CROWN SYSTEMS (S) PTE LTD
11 Tampines Cconcourse #02-06 S (528726)
Tel: (65) 6588 2378 Fax: (65) 6588 2366
www.crownsys.com.sg

CROWN SYSTEMS



CROWN SYSTEMS

AUTODESK REVIT MEP ADVANCED - ACMV

STUDENT GUIDE
V 2014

AUTODESK. IDAT TILOS asia powerproject ORACLE BIM Estimating FM Systems Novade CMC

SME One Asia Prominent Award | **Oracle Primavera**: Top ASEAN Reseller | **Autodesk**: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

CROWN SYSTEMS

Welcome to Crown Systems!

Since 1996, Crown Systems has been a leading provider of fully integrated, next generation, management solutions that are widely deployed in many organisations. In 1997, we became the Regional Primavera Authorized Representative (PAR) with operations in Singapore (HQ), Brunei, Indonesia, Malaysia, Philippines and Vietnam.

Headquartered in Singapore, we have established strong international linkages with key markets through a network of overseas offices, strategic alliances and representative offices in Brunei, Indonesia, Philippines and Vietnam. Our services include project consultancy, systems integration and software training.

You can count on Crown Systems for the most reliable and comprehensive range of software that address the diverse business needs of different industries. We also ensure highly responsive and consistent service to meet clients changing needs.

AUTODESK. IDAT TILOS ORACLE FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

CROWN SYSTEMS

Besides being an Autodesk Authorized Platinum Partner and Authorized Training Centre, Crown Systems also deals with Oracle Project & Portfolio Management, Contract & Change Management, Project Risk Management, BIM Solution and Balanced Scorecard.

In the recent year, we are working with Developers, Architects, Engineering Firms and A1 Contractors on large scale construction for BIM consulting and implementation.

We have garnered a strong portfolio of both private sector and public sector clients in the major industries. These range from engineering, construction, power, energy and process, marine and shipping, electronics manufacturing, financial, pharmaceutical to the information technology sector.

According to a recent survey, with our increasing market share in the project management field, Crown Systems is a solutions leader in these major industries and will continue to do so as more customers continue to demand for management solutions to boost their competitive edge.

AUTODESK. IDAT TILOS powerproject ORACLE BIM Estimating FM Systems Navoda CM:C

SME One Asia Frominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

CROWN SYSTEMS

1. Why the training manuals we have received are not the "thick" manuals which we use to receive previously?
   - **The current training manuals are produced by our professional certified trainers who have customized according to the experiences accumulated over the years when dealing when real live projects.**

2. How will these manuals help us better comparing the previous manuals?
   - **We have integrated data sets for you to work on and practices according to the common issues that will usually surface when working on a real live project. These manuals are much more focus towards the main points which makes it much easier for you to refer even after the training.**

3. Any additional information included in this new manual?
   - **Yes, we have also added the submission guidelines according to BCA standard.**

CROWN SYSTEMS

TABLE OF CONTENTS

Preface

Chapter 01 Creating Project Model **2-20**

1.1 Creating NEW MEP Project using specified Project Template

1.2 Linking Architecture / Structure Model

1.3 Copy / Monitoring of Link File

1.4 Acquiring Coordinates

1.5 Visibility and Graphic Overrides in Linked Models

1.6 Creating Working Views

1.7 Importing CAD file

1.8 Process of Creating Project File

Chapter 02 Title block **21-27**

2.1 Editing & Modifying Title block

2.2 Creating text & label

2.3 Inserting raster image

2.2 Manage Project Information

Chapter 03 ACMV Analysis **28-33**

3.1 Room and Spaces

3.2 ACMV Zoning

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

3.3 Calculating Heating and Cooling Loads

3.4 Process of Calculating Heating and Cooling Loads

Chapter 04 Creating Family **34-50**

4.1 Family Definition and Types

4.2 Overview of Family Editor

4.3 Family Templates

4.4 Creating Family Geometry

4.5 Creating Parametric Content

Chapter 05 Work sharing **51-58**

5.1 Overview of Work sharing

5.2 Creating Central file

5.3 Workset

Chapter 06 Saving Workshared Files **59-65**

6.1 Synchronizing with Central Model

6.2 Closing Workshared Files without saving

6.3 Opening Workshared files Independent of the Central Model

6.4 Relinquishing Ownership without Synchronizing with Central

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

CROWN SYSTEMS

BIM:

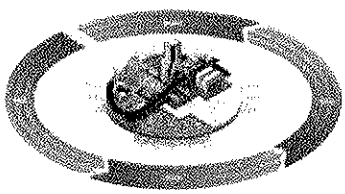
BUILDING INFORMATION MODELLING

Building Information Modelling (BIM) is an approach to the entire building life cycle. Autodesk® Revit® Architecture, Autodesk® Revit® MEP, and Autodesk® Revit® Structure are powerful BIM programs that support the ability to coordinate, update, and share design data with team members throughout the design construction and management phases of a building's life. A key component in managing the BIM process is to establish a company foundation for different types of projects by creating standard templates and custom elements. Having this in place makes the process of any new project flow smoothly and efficiently.

The objective of this training guide is to enable students who have worked with the software to expand their knowledge in setting up office standards with templates that include annotation styles, pre-set views, sheets, and schedules, as well as creating custom element types and families.

BIM for MEP Engineers

- Visualize, simulate and analyse MEP designs before they are built, more clearly
  Communicating your design intentions and using real-world engineering information
- Analyse energy usage to support sustainable building design objectives and industry requirements.
- Reduce design conflicts with real-time clash and interference detection.



AUTODESK. IDAT TILOS asia powerproject ORACLE BIM Estimating with CostOS FM Systems Nevada CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

Creating MEP Project file

In this chapter you learn how to create MEP project using specified template, Linking Architecture / Structure Model, perform monitoring of link file and getting the project coordinates established by the architect

This chapter discuss:

- **Creating a New (MEP) Project**
- **Linking Revit File**
- **Copy / Monitoring of a Link File**
- **Acquiring coordinates**
- **Creating working view**
- **Importing CAD**

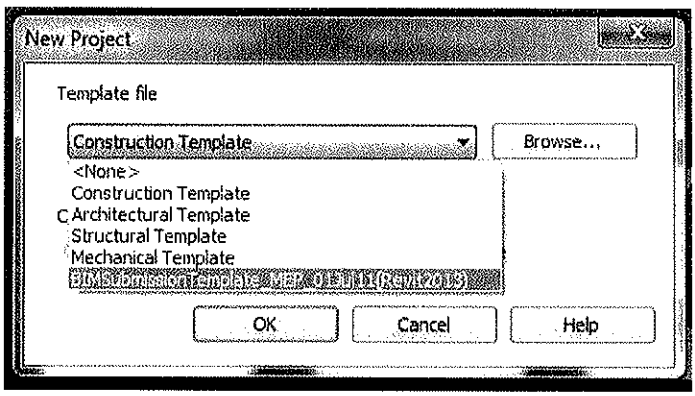
SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

1.1 Creating New Project (MEP)

MEP projects are typically created using linked architectural models. Plenums and chases should be included when analyzing heating and cooling loads for a project. Consequently, it's often necessary to add levels to the architectural model so that you can recognize the entire volume of an MEP project.

To create a project using a template

1. Click ▸ New ▸ (Project).
2. In the New Project dialog, under Template file, do one of the following:
   - Select a template from the list.
     BIMSubmissionTemplate_MEP_01Jul11(Revit2013)
   - Click Browse, navigate to the desired template (an RTE file), and click Open.



SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

1.2 Linking Architectural / Structural Model

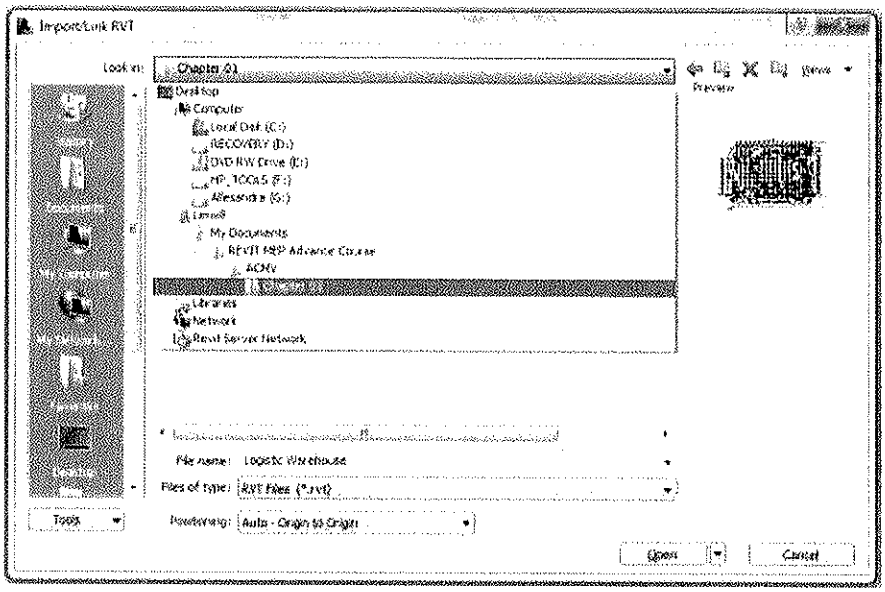
You link a project file using the Import/Link RVT dialog box. While linking, use shared coordinates, origin-to-origin, or center-to-center positioning to specify the location of the linked model in the host project.
When you link an Autodesk® Revit® Architecture or Revit Structure project file, its path is saved in the host Revit MEP project file. After linking, if the linked project file changes, you can reload it in the host project file to view the updated linked project file. If the path of the linked project file changes, you can update its path in the host project file using the Manage Links dialog box. You can access the Manage Links dialog box by selecting Manage Links on the Manage Project panel of the Manage tab or on the Link panel of the Insert tab.

To link Architecture / Structure model

1. Continue working on the New project file and switch to floor plan view in project browser **FSSD-FP_1ST STOREY**
2. Click Insert tab ➤ Link panel ➤ (Link Revit).
3. In the Import/Link RVT dialog, navigate the select the model to link.

   Logistic Warehouse.rte

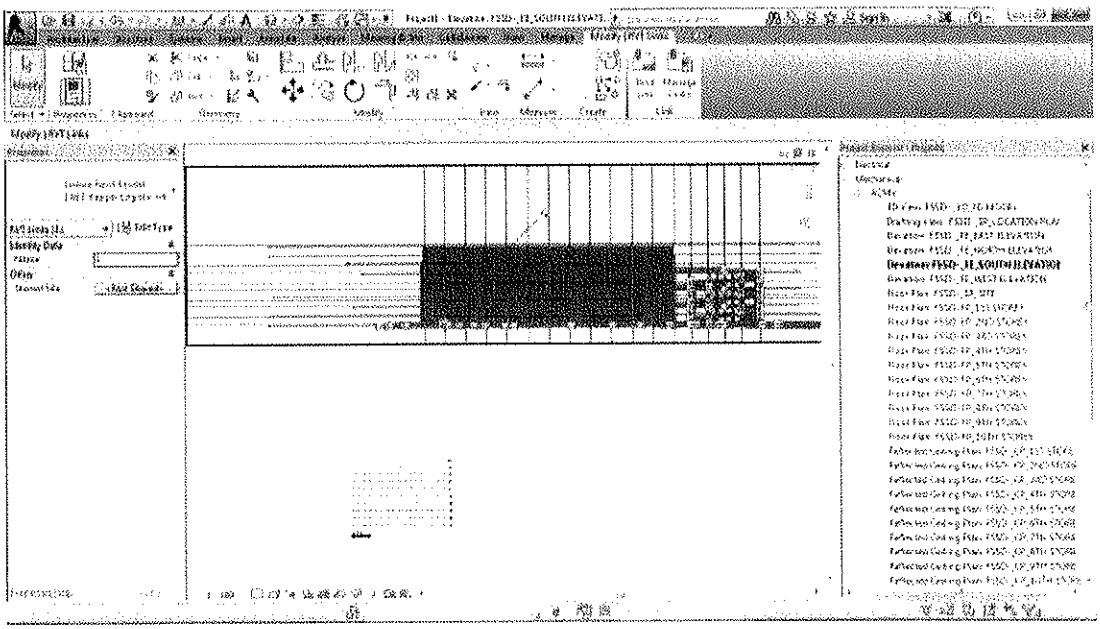
SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner



4. For Positioning select Auto - Origin to Origin
5. Click Open.
6. On the Quick Access toolbar, click 🖫 (Save) to save the project
7. Continue working on the new project file and switch the view to **FSSD-_FE_SOUTH ELEVATION** in project browser, zoom in to display both the linked Revit and the datum level of the project
8. Click to select the linked Revit file and key in **PN** (PIN) to pin the model to prevent the linked file to move from the current position.

