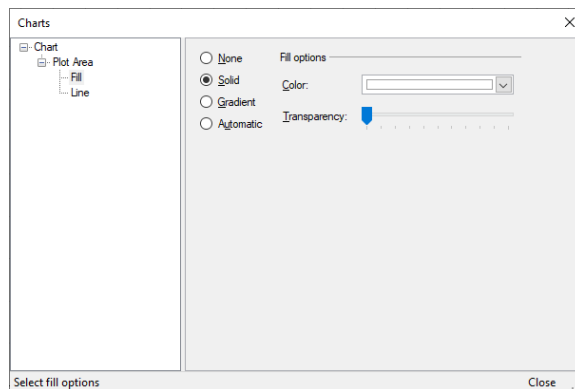
Chart Area

This option is avaiable from the right-click menu or from the **Format** button in the ribbon.

Use these settings to modify the **Font**, **Fill** color and **Line** options for the chart area.

Plot Area
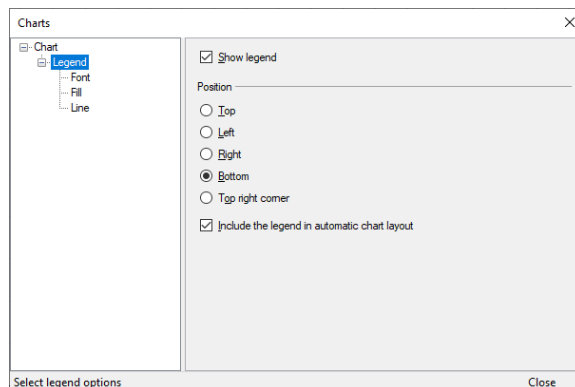
This option is avaiable from the right-click menu or from the **Format** button in the ribbon.

Use these settings to modify the **Fill** color and **Line** options for the plot area.

Legend

This option is avaiable from the right-click menu or from the **Format** button in the ribbon.
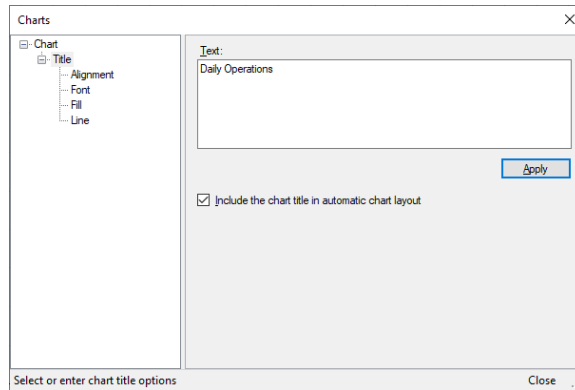

Use these settings to show a legend on the chart and choose where it should be positioned.

Once shown, use the branches beneath to configure the **Font**, **Fill** color and **Line** options for the legend.

Title

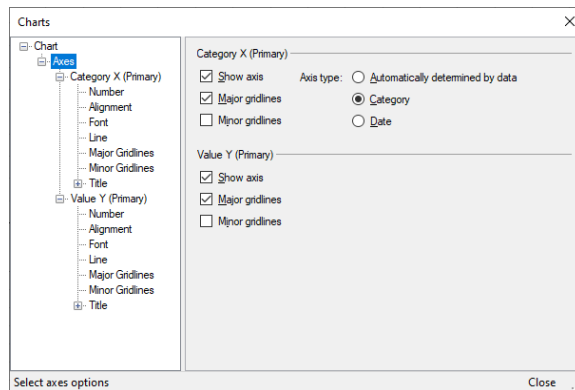This option is avaiable from the right-click menu or from the **Format** button in the ribbon.

Use these settings to configure a **Title** for the chart.

Once applied, use the branches beneath to configure the text **Alignment**, **Font**, **Fill** color and **Line** options for the title.

Axes

This option is avaiable from the right-click menu or from the **Format** button in the ribbon.

Use these settings to configure the X and Y axes for the chart. For each Axis there are a number of different options available to configure how each is displayed in the chart.

Copy Chart

This option copies the selected chart as a new chart on any worksheet in the workbook.
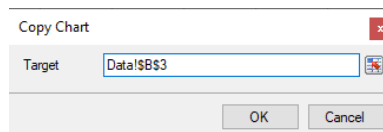
The **Target** setting is the top left corner of the worksheet of where the new chart is copied.

