Convergence of AEC and MFG

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1624
The first panelised wood house shipped from England to Massachusetts

1837
Portable cottages produced for export to Australia

1839
Kit houses were shipped by rail for settlers during the California Gold Rush

1889
Eiffel Tower completed using prefabricated cast iron sections

1903
First concrete prefabricated apartment block constructed in Liverpool

1920
Steel framed Dorlonco and Timber framed Weir houses introduced to overcome post WWI housing shortage

1947
Levittown, New York suburban development started using prefabricated homes. Build at a rate of 150 per week
DESIGN
Designing for offsite manufacture

- Designs maybe configured or engineered to order
- Co-ordination of product data is imperative
- Complex designs, often integrated into building systems
- Consideration needs to made for manufacture & delivery schedule
Using modular design principles

- Manufacturing companies have been using modular approaches to their designs for many years.
- It allows variations to be built using the same ingredients but a different recipe.
- Although not limited to, when applied to design is allows companies to:
  - Create intelligent designs and data easily
  - Respond faster to proposals
  - Save materials and waste
  - Avoid revalidation for new concepts
Using modular design principles
Driving manufacturing data from the Architectural project

- Detail required within the Architectural plans is often high level and not suitable for manufacturing.

- Data such as type, size, quantity and position can be utilised within the manufacturing detail.

- Schedule within Revit and extract the Bill of Materials using Inventor.
Driving manufacturing data from the Architectural project
Collaborating with Architectural projects

- Due to their bespoke nature, this type of model data would not be created within the architectural application such as Revit.

- The design will need to reference the building model to control interfacing, outputs such as bills of materials are required PLUS the result will need to be consumed within the architectural project.
Collaborating with Architectural projects
MAKE
Delivering manufacturing data

- 3D design enhances the manufacturing pipeline

- Downstream utilisation for manufacturing includes:
  - Fabrication drawings
  - 3D model delivery
  - Bills of materials
  - NC programs
  - Resource Planning
Driving Manufacturing from the model
Driving Manufacturing from the model
Managing and delivering data to the business

- Departments outside of design & manufacturing don’t care about CAD. Item numbers, Bills of Materials and anything else needed to buy, manage and deliver the product is all that matters.

- Data is often entered again & again, leading to errors, when instead, data can be integrated ensuring the information is always correct & current.
Managing and delivering data to the business
Factory Optimisation & Layout

- Manufacturing is often larger than a single part
- The offsite manufacturing must happen somewhere
- Facilities are often expanded or reconfigured to suit
- Optimization, flexibility and collaboration is key
Factory Optimisation & Planning

- Iterate and improve processes
- Intelligent 2D layout to 3D representation
- Snap fit and intelligent associations
- Incorporate architectural model or LiDAR
- Robust design review in 3D
- Add / update legacy 2D layouts
Factory optimisation, planning & review
Downstream collaboration and co-ordination

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<th>Type</th>
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<tr>
<td>Open</td>
<td>1</td>
<td>Design</td>
<td>Design</td>
<td>Check for H&amp;S Items in Layouts</td>
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Created by Demir Ali (Autodesk EMEA TS) on 18 Mar 2019

- **Due Date**
  - Unspecified

- **Location**
  - Unspecified

- **Location Details**
  - Unspecified

- **Linked document**
  - Unspecified

- **Description**
  - Review the facility, look for areas that have a H&S requirement. Due to the type of assembly line, access is on both sides of the cells in quite a few locations.

- **Response**
  - Unspecified

- **Photos**
  - Unspecified

- **Assigned to**
  - Demir Ali

- **Type**
  - Design

- **Sub-type**
  - Root Cause

- **Owner**
  - Code Compliance
COLLABORATE
INCREASED DATA & DIGITISED WORKFLOWS

Everyday...

95% of all data captured goes unused in the engineering and construction industries.

30% of data created during design and construction is lost by project closeout.

100’s of Subcontractors
1000’s of Open Issues
Scope Changes

FMI - 2018
COMPLEXITY OF DIFFERENT TECHNOLOGIES

25% of construction companies use 5 or more different software applications

6% of construction companies use software that all integrate with each other
THE BIM 360 PLATFORM
DOCUMENT MANAGEMENT

Securely publish and distribute all construction drawings, documents, and models in a single, cloud-based platform.

- Document Distribution
- Document Control
- Markup Drawings
- Version Control
- Approval Workflow
- Mobile Access
- Edit O365 Documents
DESIGN COLLABORATION

Accelerate project delivery, reduce rework, and improve productivity by enabling teams to securely co-author BIM designs in real-time and streamline deliverable coordination.

- Revit Cloud Worksharing
- Review Markups & Issues
- Change Visualization
- Publish Document Sets
COORDINATION

Keep the whole project team in sync, and get more constructible models earlier, by involving all project stakeholders in coordination and BIM collaboration processes.

- Clash Detection
- Trade Coordination
- Round Trip Coordination
- Change Visualization
RFI’S & SUBMITTALS

Improve communication and visibility into project controls workflows like RFIs and submittals by managing them in a single platform.

- RFI Management
- Submittal Tracking
- Reporting
- Control Approval Process
COST MANAGEMENT

Maintain transparency and improve cost control organization by centralizing cost information into a single platform.

- Full Change Order Workflow
- Flexible Budget Structures
- Contract Generation Tool
- Financial Markups
QUALITY & SAFETY MANAGEMENT

Standardize on a proactive QA/QC and Safety process with construction quality management software that enables the whole team to participate.

- Quality and Safety Checklists
- Issue Management
- Safety Checklists
- Daily Logs
- Signatures
- Reporting
DATA & ANALYTICS

Predict, prevent, and manage risk with instant visibility into daily priorities, project health, and company-wide performance.

- Project Home
- Insight Dashboards
- Reporting
- Partner Cards
- Construction IQ
# Activities supported by BIM360

## Design
- BIM360 Design
- Design Iteration
- Single source of truth
- Coordination
- Control
- Revit
- AutoCAD

## Design Collaboration
- BIM360 Glue
- Navisworks
- Automated and Digital reviews
- Control over external consultants
- Clarity around actions and project needs
- Outsourced processes to consultants
- Single source of truth
- Control

## Preconstruction
- Web Interface
  - Online document access
  - Online markups
  - Task management
  - Transmittals
  - Instructions
  - Change management
  - Program tracking
  - HSE reports
  - Quality reports
  - Progress reports
  - Change management reports
  - RFIs
  - Contract Administration
  - Single source of truth
  - Control

## Construction
- Mobile App
  - Online & offline document access
  - Online & offline markups
  - Task management
  - QA actions & tasks
  - QA forms
  - Digital forms
  - Progress tracking
  - PC checklists
  - Program tracking
  - HSE observations & Actions
  - Signoffs
  - Single source of truth
  - Control

## Handover & Commissioning
- Web & Mobile App
  - Commissioning signoffs
  - Commissioning issue management
  - O&M gathering and storage
  - Integration to 3D model for FM
  - Commissioning progress reporting
  - Single source of truth
  - Control

### Additional Features
- Out of the box reports
- AI based risk analysis reporting
- Scheduled reporting
- External dashboard publication
- Access for external reporting tools to generate custom reports
- Cross project reporting and project benchmarking
PROVEN, POWERFUL BUSINESS RESULTS

- **65%** Reduced Project Schedule
- **50%** Reduced Coordination Time
- **23%** Faster Layout Preparation
- **50%** Reduced Layout Costs
- **88%** More Productivity per Work Week
- **20%** Productivity Gain
NEXT STEPS...

1. Get a Demo

2. Pick a Pilot Project

3. Work with the Autodesk Success Team