AS10690 Revit Master Class
Building Construction Ready Curtain Walls

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Class summary

Curtain walls represent a special category of Revit software elements that we can use in many diverse ways. In this class, we will focus on building comprehensive glazed wall systems. You will learn how to build out a library of construction ready, manufacturer-based components for efficient detailing, documentation, and cost estimation of commercial curtain wall and storefront systems.
During this class, we will:

- Review the basics of how curtain wall system families and their sub-components work together
- Learn the intricacies of building curtain wall components and family types in Revit projects
- Understand how to capitalize on manufacturer detail components to produce final-quality curtain walls earlier in the design process
- Build custom mullion detail components, mullion profiles, and curtain panels which work together to provide ready to go detailing
- Build detailed Entrances families that can easily be applied to a curtain wall and also include construction detailing
About Me

- BIM Specialist with Microsol Resources in Philadelphia
- Previously the BIM / IT Manager for Erdy McHenry Architecture LLC in Philadelphia
- Long track record of BIM /IT / CAD management in DE, PA, Boston
- History of projects with crazy curtain walls
Projects
Curtain Walls and Storefront Glazing Systems
Curtain Walls

- Nonbearing exterior wall secured to and supported by the structural members of the building
- Larger glazing spans; across floors; upper floors of high-rise buildings
- Thicker / larger extrusions
- Subjected to 12-15 lbs. water test
- Shear block / shop built construction
- Each panel of glass weeps water out independently at the horizontal members
Storefronts

- Frames within wall construction
- 10’ high / 5’-0” D.L.O. span practical limit
- Smaller sightlines (2” x 4-1/2” typical)
- Lighter gage extrusions
- Screw-spline / site built construction
- Subjected to lower 8-lb. water test
- Vertical mullions act as gutters to carry water down and weep out at sill
Detailing Glazed Assemblies in Revit
Architectural detailing is meant to show design intent.

Describes the system used as the basis of design and its attachment to the building (to the wall / to the structure).

Details extents of vapor barrier, flashing, and other weatherproofing elements (roof copings).

Generally system-agnostic; systems can and will change in C/A.

Details often culled from manufacturer’s web sites and copy/pasted into CDs.
Shop Drawing Detailing

- Curtainwall / storefront subcontractor will draw up each unit separately and provide complete fabrication details.
- Provide itemized list of each component / part number used in the assemblies
Revit Curtain Wall Rundown

- Panelized wall system family composed of panels, grids, and mullions
- **Grids** separate panels; **Grid Segments** host mullions
- **Grid Layout** describes automatic creation of grids
- Fixed Distance, Fixed Number, Minimum Spacing, Maximum Spacing
- Individual curtain walls have Justification, Offset, and Angle parameters
- Turn on / off grid segments to join adjacent panels
- Panels can be non-rectangular (using System Panels or Walls only)
Modify Grids to Get Non Rectangular Panels

Click grid to toggle segment on / off
Revit Curtain Wall Rundown
Curtain Wall Mullions

- Curtain Wall Mullions are made of six system families
- Circular, Rectangular, Trapezoid, V Corner, Quad Corner, L Corner
- Quad Corner, L Corner, V Corner, and Trapezoid are fixed shapes with sizing parameters
- Circular and Rectangular mullions support custom Profiles
Curtain Wall Mullions

- Mullion Types specify the size / profile used, the mullion offset, angle, and material used in the 3D shape.
- Mullion Types are assigned to 6 possible slots in a Curtain Wall Type:
  - **Vertical Mullions:**
    - Interior Type
    - Border Type 1 (Start point)
    - Border Type 2 (End point)
  - **Horizontal Mullions:**
    - Interior Type
    - Border Type 1 (Bottom)
    - Border Type 2 (Top)
Mullion Profiles and Detail Components

- Custom profiles can be used to define the mullion shape
- Used in Rectangular and Circular mullion families only
- Vertical and horizontal mullions clean up based on extents of the profile; must have nothing jutting outside on the left or right sides
- Curtain panels are trimmed to where the profile sketch intersects the Center (Front / Back) reference plane
Mullion Detail Components

- You can create Detail Components of the head, sill, and jamb conditions you get from manufacturer / vendor
- These detail components can be *nested* inside of mullion profile families
- Detail components will show in any 2D view that is facing parallel to the view, e.g. plan, section, and detail
- Detail components can mask out model elements
- Very powerful way to get from Zero to Sixty by simply placing a comprehensive curtain wall family instance
- Very easy to swap out for a different system very late with no penalty
- Only live with the pain of initial creation *once*
Curtain Wall Mullion Detailing Workflow