Snap To Grid

This option is available from the **Format** button in the ribbon.

When selected, if the chart is moved or resized when the mouse is released the chart is resized to completely fit the range of cells that contain it.

Consider the following:
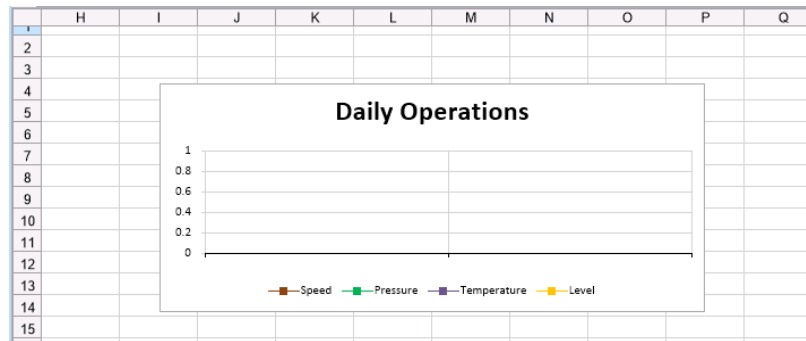
The chart encompasses the range *I4:P14* but does not fill the entire range. By enabling **Snap To Grid** and moving or resizing the chart slightly, the chart now appears as:
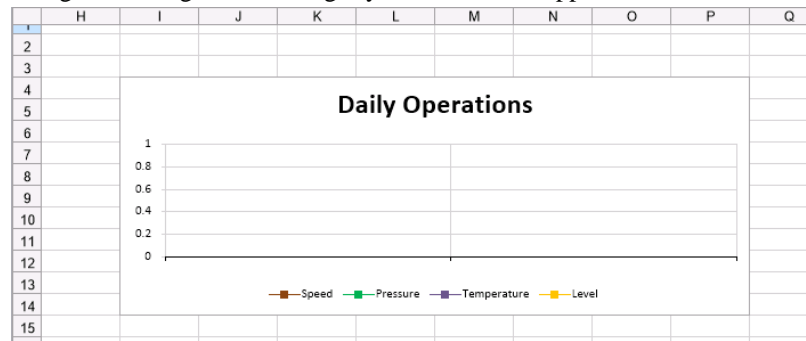
Note that once the **Snap To Grid** option is enabled it will take affect every time the chart is moved or resized until the option is selected again to shut it off even if the chart is de-selected and then selected again.

Report

Report Names

The **Report Names** define the name of the report generated from the template. The naming rule is also applied to published PDF files and Web Pages.

Names can be specified at both the workbook and worksheet level.

Select **Report Names**. On the left the workbook settings are available along with the specific worksheet names from the template.
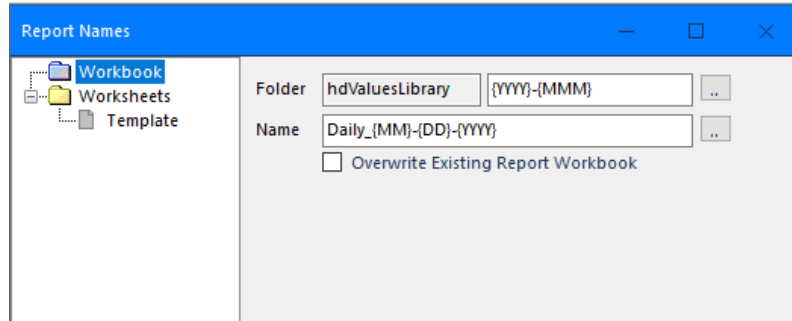
All the worksheets in the workbook are listed. Each can have a **Report** name configured. The general Worksheets folder is the default that when set is used for any worksheet without a specific name.

The masks are a combination of static text, date/time, variables, and name types.

- **Static Text**

   Text can be included in any part of the mask.

- **Date/Time**

   Date and time formats.

- **Variable**

   A **Variable**, enclosed in { } can be included in any part of the mask provided its value does not violate the Windows file naming convention. The value of the **Variable** is normally assigned before the template is used. For example, use a custom variable *{BatchName}* in the mask and set the value of *{BatchName}* to the value of a PLC tag.

The **Overwrite** setting indicates if the workbook or worksheet exists, it is overwritten.

