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Best Practices: Using Revit in a Unified Work Flow

Jason Calcagno, Division Constructability Leader – Southland Industries
Robert Langley, Project BIM Lead – Southland Industries

MP6729 Are you utilizing Revit in a manner that helps support the entire project team? If not, it is time to take Revit to the next level by getting every trade to create models that can be used efficiently by everyone involved in all phases of a project, to support a Unified Work Flow. Learn how to implement all of your Revit knowledge in a way that can save time, money, and maximize efficiency throughout every phase of a project. Based on our experience at Southland Industries, we will highlight how moving in this direction benefits you as a designer along with everyone else involved in the project. We will demonstrate everything from project setup to modeling practices in Revit that lead to properly coordinated models which are constructible. There will be a detailed breakdown of how Revit models are used throughout every phase of a project in order to show the importance of improving the quality of models from the very beginning.

Learning Objectives

At the end of this class, you will be able to:

- Learn how to set up a Revit software model so that you can use it in a unified work flow
- Learn how to sequence a design for constructability
- Understand how the quality and constructability of your model impacts the other trades during every phase of a project
- Learn how to work more efficiently and save money through the life of a project

About the Speakers

Jason received his B.S. in Mechanical Engineering from Clemson University in 2007 and currently serves as Constructability Leader for the Mid-Atlantic Division at Southland Industries, one of the nation's largest building systems experts. Prior to his current position, Jason spent 5 years as a design engineer at Southland working exclusively on large scale Design-Build projects with stringent coordination and BIM requirements. His previous roles include design lead, commissioning manager, and coordination liaison. As the current leader of the coordination department Jason is responsible for staffing, training, and managing a team of union detailers who perform coordination activities for all the current projects under the Mid-Atlantic Division. He focuses his efforts on streamlining the coordination process, integrating the design and detailing groups, ensuring a high level of communication, and enhancing software tools available to increase team performance.

Robert is a Project BIM Lead for Southland Industries, providing BIM Implementation and training for the Mid Atlantic Division. Robert is an Autodesk certified professional in AutoCAD® and Revit® with 13 years of experience working with Autodesk® products. Through his work with Southland Industries, Robert has experience in BIM implementation for the transition from AutoCAD® to Revit® and facilitation of a unified work flow. He has 9 years of experience spanning across multiple disciplines in the design and construction fields including architectural design, MEP design, and MEP coordination. As a Project BIM Lead, Robert has trained people of all skill levels and expertise which fostered his ability to structure training in a way that makes the material relatable for everyone. He has attended Autodesk University 4 times along with other industry conferences and is excited and ready to share all of his experience and expertise around the AEC industry.

Introduction

Southland Industries

Founded in 1949, Southland Industries provides innovative engineering, construction, service, and energy service solutions through a holistic approach to building performance. Advocating a design-build-maintain model, Southland believes in offering customers the option of optimizing each stage of the building lifecycle through an integrated, customized project or by selecting any of our services and capabilities to be implemented individually. For jobs large and small, our in-house experts remain connected, sharing knowledge and information in order to produce the innovative, practical solutions that have earned Southland its unmatched reputation as one of the top design-build firms in the nation.

Utilizing a variety of progressive tools such as building information modeling (BIM) and lean methods, Southland specializes in the design, construction, and service of mechanical, plumbing, fire protection, process piping, automation and controls systems, as well as comprehensive energy services' needs. As a company that has always prided itself on innovation and collaboration, Southland continues to pave the way as an industry leader in sustainability and energy efficiency so as to improve the way buildings are designed, built, and maintained.

Beginning as a Southern California-based supplier of residential heating solutions, we have organically grown and exponentially expanded our services and capabilities over the years to serve a wide variety of markets and industries. Recognized as one of the nation's largest building systems experts, today Southland delivers superior results for commercial, data center, education, healthcare, government, hospitality, industrial, life sciences, entertainment, and mixed use buildings and clients.