1. Create manufacturer-specific detail components
2. Nest detail components into profile families and trace outlines
3. Assign profiles to rectangular mullion types
4. Assign mullions to curtain wall type
You can create curtain panel families which represent glazing, entrances, railings, corrugated and standing seam panels, etc.
Basic Wall Curtain Panels

- You can assign a Basic Wall or another Curtain Wall type as a panel.
- Basic Walls will curve with the layout line curvature.
- You can embed a Wall Sweep profile to make a horizontal mullion that will curve with the panel.
- Basic Walls will center themselves on the panel by default; you can specify the Layout Line Offset on the panel itself to push it out or in.
Basic Wall Curtain Panels
Basic Wall Curtain Panels w/Horizontal Sweep
System Panels

- Two System Panels: Empty Panel and System Panel
- Empty System Panel can poke holes in curtain walls
- Both can be non-rectangular
- Both have limited options – no embedded detail, no modification of geometry, etc.
Planning 2D and 3D Levels of Detail
What’s Wrong with this Picture?
Building Better Curtain Wall Types

- We need to include the ½” sealant & backer rod at the perimeter
- Only way to guarantee accurate frame sizes and Daylight Openings
- Easy to include in custom profiles and detail components
Adding Level of Detail

- We can granulize the Level of Detail used in our curtain wall mullions and panels using embedded detailing and detail components.
Adding Realism

- Add a moderate amount of 3D geometry to custom panels to heighten realism
The Workflow
1. PLAN the family's required and requested behaviors. Think about how flexible it needs to be.
2. Choose the template (determines category / hosting condition) & initial setup (scale, units, etc.)
3. Draw Reference Planes to block out the geometry and define constraints
4. Dimension Reference Planes to sketch out geometry
5. Create Parameters: Name, Data Types (length, materials, yes/no, etc.), and Parameter Group
6. Label dimensions = Associate dimension with a family parameter. Create params "on the fly"
7. Model geometry and constrain to Reference Planes using Align / Lock
8. Create Family Types and assign values to parameters
9. Create and assign Subcategories to geometry. Note: This only works on raw geometry, not on nested families. Solution: Create nested family in the same category as the parent family (frames are Doors)
10. Nested families: make their parameters Instance based. Link parameters to host family params.
11. Leverage 2D symbolic linework, masking regions, detail components, etc.
12. Set Detail Level visibility of objects: Coarse / Medium / Fine
13. Flex in family editor and Test in project context. Tip: Don't test it in your active project.
## Basic Workflow

### AutoCAD

1. Reassemble details from Blocks
2. Create Blocks of all parts & Wblock them to DWGs
3. Clean up CAD linework
4. Copy / paste original details and align them
5. Create master detail layout drawing
6. Gather all CAD drawings and documentation

### Revit

1. Create Detail Component family template for mullion parts
2. Create Detail Components from part DWGs
3. Assemble parts into head / sill / jamb Detail Components
4. Nest Detail Components into Profile families and trace outline
5. Load Profiles into Project and assign them to Mullion Types
6. Create Curtain Wall type and assign Mullions

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Gather all CAD drawings and documentation.
Gather Data and Clean It Up

- Download the design manuals
- Determine details to use – select most common ones
- Copy / paste CAD details into a single DWG
- Clean up layers, remove small <3/64” geometry
- Use a high precision (Decimal 0.000000001) to reveal tiny errors
Recreate Details with AutoCAD Blocks

- Re-create details with blocks of parts using a common insertion point
- Wblock everything out to separate files to bring into Revit.
Build Detail Components

- Import blocks into new Detail Component file and trace
- Use Filled Regions with <Invisible> line style for border
- Create composite mullion detail components for 90° corners
Build Profiles

- Create new Profile family from template
- Load the Detail Component into it. Center on origin. Detail Level = High
- Trace
Assign Profiles to Mullions

- Be aware of direction and handing:
Build Custom Glazed Panels

- Build custom glazed panel families with glazing, gaskets, and masking regions
- Nest glazing detail component which shows all detail; place in plan and elevation; set detail level to “High” only
Building Entrances

- Entrance Assembly
- Subframe
- Door Panel
- Push / Pull Hardware
- Hinges
- Threshold
Building entrances

- Same concept as mullions and curtain panels
- Clean up CAD geometry, block it, import in Revit Detail Components
- Trace with Filled Regions; recompile into full jamb/head details
- Create profiles for aluminum door panel extrusions; parameterize their widths to make narrow, medium, and wide stile doors.
- Create Door families for frame, panel, hardware, etc.
- Assign subcategories to all raw geometry
- Add parameters to flex height/width, materials, etc.
Corner Mullions

- 90° mullions can include the right/left mullion plus corner cover detailing.
- Nest into a profile
  Load into project
  Assign it to a new mullion type
- Assign it as required to the corner as required.
Non-90° mullions can be built with the angle embedded into it.