

Forging Industrialized Construction

Tom Closs

Principal Solution Architect

Sree Kadiani

Principal Business Consultant



About the speaker

Autodesk Principal Solution Architect

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 the 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.



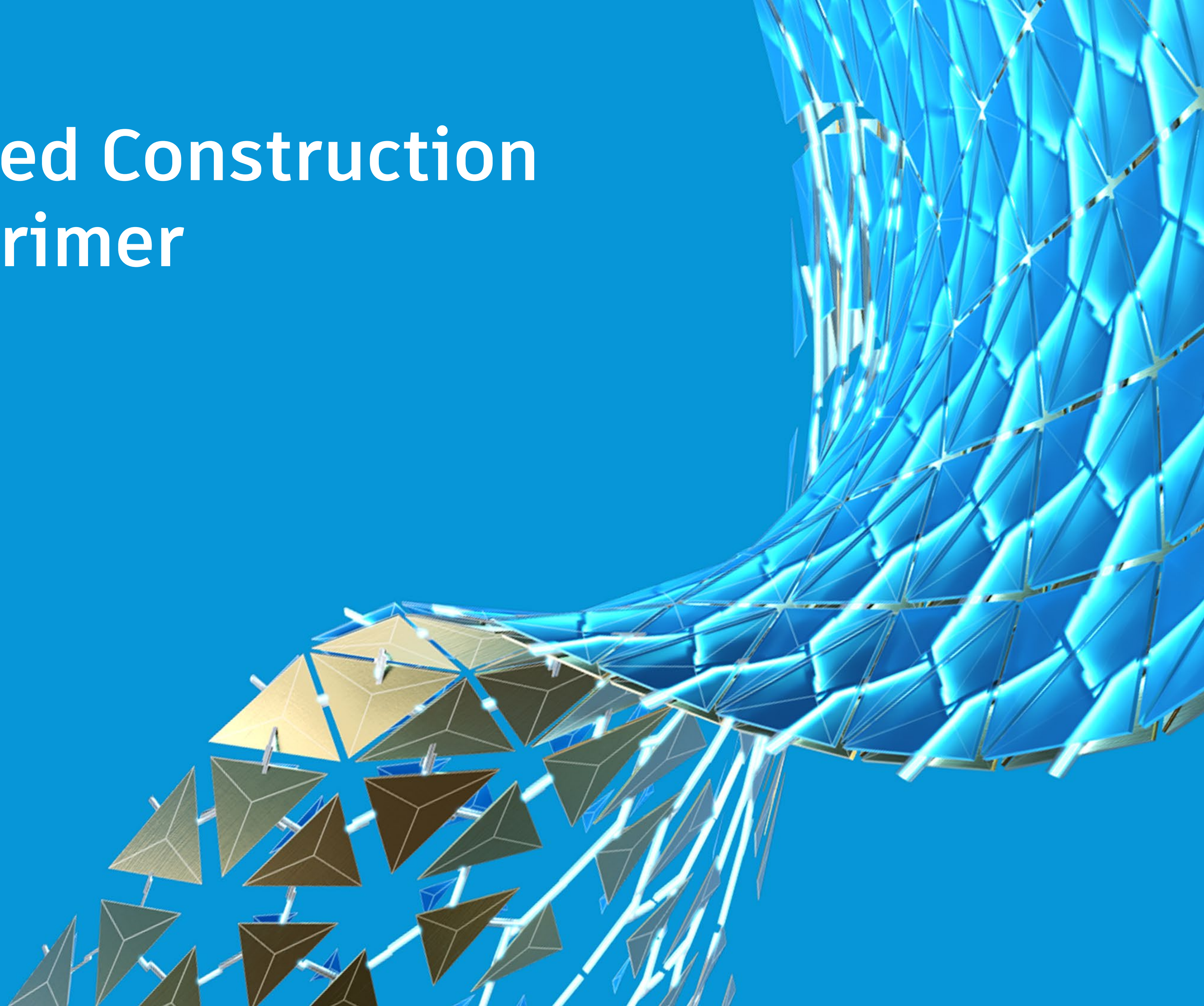
About the speaker

Autodesk Principal Business Consultant

Sree is focused on Process Improvement and strategic technology implementation in the Architecture, Engineering, and Construction (AEC) industry. Before joining Autodesk, Sree's career focus has been on continuous improvement with a decade of experience in the General Contracting Industry. Sree started her career in the field and has since worked in different roles managing BIM coordination, Design Management and Preconstruction.