Definitions

Unified Workflow

A single process in which each functional group participates from the onset of design to the completion of construction. This incorporates the involvement of all internal team members including the Project Manager, Project Engineering Lead, Project BIM Lead, and Project Constructability Lead.

Project Manager

Acts as the leader and main point of contact for the project. He or she is responsible for design, trade, and subcontractor management managing the project budget, and procures all equipment on a project.

Project Engineering Lead

Leads the engineering team through the project design, executes BIM modeling to constructability lead standards, and creates all construction documents. He or she is also must select and approve equipment procured on a job and facilitate the coordination of design trade with other trades.

Project BIM Lead

Manages BIM technology from concept to project completion, reviews RFP BIM requirements, and facilitates the creation of the BIM Execution Plan based on the projects requirements.

Project Constructability Lead

Acts as the liaison between engineering and project foreman for project standards and proper installation techniques to shape design. This involves project material standards, specifications, repeatable unity layouts, modular construction/pre-fabrication opportunities, and routing standards. He or she also manages the constructability review, coordination, and spooling processes.

Project Delivery Types

Design-Bid-Build

Typically very RFI intensive, involves large amounts of re-work in engineering, long construction administration phase, longer project delivery schedule

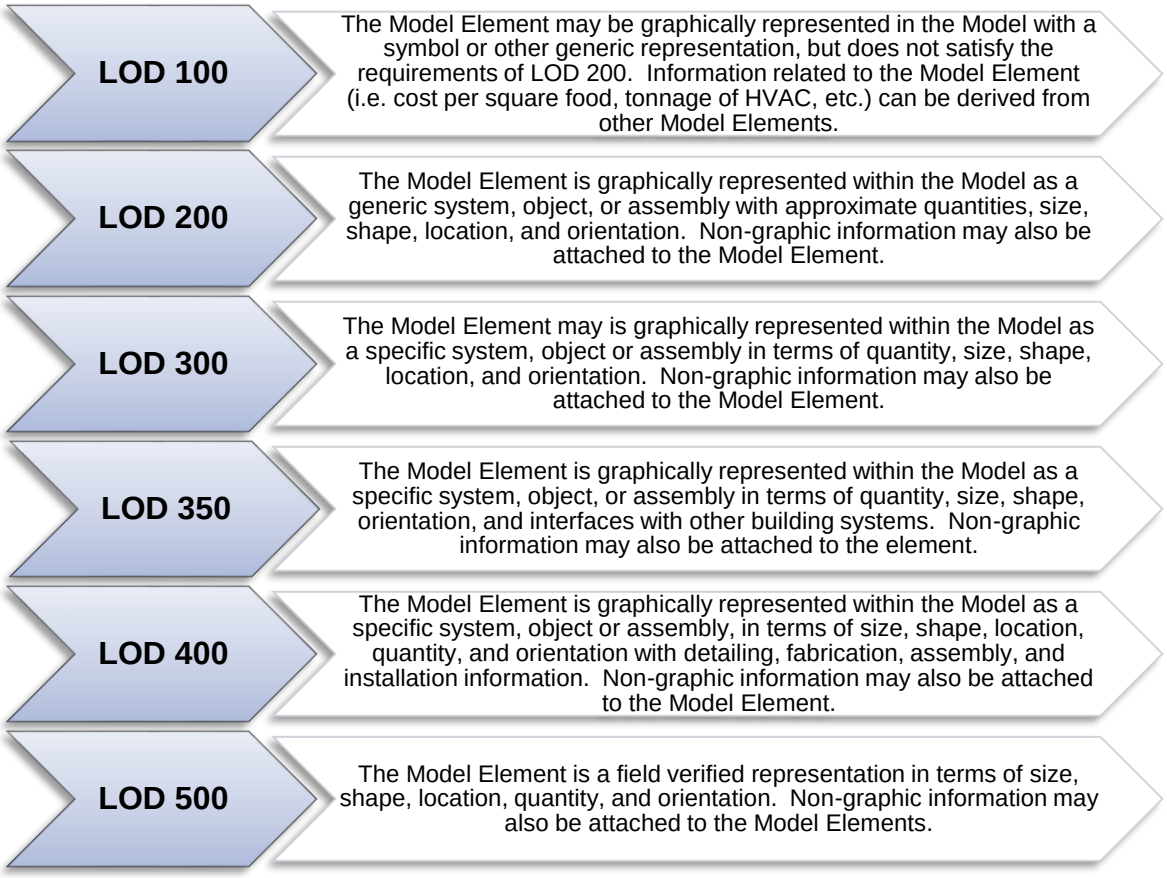
Design Assist

Reduction in the amount of RFI's, less design re-work, more cost impact designed into the job, compressed project delivery schedule

Design Build / Integrated Project Delivery