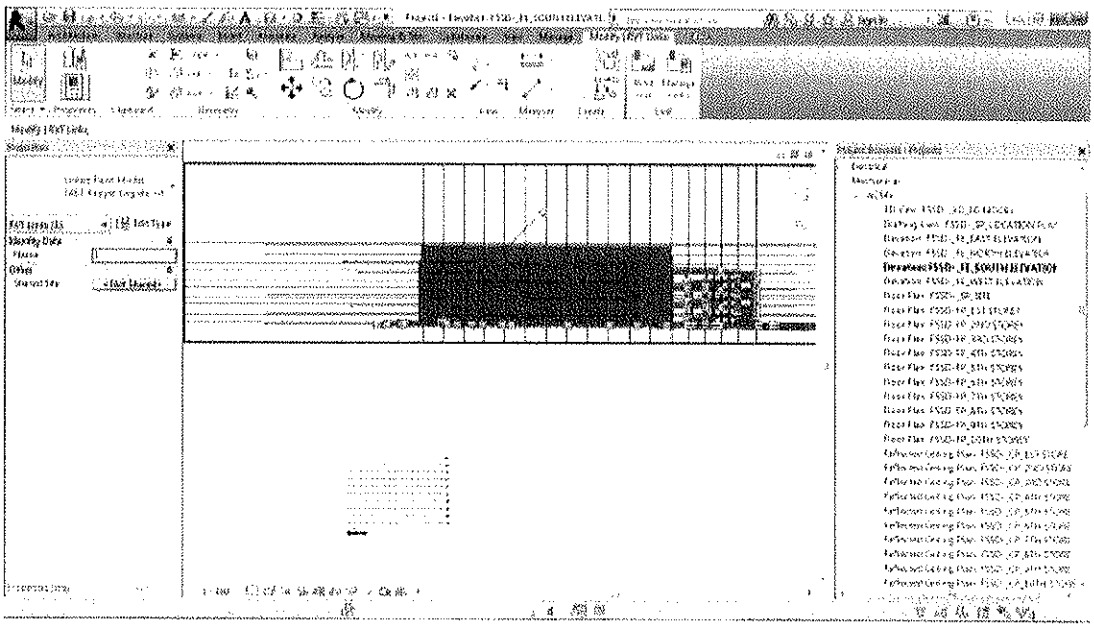
SME One Asia Prominent Award | **Oracle Primavera**: Top ASEAN Reseller | **Autodesk**: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

9. Click on the empty space of model view to deselect the linked model and change the View Scale to 1:200 in the properties under Graphics category or in the view control bar



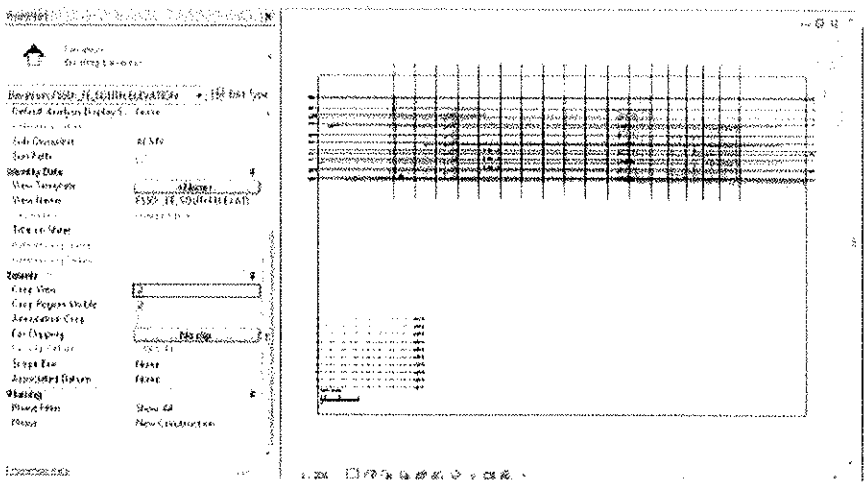
10. Click on the empty space of model view to deselect the linked model and change the View Scale to 1:200 in the properties under Graphics category or in the view control bar

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner



11. Click on the empty space of model view to deselect the linked model and change the View Scale to 1:200 in the properties under Graphics category or in the view control bar

12. Enable the Crop Region Visible on the properties dialog box and adjust crop window to extents only the linked model and project datum level



SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

13. Click Modify tab ➤ Modify panel ➤ (Align) to align Datum **Level 1** of the project to the **1st STOREY LEVEL** of the Architecture link file, rename Level 1 to 1st STOREY LEVEL and on the project browser rename the view to

14. Continue with Align tool select the **2nd STOREY LEVEL** of the Architecture link and click to select the Datum **Level 2** of the project and rename it 2nd STOREY LEVEL

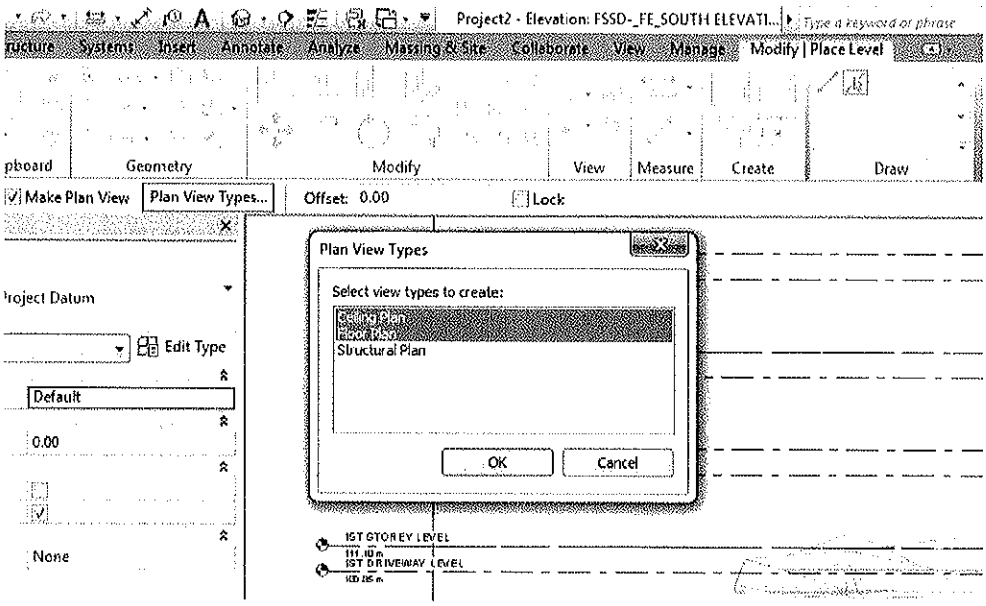
15. Do the same procedure on the ff. Datum Level and consider renaming also the view in project browser. Refer on the table below.

Project Datum Level	Align to Archi Storey Level	Level New Name	Browser View Name
Level 1	1ST STOREY LEVEL	1ST STOREY LEVEL	FSSD-FP_1ST STOREY
Level 2	2ND STOREY LEVEL	2ND STOREY LEVEL	FSSD-FP_2ND STOREY
Level 3	3RD STOREY LEVEL	3RD STOREY LEVEL	FSSD-FP_3RD STOREY
Level 4	4TH STOREY LEVEL	4TH STOREY LEVEL	FSSD-FP_4TH STOREY
Level 5	1ST DRIVEWAY LEVEL	1ST DRIVEWAY LEVEL	FSSD-FP_1ST DRIVEWAY
Level 6	1ST STOREY MEZZ.2	1ST STOREY MEZZ.2	FSSD-FP_1ST STOREY MEZZ.2
Level 7	1ST STOREY MEZZ.1	1ST STOREY MEZZ.1	FSSD-FP_STOREY MEZZ.1
Level 8	2ND DRIVEWAY LEVEL	2ND DRIVEWAY LEVEL	FSSD-FP_2ND DRIVEWAY
Level 9	2ND STOREY MEZZ.2	2ND STOREY MEZZ.2	FSSD-FP_2ND STOREY MEZZ.2
Level 10	2ND STOREY MEZZ.1	2ND STOREY MEZZ.1	FSSD-FP_2ND STOREY MEZZ.1

16. On the ribbon, click (Level). To create additional datum Level from Link Architecture Level
    - Architecture tab ➤ Datum panel ➤ (Level)
    - Structure tab ➤ Datum panel ➤ (Level)

Pick Lines is selected as Draw option, offset is equals to zero and Make Plan view is enable with the ff. Plan view type is set

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner



17. On the model view pick the Architectural Level to create additional Level for project and rename the new Level same on the label of link Architecture level
18. Open the new plan view on the project browser, rename the view name base on the naming convention for FSSD Floor plan and change the sub discipline to ACMV on properties dialog box
19. Repeat the process to all new floor plan view & ceiling view
20. Save the project.

1.3 Monitoring changes in Linked File

In most building projects, you need to collaborate on the building design. For example, a mechanical engineer uses an architect's preliminary building model to devise the initial mechanical design layout of the building. Therefore, proper coordination and monitoring helps ensure that the mechanical model is synchronized with the

AUTODESK. IDAT TILOS asia powerproject ORACLE BIM Estimating FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera**: Top ASEAN Reseller | **Autodesk**: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

changes that the architect made to the building model. Effective change monitoring reduces errors and expensive rework during construction.

Copy and Monitor

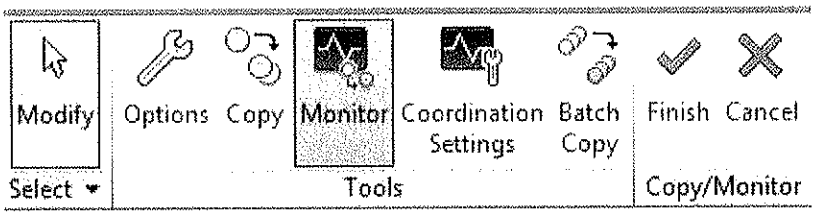
You use the Copy and Monitor tools on the Copy/Monitor tab to coordinate and monitor the changes in the building and structural models. To access this tab, activate the Copy/Monitor mode using the Select Link option from the Copy/Monitor drop-down on the Coordinate panel of the Collaborate tab.

To MONITOR the Level of the Link Architecture model

Continue working on the project file or open the project file from the training folder Chapter 1> **C01-Monitor_Logistic Warehouse.rvt**

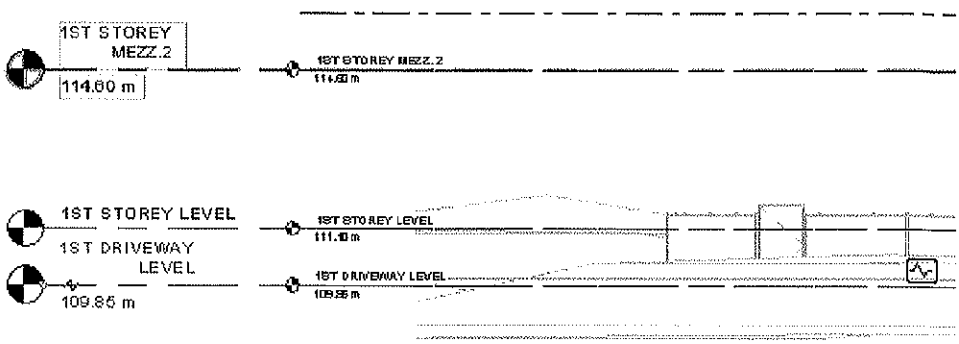
1. On the elevation view, zoom on the left side the model. Click Collaborate tab ➤ Coordinate panel ➤ Copy/Monitor drop-down ➤ (Select Link).

2. Select the Link Architecture file, on the Copy/Monitor contextual tab select Monitor option.

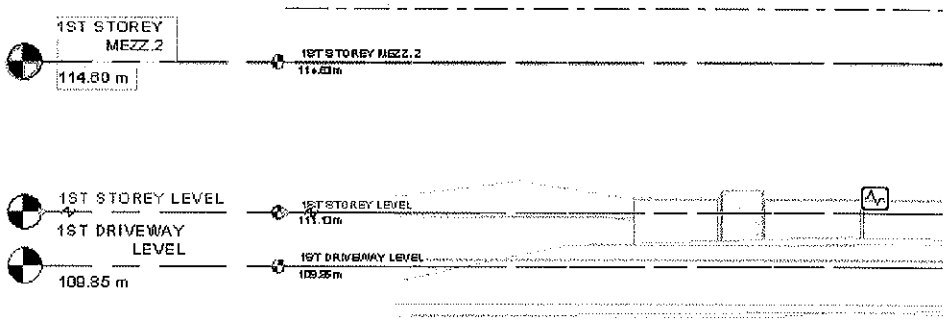


3. On the model view select the project datum Level 1ST STOREY DRIVEWAY and select the level 1st STOREY DRIVEWAY of the Link Architecture, the monitor icon displays next to it to indicate that it has a relationship with the original element in the linked model.

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner



4. Select the project datum Level 1st STOREY LEVEL and select the level 1st STOREY LEVEL of the Link Architecture, the monitor icon displays next to it to indicate that it has a relationship with the original element in the linked model.



