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Forging Industrialized Construction

Tom Closs
Autodesk

Sree Kadiani
Autodesk

Learning Objectives

- Learn how to create new workflows to take advantage of industrialized construction.
- Determine what technologies are right for your workflows.
- Learn how to employ new technologies to promote industrialized construction workflows.
- Discover industrialized construction and the types of technologies that can improve different workflows.

Description

You now know what Industrialized Construction is. Learn how different technologies can improve and augment your current workflows. This session will review several technologies, including Forge, in the application of an industrialized construction workflow. The conversation will include the workflow from design to commissioning.

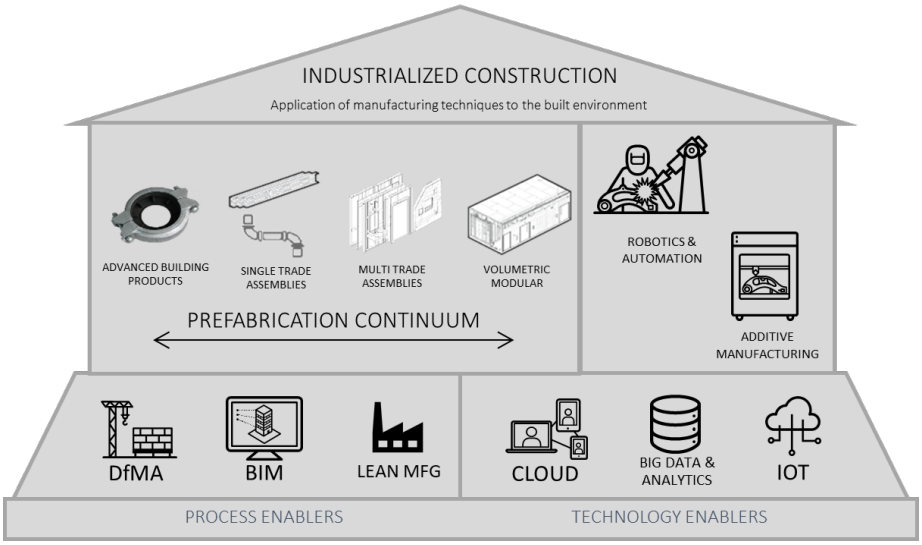
Speaker(s)

A customer driven consultant proven to solve customer needs with proven technologies and new creative processes.

Tom Closs has worked with multiple manufacturing technologies since 1994. Prior to joining Autodesk, Tom worked as an Automated Machine, Design Engineer, before moving into consulting full time. Tom Joined Autodesk Vault Team in 2007 and Autodesk Consulting in 2012. Throughout Tom's career, he has completed many large scale projects from Vault implementations and system integrations to custom tool development and teaching. Tom has worked with a wide variety of technologies, including AutoCAD, Inventor, AutoCAD Mechanical, Revit, Navisworks, Fusion 360, Vault, Fusion Lifecycle, 3DS Max, BIM360, Power Mill, NetFabb and others.

What is Industrialized Construction

Industrialized Construction (IC). IC is the application of manufacturing techniques in the built environment. IC has many elements, and DfMA is just one of these.



What is DfMA

Design for Manufacture and Assembly (DfMA) is a process of improving designs and design methods to support the manufacturing and assembly process better. DfMA can be broken into two parts, Design for Manufacturing (DfM) and Design for Assembly (DfA).

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Over the last two decades, manufacturing companies have been leveraging DfMA and 3D model-driven design approaches to drive efficiencies in:

- Interactive Collaborative Design
- Modular Design
- Bill of Material Accuracy
- Assembly Methodologies
- Production Optimization

Ask a Manufacturing Engineer what DfMA is, and they will probably answer, "It's just best design practices."

Leveraging DfMA

DfMA allows for several advantages when it comes to production:

- All-weather fabrication
- Clean, safe working environment
- Modularization of design and materials
- Optimized quality control

- Predictability
- Just in Time (JIT) processes and control

Prefabrication Continuum

Prefabrication is a broad term that encompasses the creation of building elements in a controlled environment that are transported to their final destination, preferably installed on-site using accelerated assembly methods. When you look at prefabrication, you can view it as a continuum containing:

- Advance Building Products
- Single Trade Assemblies
- Multi-Trade Assemblies
- Volumetric Modules

People

Industrialized Construction needs to be adopted by all aspects of the industry to be successful. Industrialized Construction will change how the work is performed throughout the construction's lifecycle, starting at design and engineering to material selection, manufacturing to how it is built and assembled on site.

