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Digital models supporting modular housing delivery across Ireland

Aidan O'Connell – Director - PUNCH Consulting Engineers

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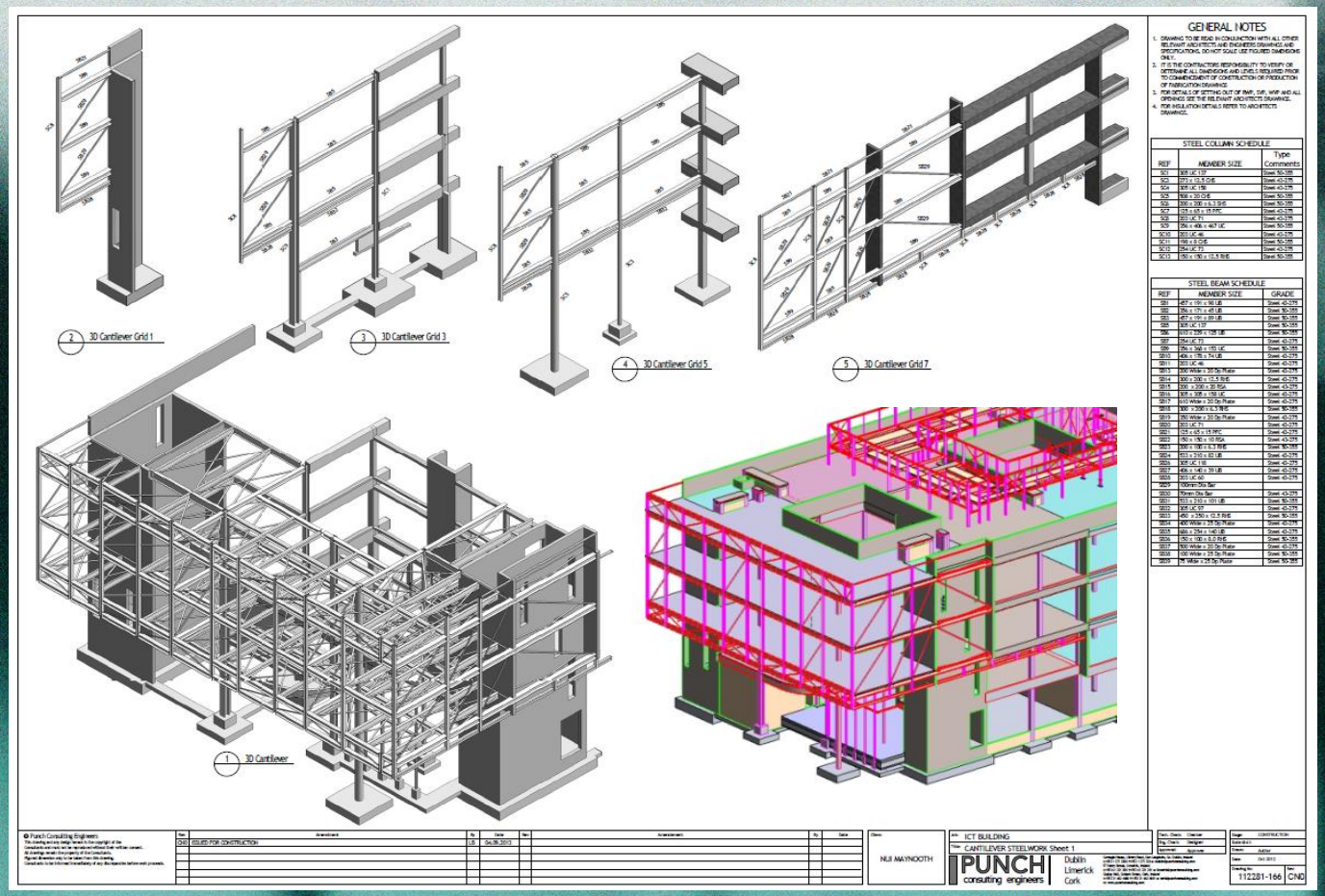
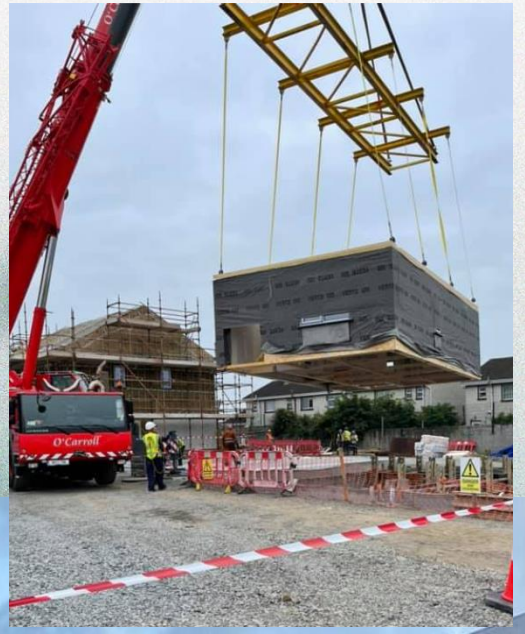
BUILDING INFORMATION MODELLING (BIM)
I.S. EN ISO 19650-2:2018
NSAI Certified

NSAI



BRB
Cost Effective Efficient Homes



RBC Modular

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- **Workflow -** Design team models and contractor models
- **Communication -** Microsoft Teams, Bluebeam, Trimble Connect CDE
- **Collaborative -** If BIM is truly collaborative, will we need drawings in the future?
- **Cost -** Will the cost of digitisation impact on smaller consultancy's viability?