5. Repeat the process on the remaining levels

6. Click Modify to finish the monitoring tool or press ESC twice

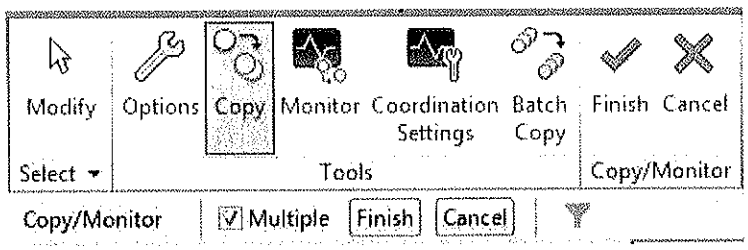
SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

To COPY the Grids of the Link Architecture model

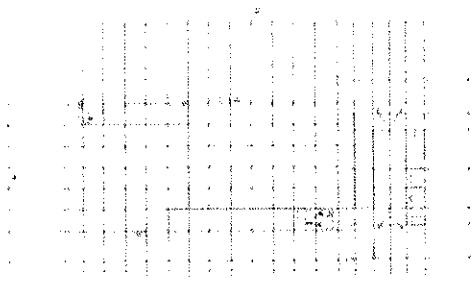
Continue working on the project file or open the project file from the training folder Chapter 1> **Copy_Monitor_Logistic Warehouse.rvt**

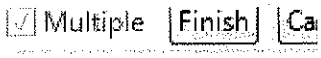
1. Open the FSSD-FP_1ST STOREY LEVEL on the project browser Click Collaborate tab ➤ Coordinate panel ➤ Copy/Monitor drop-down ➤ (Select Link).

2. Select the Link Architecture file, on the Copy/Monitor contextual tab select Copy option and select Multiple on the option bar



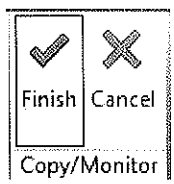
3. On the Model view select all the gridlines. Press **ctrl** on keyboard to allow multiple selection.



4. Click 

Finish on the option bar to finish the selection.

5. Click Finish on Copy/Monitor tab to finish action.



SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

1.4 Monitoring changes in Linked File

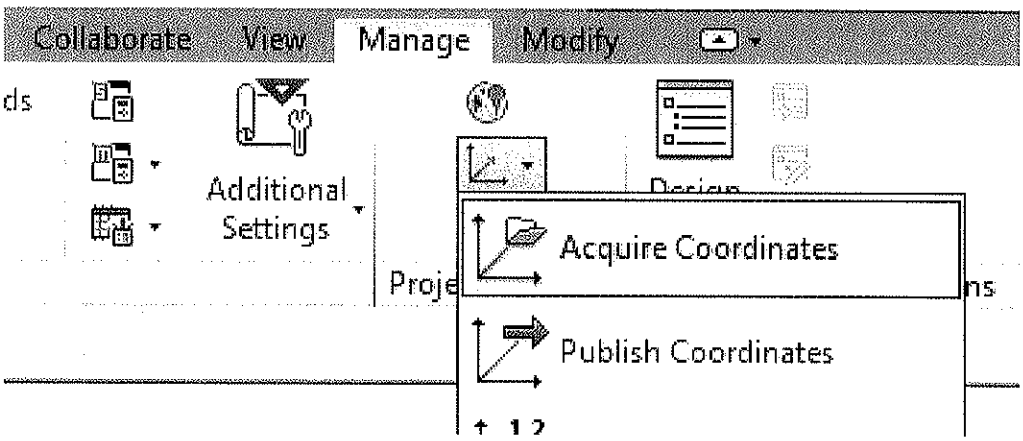
When you acquire coordinates from a linked Revit project, the shared coordinates of the linked project become the shared coordinates of the host project, based on the location of the linked project instance in the host project. There is no change to the host project's internal coordinates. The host project also acquires True North from the linked project. The origin of the linked project's shared coordinates becomes the origin of the host project's shared coordinates.

When a Revit Architecture project acquires coordinates from a linked DWG file, the World Coordinate System (WCS) of the selected linked DWG file becomes the shared coordinate system of the host Revit Architecture project, based on the location of the linked DWG instance. The Y axis of the DWG becomes True North, and the origin of the DWG becomes the origin of the shared coordinate system of the Revit Architecture project.

To acquire coordinates:

Continue working on the project file

1. Click Manage tab ➤ Project Location panel ➤ Coordinates drop-down ➤ Acquire Coordinates.



SME One Asia Prominent Award | Oracle Primavera: Top ASEAN Reseller | Autodesk: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

2. Place the cursor on a linked model instance, and click.
The host model file now has the same shared coordinates as the linked model file. If other loaded linked models share coordinates with the host model, they also acquire the new coordinates.

1.5 Visibility and Graphic Overrides in Linked Models

Linked models, like other elements, can modified by hiding individual elements
And categories of elements, and overriding the display settings.

When a model is linked to a host project, any changes you make in the Visibility/Graphics Overrides dialog box (VG) are also made in the linked model by default. For example if you turn off the visibility of the Grids in the host project, it turns off the visibility of Grids both in linked model and project model.

To modify display Settings in a Linked View

Continue working on the project file or open the project file from the training folder Chapter 1> **C01Visibility Settings_Logistic Warehouse.rvt**

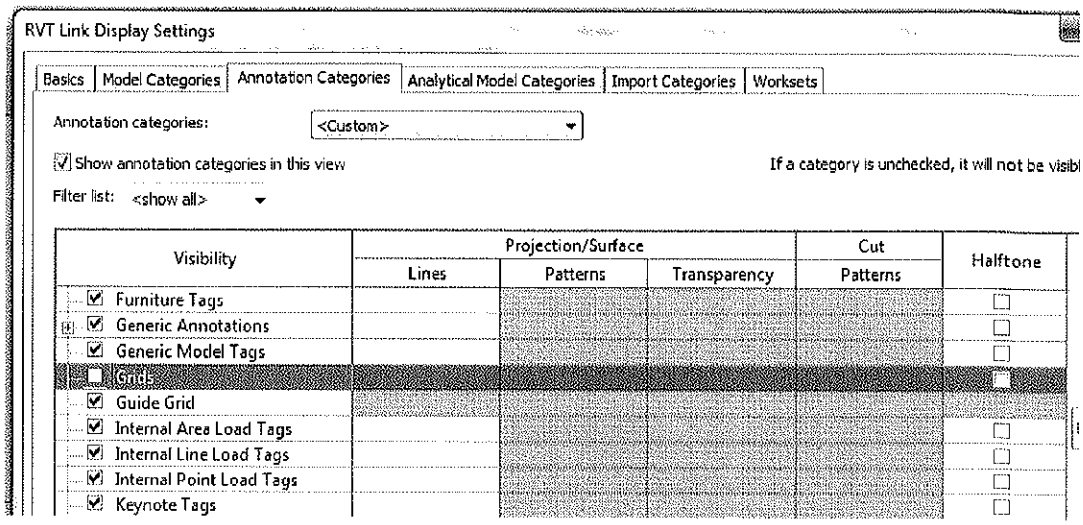
1. Click View tab ➤ Graphics panel ➤ (Visibility/Graphics). Alternatively Type **VV** or **VG** to open Visibility/Graphics Overrides dialog box

2. Switch to Revit Link tab, select by **Host View** under Display Settings column

3. In RVT Link Display Settings under basic tab select **Custom** option. Click Annotation Categories and change **<By host view>** to **<Custom>**

4. Clear the visibility of Grids and click OK twice.

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner



1.6 Creating Working Views

BCA template provide a set of views associated with datum level organize by approving agency. These views are refer as submission view where all the requirements stipulated by the agency should reflect on this views. However when developing the MEP service there is a lot of process and setting need to apply to the views and eventually change the arrangement of the views in browser.

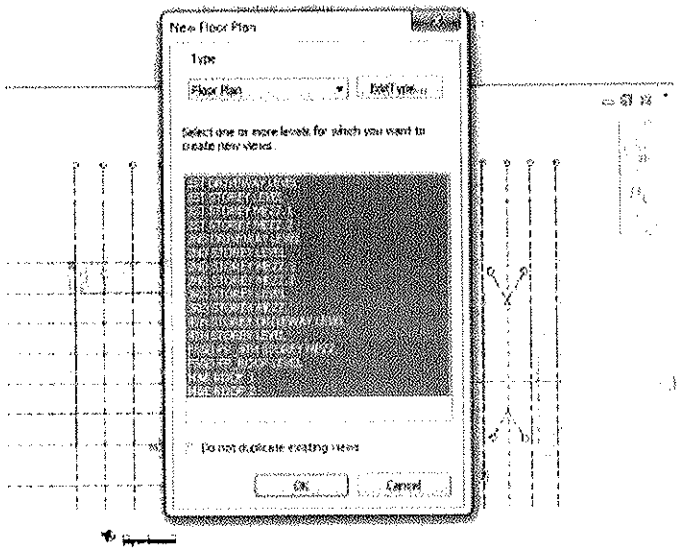
Creating another Instance of floor plan views /ceiling view in developing the ACMV is not mandatory but it is recommended as good practice to ensure the neatness and organize browser of the project.

To create Floor plan/ RCP view

1. Click View tab ➤ Create panel ➤ Plan Views drop-down, and then click
   - (Floor Plan)
   - (Reflected Ceiling Plan)

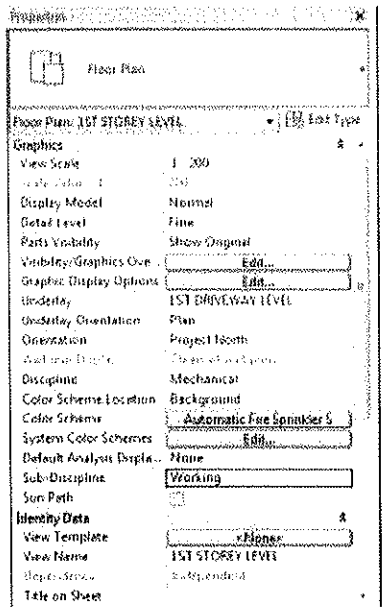
SME One Asia Prominent Award | Oracle Primavera: Top ASEAN Reseller | Autodesk: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

2. In the New Floor Plan dialog:
   - To create a plan view for a level that has an existing plan view, clear Do not duplicate existing views.
   - Select one or more levels for which you want to create a plan view.



3. In the Project browser open the view **1ST STOREY LEVEL** under HVAC, this is the location of all new created Floor Plan is placed

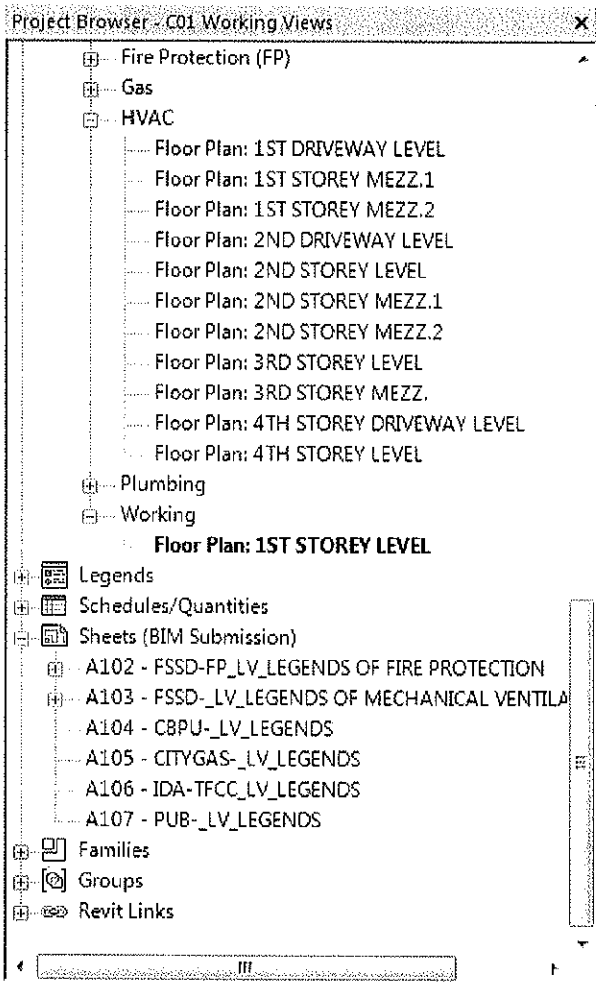
4. In the Properties Dialog box apply a view template **Linked View FP** and click apply



SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

- Remove the View Template applied by selecting <None> from the list.

- Change the Sub-Discipline **HVAC** to **Working** by Key-in the word Working and click apply. Notice in the project browser the view is move and create a new sub –discipline. Do the same process on the other view under HVAC.



SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

1.7 Importing and Linking Vector Files

Revit enables you to import or link vector data from other CAD programs, such as AutoCAD (DWG and DXF), MicroStation® (DGN), and Trimble® SketchUp® (SKP and DWG). Revit supports importing most DGN surfaces and solids with the exceptions of cones, B-Spline surfaces, and SmartSolids.

Revit does not internally use layers; however it can recognize layers and its information is retained.