Every persona involved in the process befits from industrialized Construction.

Design Teams

Building design needs to be optimized for fabrication and assembly of building components by Creating standards that enable repeatable design elements. The design team benefits from industrialized Construction, such as:

- It encourages a more innovative design focused on efficiency and your customer's vision beyond constructability limitations.
- Standardization and smart manufacturing will help improve the quality of building systems.
- IC allows the opportunity to adopt continuous improvement for better building systems.
- Improve the certainty of the project by using well-defined assets/components/elements.
- Design is informed by manufacturing and fabrication, so processes are accelerated.
- Increases the focus on building functionality, aesthetics, or the areas that require custom work rather than the repetitive parts.

Trade Partners / Fabricators

IC will ensure that the design incorporates the manufacturing and assembly inputs that will remove any ambiguity from the method of Construction. Trade partners adopting manufacturing and fabrication of building systems can benefit from:

- Assembly in a controlled environment that will improve quality and reduce rework.

- IC provides flexibility for the trade partner to influence the supply chain and control the flow of material.

- Materials for Construction typically contribute to much of the overall project cost. Smart manufacturing reduces the waste of materials, contributing to a LEAN construction process.

Smart manufacturing is a broad category of manufacturing that employs computer-integrated manufacturing, high levels of adaptability and rapid design changes, digital information technology, and more flexible technical workforce training.

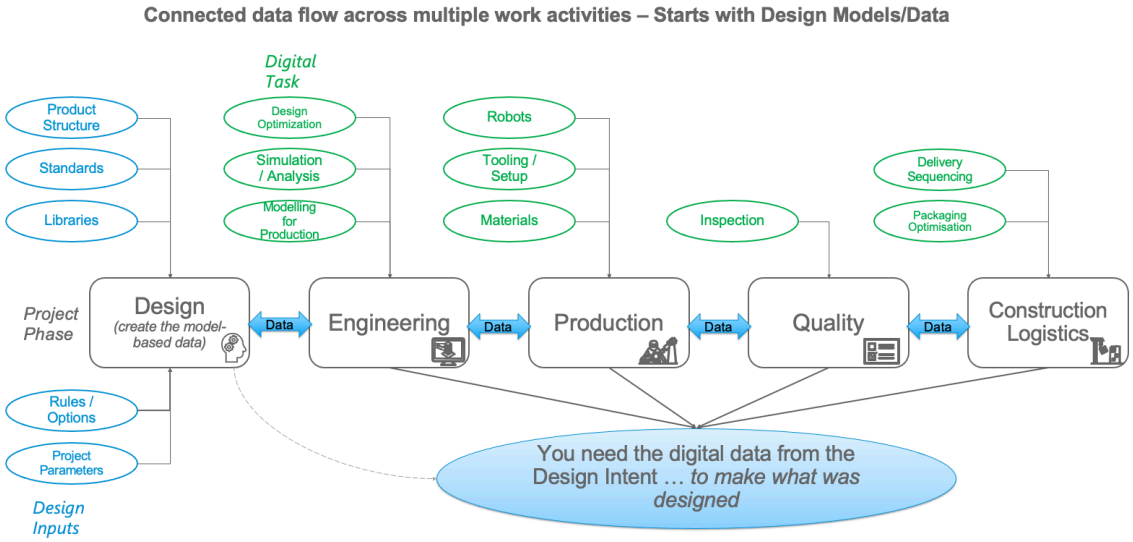
Contractors

IC encourages offsite assembly of manufactured components, which improves the health and safety of the project team. IC will also help construction teams

- Adapt other LEAN manufacturing principles that will improve the overall project health.
- Allows for parallel construction sequences reducing the overall duration of project schedules, making projects more predictable.
- Increase safety for the construction workers
- Better defined data with more information will enable better coordination across groups.
- Increased predictability reduces overall risk for the project.