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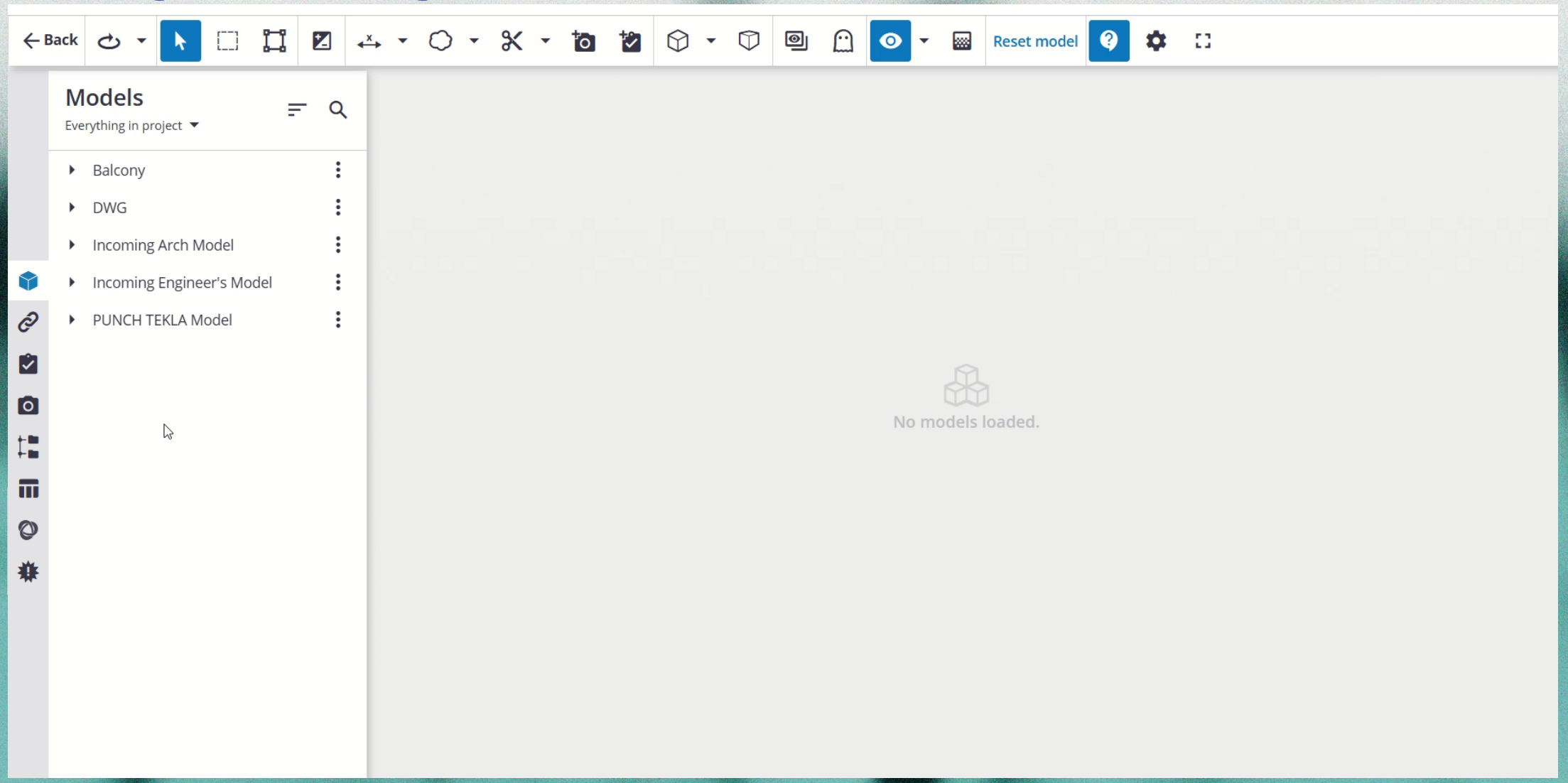


Main Contractor – MACE

Architects – Lifschutz Davidson Sandilands | Adamson Associates

Structural Engineer – Walsh Associates

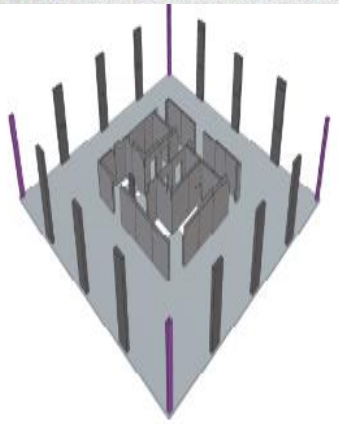
Tower 1 – 30 Storey's

Tower 2 – 26 Storeys

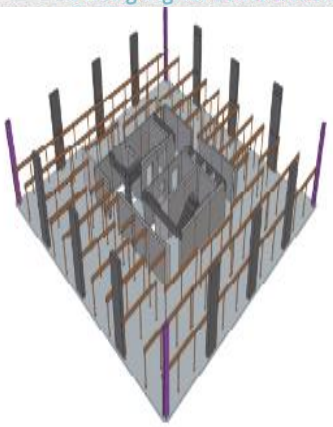
480 Apartments + Leisure and Retail space