To Import CAD file

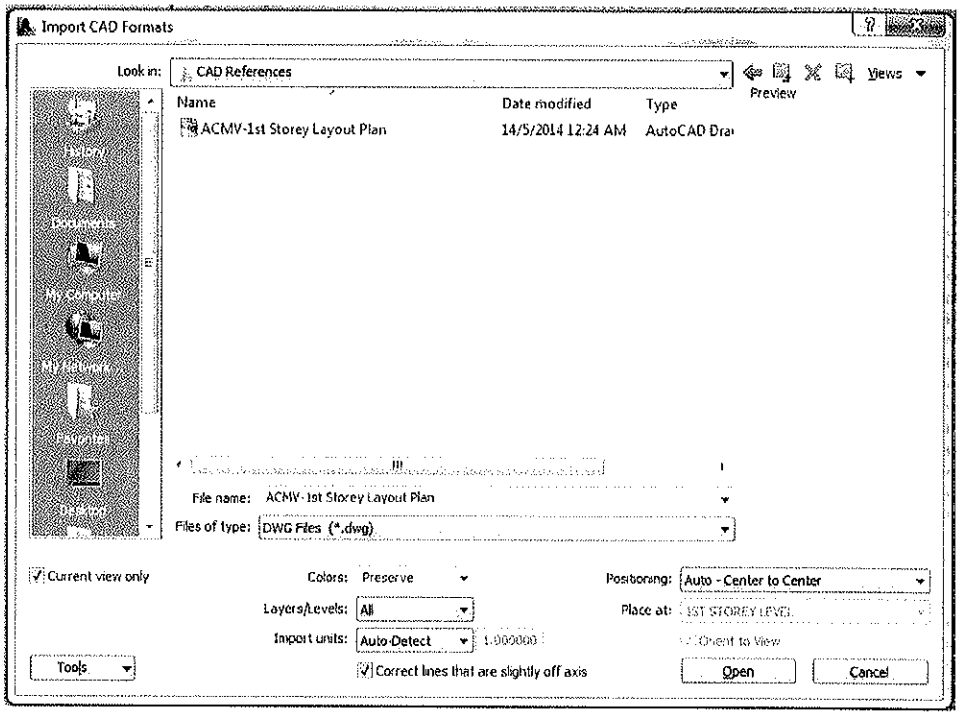
Continue working on the project file or open the project file from the training folder Chapter 1> **C01 Importing CAD**

1. Click Insert tab » (Import CAD), or click Insert tab » Link panel » (Link CAD).
   If you link the file instead of importing it.
2. In the Import CAD Formats or Link CAD Formats dialog, navigate to the training folder Chapter 1 > Cad references> **ACMV–1st Storey Layout Plan.dwg**

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

3. Set the ff. settings on Import Cad Formats dialog box

- Colors: Preserve
- Layers/Level: All
- Import units: Auto-Detect
- Positioning: Center to Center
- Place at: 1ST STOREY LEVEL
- Current view only is enable



SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

Process: Creating Project File

The following illustration shows the process of creating project file

STEPS	Notes & Setting
Create New Project	➢ Use BCA MEP Submission template. (rte)
Link the Architecture / Structure Model	➢ Positioning is origin to origin
Align Project Level to Link Model Level	➢ Positioning is origin to origin ➢ Pin the Link Model ➢ Use Align tool
Create Additional Level / Delete unnecessary level	
Perform Copy /Monitor on Levels & Grids	➢ Select Multiple option to allow multiple selection
Create Working View	
Import CAD (optional)	

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

Project Title block

In this chapter you learn how to edit and modify title block that will use on the project, modifying text and label, Inserting raster image and Manage project
Information.

This chapter discuss:

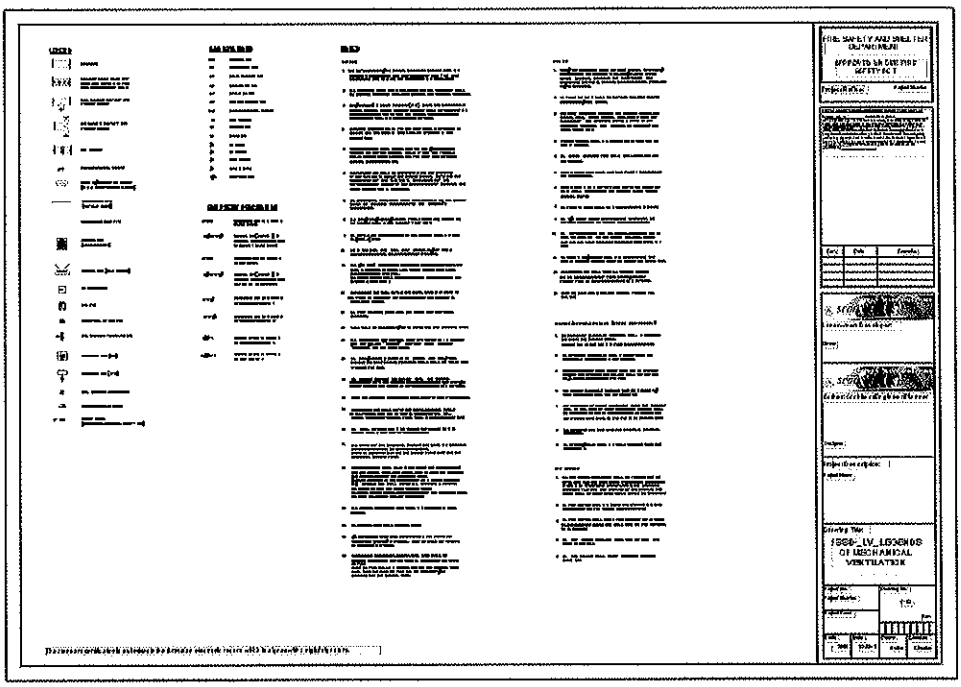
- **Editing Titleblock**
- **Adding Image on sheet**
- **Creating Text and labels**

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

2.1 Editing Titleblock

BCA Template for Submission provide a preloaded Titleblock that you can use to generate drawing sheet of the project, you can modify or edit this title block to suite on your organization standard as well as conforming on the authorities requirements

Below graphics is the sample Titleblock loaded on BCA template for submission.



SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

To Edit the Titleblock

Continue working on the project file or open the project file from the training folder Chapter 2> **C02 Project Title block.rvt**

1. Open a sheet view **A103 - FSSD-_LV_LEGENDS OF MECHANICAL VENTILATION** under sheet category in the project browser.
2. Select the title block from View Window and click (Edit family) from contextual tab
3. Save the family title block by clicking ▸ (Save As) ▸ family

2.2 Adding Image to Sheet

You can import raster images to a project to use as background images or as visual aids needed during the creation of a model. By default, images are imported behind the model and annotation symbols; however, you can change the display order. You can import images into 2D views only.

To add image to sheet

Continue working on the project file or open the project file from the training folder Chapter 2> **C02 Project Title block.rvt**

1. Zoom in to the right portion of the title block, select the two sample images and delete.
2. Click Insert tab ▸ Import panel ▸ (Image).

Note: If the legacy details are stored using a CAD format, such as DWG, click Insert tab ▸ Import panel ▸ (Import CAD).

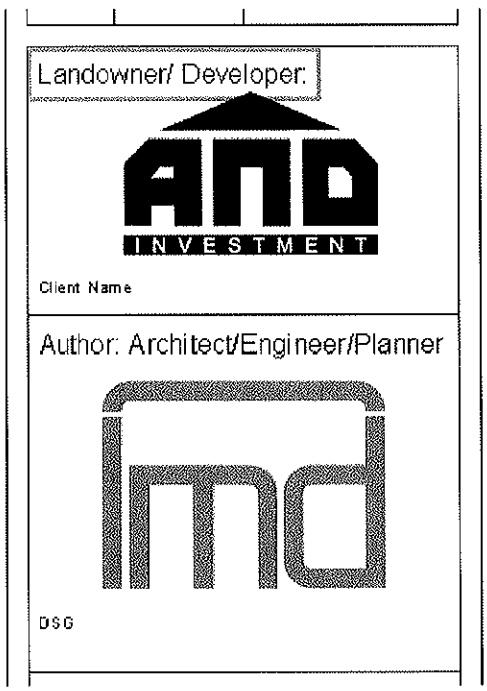
AUTODESK. IDAT TILOS asia powerproject ORACLE BIM Estimating FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

3. In the Import Image dialog, navigate to the location of the image file in training files Chapter 2 > **LMD logo.jpg**
4. Select the image file, and click Open.
5. Click in the drawing area to place the image on the sheet.

To reposition the image, drag it to the desired location on the sheet. To resize the image, select it and drag a blue corner dot, or enter the desired height and width on the Properties palette.

6. Import also the Image **AND logo.jpg**, if necessary adjust the location of text header to have a same result shown in graphics below



AUTODESK. IDAT TILOS ORACLE FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

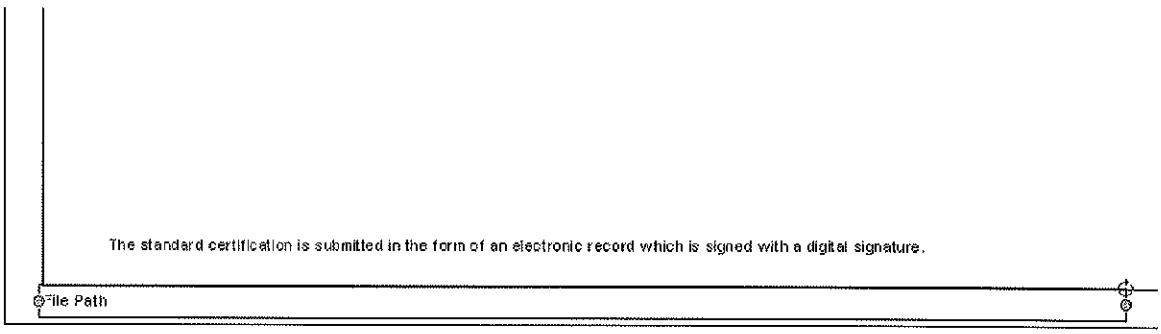
2.3 Annotation Text & Label

An annotation label is a text placeholder added to tags or title blocks. You create a label as part of a tag or title block family while in the Family Editor. When you place the tag or title block in the project, you place substitution text for the label, and the text appears as part of the family.

To place label to sheet

Continue working on the project file or open the project file and zoom in on the lower left part of the title block.

1. In the Family Editor, click Create tab ➤ Text panel ➤ (Label).
2. In the Type Selector, select the label type. **Label 4mm**
3. On the Format panel, select the vertical and horizontal justification.
4. In the drawing area, click to position the tag at lower left portion of the title block.
5. In the Edit Label dialog box select file path list of Category parameters and select add parameter(s) to label.
6. Drag the border of the label going to right.



7. Delete the text above the File path label and save the family to update.

AUTODESK. IDAT TILOS ORACLE Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

8. Click  (Load into Project) to enable to use this title block in the project.

2.4 Manage Project Information

In general, a title block contains placeholders for 2 types of information:

- **Project-specific information.** This information applies to all sheets in the project. Examples: project name, client information, project address.
- **Sheet-specific information.** This information differs for each sheet within a project. Examples: sheet name, sheet number, reviewer, sheet issue date.

When you add a sheet to a project, the project-specific information in the title block displays the appropriate information. You can enter the sheet-specific information directly on the sheet.

Project-specific information is data that remains the same on all sheets of a project. Examples include the project issue date and status, the client name, and the project's address, name, and number.

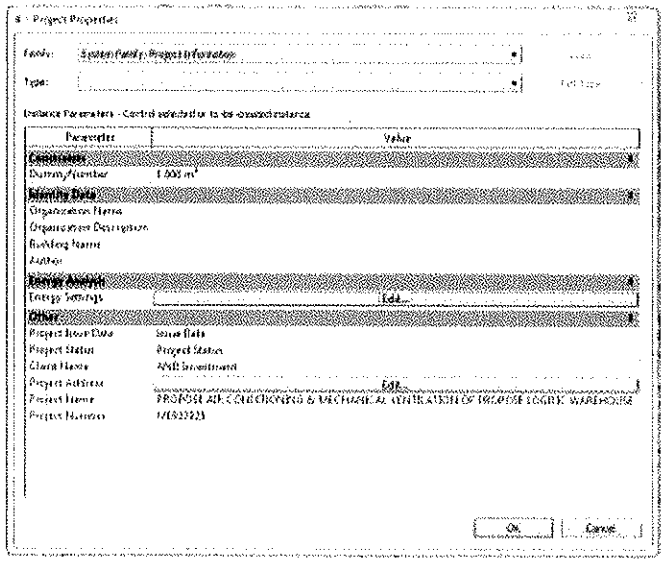
To update the title block of a sheet with project-specific information, open the project, and use either of the following methods:

- **Enter the information directly on a sheet.** Open a sheet. Click on the placeholder text for project-specific information in the title block. Update the text as desired.
- **Change project information settings.** Click Manage tab ➤ Settings panel ➤ (Project Information). Under Other, enter values for the project information parameters. Click OK.

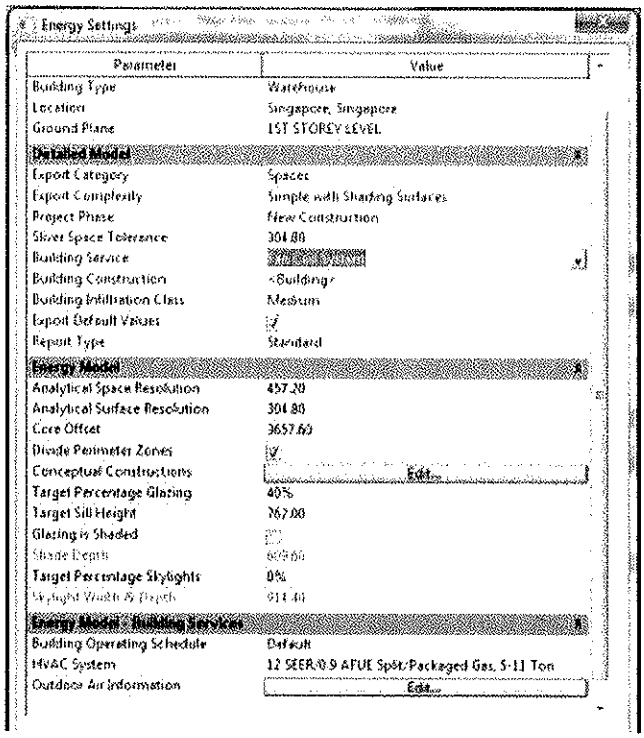
AUTODESK. IDAT TILOS asia powerproject ORACLE BIM Estimating FM Systems Novade CM&C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

Under Energy Analysis click Edit, enter values for the Energy Settings parameters. Click OK.