Select an option to the right row and click **Modify** to edit the masks.
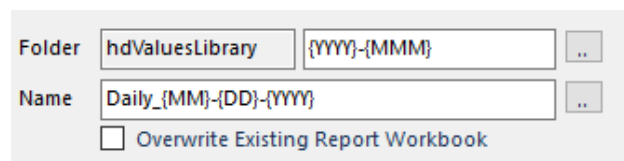
The mask items can be selected by clicking the browse […] pushbutton.
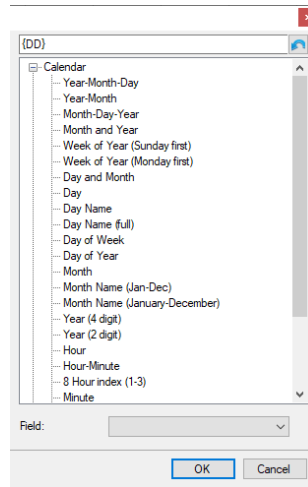
Schedule

The **Schedule** option opens the Schedule Designer where templates can be scheduled to produce reports periodically, on time or event.

For more information, see REPORT, **Deploy Schedule Reports**.

On-Demand Designer

The **On-Demand Designer** is used to configure a template to generate reports on demand. This includes configuring parameters for the user to specify and setting the action(s) necessary to generate the report.

For more information, see DESIGN, **Design On-Demand Reports**.

Preview

The **Preview** option is used to preview the template as a report using the On-Demand Reports application.

For more information, see REPORT, **Deploy On-Demand Reports**.

Workbook Features

The following highlight some features that can be used to help enhance the report template. These features are available in both Excel and the **XLReporter Template** Studio except where noted.

Cell Formatting

Number Format
Excel

For custom formatting of cells, right click and select the **Format Cells…** In this dialog decimal places, date formats, currency, percentage, and other options can be specified. On the **Number** tab, the **Custom Category** provides more advanced formatting e.g., *mm/dd/yy h:mm:ss* gives the date and time to the second.

XLReporter Template Studio

For custom formatting of cells, right click and select the **Format Cells…** With the **Format** button decimal places, date formats, currency, percentage, and other options can be specified. The **Custom** option provides more advanced formatting e.g., *mm/dd/yy h:mm:ss* gives the date and time to the second.

Borders and Backgrounds
Borders and background colors can add a level of sophistication to reports.

For **Data Entry Forms**, placing a border around each input cell is a good idea to emphasize the form field. Different background colors can be used to color code input cells one color and any formula cells with another.

Excel

These settings are available in the **Format Cells** dialog under the **Border** and **Fill** tabs.

XLReporter Template Studio

These settings are available in the **Format Cells** option under the **Border** and **Font** sections.

Formulas
There are over 400 formulas and functions that can be incorporated into reports. To access, click the *fx* button in the formula bar.

For **Data Entry Forms**, user entry can be values used by formulas in other cells. Both user entry and formulas can be saved to the database. Note that in order to prevent a formula from being overwritten when the form is refreshed, set the **Transfer** of the cell(s) to **Write**.

Data Validation
All the **Data Validation** in the workbook can be used in a **Data Entry Form.**

In Excel, select **Data, Data Tools, Data Validation**. In **XLReporter** Template Studio select **Design**, **Data**, **Data Validation**.
Examples of data validation include restricting cell values to certain ranges and providing pick list for the user's selection. In addition, custom instructions and error prompts can be configured to give feedback to the user.

Most of these validation types require a data type and a condition that must be met. The condition can be hardcoded or given by a cell reference.

Hint: Select the entire range of cells that require the same type of validation before opening **Data Validation**.

- **Validation Types**

Any Value

Any input is accepted for this type. This is applicable for fields in a form that you do not need any validation for, however still want to utilize the custom input prompt for providing instructions.

Whole Number

The field can accept a whole number that meets the specific criteria.

For example, a field can only accept an integer between a min and max value contained in cells **C10** and **C11,** respectively.

> **Allow:** *Whole Number*
> **Data:** *Between*
> **Minimum:** *=C10*
> **Maximum:** *=C11*

Decimal

The field can accept a decimal number that meets the specific criteria.

For example, a field can only accept a decimal number that is less than or equal to 5.

> **Allow**: *Decimal*
> **Data**: *less than or equal to*
> **Maximum**: *5*

List

A drop-down list is provided to select from. It is recommended to use this option whenever possible to prevent against manual entry errors and to keep the database entries consistent. In addition, dynamic lists can be created by using formulas.