Installation – 7 Days

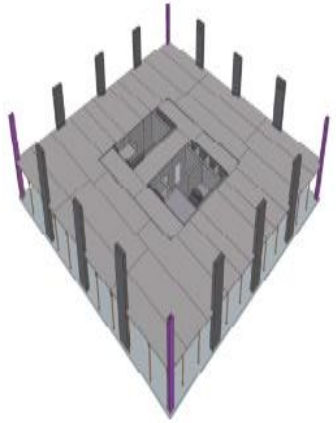
- Total floor area = 700m²
- 8 Apartments per floor



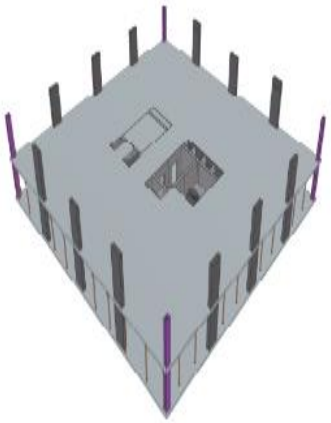
Install Vertical Elements: 15 Columns, 34 Twin Wall Panels and 9 Solid Wall Panels.



Install Propping to support Lattice Slabs



Install 34 Lattice Slabs, 2 Stair Flights and place top mat of reinforcement



Pour 185mm Insitu concrete

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Digital Transformation Snapshot

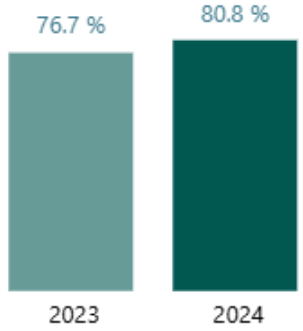
Build Digital

Key indicators reveal **advancements in the digital transformation of Ireland's construction industry**.

In 2024, a higher percentage of participants reported being part of organisations that had **already initiated their digital transformation process**, with improved accuracy and operational efficiency identified as the top expected benefits.

There has also been **notable growth in the use of Common Digital Deliverables.** In 2024, over 70% of participants indicated that they had experience using digital tools and methods to produce three or more types of project deliverables. While capturing, representing and designing remain the most widely adopted areas, activities such as operation, monitoring and linking continue to lag, highlighting opportunities for further development.

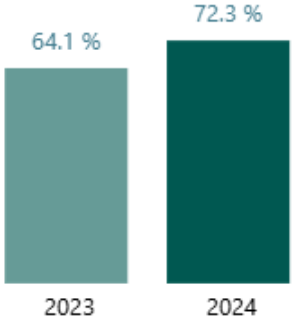
Participants in organisations that have started digital transformation process



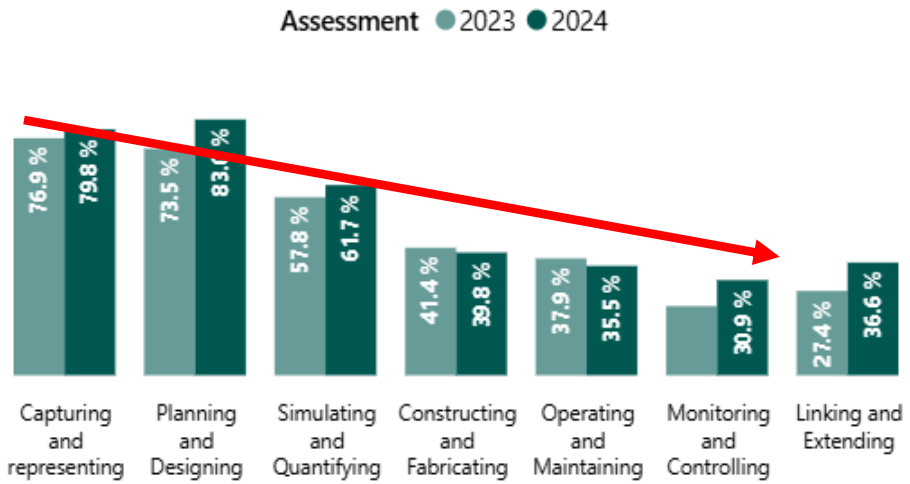
Insight 1: Most survey participants are personally involved in their organisation's digital transformation journey.

Insight 2: Improvements in accuracy and in operational efficiency are the top expected benefits in both editions.

Participants with experience using digital tools for multiple project deliverables



Participants with experience using digital tools and methods on projects



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Digital twins are **virtual replicas of physical assets**, kept in sync with real-time data

