Automation in a world of endless parts and pieces

Tim Catalano – BIM Technology Coordinator – RK
Jubel Beren – BIM Technology Coordinator - RK
In this class I will show how we have successfully implemented and benefited from automation in our CAD / Building Information Modeling (BIM) department to make use of the vast amounts of data we have to give our company an advantage. I'll be showing a number of automation projects that I've worked on that have given us a free flow of data to various departments—such as purchasing, the shop for production planning, and to the field. I'll also discuss our philosophy on technology and automation.
Key learning objectives

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

- Understand the benefits of automation
- Be compelled to try new ways to enable the computer to do the work
- Get fresh ideas and inspiration
- Learn how various technologies are required to have a satisfactory solution
Who are we?

- **Tim Catalano**
  - BIM Technology Coordinator
  - 18 years in CAD/BIM

- **Jubel Beren**
  - BIM Technology Coordinator
  - 23 years in shop and CAD/BIM

- **RK (rkmi.com)**
  - Denver’s Largest single source of Mechanical Contracting
  - Family Owned since 1963
Who are you?

- Who is using your software out of the box?
- Who is using some level of automation currently?
- Full time or part time developers in house?
- Anybody outsourcing automation needs?
Previous Classes

- 2014
  - Worksheets and Spool Sheets
    
  "MSF7147-L"

- 2015
  - Fabrication Advanced Scripting
    
  "MSF9703-L"
  - Fabrication API
    
  "SD9704"

- 2016
  - Automation in a world of endless parts and pieces
    
  "MSF21766"
History

- UI Buttons
- Lisp
- VBA
- VB.net
- WPF, C++, etc…
Why Automate?

- Number one reason, because I’m super lazy!
- Communicate instructions to the computer
- Automate tedious tasks
- Enable unreasonable or impossible tasks
- Diminish human error
- Error checking manual input
- Efficiency
- Tracking and Reporting
Examples
RK Sync

- To Replace the Xcopy Method previously used
- Local Files: Better performance/reliability
- Efficiently copies only what’s changed
- Bi-directional syncing
- Automatically sets up configurations and installs internal plugins
- Also sets active configuration
- Built using WPF and .net
- User controlled via Active Directory
Task Site

- Originally built as a simple tool when I was learning Silverlight
- Continues to be used for the last 8 years
- Tried to revise, my ideas were too big
- Created using SilverLight and .net
- WCF for communication, XML for data storage
Multiple Duct Check

- Set sheet metal items properties to match shop standards, which generally exceed SMACNA standards
- Ran just before download in CAD
- Ran after takeoff in CAM
Coupling Change

- Consolidates multiple similar scripts
- Easy for the user to understand
- Would like to replace this with a .net version
  - Current limitations prevent that implementation
Generate Navisworks NWD Models

- Windows task scheduled to run each night to update the site NWD’s for the field to review
- Also used to update glue models for local coordination every few hours
Revit Batch Upgrade

- Eliminates almost all dialog boxes that pop up when opening a file that needs upgrading
- Upgrade multiple files as a batch, no need to keep babysitting Revit
- Can overwrite the original or save the upgraded files to another folder
- Skips already upgraded files for performance
- Newly added ability to reconnect references automatically
- Future plans to upgrade reference files during reconnect. Currently has to be done separately
RKJobInfo

- Consolidates relevant Job information from JobInfo dialog
- Enables getting data directly from Viewpoint for project and phase
- Date Pickers for Custom Data
- Checkboxes for yes/no true/false fields
- Current user input
- Color change per phase
- Future
  - Add user lookup from active directory for validating user names for reports that automatically send emails down the line
  - Batch number lookup from GlobalShop
RenumberAll

- Chains together a number of renumber operations
- Displays help information to remind the user what information to put into the renumber dialog
- Also does some other things like adds dimensions to the piece fitting spools
- Future would like to eliminate the dialog box by implementing a fully custom renumber routine
- Custom RenumberHangers to resolve issues with sloped pipe
MarkSpoolDimensions

- Adds dimensions into a custom data field describing general dimensions for a piece fitting spool
- Eliminates the need for spools drawings for simple spools which reduces the time required to spool a drawing
- Prompted by manufacturer issues
Commands

- RKExecuteScript
- ImportStyles
- AddMissingDrawingsToProjectNavigator
- SetHangerLength
- RoundRodLength
- AutoSetSupportedSize / ManualSetSupportedWidth
- UCS
  - ImportUCS
  - ApplyUCS
  - ExportToSharedCoordinates
- MaximizeAutoCAD and SplitAtScreen
- UnloadXRefsAndOpen
- ExtractDatabase / MergeDatabase
  - Recover otherwise impossible to recover drawings
  - Find layers with data causing file size bloating
- FindDuplicates
- PlaceItemNumbers
- TextOff / TextOn / SizeOff / SizeOn
Internal Library