With this option, **In-cell dropdown** should always be checked.

For example, the field requires one operator name to be entered. There are 10 total operator names that could be chosen. Their names are listed in cells **J1** to **J10**.

> **Allow**: *List*
> **Data**: *N/A*
> **Source**: *=$J$1:$J$10*

Date

The field requires a date to be entered that meets the conditions set.

For example, the field can accept a date that is within today's date and a week from today.

> **Allow**: *Date*
> **Data**: *Between*
> **Start date**: *=TODAY()*
> **End date**: *=TODAY() + 7*

Time

The field requires a time to be entered that meets the condition set.

For example, a time must be entered between normal working hours 9am to 5pm.

> **Allow**: *Time*
> **Data**: *Between*
> **Start time**: *9:00 AM*
> **End time**: *5:00 PM*

Text Length

The field requires text to be entered that meets the condition set.

For example, the field is a comment field that requires text but is limited to 255 characters so it can be inserted into a **Text** data field.

> **Allow:** *Text Length*

Data: *Less than or equal to*
Maximum: *255*

Custom

The field uses a calculation/formula to determine if data entered is valid. The formula must evaluate to TRUE for valid entries and FALSE for invalid entries. This is the most dynamic of the validation types because it can use a vast array of formulas. The value of other cells can be used to determine validation as well.

For example, the field configured for cell **B10** can only accept text. Use *=ISTEXT(cell)* as the formula to validate that only text is entered.

Allow: *Custom*
Formula: *=ISTEXT(B10)*

In another example, the cell **A11** can only accept a product ID starting with "PROD" and ending with a number. E.g., *PROD459789.*

Allow: *Custom*
Formula: *=IF(LEFT(A11,4)="PROD", TRUE, FALSE)*

- **Ignore Blank**

Most validation types offer the **Ignore blank** option which is found in the **Settings** tab. To ensure the user must enter a value, uncheck this option. When the form is deployed, the cell will appear with a red background when the form is deployed until data is entered.

If you wish to create a required cell with no additional validation, set **Allow** to *Any Value*. However, the **Ignore blank** option is disabled. To work around this problem:

- Switch **Allow:** to *Whole Number.*
- Uncheck **Ignore blank**.
- Set **Allow**: back to *Any Value.*

- **Custom Input and Error Messages**

As part of the validation configuration, custom input and error messages can be set. These messages appear when the cell is selected or when data entered in the cell does not meet the validation configured. By creating input messages, you can give the user instructions on each form input as well as instructions to correct the data if it does not pass validation.

Input Message

This option, when enabled, displays a prompt when the user selects the cell to edit. It can be used to give instruction on what type of data is required for this field.

Error Alert

This option (when enabled) prompts the user after invalid data is entered in the cell to alert them that it is invalid. In **Data Entry Forms** only the *Stop* **Style** is supported, the others should not be used. When invalid data is entered, a Stop alert message is shown. There are 2 options available:

- **Retry** to enter a new value
- **Cancel** to remove the current value from the cell

If this option is not enabled and the user enters invalid data, the data remains in the cell. This can be useful for cells that present a list of values to select from but also allow for the user to enter something manually. For example, on a form a user must fill out if a piece of equipment fails, a list of common failure reasons may be provided, but there may also be the need for a user to enter a custom reason that is not on the list.

Conditional Formatting

One of the best features of workbooks is conditional formatting which highlights anomalies or values that are "out of spec".

To configure in Excel, under the **Home** tab select **Styles, Conditional Formatting, New Rule**. For example, to color a cell red if the value is greater than 50, Select Format only cells that contain. For the **Rule**, set *Cell Value greater than 50*. Click **Format** and under **Fill**, select red.

To configure in the **XLReporter** Template Studio, under the **Design** tab select **Content, Conditional Formatting, Manage Rules**.

Named Cells/Ranges

Providing a name to a cell has the benefit that if rows/columns are added/removed, the name always remains with the cell. This means that if a data connection uses a named cell, the data from the connection is placed at the current location of the cell. This is in contrast with a connection that uses a specific location e.g., $B$8, which always places its data to the specific cell.