DIGITAL TWIN MATURITY LEVELS

DIGITAL TRANSFORMATION

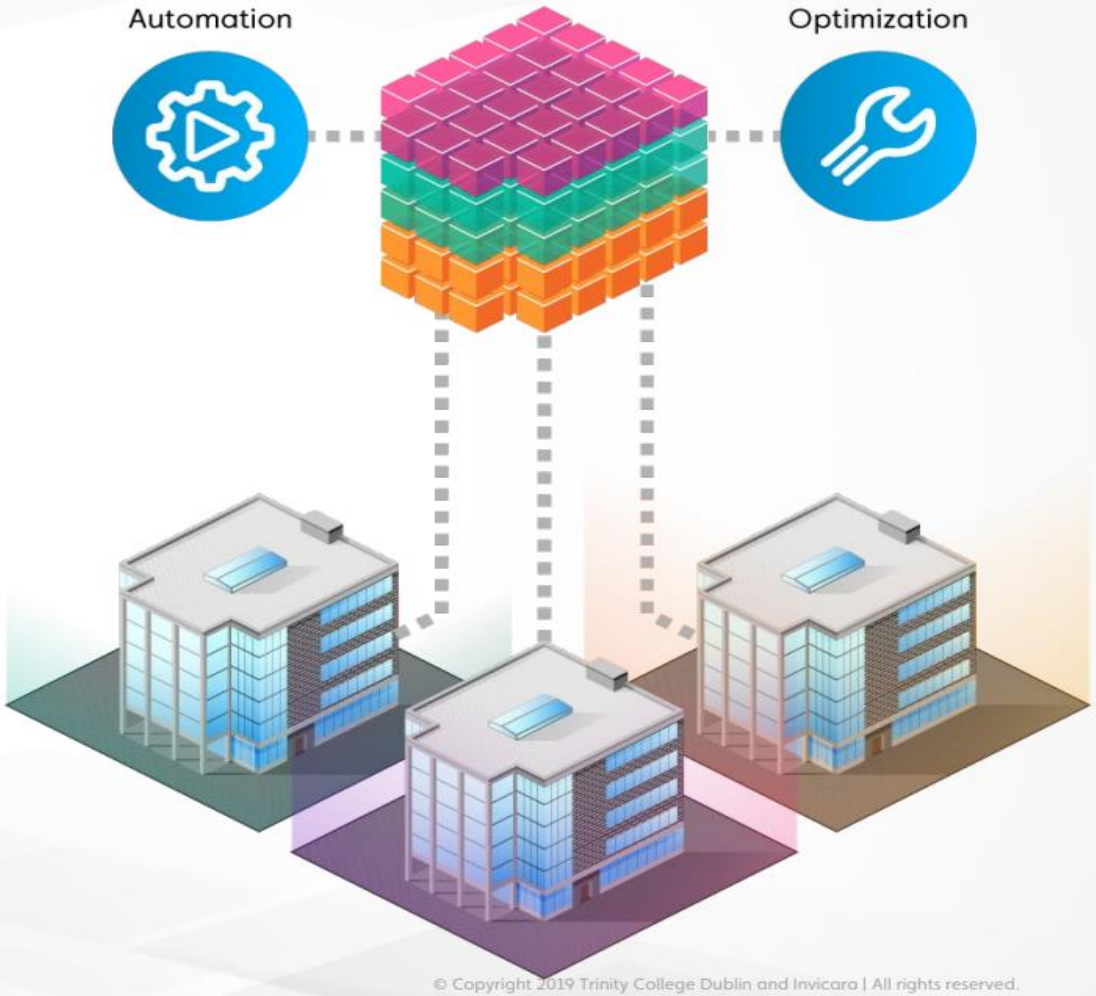
05 **A Platform for Continuous Improvement:** Automate existing and new processes involving asset, operations or performance data for a building or an entire portfolio. Continually optimize building performance and real estate business operations.

04 **Performance Twin:** Asset Twin integrated with Maintenance Management, Building Automation and IoT systems to join data across adjacent processes, to generate Business Intelligence and insights.

03 **Asset Twin:** Asset information management processes and system implemented to bring together building graphics, data, documents, to create a unified and living Asset Information Model.

02 **Project Twin:** Model data management processes and system implemented to get data relating to building elements to drive design optimisation and sustainability.

01 **Digital Twin Strategy:** Business outcomes clearly defined with well-structured owner information requirements for the full building lifecycle: design, construction, commissioning, and operations.



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

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What digital models do

a) Create accurate 3D/BIM models of modular units so factories and sites know exactly what to build and install.
b) Allow clash-detection, coordinating structural, services and transport logistics before modules leave the factory.
c) Enable virtual planning of site layout, transport, crane lifts and foundations – reducing on-site surprises.
d) Maintain a digital "kit of parts" library: reusable module types that simplify design and delivery.
e) Drive sustainability metrics and life-cycle data from design onwards (energy, durability).
f) Support faster permitting and tendering since visuals and data are ready early.

How to implement in practice

a) Define standard module types in digital form (BIM models) early in the programme.
b) Ensure the entire supply chain (designer, factory, transport, on-site) works off the same digital model.
c) Use site digital modelling (3D context) to test access, stacking, foundations, and services before modules arrive.
d) Integrate manufacturing data: module internal services, connections, tolerances are all baked into the model.
e) Use the digital model post-build for operations: maintenance, energy monitoring, adaptability.
f) Develop training and skills so all stakeholders (including off-site manufacturers) can work with digital models.

Recommendations for implementation

a) Develop a **modular library** of digital units (BIM models) national-level: multiple types, layouts, modules.
b) Ensure **interoperability**: adopt standards such as ISO 19650, ensure digital model data can move between designer, factory, site.
c) Use **digital twin / city context modelling** for site selection & planning for modular housing clusters.
d) Align **factory production** with digital modelling: manufacturing robots, CNC, QA linked to the BIM model.
e) Train the workforce: up-skill designers, manufacturers, site installers on digital workflows.
f) Use digital models for **monitoring** once modules are assembled: track performance, maintenance, future flexibility.
g) Integrate with policy: The national MMC roadmap should mandate or incentivise digital modelling as part of future housing delivery.

