Improving Electrical Workflows: A Contractor’s Perspective

Tim Vock
BIM Manager | Gibson Electric
Learning Objectives

PROBLEM: OUR PROJECTS GO OVER BUDGET AND SCHEDULE
SOLUTION: CREATE FRAMEWORK FOR ORGANIZING PEOPLE AND DRAWINGS

PROBLEM: OUR MODELS ARE NOT SET UP WELL ENOUGH TO TRUST THEM
SOLUTION: PUSH THE POWER OF THE RUN SCHEDULE

PROBLEM: WE SPEND TOO MUCH TIME ON REPETITIVE TASKS WITHOUT CONSISTENCY
SOLUTION: AUTOMATE DRAWING CREATION

PROBLEM: OUR BIM INVESTMENT ISN’T PAYING ITSELF OFF IN OUR PREFAB SHOP
HOW WE PREFAB TODAY; HOW WE WILL PREFAB TOMORROW
Organizing People

Success requires a way to measure success

• Meet with the whole team at internal kickoff (required!)
  o Have a checklist
    ▪ Lays out responsibilities
    ▪ How are changes handled?
    ▪ What are my objectives and how do they fit with everyone else’s?

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PROJECT COORDINATION CHECKLIST

PART-1: IDENTIFICATION AND START-UP (Internal Kickoff)

Required: estimator, PM, foreman, coordinator, BIM manager

✓ Project Overview – Project scope, customer, schedule, expected challenges for construction (estimator / PM)

✓ Coordination deliverables owed to customer
  a) BIM requirements
  b) List of drawing submittals (signoffs, slab pans, pad drawings, point loads...)
  c) Meeting attendance

What recourse do we have when customer asks for more? When customer runs coordination poorly, forcing us to go over on hours?

✓ Coordination deliverables for internal use
  a) Install drawings
  b) Takeoffs
  c) Pre-fab

Do we have enough hours? What happens when expectations change? How are we tracking coordination hours?

✓ Create coordination / sign-off schedule
  a) Earliest dates we could promise at external kickoff meeting
  b) Latest dates we require to make pre-fab / install dates

✓ What other questions / concerns need to be voiced at external kickoff meeting?

✓ Review Document and Information Control Plan (Part 2)

✓ Obtain and review documents/information from the estimating phase that can assist start-up.

✓ Identify any line items or scope that is in the contract but not represented on the drawings or in the specifications. Associated documents that pertain to and added scope need to be marked up to reflect these
Organizing Documents

Make it easy to find updated information

- Every job has the same folder structure
  - Main folders divided by who needs access
    - Group permissions
    - Permissions matrix
  - Begin with end (archiving) in mind

PART 2: DOCUMENTS AND INFORMATION CONTROL

Required: PM, administrator, foreman, coordinator, BIM manager

If set up properly, this next phase can save you time and many headaches throughout your project. Accurate information that is easily accessible by everyone (including field) is key for all projects. Avoid wasting time searching for information and keep the field focused on installing. Coordinators need to be current with all changes happening.

1. Folder structure:

   ![Folder Structure Image]

   When the job is complete, folders 1 and 2 will be downloaded to the S-drive (no duplicates) so the entire job can be archived.

2. Who maintains the current set of drawings and how? What about submittals (internal and external) RFI's?

3. Construction Document Issuances and associated tasks
   a) Document Issuances
      i) Individual or Batch slip sheeting. (See example C).
      ii) Overlay drawings can be created to identify all changes, not just clouded changes.
      iii) Coordination team can track quantities for pricing while reviewing documents.
      iv) Tracking of time.
   b) RFI/Submital Comments
The Right Software Can Help

Softwares include: BIM 360 Docs, Bluebeam Studio, Procore, Box, OneDrive

- Find solution that meets your needs
  - Ease of managing licenses
  - Ease of managing permission groups
  - Check-in / Check-out functionality
  - Automatically maintain current set
Updating Drawing Sets
Organizing Models
Power of the Run Schedule

The only way to make sure the model ‘thinks' like an electrician is to bring in the one-line

- Put the one-line in the background
- Then add a family to “tag” each run
  - Each tag contains all the run info: start, end, parallel quantity, size, etc.
Power of the Run Schedule

- 1 LINE FDR#: 30
- BIM: Y
- Id: DP-1:1
- Start: DP-1
- Finish: RTU-1
- ParallelQuantity: 1.000000
- Size(Inches): 0.750000
- Type: EMT
- EstimatedLength: 0' 0"
- ModeledLength: 0' 0"
- InstalledLength: 0' 0"
- System: 480/277V Power
- Notes: Circuits
- 30