Take, for example, a report template set up with 2 data connections where the number of rows returned for each connection is unknown during template design.
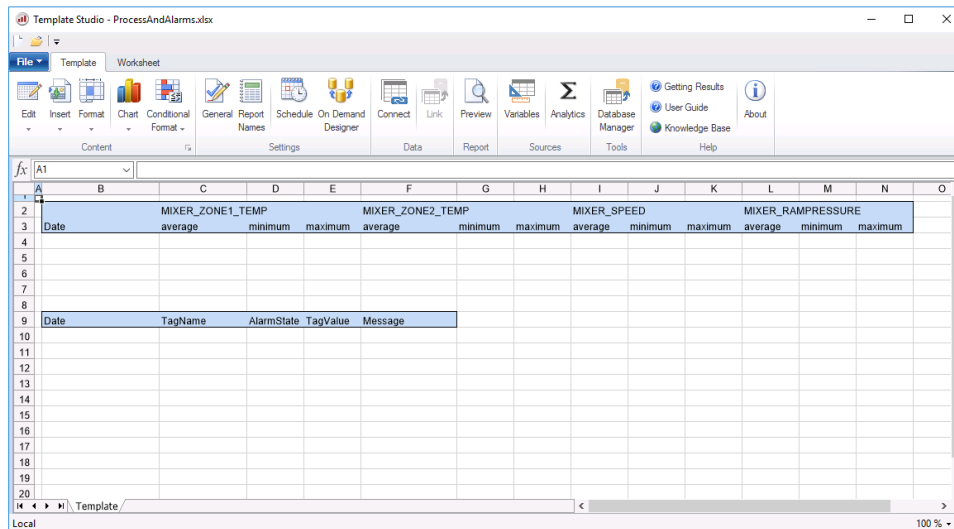
The connections are configured to insert with one connected to cell *$B$4* and the other to *ABC* which is a named cell for *$B$10*. The connection at *$B$4* inserts its data pushing the name *ABC* down the worksheet. The connection at *ABC* now starts below the entire data table of the top connection.

Named cells can be used in both **Data Connect** and **Data Manage**. To use a named range, the **Scope** (**Data Connect**) or **Active By** (**Data Manage**) setting must be set to a specific worksheet.

Then in the settings where a cell reference can be specified (like **Placement** for **Data Connect**), toggle from **Cell** to **Name**. A drop-down list of all configured named ranges configured for the selected worksheet.

Defining a Named Range

Excel

Named cells/ranges are defined in Excel a few different ways.

- Under the **Formulas** tab, in the **Defined Names** section, click **Define Name**.
- Under the **Formulas** tab, in the **Defined Names** section, click **Name Manager**. In **Name Manager** click **New**.
- With the cell/range to name highlighted in the worksheet, click into the **Name Box** to the left of the Excel's formula bar, enter a **Name** (replacing the cell reference shown) and press the *Enter* key.

XLReporter Template Studio

- Under the **Design** tab, select **Content, Insert, Named Range**.
- Under the **Design** tab, select **Data, Name Manager**.

LastCell

Special consideration is made for any connection configured to a cell named *LastCell*. *LastCell* should only be used with connections that have **Placement** set to one of the *Insert* types.

When a connection configured to *LastCell* is updated, cells/rows/columns are inserted (depending on **Type** and **Direction**) causing the *LastCell* definition to move down or across the worksheet. This functionality can be useful for reports where multiple rows/columns of data are brought into the report at different times, and each appears beneath / to the right of the previous.

Inserting Cells, Rows and Columns

On a worksheet cell, rows and columns can be inserted shifting the existing content of the worksheet. However, different insertion methods net different results.

Inserting Entire Rows

In the **XLReporter** Template Studio, insert a row by selecting an entire row and selecting **Insert, Rows**.

When an entire row is inserted into a worksheet every row starting at the row selected and below is shifted down by 1 row. This includes:

- Cell Content and formatting
- Charts
- Images
- Row Heights

Inserting Entire Columns

In the **XLReporter** Template Studio, insert a column by selecting an entire column and selecting **Insert, Columns**.

When an entire column is inserted into a worksheet every column starting at the column selected and to the right is shifted to the right by 1 column. This includes:

- Cell Content and formatting
- Charts
- Images
- Column Widths

Inserting Ranges

When a range is inserted into the worksheet you have the option of shifting cells right or shifting cells down. However, this only affects cells within the range inserted.

For example, with cell $B$4 selected if you insert shifting cells down, anything in the B column starting at 4 is shifted down by 1 row. Nothing else is affected. Unless charts and images are contained completely within the B column they will not be shifted down. In addition, row heights are not shifted down either.