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Key ways this can be applied in modular housing delivery in Ireland

a) Early design → Use BIM to create modular unit prototypes, standardised modules that can slot together.
b) Factory production → The digital model drives manufacturing: accurate dimensions, QA, integration of services (electrical/plumbing) in the modules.
c) Site delivery & assembly → The digital model includes logistics (transport route, crane, stacking), ensures modules fit on site and align with foundation.
d) Planning & approval → Use city-digital models (3D context) to speed up approvals, test different modular layouts visually and for impact.
e) Data management → Maintain a module-library (digital) that local authorities or suppliers can reuse for multiple housing sites.
f) Lifecycle/operations → Digital model carried forward to operations: maintenance schedule, energy performance, replacement modules, adaptability.

Germany is preparing to transform its **building sector** by embedding **energy efficiency** into every stage of **construction**. Under new EU regulations, buildings will soon be required to disclose their life cycle greenhouse gas emissions, shifting the focus from operational energy use to a full environmental accounting. This approach recognises that emissions from materials, construction, and end-of-life processes are just as critical as those from heating and cooling.
The study highlights that **life cycle assessments (LCAs)** are becoming essential tools for achieving climate targets. By evaluating both embodied and operational emissions, LCAs help identify the most carbon-intensive phases of a building's life and offer pathways for improvement. This enables planners and developers to make informed decisions that reduce environmental impact while enhancing long-term **energy performance**

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Construction - AI

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AI represents a new frontier in **construction**, offering unprecedented opportunities for automation, efficiency, safety, and sustainability.

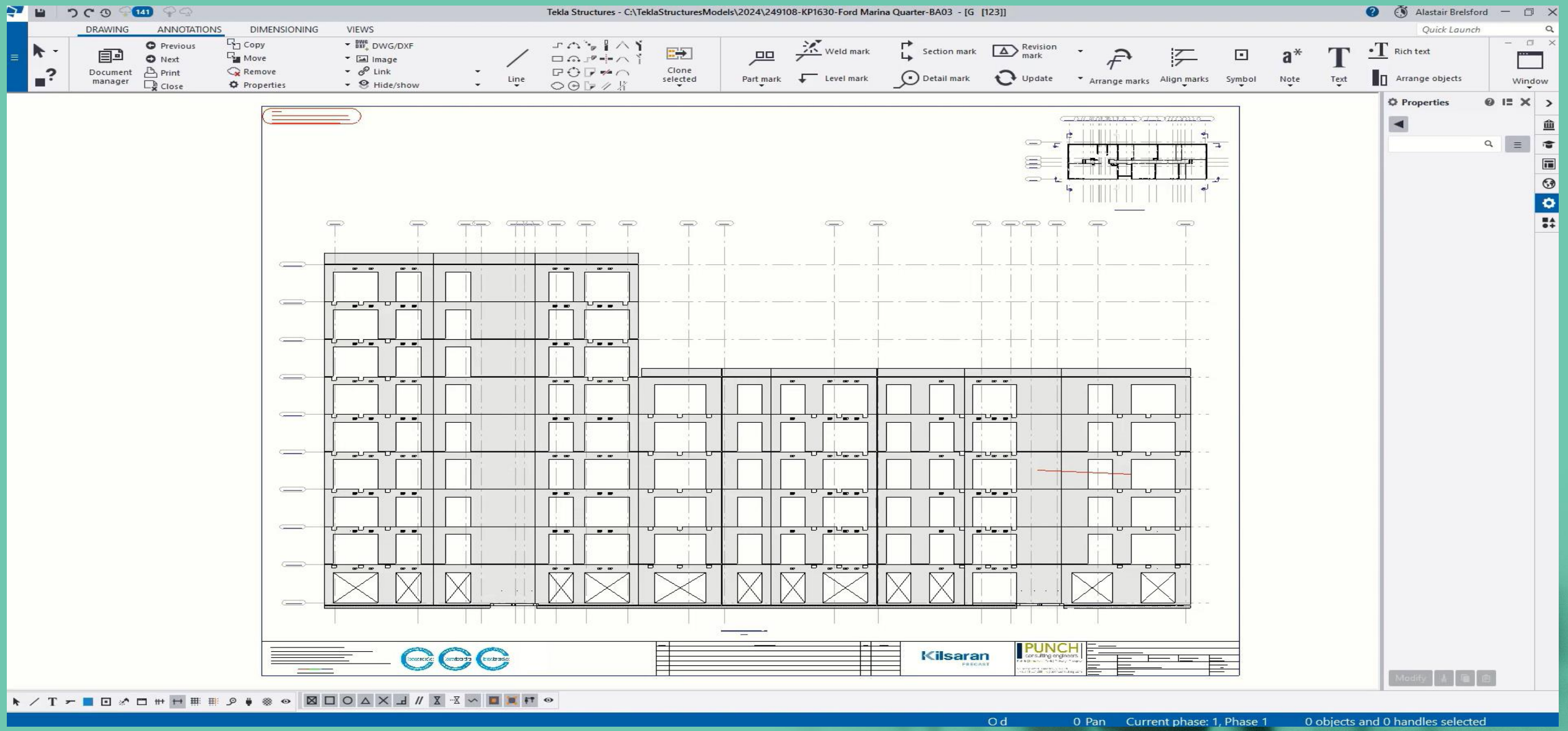
By integrating AI with traditional 3D modelling, BIM, mixed reality, and other visualization technologies, the construction industry can drastically improve decision-making, streamline workflows, and deliver higher-quality projects.

