VIRTUAL CITIES

TRAINING

CREATING PARAMETRIC FAMILIES IN AUTODESK REVIT FOR HISTORIC BUILDING ELEMENTS

Beginners Workshop

Duration: 1 day (10.00 AM – 5.00 PM hours)
Audience: Heritage professionals, architects, and surveyors new to HBIM
Level: Beginners

Training Focus

This intensive one-day workshop focuses on developing the specialised skills needed to create accurate, flexible parametric families for historic building elements in Revit. Participants will gain hands-on experience building complex families that balance historical accuracy with parametric flexibility, essential for Heritage Building Information Modelling (HBIM) projects.

Learning Objectives

By the end of this course, participants will be able to:

- Importance of reference plane hierarchy
- Creating subcategories for different visibility controls
- Locking dimensions to parameters vs. reference planes
- Understand LOD (Level of Development) considerations for heritage assets

Course Schedule

Session 1: Family Editor Fundamentals & HBIM Context (10:00 AM - 10:45 AM)

10.00 – 10.20 Introduction to the Family Environment

- Understanding the Family Editor interface vs. Project environment
- Family templates: choosing the right starting point for historic elements
- Category selection and its impact on schedules and filters
- Reference planes, levels, and the importance of establishing a strong framework
- Work planes and their role in 3D family creation

10.20 – 10.45 Parametric vs. Fixed Families in HBIM

- When to use parametric families: elements with dimensional variations (windows, doors, columns)
- When fixed families are appropriate: unique decorative elements, sculptures
- The balance between flexibility and historical accuracy
- Understanding parameters: Type vs. Instance parameters
- Formulas and constraints in historic contexts
- Case studies: examining well-built historic families

Discussion: Challenges specific to historic building documentation

Session 2: Building Your First Historic Family – Georgian Sash Window (10:45 AM - 12:30 PM)

10.45 – 11.00 Modelling Historic Elements Part 1

- Analysing historic sash window construction and proportions
- Identifying key parameters: width, height, glazing bar configurations
- Sketching the reference plane framework
- Understanding traditional joinery and how to represent it

11.00 – 12.30 Hands-On Exercise

Step 1: Setting up the framework

- Creating reference planes for overall dimensions
- Establishing parameters for Width and Height

- Setting up offset reference planes for frame thickness
- Creating sill and head details with appropriate historic profiles

Step 2: Building the frame components

- Creating the box frame using extrusions
- Modelling meeting rails with period-appropriate profiles
- Using swept blends for traditional weathering details
- Creating mullions and transoms with correct proportions

Step 3: Adding glazing bars and parametric controls

- Establishing parameters for horizontal and vertical bar spacing
- Using arrays with formulas for glazing bar distribution
- Creating the glazing bars with traditional profiles (ovolo, lamb's tongue)
- Adding glass panels with appropriate materials
- Testing parameter changes and troubleshooting constraints

LUNCH (12.30 – 1.30PM)

Session 3: Complex Profiles – Historic Mouldings and Cornices (1.30PM – 3.00PM)

1.30 – 1.45 Understanding Profile Families

- Profile family templates and their applications
- How profiles work with swept, swept blend, and reveal features
- Historic moulding proportions and classical orders
- Measuring and documenting existing mouldings

1.45 – 3.00 Hands-On Exercise: Custom Cornice Profile Family

Step 1: Creating the profile

- Loading the Profile template
- Sketching a Georgian/Victorian cornice profile using reference lines
- Understanding classical proportions (cyma recta, cyma reversa, ovolo, etc.)
- Adding parameters for adjustable projection and height
- Saving and categorising the profile

Step 2: Building the cornice family

- Starting with Generic Model or appropriate template
- Creating swept geometry using the custom profile
- Adding returns and mitred corners
- Building in modular length parameters
- Creating enrichments (dentils, modillions) as optional components
- Using Yes/No parameters to toggle decorative elements

Step 3: Advanced details

- Adding backing timbers/fixing details
- Creating multiple profiles for external vs. internal cornices
- Nesting profiles for complex assemblies
- Material parameters and historic finishes

Session 4: Structural Historic Elements – Timber Beam with Joinery Details (3.00PM – 4.30PM)

3.00 – 3.20 Introduction to Structural Historic Families

- Difference between modern and historic structural families
- Timber species, sizes, and historic dimensioning systems
- Common historic joinery types: mortise and tenon, lap joints, scarf joints

3.20 – 4.30 Hands-On Exercise: Timber Beam with Historic Joinery

Step 1: Basic beam setup

- Using Structural Framing template
- Creating reference planes for adjustable length, width, and depth
- Modelling the main beam body with tapered or hewn characteristics
- Adding parameters for timber section sizes (non-standard historic dimensions)

Step 2: Joinery details

- Creating a mortise at the beam end using void extrusions
- Modelling tenon features for beam-to-post connections
- Adding traditional carpenter's marks or assembly numbers
- Using formulas to control joinery dimensions relative to beam size
- Building in peg holes and chamfer stops

Step 3: Additional details and variations

- Adding chamfered edges with parameters
- Creating decorative stops and run-outs
- Modelling degradation/losses (optional voids for condition documentation)
- Creating Type variations for common historic beam sizes
- Adding symbolic representation lines for 2D views

Testing and troubleshooting:

- Loading into a test project
- Checking schedules and material take-offs
- Verifying visibility in different view scales

Session 5: Best Practices & Family Management (4.30PM – 4.55PM)

4.30 – 4.40 Balancing Detail vs. File Size

- Level of Detail (LOD) settings in families
- When to use symbolic lines vs. 3D geometry
- Optimisation strategies for large HBIM projects
- Impact of nested families on performance

4.40 – 4.50 Creating Flexible, Reusable Families

- Parameter naming conventions
- Using shared parameters for scheduling across projects
- Creating family types for common variations
- Documentation within families (notes, images, data)

4.50 – 4.55 Organising Family Libraries for Historic Elements

- Folder structures for period/style-specific families
- Naming conventions for historic elements
- Version control and metadata
- Building a practice-wide HBIM library
- Linking families to historic research and sources

4.55 – 5.00 Wrap-Up & Q&A

- Common issues and solutions
- Resources for further learning
- Historic reference materials and documentation standards
- Course materials and practice files distribution

Action Items for Participants:

- Practice exercises to complete
- Suggested families to build for portfolio development
- Recommended reading on historic construction techniques