Very few RFI's, minimize drafting re-work in engineering, constructability is built into the design model, very compressed project delivery schedule

Level of Development



Revit Model Types from Architects and Engineers

Presentation Model

Generic design intent is conveyed, estimated locations of equipment, high detail equipment is used to convey a low LOD, used to create renderings, walkthroughs, and other presentation materials

Spatially Coordinated Model

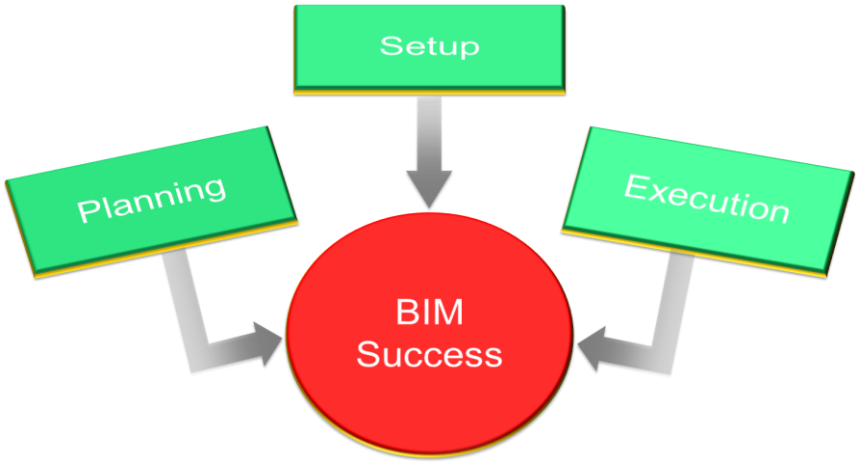
In design, trade zones are enforced, general routing guidelines are followed, Constructability Lead's standards are followed, and there is coordination of the design trade with other trades

In coordination, clash detection with other trades is completed in small scale magnitude. Placement of small scale details, placement of hangers and supports, and drawing of highly complex connections are completed.

Constructable Model

A model that meshes design intent with what will be built in the field. Model is drawn to the level that requires minimal rework from the contractor's coordination team.

BIM Implementation



Execution Plan

Having well laid out BIM execution plan is the key to any project's BIM success. This plan should be a roadmap for any architect, designer, or contractor involved with the project to understand the required processes and expected deliverables. Items that need to be clearly described include:

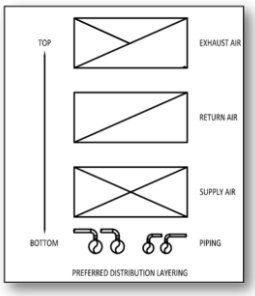
- Technology – Identify what software platforms will be utilized and clarify if those platforms are compatible and how they will interact.
- Deliverables – What are the expectations for BIM deliverables? Clarify the schedule, level of development, and format for all deliverables and communicate that to the teams.
- File sizes and naming conventions.
- Model coordinates and grids.
- Software upgrade strategies.