The keyways in which AI is becoming the next frontier for construction visualization:

1. **Automated Design Generation and Optimization**.
2. **Real-Time Project Monitoring and Analysis**
3. **AI for Enhanced Visualization**
4. **Automated Clash Detection**:
5. **AI-Enhanced Mixed Reality (MR) and Augmented Reality (AR)**
6. **AI-Powered Construction Robotics and Automation**4
7. **Predictive Maintenance and Building Lifecycle Management**
8. **AI for Sustainable and Smart Construction**
9. **Improved Decision Making and Automated Insights**
10. **AI for Safety and Risk Management**

Future Today Strategy Trends - 2025 TECH TRENDS REPORT 18th Edition
Futurist Amy Webb

6th November 2025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Alastair Brelsford
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ANNOTATIONS
DIMENSIONING
VIEWS
Quick Launch
Document manager
Previous
Next
Print
Close
Copy
Move
Remove
Properties
DWG/DXF
Image
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Hide/show
Line
Clone selected
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Level mark
Section mark
Detail mark
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Arrange marks
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0 objects and 0 handles selected









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Welcome to the CitA BIM Gathering

The Clayton Hotel, Ballbridge, Dublin, 6th November 2025.

In response to this conundrum, McKinsey posits a two-pronged strategy to address the longstanding issue of stagnant and declining construction productivity. **The first part of the strategy includes initiatives to "reshape regulation, rewire contracts, rethink design, improve procurement and supply chain, improve onsite execution, infuse technology and innovation and reskill workers,"** hypothesizing that these changes could "boost sector productivity by 50%-60%." The second part of the strategy includes a shift to "**manufacturing style production systems," or industrialized offsite construction,** that could yield as much as five-to-ten times increase in productivity.6 Although the McKinsey report offered a more nuanced series of alternatives, many of the new players entering the offsite construction market have leaped to digitalization and robotics without adopting the other changes to process and manufacturing principles advocated in the research. This kind of technocratic 5 Barbarosa, et al., Reinventing Construction, 23. 6 Ibid., 8-9. 3 approach has contributed to widely publicized offsite construction failures that have reverberated throughout the US industry, further reinforcing an ingrained cultural hesitancy to evolve towards a manufacturing-oriented production process.

Joint Centre for Housing Studies Harvard University Modularization Precedes Digitalization in Offsite Housing Delivery Ivan
November 2022
McKinsey Global Institute

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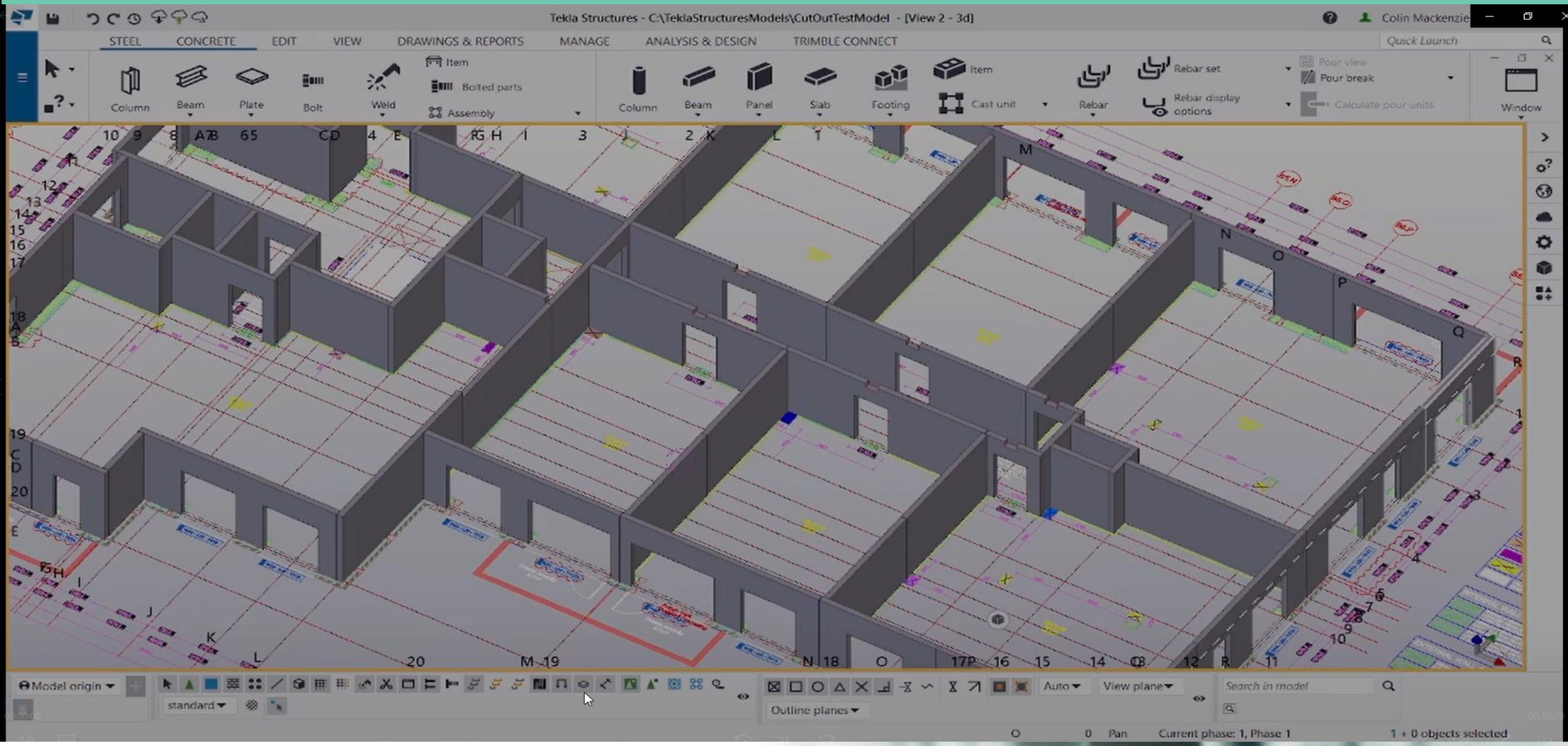