Revit updates all sheets in the project with the new information.



SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

ACMV Analysis

To create a mechanical system in Revit MEP, as with any design project, you first carefully plan the system based on the requirements provided (occupancy)
In this lesson, you plan the system by first placing spaces in the building. Then you assign zones to the spaces in order to control the spacial environment and perform a heating and cooling load analysis to determine the heating and cooling requirements for the building.

This chapter discuss:

- **Spaces**
- **ACMV Zone**
- **Calculating Heating and Loading loads**
- **Process of Calculating Load**

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

3.1 Spaces

Spaces are exclusively used for the MEP disciplines to analyze volume. They contain parameters that maintain information about the areas in which they have been placed. This information is used for performing a heating and cooling loads analysis.

An accurate heating and cooling loads analysis can only be accomplished if spaces are placed (created) in all areas to account for the entire volume of your building model. You place spaces in either bounded, semi-bounded, or unbounded areas.

- *Bounded areas are areas that are bounded by room-bounding components such as walls, curtain walls, curtain systems, columns, roofs, floors, and room and space separation lines.*
- *Semi-bounded areas are not fully bounded by room-bounding components.*
- *Unbounded areas are open areas without any room-bounding components.*

The latter 2 spaces need room-bounding components, such as space separation lines, to fully bound the area. The computation height of a space is 0' 0" (0.00 mm) above its reference level (default setting).

To Place a Space

Continue working on the project file or open the project file from the training folder Chapter 3> **C03 Adding Space**

1. Select the link model and click edit type on the properties dialog box
2. Enable to Room Bounding on the Type properties and click ok
3. Zoom in on the upper left portion of the model.
4. Click Analyze tab ➤ Spaces and Zones panel ➤ Space.
5. On the Options Bar, specify parameters for the space.

AUTODESK. IDAT TILOS asia powerproject ORACLE BIM Estimating FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

6. Move the cursor into the drawing area and click to place the space.
7. Continue placing spaces or click Modify.
8. To see room-bounding elements, click Modify | Place Space tab » Space panel » ☐Highlight Boundaries.

   Revit MEP highlights all room-bounding elements in gold, and displays a warning. To see a list of all room-bounding elements in the model, including those that do not display in the current view, click Expand in the warning dialog. To exit the warning and remove the highlighting, click Close.

3.2 Zone

Consist of one or more spaces that are controlled by equipment that maintains a common environment (temperature, humidity, and so on). You create zones to define spaces that have common environmental or design requirements. Spaces in unoccupied areas such as plenums can be added to zones. Spaces that are on different levels can be added to the same zone. You can create zone schedules and use a zone schedule to modify zones

Zone Properties collect information from spaces, such as heating and cooling temperature set points that, together with Space Properties, is used with a heating and cooling loads analysis to determine the energy demands of the building

AUTODESK. IDAT TILOS ORACLE BIM Estimating FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

Add spaces to the new zone

1. Open a floor plan that contains the spaces that you want to add to a zone.

   Note: Zones cannot be displayed in elevation views or 3D views. Zones can be viewed in section views.

2. Click Analyze tab ➤ Spaces and Zones panel ➤ Zone.

   The Edit Zone tab is activated and a new zone is created. The new zone displays in the System Browser but, until spaces are assigned to it, the zone is empty. The default numeric name assigned to the new zone displays in the System Browser.

   Note: To view zones in the System Browser, press F9 and in the View bar, click Systems and select Zones.

3. Click Edit Zone tab ➤ Properties panel ➤ Properties.

4. In the Properties palette, for Name, enter a name for the new zone.

5. On the Mode panel, verify that Add Space is selected.

6. If you are adding a single space to the zone, place the cursor over a space, and after the space highlights, click to add the space to the new zone.

   To add multiple spaces to a zone draw a selection box around the spaces being added, or press CTRL while selecting spaces one at-a-time.

7. Click Finish Editing Zone.

   In the System Browser, notice that the spaces that you added are moved from the Default zone to the zone that you created.
   Attention: Conditioned and Unconditioned spaces must not be mixed within a particular zone.

AUTODESK. IDAT TILOS ORACLE BIM Estimating FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

3.2 Heating and Cooling Load Analysis

Spaces are placed in areas of the building model to determine the volumes for each area. Revit computes these volumes as an analytical volume and an inner volume. The analytical volume is bounded by the center plane of walls and the top plane of floors and roofs. You use the analytical volume to verify that there are no gaps in the building model. The inner volume is bounded by the interior surfaces of walls, floors and roofs. Inner volumes are computed when the loads calculation is started.

Once all the data has been assembled, the engine can calculate the loads. For standard calculations, the engine will examine each space from the months of April to November and from 6am to 6pm (Oct-May in the southern hemisphere). After the loads of all the spaces have been determined, the maximum month/hour (depending on the calculation type) is used to determine the psychometrics, airflow, and coil loads. The following (borrowed liberally from the ASHRAE 2005 Handbook of Fundamentals) is a discussion of the calculation process and principles employed.

AUTODESK. IDAT TILOS ORACLE FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera**: Top ASEAN Reseller | **Autodesk**: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

Process: Calculating and Cooling Loads

The following illustration shows the process of calculating heating and cooling loads

STEPS	Notes & Setting
Enable room bounding	➢ Select the link and click edit type
Add spaces	➢ Add spaces to all areas of the building to
Add spaced to Zone	➢ Add existing spaces to zone by selecting Add option on the Analyze toolbar ➢ Set the cooling condition on the zone determine the Volume of each area
Perform analytical checking for any gaps	➢ Perform gap checking using the Highlight and Isolate Tools in Heating and Cooling Load Tool
Perform Load Analysis	➢ Set the parameters on Energy Setting under Heating and Cooling Loads Tool

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

Creating Families

In this chapter you learn how to differentiate types of families the building blocks of Revit. Overview of the family editor tool, family template, Reference plane, Adding parametric controls on dimension and family connector and their properties

This chapter discuss:

- **Family definition and types**
- **Overview of Family Editor**
- **Family Template**
- **Reference plane**
- **Adding Parameters**
- **MEP Connectors**

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

4.1 Family definition and types

A *family* is a group of elements with a common set of properties, called parameters, and a related graphical representation. Different elements belonging to a family may have different values for some or all of their parameters, but the set of parameters (their names and meanings) is the same. These variations within the family are called *family types* or *types*.

In Revit, there are three types of families: Loadable, System, and In-place. The following table describes these types.

FAMILY TYPE	DESCRIPTION
Loadable	These families are created in the Family Editor and can be loaded into a project file
System	These families cannot be opened in the Family Editor. However, these families have specified parameters that can be manipulated in a project. You can transfer these families between projects. Examples of System families are duct, pipe, and walls.
In-Place	These families are created in a project in the context of a custom element with unique geometry that is not intended for reuse.

4.2 Family Editor

The Family Editor is a graphical editing mode in Revit that allows you to create and modify families to include in your project. When you start creating a family, you open a template to use in the editor. The template can include multiple views, such as plans and elevations. The Family Editor has the same look and feel as the project environment in Revit, but it features different tools. The availability of tools depends on the type of family you are editing.

Opening the Family Editor

Use the Family Editor to make changes to existing families or to create new families. The method you use for opening the Family Editor depends on what you want to do.

AUTODESK. IDAT TILOS ORACLE FM Systems Nevada CM-C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

You use the Family Editor to create and edit loadable families and in-place elements. The tabs and panels change depending on the type of family that you are editing. You do not use the Family Editor to edit system families.

To edit a family from a project

Do one of the following:

- Select an instance of the family in the drawing area, and click Modify | <Element> tab ➤ Mode panel ➤ (Edit Family).
- In the Project Browser, right-click the family and click Edit.
- Double-click an instance of the family in the drawing area.

To edit a loadable family outside a project

1. Click ➤ Open ➤ Family.
2. Browse to the file containing the family, and click Open.

To create a loadable family from a template file

1. Click ➤ New ➤ Family.
2. Browse to the template file, and click Open.

To create an in-place element

- Systems tab ➤ Model panel ➤ Component drop-down ➤ (Model In-Place)

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

4.3 Family Templates

Family templates are pre-set groupings of parameters and views that aid in the creation of system specific families. After you select a template, Revit MEP starts the Family Editor and opens the commonly used views for that family creation. The template also includes common references that are required to create a family. The common references include reference planes to define the origin and sketching references, common dimensions to help capture design intent, and any solid geometry needed or commonly used to complete the family. The family template files are available in the Imperial Templates & Metric Templates folder.

The following table describes the different types of family templates.

FAMILY TEMPLATE	DESCRIPTION
Wall-based	The wall-based template is used for components inserted into walls. Wall components can include openings so that when you place the component on a wall, it also cuts an opening in the wall.
Ceiling-based	The ceiling-based template is used for components inserted into ceilings. Ceiling components can include openings so that when you place the component on a ceiling, it also cuts an opening in the ceiling.
Floor-based	These families are created in the Family Editor and can be loaded into a project file
Roof-based	The roof-based template is used for components inserted into roofs. Roof components can include openings so that when you place the component on a roof, it also cuts an opening in the roof.
Non-hosted	The non-hosted template is used for components that are not host dependent. A non-hosted component can appear anywhere in a model and can be dimensioned to other non-hosted or host-based components.
Face-based	The face-based template is used for creating workplane-based families that can modify their hosts. Families created from the template can make complex cuts in hosts. Instances of these families can be placed on any surface, regardless of its orientation. It is recommended that all families be created using the face-based template for working in a linked environment so that when there is an architectural design change, the plumbing fixtures that are hosted to the wall move with the wall.

AUTODESK. IDAT TILOS ORACLE BIM Estimating FMSystems Nevada CM:C

SME One Asia Prominent Award | **Oracle Primavera**: Top ASEAN Reseller | **Autodesk**: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

4.4 Reference Plane

Reference planes are used to define relationships among the geometric components within the Family Editor. Reference planes are not displayed when a family is used in a building model, unless a defined relationship between a reference plane and geometry exists,

To create reference plane

1. On Family Editor: Create tab ➤ Datum panel ➤ (Reference Plane)
2. To draw a line:

   On the Draw panel, click (Line).

- In the drawing area, draw the reference planes by dragging the cursor.
- Click Modify to end the line.

To pick an existing line

On the Draw panel, click (Pick Lines).

1. On the Options bar, specify an offset, if desired.
2. Select the Lock option to lock the reference plane to the line.
3. Move the cursor near the line to which you want to place the reference plane and click.

SME One Asia Prominent Award | **Oracle Primavera**: Top ASEAN Reseller | **Autodesk**: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

4.5 Family Geometry

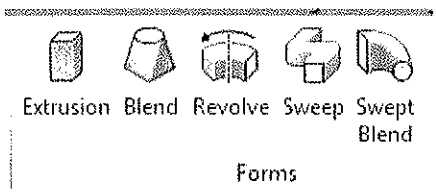
You can use both 2- and 3-dimensional geometry to create families. Create solid geometric shapes to represent the element that the family is intended to create. Use 2D line work to add detail to solid geometry in certain views or to create a symbolic plan representation of an element.

As you create the family geometry, you can specify the visibility, material, and an optional subcategory of the geometry. These settings determine how and when the specific geometric components of the family display.

To ensure the stability of each parametric family, build the family geometry incrementally, testing (flexing) the parametric relationships in each increment.

Methods of creating solid form

There are five (5) methods of creating solid form as the base of your family object, and each method uses a sketched 2D profile as the basis of the 3D shape.



Forms

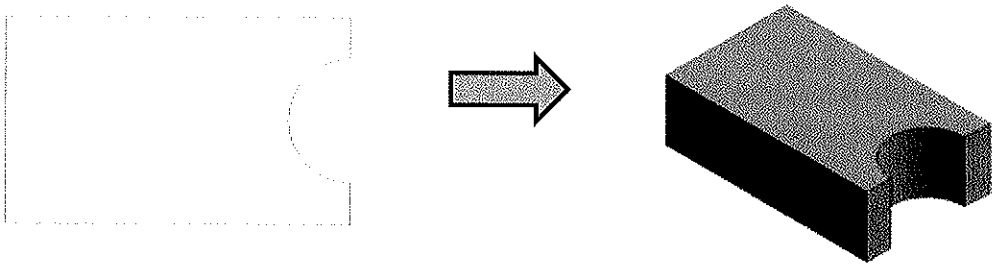
1. **Extrusion** pushes the profile out in one direction.
2. **Blend** links two profiles together.
3. **Revolve** rotates the profile around an axis.
4. **Sweep** extends a profile along a path.
5. **Swept Blend** connects two different profiles along a path.

