2D to 3D: How to Make it Work for You

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Digital Design Leader | @KathrynDonald

Carlotta Mirri
Digital Design Engineer | @CarlottaMirri
Introduction
Kathryn Donald

Kathryn is a Partner at Max Fordham LLP, leading their transition to a fully digital design environment through Building Information Management (BIM) and digital engineering. Her digital design expertise has developed through her 10 years’ experience as a building services engineer with the Practice.

As a project engineer on early BIM projects, Kathryn developed a real-world understanding of the opportunities and challenges of deploying digital design.

Kathryn and her Digital Design Team work closely with the engineering teams to develop bespoke digital tools, processes, content and training to improve the quality, efficiency and effectiveness of the Practice’s engineering output.
About the speaker

Carlotta Mirri

Carlotta is passionate about applying technology in the AEC industry.

As a Digital Design Engineer at Max Fordham, Carlotta manages BIM model production for large scale projects and supports teams of engineers in optimizing and enforcing BIM strategies and effective collaboration.

She has been heavily involved in the development of BIM procedures, content and custom digital tools. Carlotta began exploring pyRevit as a way to interact with the Revit API using Python, for automating time consuming tasks in Revit and speeding up the production of information, and surfacing model data for engineering calculations.
Introduction

• INTRODUCTION TO MAX FORDHAM
• A DIFFICULT START TO 3D
• PLANNING FOR SUCCESS
• TRAINING
• DEVELOPMENT
  • Content
  • Workflow
  • Tools
• PROGRESS AND ACHIEVEMENTS
• FUTURE APPROACH & DEVELOPMENTS
• KEY MESSAGES
Key Max Fordham Figures

- **1966**
  YEAR FOUNDED
  - The year Max Fordham founded the Practice

- **5**
  OFFICES
  - Number of offices, all of which are located in the UK

- **225**
  PEOPLE
  - Total number of partners and employees at Max Fordham

- **170**
  ENGINEERS
  - We currently have around 170 engineers
Revit was first used by the Practice in 2010.

Around 150 engineers and admin staff use Revit on a regular basis to deliver our projects.

We don’t typically employ CAD technicians, our engineers create our Revit models.

We have over 200 Revit projects currently being delivered.
A Difficult Start to 3D
A Difficult Start to 3D

WHY REVIT?

MINIMAL CENTRAL DEVELOPMENT

TRAINING

AUTOCAD REPLICATION
Example early drawing output (RIBA Stage 3)
What do you want to achieve?
What do we want to achieve?

- **Higher Quality and Consistent Output**
- **BIM Compliancy**
- **More Efficient Project Delivery**
- **Happier Engineers**
How to achieve this?
How to achieve this?
Strategy and Approach
Strategy and Approach

Digital Design Team

Engineering Groups
Training
Training

Digital Design Team

Global eTraining
Development Work
Content Development

- **CONTENT**
  - Project Template
  - Families

- **WORKFLOWS**
  - Early stage drawings
  - Schematics (or One Line Diagrams)
  - Health and safety information
  - Schedules
  - Clash detection
  - Model QA

- **TOOLS**
  - Third party tools
    - Dynamo
    - pyRevit

✓ Consistent and high quality output
✓ BIM compliant
✓ Easy to use
✓ More efficient
Content Development – Project Template

Project Browser organization
Content Development – Project Template

Project Browser organization
### Content Development – Project Template

<table>
<thead>
<tr>
<th>View group number</th>
<th>View type</th>
<th>Output</th>
<th>Role and discipline code</th>
<th>Classification Number</th>
<th>Classification Description</th>
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</table>

### View Templates

#### Discipline filters:

- **500** - Pr - 2DP - M20 - Ss_65_40_00_00 - Ventilation

#### View type filter:

- **500** - Pr - 2DP - M20 - Ss_65_40_00_00 - Ventilation
Content Development – Project Template
Content Development – Families

Family Template
Content Development – Families
Content Development – Families

Family Template

- Access Control Point
- Card Reader
- CCTV Fixed Camera
- CCTV PTZ Camera
- Door Maglock
- Egress Button
- Emergency Break Glass
- Handle Lock with Proximity Reader
- Handle Lock with Proximity Reader and Keypad
- Help Point
- Intercom Entrance Panel
- Intercom Remote Handset
- Intruder Alarm Panel
- Panic Alarm
- PIR Presence Detector
- Security Door Contact
- Security Keypad
- Vibration Sensor
Content Development – Families

Naming Conventions

<table>
<thead>
<tr>
<th>Source</th>
<th>Type</th>
<th>Product Description</th>
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<tbody>
<tr>
<td>Who placed it in the model</td>
<td>MXF</td>
<td>AirHandlingUnitThermalWheel</td>
</tr>
<tr>
<td>MXF</td>
<td>ME</td>
<td>AirHandlingUnitPlateHeatExchanger</td>
</tr>
</tbody>
</table>
Content Development – Families

QA process
Content Development – Families

Stage 2
Concept Design

Stage 3
Spatial Coordination

Stage 4a
Technical Design

Stage 4b/c
Technical Design

Stage 5
Manufacturing and Construction

3D Typical Arrangements
Content Development – Families

2D Typical Arrangements
Workflow Development

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✓ Consistent and quality output
✓ Simpler for less experienced Revit users
✓ More efficient
✓ BIM compliant
Workflow Development

Strategy Drawings
Workflow Development

MEP service zones
Workflow Development
Workflow Development
Workflow Development

Clash Detection

Search Sets

Rules
Workflow Development

QA check
Tool Development

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- Consistent and quality output
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- BIM compliant
Tool Development

Model Management Tools

Automated Modelling Tools

Document Management Tools

Max Fordham in-house toolbars (MF Tools)
Tool Development

Model Management Tools
Tool Development

Automated Modelling Tools – Insulation Tool
Tool Development

Automated Modelling Tools – Builder’s work holes Tool
Tool Development

Document Management Tools
Progress and Achievements
Example drawing output
% Revit Projects by Year Started

Percentage of Projects Delivered in Revit

- 2015
- 2016
- 2017
- 2018
- 2019
- 2020

Percentage of Projects Delivered in Revit
Revit Tools

- **£35k**
  - Tool Creation

- **£10k**
  - Annual Maintenance

- **~9000**
  - Number of Uses

- **~14k**
  - Hours Saved

Estimated cost of creating the bespoke tools

Estimated yearly maintenance cost of bespoke tools

The average number of times the tools are used per year

Estimated number of engineering hours saved through using the tools
Future Approach & Developments
Future Approach

FUTURE LICENSING ARRANGEMENTS

ADAPTING WORKFLOWS
Future Developments

- Further Central Content
- Improved Workflows
- Data for Analytics
- Further Automation
Key Messages
Key Messages

- Complex with lots of functionality
- Gradually build up your content and templates
- Learning from others mistakes and successes
- Don’t worry too much about making mistakes
- Plan out your strategy and standards
- Targeted training