Modeling Standards

For a Unified Workflow project to be truly successful from concept through construction it is important to have all architects, designers, and contractors on the same page with how the project will actually be built. This concept should be rooted in the modeling standards set up at the onset of the design phase. These standards should be built into the model to limit the model creators from using any fittings or materials not approved or not cost efficient. Standards should be created for items such as:

- System placement – Create standard piping spreads and ensure that models are drawn using bottom elevations of pipe.
- Preferred layering and trade zones – Agree on elevation zones for each trade to route their systems. This will limit confusion and clashes throughout the design process.
- Materials, fittings, and connectors – Build the model such that only standard fittings and connections are options. This will minimize the need for expensive custom fittings or otherwise inefficient work-arounds. Also ensure that systems

are properly assigned in the model with the correct materials and construction standards (i.e. copper vs. steel and internal duct bracing vs. external).



FITTING STANDARDS		
Material	Shape	Fitting Angle (degrees)
Piping	-	22.5 (2-1/2" and up only)
		45
		90
Sheetmetal	Rectangular	Any
Sheetmetal	Round	5+
Sheetmetal	Round (bought) e.g. Lindab)	15
		30
		45
		60
		90

CENTERLINE-TO-CENTERLINE SPACING FOR FLANGED OR EAR-TO-EAR VICTAULIC-COUPLED PIPING [IN.]									
1" Insulation and 1" Clear									
Pipe Size	12"	10"	8"	6"	5"	4"	3"	2.5"	2"
12"	22.00	20.50	19.25	18.00	17.50	17.00	16.25	16.00	15.50
10"		19.25	17.75	16.50	16.00	15.50	14.75	14.50	14.00
8"			16.50	15.25	14.75	14.25	13.50	13.25	12.75
6"				14.00	13.50	13.00	12.25	12.00	11.50
5"					13.00	12.50	11.75	11.50	11.00
4"						12.00	11.25	11.00	10.50
3"							10.50	10.25	9.75
2.5"								10.00	9.50
2"									9.00

Sequencing Design for Construction

Scheduling

Building a constructable model is only one small part of setting the project up for success in the field. Sequencing the design schedule properly can be a huge benefit to the construction team and will allow them to not only condense their construction schedules, but it will reduce early re-work and RFI's. It is very important to consider the following items when sequencing and scheduling the design effort:

- **Understand the owner:**
  Identify the owner's "hot button" items. Does the owner expect a certain layout? Do they have specific operations or maintenance procedures that require a different install technique? If so, it is imperative to identify these items clearly in the design documents and be sure to educate the owner on how their atypical requests will affect the project.

- **Educate the owner:**
  Manage the owner's expectations of each design deliverable and how far the design for each area will be progressed. For example, at the overall 30% design deliverable, the central utility plant may be progressed to 90% design while the rest of the building is only 20% done. This is to ensure that the construction teams are utilizing completed documents as they start installing work in the field.

- **Understand how the model will be used:**
  It is important to understand how each member of the design and construction team will utilize the model at each phase of the design submission. Consider tasks like energy modeling, permitting, long lead equipment procurement, concrete pours (equipment pads), and early system layout. Clearly communicate with the team what Level of Development to expect from each of the design deliverables.

Project Success

It is important to understand that the Unified Workflow is aimed at providing the highest value to the owner while allowing each of the architects, designers, and contractors to also be successful. If the proper plan is implemented on the project early the entire team can realize improvements and profits from all aspects of the job including safety, budget, and schedule.

- **Safety**
  Well laid out building systems, properly placed equipment, and high levels of pre-fabrication all lend themselves to a very safe jobsite. This not only allows every worker to go home safely at the end of each day, but it reduces overall project costs.

- **Budget**
  Upwards of 2% of the overall mechanical contract can be directly attributed to simply replicating data. Reducing the need for this data replication across all trades can significantly affect the project budget. Reducing RFI's, DCN's, and Change orders will also have very positive impacts on the project.

- **Schedule**
  A properly sequenced and executed project will allow all trades involved to condense the overall project delivery schedule thus delivering the final product to the owner in a shorter period of time.