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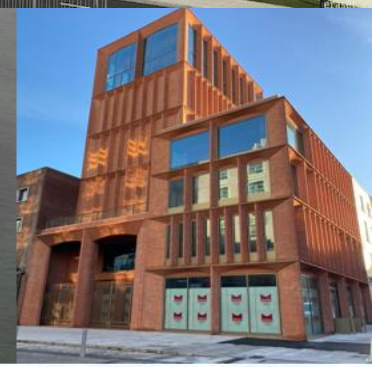


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Precast Cross Wall

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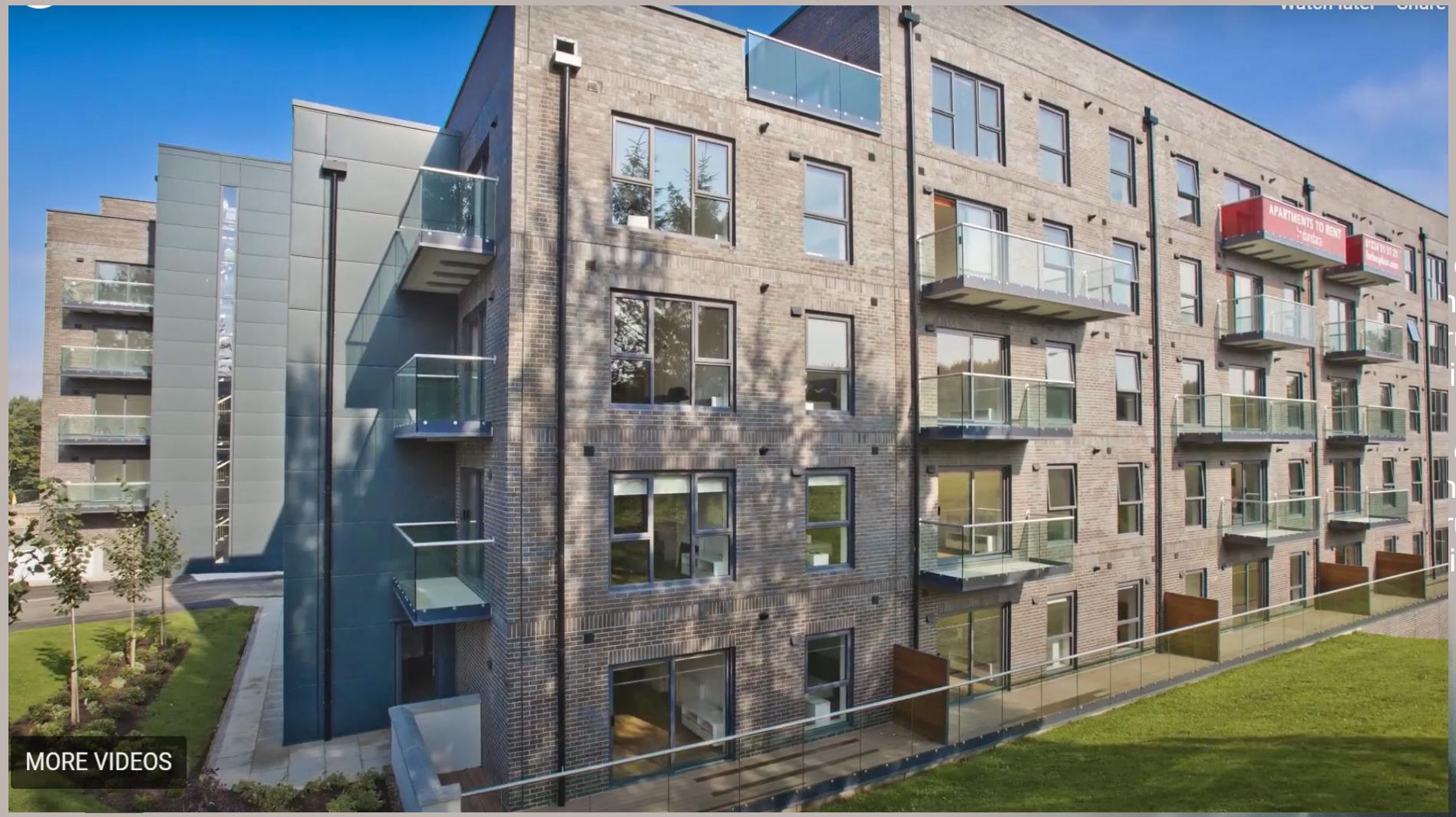