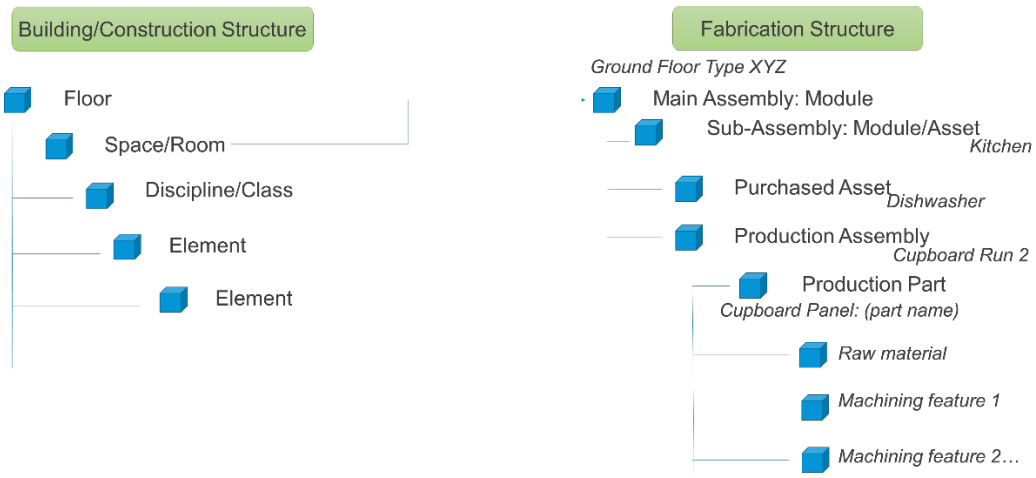
Process

By looking at a building as a group of elements, we can look at how data can be structured and reused.



Product Structure

Design teams have to start to think with a manufacturing/fabrication mindset. This means looking at a structure based not just on design elements such as walls, doors, etc. These are needed for bills of quantity (BOQ) for cost estimation and procurement but expand into a product structure basis that considers the operation steps to manufacture that element.

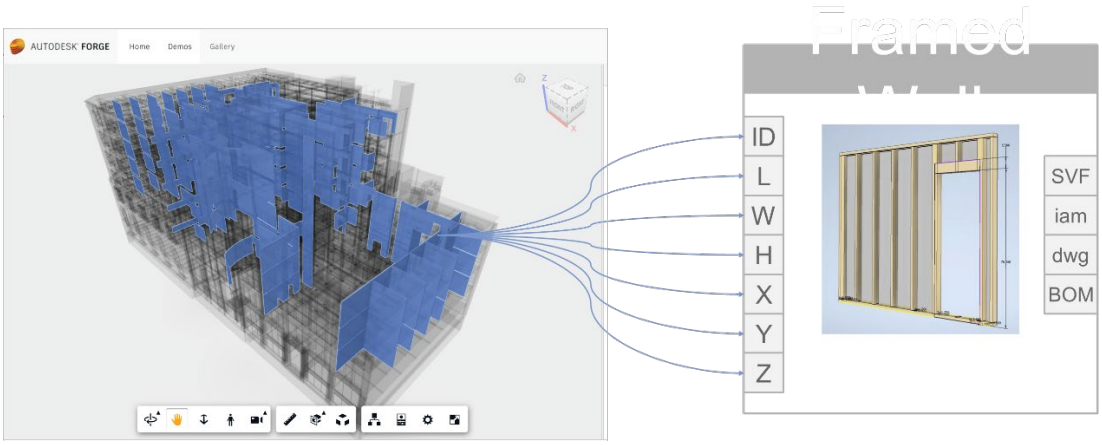


The optimal way an element is to be manufactured is an inherent part of the design process. This means closer alignment between design and fabrication/manufacturing teams. Design-Fabricate-Construct processes need to merge. This will allow people to take the maximum advantage of Industrialized Construction.

This, in turn, highlights the need to have ways to use and share project and design data.

Sharing Data

When we look at all the ways to create digital designs and data, many tools are used. Regardless of what tool is used, each tool stores the same data. Some or all of the data from one design is typically needed for a complimentary or detailed design. It's the goal of a common data environment to utilize the data from design to another as needed.