Diagram shows: DP-1:1
Power of the Run Schedule

| Schedule | Power of the Run Schedule |

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Power of the Run Schedule

Now we have consistent naming throughout ENTIRE project

- Insist that everyone use the same IDs everywhere!
  - Markups, feeder schedules, takeoffs...
Power of the Run Schedule

Use a Shared Parameter to tie them all together

- Tab-select conduit run and assign correct ID
- Make a schedule that relates each tag to all its information
  - Placed on drawings for submittals, install
Power of the Run Schedule
Power of the Run Schedule

What about home runs and low voltage runs?

- Use key schedule hack
- Add information about new runs simply by clicking “Add row”
Power of the Run Schedule

Run Schedules are Great for Take-offs!

- Use “Conduit without fittings” in native Revit
- Great for ordering material, checking costs vs initial estimates
Run Schedule: with Plugin

Plugins “push” information through the conduit run

- Tie Excel to Revit to Navisworks model
- Avoid the: copy, tab-select, paste routine for every conduit change!
Run Schedule: with Plugin

More uses of plug-ins with Run Schedule

- Quality check your model
- Push colors (without filters!) and materials through the model
Run Schedule: with Plugin

Materials = better Navisworks models

- Default Revit = all white
- With materials = color
  - Your foremen will thank you!
  - Does not rely on the person running the model
Automate Drawing Creation
Create Drawings Automatically

Sorry! Requires Plug-in (eVolve)

- Use eVolve Kit Areas
  - Like rooms / spaces, but better
  - One per key plan area
Create Drawings Automatically

Automation!

- Open Kit Manager
  - Check which areas to make drawings
  - Pick a titleblock that goes with the drawing type you’re making
Create Drawings (and Schedules!) Automatically
Automation Requires Setup
Prefabrication
Pre-fab: Don’t Do This
Do it all with Schedules

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How We Prefab

Native Revit = Not Made for Conduit Prefab
(Pretty good at other kinds of prefab)

- Modify your conduit bends for dimensioning
  - See video link in Handout
  - Adding to 10’ lengths is still manual
  - So many drawings to spool, rack, and install!
Prefab Next Steps: Plugin

Greenlee Bender: 881
Conduit Type: EMT
Conduit Size (INCHES): 2 1/2

Pipe Identification    SB-910_0015
Segment Before:        SB-910_0016
Segment After:         SB-910_0017

# of Seq. Bends:       1
Bend Mark:             1' - 7 1/8"  0"  0"
0"  0"
Bend Rotation (DEGREES): 0  0  0
0  0
Bend Angle (DEGREES):  90  0  0
0  0
Note: NEGATIVE rotation values represent rotating the conduit CLOCKWISE from the tail end of the conduit.
Bend rotation values are all relative to the first bend.
Cut Mark:              9' - 8"
Prefab Next Steps: Plugin

Think, “How would I schedule this?”
Makes everything pre-fabbable

- Could make adjacent pieces “talk” to each other
  - Skill with Dynamo or some plug-ins
- Or make it all one family
  - For example, eVolve offsets shown at right
  - Tie it to your bender specifications

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Prefab Next Steps: Plugin

Clean-up Install Drawings

- Drawings require only tags identifying pieces already made
- Changes require reprinted schedules only; NOT redoing many drawings!
- Cut required BIM time for pre-fab in half!
Prefab Next Steps: Plugin

Shortened Schedules Make Pre-fab possible
Prefab of Tomorrow

BIM: The better it gets, the more everyone relies on just a few people who know how to use it

- Cloud worksharing
- Train foremen
- Train estimators
- Involve pre-fab shop
- Eliminate thoughts of protecting knowledge = job security; it doesn’t!
Wrap-Up

BIM = most exciting place to be in the industry

• Organization is essential
  o People
  o Files
• Organize models with Run Schedules
  o Make modelers think like electricians at the same time!
• Automate what you can
  o Most difficult = conduit runs, but now we can do it!
• Pre-fab is our way to keep growing
  o Future dominated by work shortages; how else do you keep working?
About the speaker

BIM Manager, Gibson Electric

- Chicago area
- went from engineering to economics to business to construction?!
- in the industry since 2008
- work on everything from hospitals to data centers across the country
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