SOLID EXTRUSION

Extrude is the simplest of the four Solid Form Creation Methods. The use of this tool requires two distinct steps. *1. Sketch the profile that you wish to extrude.*

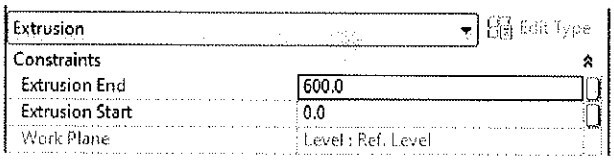
AUTODESK. IDAT TILOS ORACLE FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner



2. Set the Depth for the extrusion on properties.

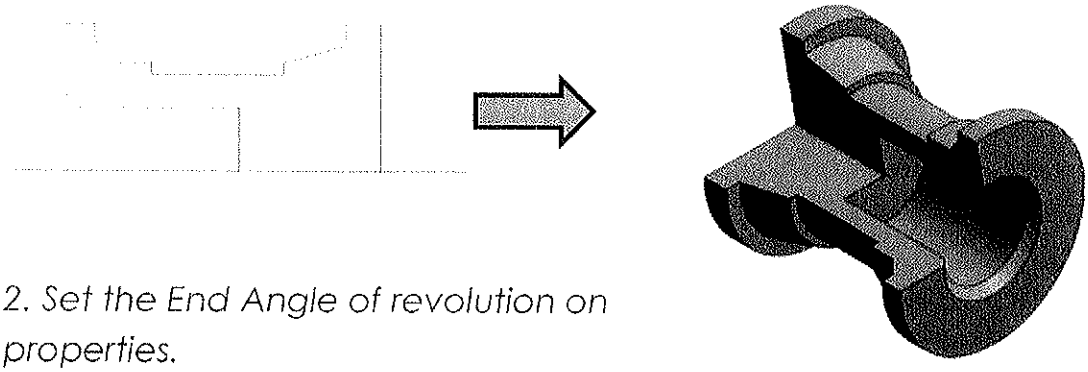
Note: You can also set the absolute Start and End for the extrusion



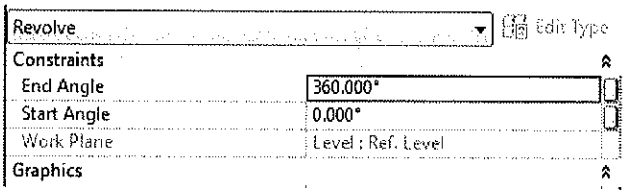
SOLID REVOLVE

This tool is allows you to define a close profile and then revolve this 2D shape around a central axis, to form a 3D mass. Examples of when you may need any object comeson cylindrical shape or dome

1. Sketch profile and define the axis (horizontal blue)



2. Set the End Angle of revolution on properties.

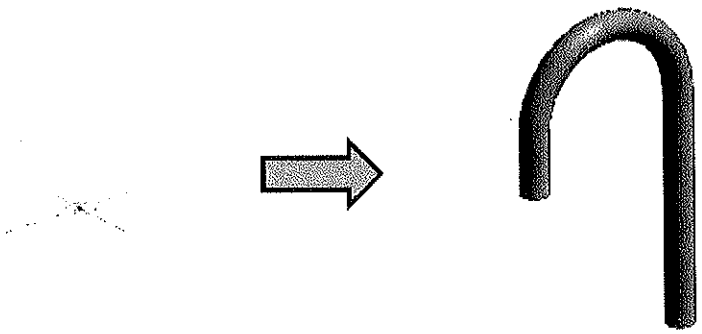


SME One Asia Prominent Award : **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

SOLID SWEEP

Along with Extrude, the Sweep tool will be used to create 95% of the geometry you need for your components. Using the Sweep tool is a two Step process. First of all we need to draw a 2D path along which our profile will be swept. Note: The 2D path does NOT need to be closed

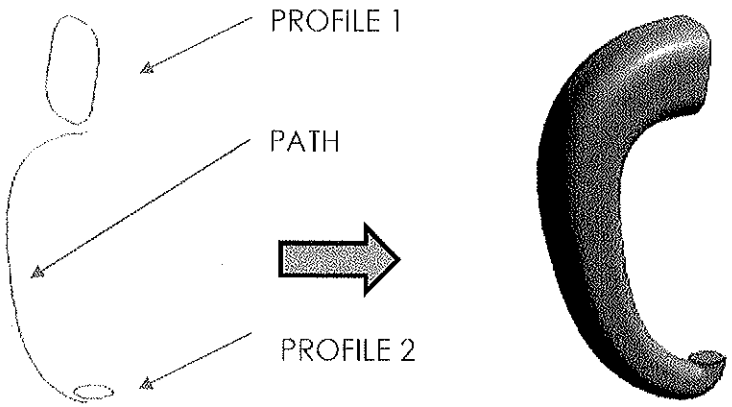
Sketch path (grey) and the profile (magenta)



SOLID SWEPT BLEND

Creates a blend that sweeps along the defined path.The shape of the swept blend is determined by the starting shape, the ending shape and the 2D path that you specify.

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner



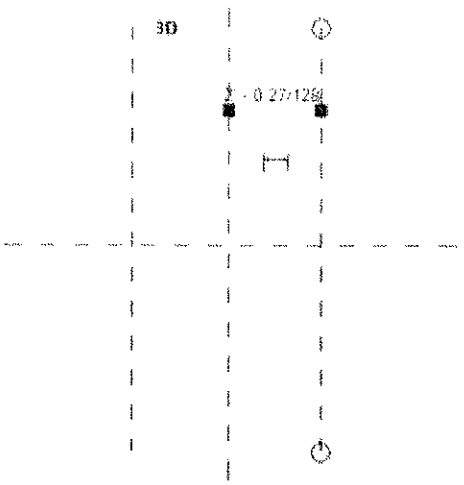
Exercise: Create an Air Terminal Family

STEPS

1. Click ▸ New ▸ Family

2. In the New Family - Select Template File dialog box:

- Navigate to the folder where you saved the exercise dataset.
- Select c_rmep_air_terminal_template.rft.
- Click Open.



3. Enter WT to tile the windows.

4. To begin drafting reference planes, maximize the Floor Plan: Ref. Level view window.

5. Zoom to fit the view.

6. Click Create tab > Datum panel

7. In the view window, on either side of the vertical centre line, draw reference planes as shown. The exact location is not critical.

8. Exit the Reference Plane tool.

9. To keep the reference planes equidistant, you need to create an equal dimension. You can then use this dimension to control the geometry. To do this, click Detail tab >Dimension panel > Aligned.

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

10. in the view window:

- Click the three vertical reference planes in Succession.
- Click to place the dimension string above the planes. Notice that an EQ symbol with a slash appears on Dimension string.
- Click the EQ symbol to make the planes equidistant.

11. Exit the Aligned dimension tool.

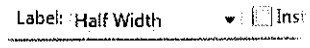
12. To add a dimension to control the two outer planes, activate the Aligned dimension tool.

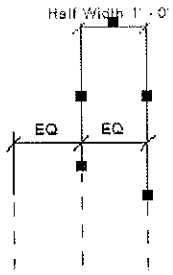
13. in the view window:

- Click to select the vertical centerline.
- Click one of the outer planes.
- Move the dimension string up and click to place it.

13. Exit the Aligned dimension tool. In the view window, select the dimension you just placed.

14. To map this dimension, on the Options Bar, select Half Width from the Label list.





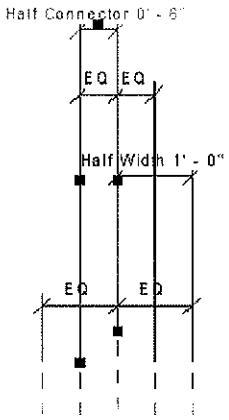
15. Click anywhere in the view window to clear the selection.

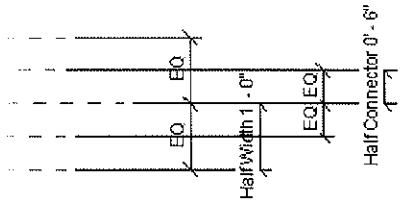
16. You have set up two of the outer reference planes for the air terminal. Next, you need to create the inner reference planes for the connector segment of the air terminal. Select the right reference plane.

17. Click Modify Reference Planes tab > Modify panel > Copy.

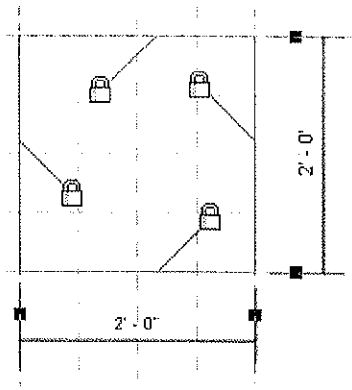
SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

18. Create a copy of the reference plane between the centerline and the right reference plane. The exact placement is not critical.
19. Create a copy of the left reference plane between the centreline and the left reference plane
20. Add dimensions to the two inner reference planes and the centreline and make the dimensions equidistant.
21. Add dimensions to the inner reference plane on the left and the centreline and place the dimension above the other dimension strings.
22. Label the dimension that you just created Half Connector.
23. Similar to the vertical reference planes and dimensions, create horizontal reference planes and dimensions as shown.





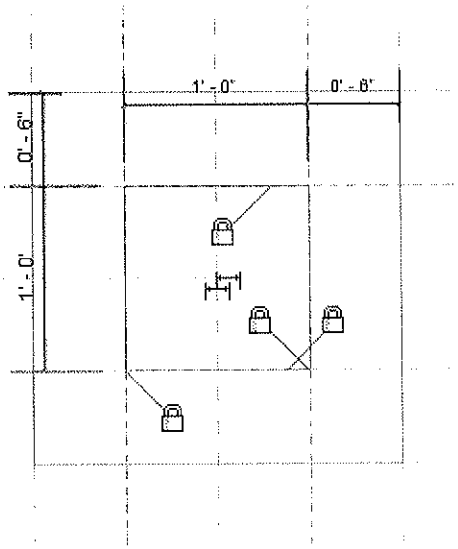
Create a Blend and Add a Connector



1. Click Create tab > Forms panel > Solid dropdown> Blend.
2. Click Create Blend Base Boundary > Draw panel> Rectangle.
3. In the view window, draw a rectangular outline from the upper-left corner to the lower Right corner created by the intersection of the reference planes.
4. To associate the lines with the reference planes, click all open padlocks.

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

5. On the Mode panel, click Edit Top.
6. Activate the Rectangle tool.
7. In the view window, draw a rectangle on the inner square as shown. This will be the top extrusion of the air terminal connector.
8. Lock all four padlocks to associate these lines to the reference planes.

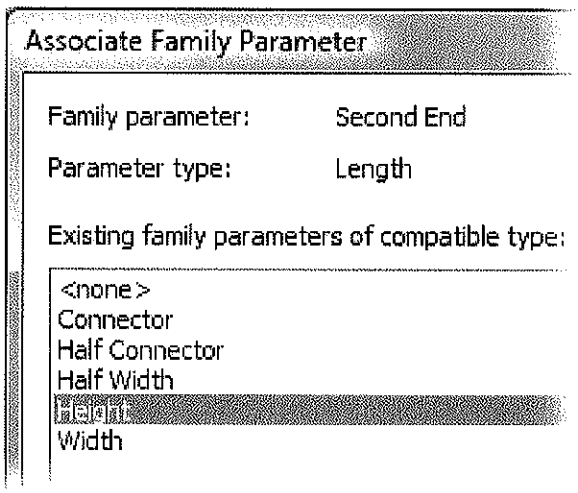


9. On the Element panel, click Blend Properties.
10. To control the height of the air terminal, in the Instance Properties dialog box, under Constraints, for Second End, click the gray button next to 1' 0" in the Value column.

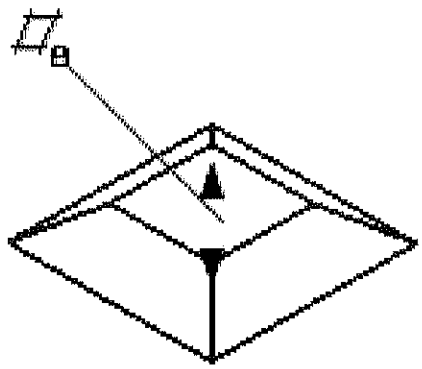
Parameter	Value	=
Constraints		
Second End	1' 0"	
First End	0' 0"	
Work Plane	Level : Ref. Level	

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

11. In the Associate Family Parameter dialog box:
    - Under Existing Family Parameters of Compatible Type, select Height.



12. Click OK to close the Instance Properties dialog box.
13. On the Blend panel, click Finish Blend.
14. Open the default 3D view.



15. Save the family

AUTODESK IDAT TILOS ORACLE FM Systems Novade CM/C

SME One Asia Prominent Award | **Oracle Primavera**: Top ASEAN Reseller | **Autodesk**: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

4.6 Connector

A primary difference between Revit MEP components and components for Revit Architecture or Revit Structure is the concept of connectors. All Revit MEP components require connectors to behave with intelligence. Components created without connectors cannot participate in a system topology. Connectors are primarily logical entities that allow calculating loads within a project. Revit MEP maintains information about loads associated with the spaces in a project. As devices and equipment are placed in spaces, Revit MEP keeps track of the loads based on load type: HVAC, Lighting, Power, Other. The loads associated with the spaces can be viewed in the instance properties for each space, and displayed in schedules.