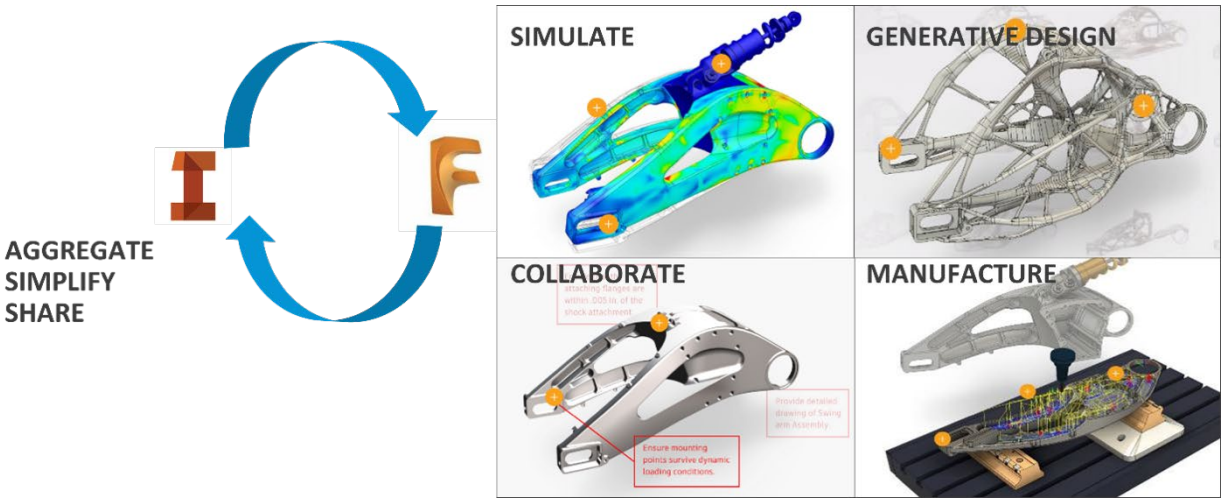
Technology

This section will highlight some of the Autodesk technologies that can be used for Industrialized Construction.

First, the tools you may already know:

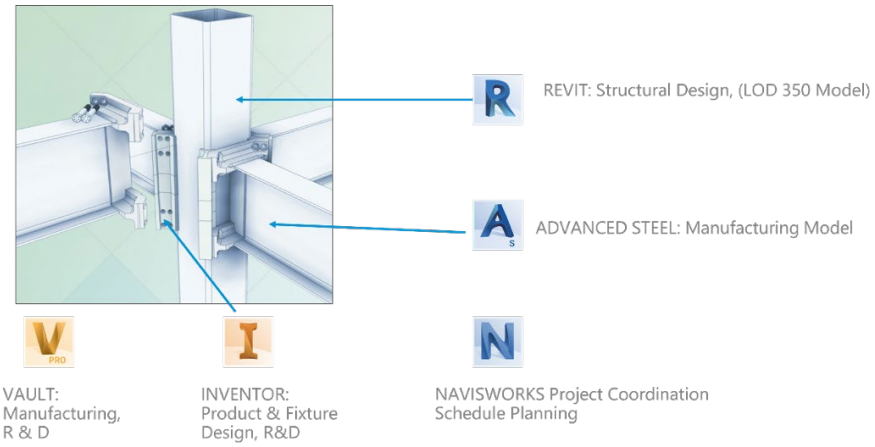
- Revit
- BIM 360
- Dynamo

Second some tools that may be new to you:

