

Convergence of AEC and MFG

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1624

The first panelised wood house shipped from England to Massachusetts

1839

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

1903

First concrete prefabricated apartment block constructed in Liverpool

1947

Levittown, New York suburban development started using prefabricated homes. Build at a rate of 150 per week

1837 Portable cottages produced for export to Australia

1889

Eiffel Tower completed using prefabricated cast iron sections

1920

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

www.autodesk.com/redshift/history-of-prefabrication/

DESIGN

MAKE

COLLABORATE

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CIESK BIM 360 GLUE Van wijnennoonttiv) 2220211 - Amsterdam Olympic Hotel) LOO300 - Basismodel G





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





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.





Collaborating with Architectural projects

- Due to there 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 consumed within the architectural project.





Click to select, TAB for alternates, CTRL adds, SHIFT unselects.



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

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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.



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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





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COLLABORATE











INCREASED DATA & DIGITISED WORKFLOWS

Everyday...

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

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.

COMPLEXITY OF DIFFERENT TECHNOLOGIES



6%

-2.15

of construction companies use software that <u>all</u> integrate with each other

PlanGrid/FMI 2018 Industry Report IBKnowledge Construction Technology Report

THE BIM 360 PLATFORM

DIGITISE INTEGRATE PREDICT

BIM 360 PLATFORM

		1
PROJE	CT DATA	



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 0365 Documents

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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

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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

4:02 PM Wed Feb 20						
Checklists Templates	General Space - Punch					
Type: Quality Updated by: Edward Roy (Modern Developments)	Overview					
Copy of Ladder Inspection Form Type: Safety Updated by: Ola Serebryany (BNIM)	General Space - Punch	I Instances				
Copy of Ladder Inspection Form Type: Safety Updated by: Ola Serebryany (BNIM)	Type Punch List					
Drone Log - Pilot Type: Punch List Updated by: John Sanner (Autodesk)	Description 1 Door			_		
General Space - Punch Type: Punch List Updated by: Edward Roy (Modern Developments)	1.1 Door		N/A 1			
Ladder Inspection Form Type: Safety Updated by: Anonymous	12 Door Frame			_		
OSHA 2209 - LOCKOUT - TAGOUT PROCEDURES Type: Safety Uodated be: John Sanner (Autodesk)	YES	NO	N/A (
OSHA 2209 - WELDING, CUTTING AND BRAZING	1.3 Door Hardware					
Type: Safety Updated by: John Sanner (Autodesk)		NO	N/A			
OSHA 3257-12R-05 - FALL PROTECTION Type: Safety Updated by: John Sanner (Autodesk)	1.4 Threshold		51/5			
Piles & Pile Driving - Drilled Cast-In-						
5 0 0				~		

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

Pacific Cente	r Lampus				
Project Dates: Mon Oct 16 2017	- The Oct 28 2021				O Customer
roject Address	Design Packages		Project Submittals		N
ACKSON	Package Title	Date	ID Rev Title	Type Scheduled At	Collapse
FINANCIAL	O BNIM (90)	Today	3 0 Samples	Samples May 31, 2018	
DISTRICT	O BNIM (1)	Feb 26, 2018	27 1 Product DE - 02	Product Data May 31, 2018	
EN PLACE	O BNEM (87)	Oct 10, 2018	13 0 Maintenarce Data	O&M Manuals Jun 30, 2038	
Market street	O BNIM (86)	Oct 4, 2018	21 1 CT-6 Tile	Product Data Jul 21, 2018	
an Francisco, CA 94105	AZ - Architectural Share-Out	Sep 28, 2018	149 0 SKIM COAT PLASTERING	LEED Aug 16, 2018	
	5 of 42 Packages I Vex III (42)		5 of 37 Submittals (View ell (37)		
roject RFIs		Weather	Project Field Issues		
ID Title	Due Date	7000	ID Title	Due Date	
10 Bath partition anchorage	Nov 15, 2017	/30(5)	11 Is fire proofing on structural steel in	Jun 2, 2018	
3 Floor specifications needed	Nov 15, 2017		5 Insulation missing	Jun 15, 2018	
14 Ceiling fixture	Nov 16, 2017		6 Drywall Defect	Jun 15, 2018	
1 Mechanical pad needed	Nov 17, 2017	Rain	9 Issue	Jun 15, 2018	
11 Partition attachment detail	Nov 17, 2017	74* 1 71* 1 65* 1 62* 1	S2 Door Handware	Jun 22, 2018	
of 42 Open RFIs 1 Vew at (42)		Powered by Gark Sky	S of 94 Open Issues I View at (%)		
roject Checklists		Project Document Issues		Open RFIs and Submittals	
Title	Location Scheduled	ID Title	Due Date	🔹 Dvendue 🔹 Due in the next 5 days 😐 Due after 5 days	
Safety Event Form	May 31, 2018	28 Carpet damaged	Apr 3, 2018	42 RFIs	
General Space - Punch	May 21, 2018	29 Need stair spec	Apr 14, 2018	29	4
Above Ceiling Inspection	May 21, 2018	39 Check Foundation	May 16, 2018		
Above Ceiling Inspection	May 31, 2018	40 What is the depth of recess	May 16, 2018	37 Submittal Items	
Above Ceiling Inspection	May 31, 2018	42 Change Guardral	May 19, 2018	8	19
of 91 Open Checklists I View all (92)		5 of 49 Open Issues I Wew alt (49)			





Activities supported by BIM360

Design	Design Collaboration	Preconstruction	Const	ruction	Handover \$ Commissioning
 Revit AutoCAD 	 BIM360 Design Design Iteration Single source of truth Coordination Control 	 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 	Web InterfaceOnline document accessOnline markupsTask managementTransmittalsInstructionsChange managementProgram trackingHSE reportsQuality reportsProgress reportsChange management reportRFIsContract AdministrationSingle source of truthControl	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	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
		Out of the box reportsAl based risk analysis reporting	Scheduled reportingExternal dashboard publication	 Access for external reporting tools to generate custom reporting Cross project reporting and 	project benchmarking ts

PROVEN, POWERFUL BUSINESS RESULTS





23% Faster Layout Preparation









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