CHOOSING A DISCIPLINE FOR A CONNECTOR

The discipline assigned to a connector determines the types of systems with which it can interact and how it interacts with other system components.

When you add connectors to a family, you can specify one of the following disciplines:

-  **Duct connectors** are associated with ductwork, duct fittings, and other elements that are part of the air handling systems.
-  **Electrical connectors** are used for any type of electrical connections, including power, telephone, alarm systems, and others.
-  **Pipe connectors** are used for piping, pipe fittings, and other components that are meant for transmitting fluids.
-  **Cable tray connectors** are used for cable tray, cable tray fittings, and other components that are meant for wiring.

AUTODESK. IDAT TILOS ORACLE BIM Estimating FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

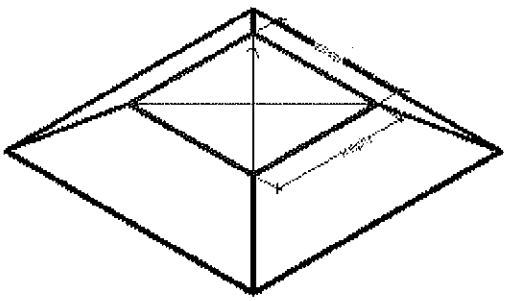
- **Conduit connectors** are used for conduit, conduit fittings, and other components that are meant for wiring. A conduit connector can be an individual connector or a surface connector. The individual connector is used for connecting only one conduit. The surface connector is used for connecting more than one conduit to a surface.

To place a duct connector

Continue working on the Air terminal.rfa

1. Click Create tab > Connectors panel > Duct Connector.
2. On the Options Bar, verify that Supply Air is selected in the list.
3. In the view window, click the top face of the air terminal to place the connector on the top of the terminal.

Tip: Use the TAB key to locate the top face of the air terminal.



4. Exit the Duct Connector tool.
5. Select the connector you just placed.
6. Open the Instance Properties dialog box to adjust the settings in the connector so that it connects to the system properly.
7. In the Instance Properties dialog box, under Mechanical:
   - For Flow Configuration, select Preset from the Value list.
   - For Flow Direction, ensure that In is selected in the Value list.
   - For Loss Method, select Specific Loss from the Value list.

AUTODESK. IDAT TILOS ORACLE FM Systems Navoda CMC

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

8. In the Instance Properties dialog box, under Mechanical - Airflow:
   - Map Pressure Drop to the Static Pressure parameter.
   - Map Flow to the Flow parameter.

Tip: Click the gray button next to the Value column to map the parameters.

9. In the Instance Properties dialog box, under Dimensions:
   - Map Height and Width to the Connector parameter.

Parameter	Value
Mechanical	
Flow Factor	0.000000
Loss Coefficient	0.000000
Flow Configuration	Preset
Flow Direction	In
System Type	Supply Air
Loss Method	Specific Loss
Mechanical - Airflow	
Pressure Drop	0.0800 in-wg
Flow	500 CFM
Dimensions	
Shape	Rectangular
Height	1' 0"
Width	1' 0"
Radius	1' 0"

   - Click ok

10. Clear the selection. You can now load the air terminal family into a project and use it as required.

SME One Asia Prominent Award | Oracle Primavera: Top ASEAN Reseller | Autodesk: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

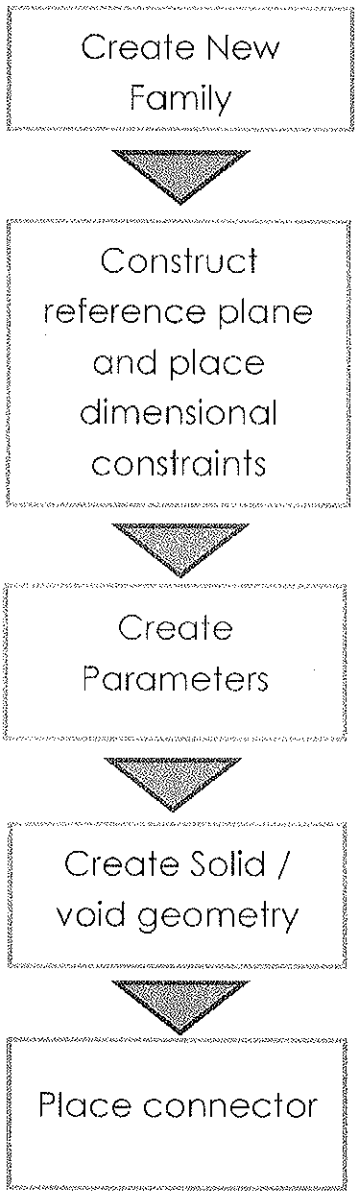
CROWN SYSTEMS

Process: Creating Families

The following illustration shows the process of creating families

STEPS

Notes & Setting



AUTODESK. IDAT TILOS ORACLE BIM Estimating FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera**: Top ASEAN Reseller | **Autodesk**: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

Working on Team Project

In this chapter you learn how to open workset-related projects, work in workset-related projects, work with visibility and display options, set up worksets and use best practices for worksets.

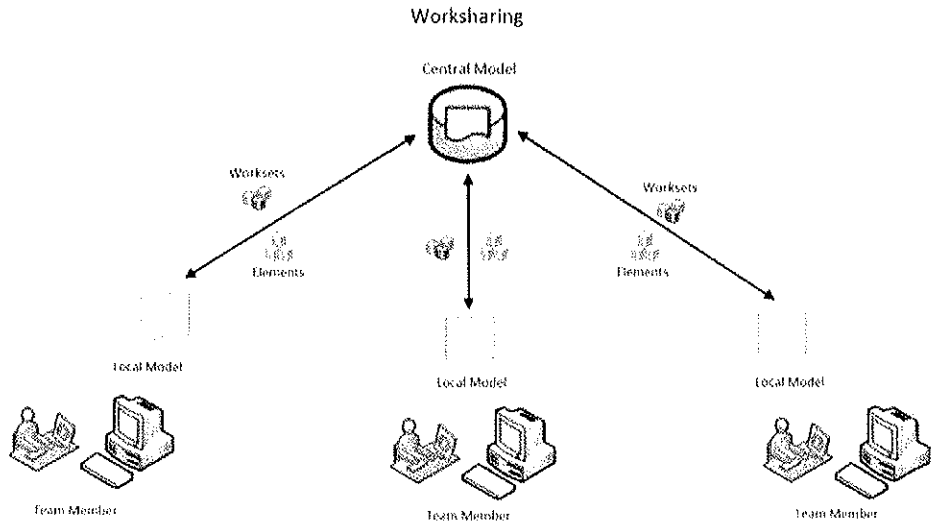
This chapter discuss:

- **Create Central File by activating work sharing and dividing the models into workset**
- **Allow multiple user to work on the same dataset utilizing local file**
- **Work with the manage workset**
- **Control the visibility**

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

5.1 Worksharing Overview

Worksharing is a design method that allows multiple team members to work on the same project model at the same time. When worksharing is enabled, a Revit document can be subdivided into worksets, which are collections of elements in the project.



Team members share a central model

Revit projects can be subdivided into worksets to accommodate such environments. You can enable worksharing to create a central model so that team members can simultaneously make design changes to a local copy of the central model.

SME One Asia Prominent Award | **Oracle Primavera**: Top ASEAN Reseller | **Autodesk**: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

5.2 Worksharing Terminology

Term	Definition
central model	The master project model for a workshared project. The central model stores the current ownership information for all elements in the project, and acts as the distribution point for all changes published to the file. All users save their own local copies of the central model, work locally, and then synchronize with central so that other users can see their work.
local model	A copy of the project model that resides on the computer system of the team member who is working on the model. When worksharing is used to distribute project work among team members, each member uses a local model to work on his or her workset (functional area). Team members periodically save their changes to the central model so that others can see the changes and update their local model with the latest project information.
active workset	A collection of elements in a project.A workset is typically a discrete functional area, such as HVAC, electrical, plumbing, or piping. When you enable worksharing, you can divide a project into worksets, with different team members responsible for each workset

con't.

Term	Definition
element borrowing	Allows you to edit an element that you do not own. If no one owns the element, permission to borrow is automatically granted. If another team member is currently editing the element, that team member is the owner, and you must place a request or wait for it to be relinquished so that you can borrow it.
workshared file	A Revit project for which worksets have been enabled.
non-workshared file	A Revit project for which worksets have not been enabled.
collaboration	Multiple team members working on the same project. These team members may be from different disciplines and working in different locations. Methods of collaboration can include worksharing and using linked models.

AUTODESK. IDAT TILOS asia powerproject ORACLE BIM Estimating FMSystems Novade CMC

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

5.3 Enabling Worksharing

Enabling worksharing involves creating a master project model, known as a central model, from an existing model.

The central model stores the current ownership information for all worksets and elements in the project, and acts as the distribution point for all changes made to the model. All users should save their own local copy of the central model, edit locally in this workspace, and then synchronize with central to publish their changes to the central model so that other users can see their work.

To enable worksharing and create a central model

1. Open the Revit project file (RVT) on exerice file to convert as the central model.
2. Click Collaborate tab ➤ Worksets panel ➤ (Worksets).
   The Worksharing dialog displays, showing the default user-created worksets (Shared Levels and Grids, and Workset1).
3. If desired, rename the worksets.
4. In the Worksharing dialog, click OK. The Worksets dialog displays.
5. In the Worksets dialog, click OK. You do not need to create worksets at this point.
6. Click ➤ Save As ➤ (Project).
7. In the Save As dialog, specify a file name (**ACMV-Logistic Warehouse_Central Model)** and directory location for the central model.
8. In the Save As dialog, click Options.
9. In the File Save Options dialog, select Make this a Central Model after save.

Note: If this is the first time you have saved after enabling worksharing, this option is selected by default and cannot be changed.

10. Click OK.
11. In the Save As dialog, click Save.

AUTODESK. IDAT TILOS asia powerproject ORACLE BIM Estimating FM Systems Novade CM-C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

5.4 Creating Local copy of Central file.

When you save the central model, be sure that it is saved to a network drive to which all team members have access. If you are using server-based worksharing, Revit Server must be installed on any machine hosting a central model, and the Host role must be enabled in the RSN.ini file on that machine.

For the class set up we will configure the revit to replicate different user accessing the central file and create a local file to save in different directory or folder.

To create a local file (USER 1)

1. Close the Central model
2. Click ▸ Options.
3. Click General Tab, under Username change the username to USER1
4. Click File Location, Default path for user files, click browse and navigate or create a folder to which the local file will be save.
5. Click OK
6. Click ▸ Open and look for the location of the central file, on the open dialogue box ensure the Create New Local is selected
7. Click open, you will opening the local file created under the folder you specify on the option.

To create a local file (USER 2)

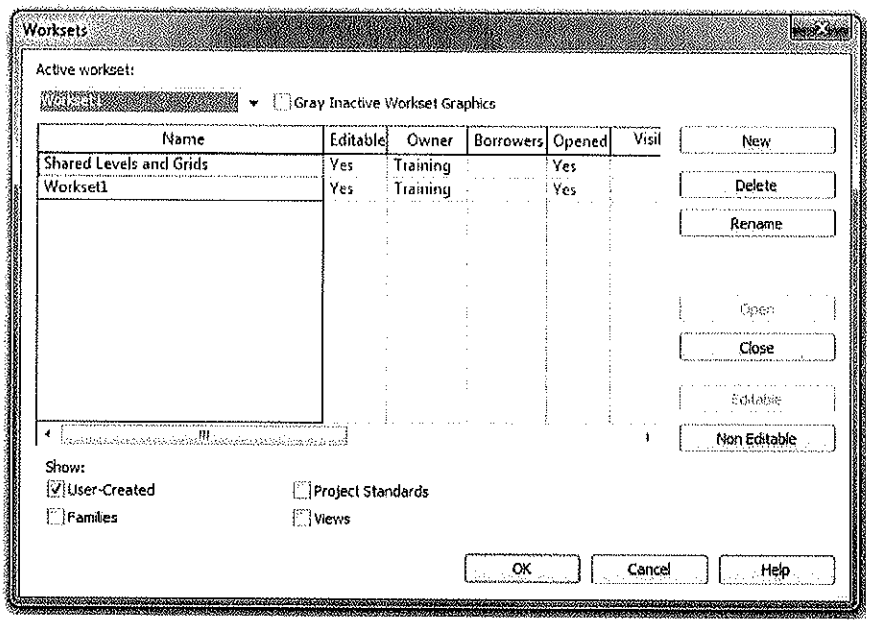
1. Run again a new Revit Application
2. Click ▸ Options.
3. Click General Tab, under Username change the username to USER2

SME One Asia Prominent Award | Oracle Primavera: Top ASEAN Reseller | Autodesk: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

4. Click File Location, Default path for user files, click browse and navigate or create a folder to which the local file will be save.
5. Click OK
6. Click ➤ Open and look for the location of the central file, on the open dialogue box ensure the Create New Local is selected
7. Click open, you will opening the local file created under the folder you specify on the option.