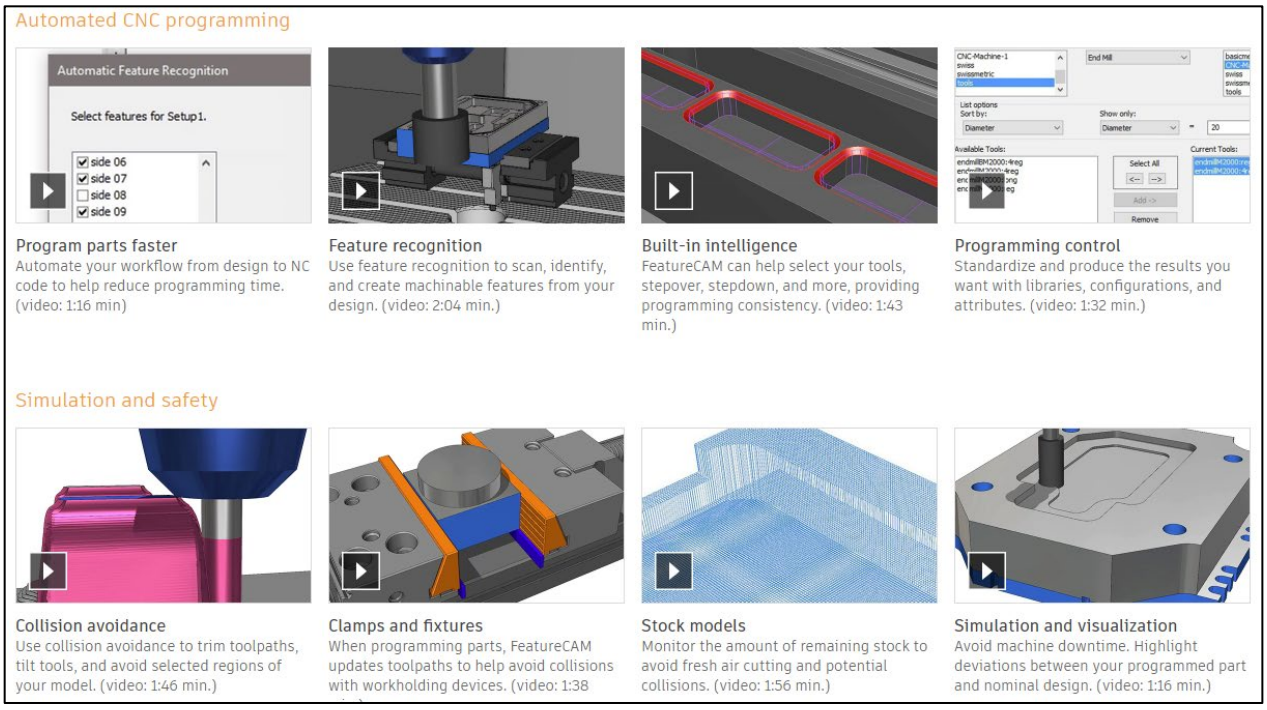


- Autodesk Inventor
- Fusion 360
  - Generative Design
  - Manufacturing

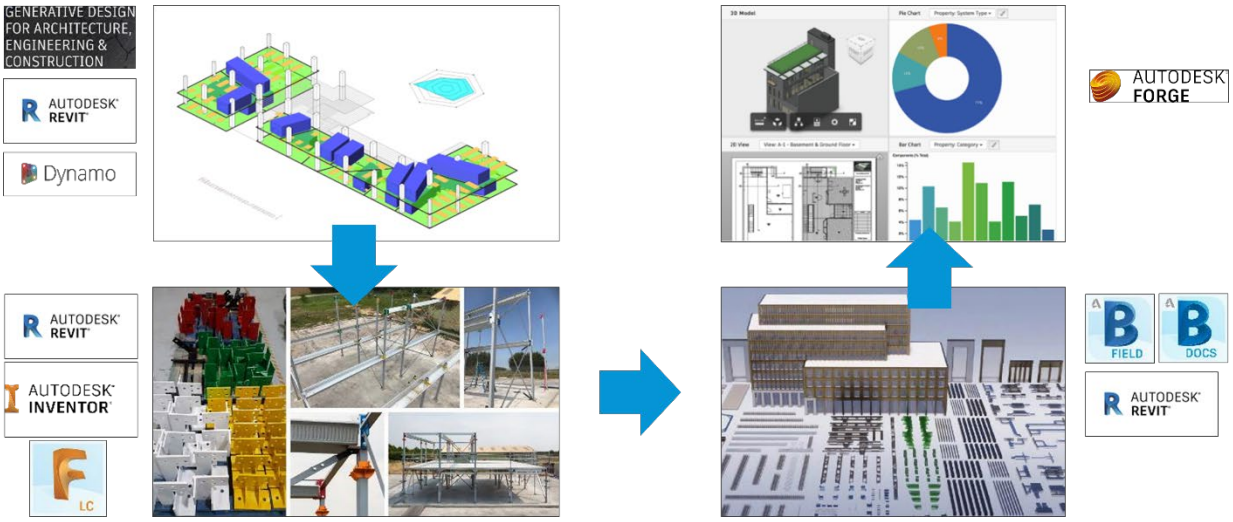
A few more tools you might know:



And finally, the Advance Manufacturing tools in the Autodesk portfolio



These can all come together to build out a common platform for Industrialized Construction.


GENERATIVE DESIGN FOR ARCHITECTURE, ENGINEERING & CONSTRUCTION
AUTODESK REVIT
Dynamo
AUTODESK REVIT
AUTODESK INVENTOR
LC
AUTODESK FORGE
B FIELD
B DOCS
AUTODESK REVIT