Usage with Data Connections

As part of template design, **Data Connections** (as well as some **Management**) can be configured to insert cells, rows or columns depending on the **Placement Type** specified.

The *Insert At Start* and *Insert At End* types perform a range insert on the worksheet, shifting cells either down or to the right depending on **Direction**. The *Insert At Start (full)* and *Insert At End (full)* types perform full row or column inserts on the worksheet shifting all rows down or columns right depending on **Direction.**

To illustrate the behavior, consider the following scenario: a template with a single connection that returns 5 columns and 24 rows configured to cell *$B$4*.

If this connection is set up as *Insert at Start* with **Direction** *Down*, when it runs it inserts a range of 5 columns by 24 rows into worksheet. This means anything in the B – F columns below row 5 is pushed down the worksheet. Nothing else is affected.

The benefit of this configuration is that anything set up to the right of the connection is not affected by the insert of this connection so a second connection could be easily configured to the right and nothing else would have to be considered.

If this connection is set up as *Insert at Start (full)* with **Direction** *Down*, when it runs it inserts 24 full rows into worksheet. This means anything in any column below row 5 is pushed down the worksheet.

The benefit of this configuration is that if anything is set up below the connection that is "wider" than what the connection returns, it is shifted down and not displaced. In addition, objects like charts and images which may not fit exactly under the range of the connection are shifted down as well along with any custom row heights that may be configured.

Excel Considerations

When using Excel as the Template Studio, the following should be considered.

Saving Templates
When a template is saved, use the **Template**, **Save** option since this saves the workbook and compiles a list of worksheets in the workbook for other uses.

Copying an Existing Template
To create a new report template from an open template, use the **Template**, **Save As** option since this saves the workbook and the configuration to the new template.

Adding/Deleting Rows and Columns
Use the **Cells, Insert/Delete** option to insert or delete rows or columns so that changes in the position of cells also affect the data connections.

Comments
By default, when a data connection is configured, a comment is added to the target cell. The comment appears as a red mark in the upper right-hand corner of the cell and can be removed if desired.

In **Data Connections** set **Auto Comment** to *No* to turn comments off.

Design Considerations

When designing in either environment, the following should be considered.

Renaming Worksheets
If a worksheet is referenced by data connection, renaming the worksheet invalidates the connections. In such cases, use the **Export** function provided in **Data Connection**, replace the old worksheet name with the new one and then use **Import** to update the configuration.

Printing Reports and Forms
When a report or form is printed, the page layout defined in the studio is used for the worksheet. These settings are accessible under the **Page Layout** tab in Excel and **File**, **Print**, **Page Setup** on the in the **XLReporter** Template Studio.

These page settings extend to the report when it is published as a PDF file.

Print Area
By default, when a worksheet is printed, every populated cell appears on the printout. The Studio provides an option to set the print area of a worksheet so that only a specific range of cells appears on the printout. This can be defined for each worksheet by highlighting the cells to print and selecting **Page Layout, Print Area** in Excel and **File**, **Print**, **Page Setup** in the **XLReporter** Template Studio.

Security

Reports viewed using the **Report Viewer**, both locally and with a **Team Client**, are read-only. If manual edits are to be permitted, then the cells in the template need to be unlocked. To unlock a cell in Excel, right-click and select **Format Cells**. In the **Protection** tab, uncheck **Locked**. To unlock a cell in the **XLReporter** Template Studio, select the cell(s) and click the **Format** dropdown list on the **Design** tab and choose **Unlock Cells**.

This security is applied to on-demand reports that are generated using the **On-Demand Reports** application.

The same security is extended to **Form Templates** so any cells that user must enter data into should be unlocked.

In addition, any cell containing a formula is automatically protected against editing regardless of whether any security is applied to the report.

Formulas and Functions

As previously mentioned, there are over 400 formulas and functions that can be incorporated into a report template. To access, click the **fx** button in the formula bar.

Parameters

A formula can have one or more parameters that define the value returned to the cell. A parameter can be a hard coded value or a cell reference (or range). When a cell reference or range is specified, it can be done as an absolute reference, a relative reference, or a mix of both.

Absolute Reference

An absolute reference means that the cell or range is locked so that if the cell is copied the reference will not change. An absolute reference is denoted with "$", e.g., *$A$1* or *$A$1:$C$5*.