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INNOVATION IN CONCRETE

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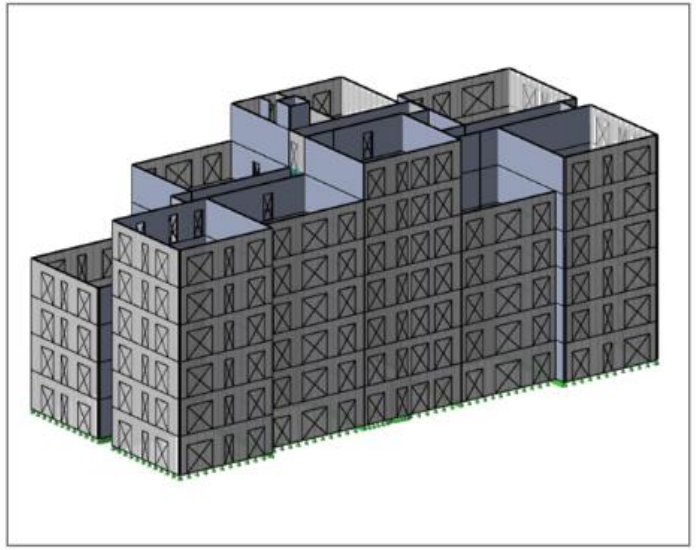

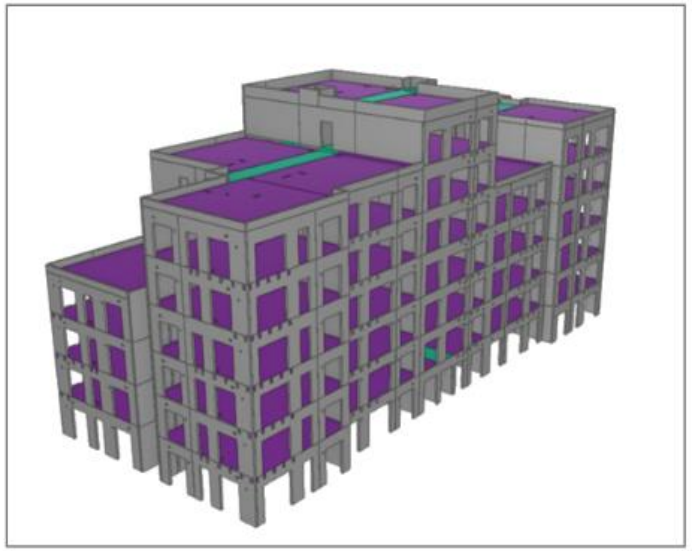

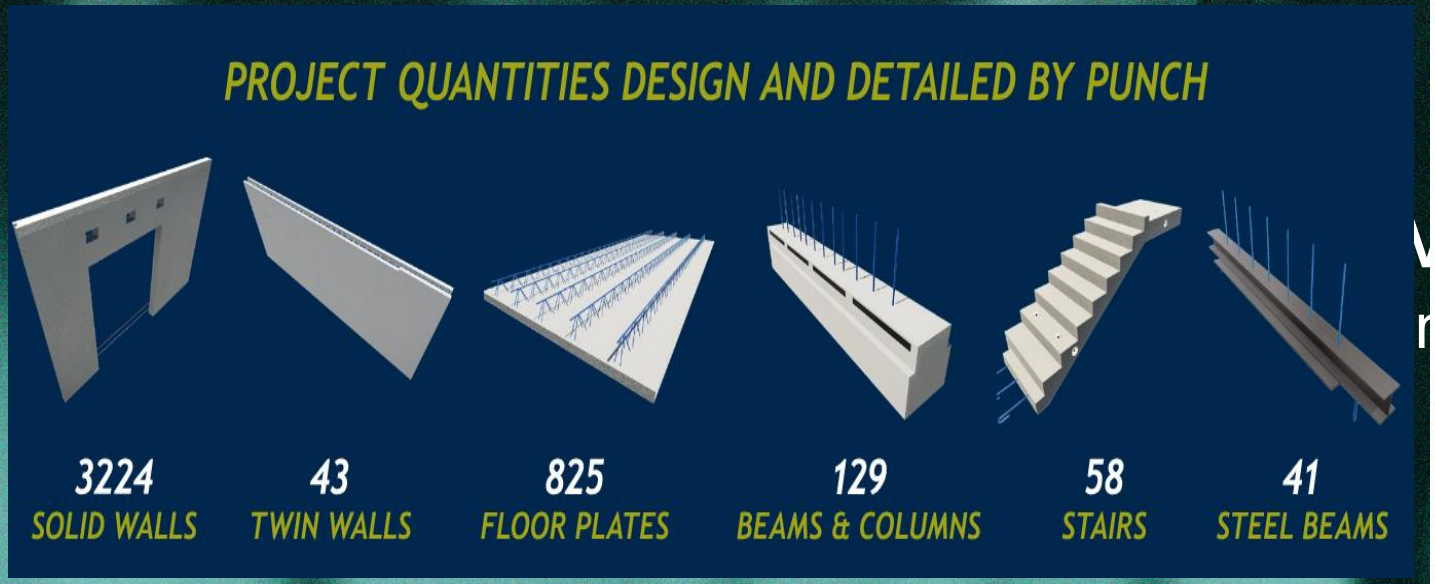

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RBC modular

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