- Preset item filters
  - Exposed to .net, lisp, and the command line

- Generic Lisp Functions
  - Expose .net functionality in lisp
  - Expose Fabrication API functionality to lisp
  - Script re-write paths for lisp

- New Object Tracking
  - Storing who drew an item and on what date
  - Partial load all files in the project to generate linear footage and weight reports per user and per service
Batch Export

- Exports batches and workorders multiples at a time to controlled and systematic batch files for detailing and material requisition.
- Can also update changes to the batch drawing so only changes need to be re-spooled and dimensioned.
- Each item associated with the batch enabling pre-made selection sets and other nifty functionality.
- Needs to be updated to work with the new batch number system.
AdvArray

- 3ds Max Plugin
- C++
Material Requisition

- History
- Technology
  - VB.net
  - Fabrication API
  - Entity Framework
- SQL
- ASP.net / MVC

### Material Requisition

<table>
<thead>
<tr>
<th>Material Requisition</th>
<th>Requested By</th>
<th>Date Ordered</th>
<th>Project #</th>
<th>Project Name</th>
<th>Material Date</th>
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</thead>
<tbody>
<tr>
<td>rk</td>
<td>Tim Catalano</td>
<td>10/31/2016</td>
<td>1234</td>
<td>Test Project</td>
<td>4/30/2015</td>
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</table>

<table>
<thead>
<tr>
<th>Ship To</th>
<th>(Varies per Batch)</th>
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<table>
<thead>
<tr>
<th>Purchasing Agent</th>
<th>Contact</th>
<th>Material Cost Code</th>
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<tr>
<td>(Varies per Batch)</td>
<td>Tim Catalano</td>
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<table>
<thead>
<tr>
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<th>Manufacturer</th>
<th>Part Number</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>4</td>
<td>260 Clevis Hanger Blk</td>
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<td>Butt Weld LR 90</td>
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<table>
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<tr>
<th>Notes</th>
<th>This is a revised requisition, please use the Difference link below to see the changes from the previous version. N/A</th>
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</table>

### Batches:
- All Batches
- HVAC/Plumbing Batch
- Hanger Batch
- Pipe Batch

Project Requirements | Info | Order
Reports: Excel | Pipe Cut | Difference
Viewpoint: CSV | Address | Consignment
Shop Estimates: Hydronic/Plumbing | SMACNA Run Times

© 2015 - RK Material Requisition ASP.NET Application

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# Material Requisition

- **Reports**

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### Material Requisition Details

- **Project #:** 1234
- **Ship To:** Xanthia
- **Purchasing Agent:** Tim Catalano
- **Contact:** Hanger Batch
- **Requested By:** Tim Catalano
- **Date Ordered:** 10/31/2016
- **Material Date:** 4/30/2016
- **Material Cost Code:** 987654
- **USA Products Only:** No

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### Material Requisition Table

- **Job Number:** 1234
- **Requisition ID Number:** 001
- **Vendor:** EA
- **Material:** Carbon Steel
- **Description:** 4 260 Clevis Hanger Blk
- **Quantity Request:** 2

---

### Additional Notes

- **Viewpoint Company:** 1
- **Material:** Carbon Steel
- **Description:** 6 260 Clevis Hanger Blk
- **Quantity Request:** 4

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Material Requisition

- Reports

Pipe Cut Sheet

Shop Time Estimate

Total Length: 20' 6 1/4"
Material Requisition

- Info Page
  - Version access
  - Drawing statistics
  - Activity Logs

Test Material Requisition.dwg

Details

<table>
<thead>
<tr>
<th>Project</th>
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<tr>
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<tr>
<td>State</td>
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<td>Batches</td>
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Statistics

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Included

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Size Description

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Excluded

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<tbody>
<tr>
<td>Fittings</td>
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<td>Linear Items</td>
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Logs for Version 5

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<td>Created</td>
<td>New Requisition Created v1</td>
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<tr>
<td>4/4/2016</td>
<td>Tim</td>
<td>Superseded</td>
<td>Requisition has been</td>
</tr>
</tbody>
</table>

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Material Requisition

- Other Benefits
  - Purchasing Tracking
  - Versioning
  - Web deployment makes changes much easier to do in near realtime
  - Access to data without the need for expensive design applications for users like the yard
  - Web interface enables using phones and tablets as well

- Excel functions for Purchasing
  - Export to CSV
  - Merge CSV
  - Autosize Columns when opening CSV
The future

- Material Requisition
  - Adjust database to add tables to store repetitive data in some rows to reduce database size
- RKJobInfo
  - Convert the RKJobInfo to use only the Fabrication API and eliminate the dependence on scripting and lisp
- Batch Export
  - Revise to work with our new batch number
  - Include the material requisition export during the batch export
- BatchExportToSharedCoordinates
- Custom HangerCommand
Questions?
How did I do?

- Your class feedback is critical. Fill out a **class survey** now.
- Use the AU mobile app or fill out a class survey online.
- Give feedback after each session.
- AU speakers will get feedback in real-time.
- Your feedback results in better classes and a better AU experience.