Relative Reference

A relative reference means that the cell or range changes if the cell is copied. A relative reference is denoted without "$", e.g. *A1* or *A1:C5*.

Mixed Reference

A mixed reference means that either the column or row is locked but the other is not so if the cell is copied only the unlocked reference is changed. For example, *$A1* means that the column (A) is absolute while the row (1) is relative. Conversely, *A$1* means that the column (A) is relative while the row (1) is absolute.

A Practical Example

Consider a report template that brings in product codes from 4 different lines and contains a lookup table to determine the name of the product based on the code.

To show the product name along with the product code, a LOOKUP formula can be used. Let us assume that the product codes are to be written to cells *C4*, *D4*, *E4* and *F4* and the corresponding names in cells *C5*, *D5*, *E5* and *F5*. The lookup table is in cells *AA2:AB51*.

In cell *C5*, the formula should be:

$$=LOOKUP(C4, \$AA\$2:\$AB\$51)$$

The **LOOKUP** function has two parameters: the first is the value to look up and the second is the range of the table to use for looking up. Notice that the first parameter is set as a relative reference and the second parameter as an absolute reference. This is so the formula can be copied from *C5* and pasted into *D5*, *E5* and *F5* without making any edits. The first parameter will change but the second will not.

Useful Functions

While it would be impossible to document all the functions available in the studio, the following are ones that can help in reporting.

IF

The **IF** function is used to compare values and show a different value based on the comparison being true or false.

A common use of this would be that if a measurement is less than a threshold (like 0.1) show is as "N/A", otherwise show the value. If the value is in cell A1, the formula is:

$$=IF(A1<0.1, \text{"N/A"}, A1)$$

The first parameter is the comparison, the second is the value if the comparison is true and the third is if the comparison is false.

IFERROR

The **IFERROR** function is used to check if there is an error and if so, do not show the error but instead show what is specified.

A good example of this is using this function in conjunction with the AVERAGE formula so that if all the cells are empty, *#DIV/0!* is not shown. If the average spans the range A1:A23, the formula is:

$$=IFERROR(AVERAGE(A1:A23), \text{""})$$

The first parameter is what to test for an error. If this is not an error, the value from the parameter is used. However, if the value from parameter 1 is an error, the value in parameter 2 is shown. In this case, the cell will appear empty.

COUNTIF

The **COUNTIF** function can be used to count values in a range that meet the criteria specified. The criteria can be hard coded like *">25"* or *"<1"* or a cell reference. If a cell reference is specified on its own, this means that the criteria operator is equals. For any other operator it must be concatenated with the cell reference. For example, if the criteria is greater than the value of cell *A1*, it must be specified as *">" & A1*.

For example, if cells *C4:C50* contain temperature readings and the report needs a count of how many times the temperature exceeded *100* degrees the formula is:

$$=COUNTIF(C4:C53, \text{">100"})$$

SUMIF and AVERAGEIF

The SUMIF and AVERAGEIF functions are very similar to the COUNTIF function in that a range and a criteria is specified to derive a value. However, both functions have an optional third parameter which is the range to perform the calculation on.

For example, let us say the B column contains the state 0 or 1 and the C column contains temperature in rows 4 to 53. To get the average temperature only when the state is 1, the formula is:

$$=AVERAGEIF(B4:B53, \text{">0"}, C4:C53)$$

MATCH

The **MATCH** function is used to find the matching row or column where a specified value is located.

For example, if the report contains hourly values from cells *C4:C27* and in cell *C29* the maximum of that range is determined (using the **MAX** function), the **MATCH** formula can be used to determine which row in the range contains the maximum. The formula is:

$$=MATCH(C29, C4:C27, 0)$$

This in and of itself may not be very useful, however, if the *B* column contains the timestamps corresponding to those values, the OFFSET function can be used with the MATCH function to get the time of maximum for the day. The formula for that is:

$$=OFFSET(B4, MATCH(C29, C4:C27, 0)\text{-}1, 0)$$

Note the *-1* at the end of the **MATCH** formula. This is because the **OFFSET** formula is 0 based and the **MATCH** formula is 1 based.

MID

The MID function is used to extract characters from text. A good example of this would be a report where a code is retrieved that has multiple elements that need to be broken out within the report. For example, if the code is brought into cell *B4* and the *4th* and *5th* characters need to be extracted, the formula is:

$$=MID(B4, 4, 2)$$

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