5.5 Setting up and Managing Workset

When you enable worksharing, several default worksets are created (two default user-created worksets, and worksets for the families that are loaded in the project, project standards, and project views)



The following image shows the Worksets dialog, with the two default user-created worksets, Shared Levels and Grids and Workset1.

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

To create a new workset

1. Open your local copy of the central model.
2. Click Collaborate tab ▸ Worksets panel ▸ (Worksets).
3. In the Worksets dialog, click New.
4. In the New Workset dialog, enter a name for the new workset.
5. To display the workset in all project views, select Visible in all views.
6. Clear this option if you want the workset to display only in views where you specifically turn on its visibility.
7. Click OK.
8. The new workset displays in the list of worksets; it is editable, and your user name displays for Owner.
9. If you are setting up a workshared model for your team and want to assign owners to each workset, each team member must open a local copy of the central model, select the workset in the Worksets dialog, and then select Yes in the Editable column.
10. When you finish creating worksets, click OK to close the Worksets dialog.
11. If you have added only one new workset, Revit prompts you to make the new workset active. Click Yes or No.

5.6 Adding Element to Workset

To add element on workset

1. Select the workset from the Active Workset drop-down on the status bar or the Collaborate tab ▸ Worksets panel.

AUTODESK. IDAT TILOS ORACLE BIM Estimating FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

2. **Note:** You can select a non-editable workset as the active workset. If you place an element in a non-editable workset, the element becomes non-editable after you synchronize with central. If you add view-specific elements, such as detail lines or dimensions, they are added to the workset of the active project view.

3. If you want all elements that were not created in the active workset to display as gray, click Collaborate tab ➤ Worksets panel ➤ (Gray Inactive Worksets).

4. Add the necessary elements to the Drawing Area.

AUTODESK. IDAT TILOS asia powerproject ORACLE BIM Estimating FM Systems Novade CM:C

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

Saving Workshared File

In this chapter you learn how to open synchronized your local saved files to the central file and relinquished ownership without saving local file

This chapter discuss:

- **Synchronizing with central model**
- **Closing workshared file without saving**
- **Opening workshared files Independent to the central model**
- **Relinquishing ownership without synchronizing with central**

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

Saving Workshared File

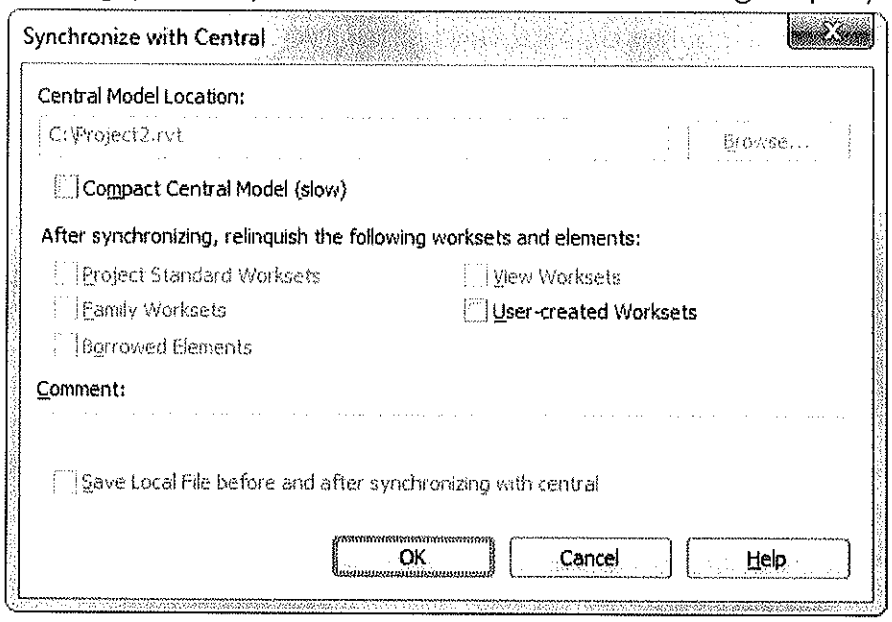
When saving the changes in your local workshared file, you can do either of the following:

- Synchronize with Central
- Save locally

6.1 Synchronizing with Central Model

To Synchronize with Central: Click Collaborate tab ➤ Synchronize panel ➤ Synchronize with Central drop-down ➤ (Synchronize Now).

If you want to modify the Synchronize with Central settings before you synchronize with central: Click Collaborate tab ➤ Synchronize panel ➤ Synchronize with Central drop-down ➤ (Synchronize and Modify Settings). The Synchronize with Central dialog displays.



1. In the Synchronize with Central dialog, verify the location of the central model.
2.

SME One Asia Prominent Award | Oracle Primavera: Top ASEAN Reseller | Autodesk: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

3. If necessary, click Browse to specify a different path for the central model. Specify the new path in the Central File Location dialog, and click OK.
4. Select Compact Central Model to reduce file size when saving.
5. **Note:** Selecting this option increases the time needed to save.
6. Under After synchronizing, relinquish the following worksets and elements, select from the following options:
    a. To make your changed worksets and elements available to other users, select the appropriate check boxes.
    b. To synchronize the changes to central but keep the worksets and elements editable, clear the appropriate check boxes.
7. If desired, enter a comment that is saved to the central model.
8. Verify that Save local file before and after synchronizing with central is selected to ensure your local file remains synchronized with central.
9. Click OK.
10. Your changes are saved to the central model and any changes from other team members are copied to your local model.

EDITABLE ELEMENTS

If you have saved all changes to the central model, but still have editable elements when you close the local file, the Editable Elements dialog displays.
If you do not want to keep ownership of the checked out worksets and borrowed elements, click Relinquish elements and worksets; otherwise, click Keep ownership of elements and worksets.

AUTODESK. IDAT TILOS ORACLE BIM Estimating Novade CMC

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

6.2 Opening Workshared Files Independent of the Central Model

Use this procedure to open a file independently for clients who want to see changes or make changes without saving them. Clients can view the file and modify it without worrying about borrowing elements or owning element worksets. This is also useful for project managers who are not working in the project file, but might want to open it for review without interrupting the team.

1. Click ▸ Open ▸ (Project).
2. In the Open dialog, navigate to the central model and select it.
3. Select Detach from Central.
4. Click Open.

If a non-workshared file is opened with Detach from Central selected, Revit ignores the option, and opens the file normally.

After you open the file, it no longer has any path or permissions information. It is in a state similar to when worksharing was first enabled; all elements in the file can be modified, but no changes can be saved back to the central model. If you save the file, it is saved as a new central model.

Note: If a longer-lasting independent copy of the central model is needed, such as when the central model is suspected to be corrupt, detach from the central model and save it as a new central model. Note that existing local files cannot synchronize with this new central model, and new local files created from the detached central model cannot synchronize with the old central model.

6.3 Closing Workshared File without Saving

If you close your local model without saving, the Changes Not Saved dialog displays. The following sections describe the options.

AUTODESK. IDAT TILOS ORACLE BIM Estimating FM-Systems Novade CM:C

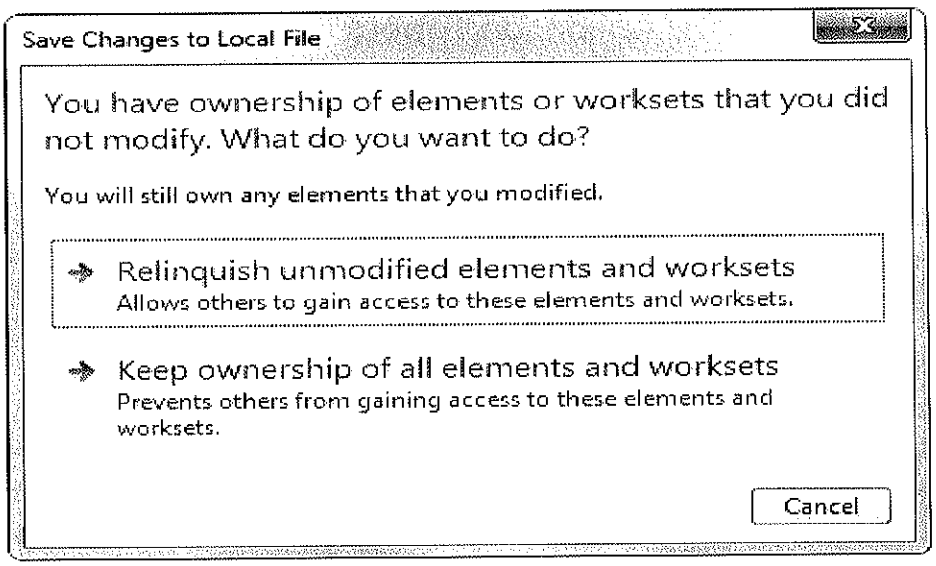
SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

SYNCHRONIZE WITH CENTRAL

This option saves your changes to the central model. The default settings are selected, including saving your changes to the local model. Also, any changes that have been saved from other team members are copied to your local model.

SAVE LOCALLY

This option saves your changes to the local model without synchronizing them with the central model and displays the Save Changes to Local File dialog. Because you did not Synchronize with Central, you still own any elements you modified.



You have the following options:

- Click Relinquish unmodified elements and worksets if you want others to have access to them. Unchanged editable elements and worksets are relinquished, and the local model is saved. You remain the borrower of any elements you changed in the editable worksets.

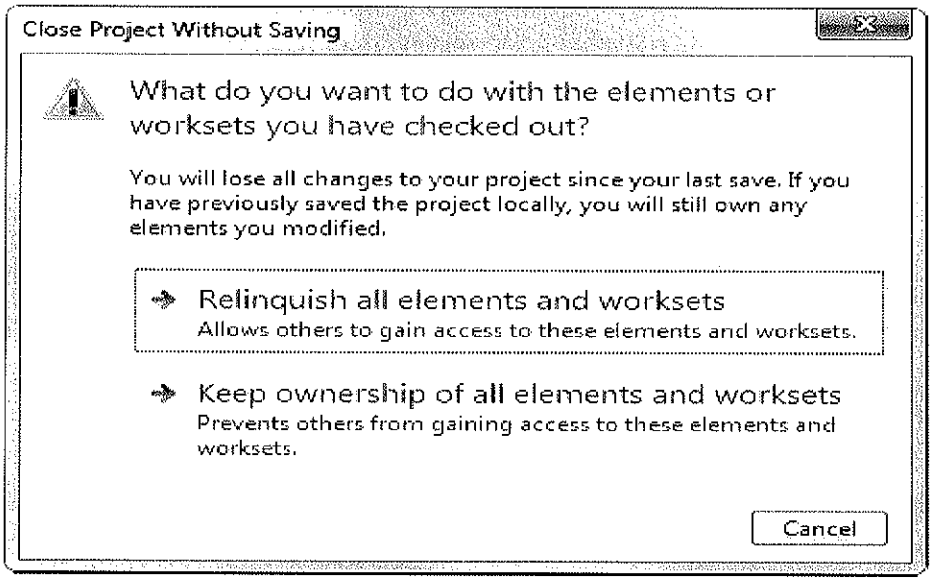
AUTODESK. IDAT TILOS asia powerproject ORACLE BIM Estimating TM Systems Novade CMC

SME One Asia Prominent Award : **Oracle Primavera**: Top ASEAN Reseller | **Autodesk**: 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

- Click Keep ownership of all elements and worksets to retain all editing permissions when the local model is saved. The local model closes without synchronizing with central or relinquishing worksets or borrowed elements.

DO NOT SAVE THE PROJECT

This option discards any changes you made to the local model. It has no effect on your last save to the local model. This option rolls back the state of your local model to the last time you saved it and displays the Close Project **without** saving dialog.



You have the following options:

- Click Relinquish all elements and worksets to let others gain access to both modified and unmodified elements and worksets. You relinquish all changes you made to the elements you borrowed and the worksets you own.
- Click Keep ownership of all elements and worksets to retain ownership of the elements you borrowed and the worksets you own. You will lose the changes you made.

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner

6.4 Relinquishing Ownership without Synchronizing with Central

To relinquish editable elements for which you have editing permissions without synchronizing with the central model:

1. With the local model open, click Collaborate tab ➤ Synchronize panel ➤ (Relinquish All Mine).
2. Revit checks for any changes that require synchronizing with central:
   a. If there are no changes to the model elements, ownership of the worksets and borrowed elements is relinquished. A dialog does not display.
   b. If there are changes, ownership status does not change. You still own any model elements you modified. A dialog displays telling you that you made changes and suggests synchronizing with central.
3. Click Close to close the dialog, if one displays.
4. If you do not mind discarding your local changes, you can relinquish permissions and borrow elements. Open the central model directly or create a new local file from the central model, and choose Relinquish All Mine. Best practice is to discard your original local file so that you do not accidentally work on an outdated file or the wrong local file. If you retain your original local file, be aware that if other users have modified elements that you used to own, the original local file will be incompatible with the central model.

AUTODESK. IDAT TILOS ORACLE BIM Estimating FM Systems Navada CMC

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner



Copyright © 2014 by Crown Systems (S) Pte Ltd

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other non-commercial uses permitted by copyright law.

Author: Limwill Donasco

SME One Asia Prominent Award | **Oracle Primavera:** Top ASEAN Reseller | **Autodesk:** 1st Platinum Partner in ASIA | Best Performing Partner in ASEAN | Best Performing Partner in AEC | Worldwide Channel Sales Platinum Club Winner