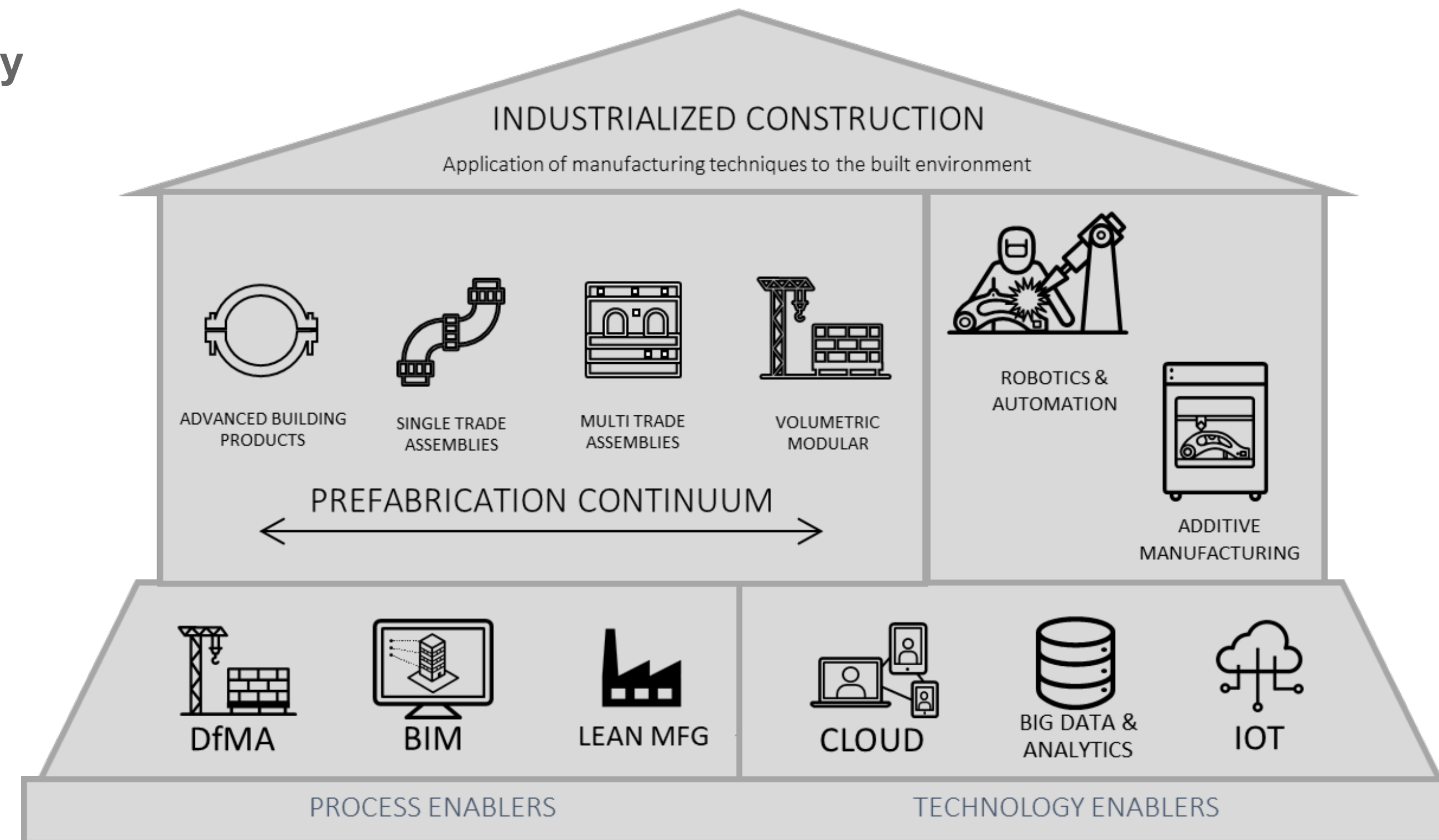
At Autodesk, Sree helps customers implement document management and project management standards and workflows that improve efficiency.

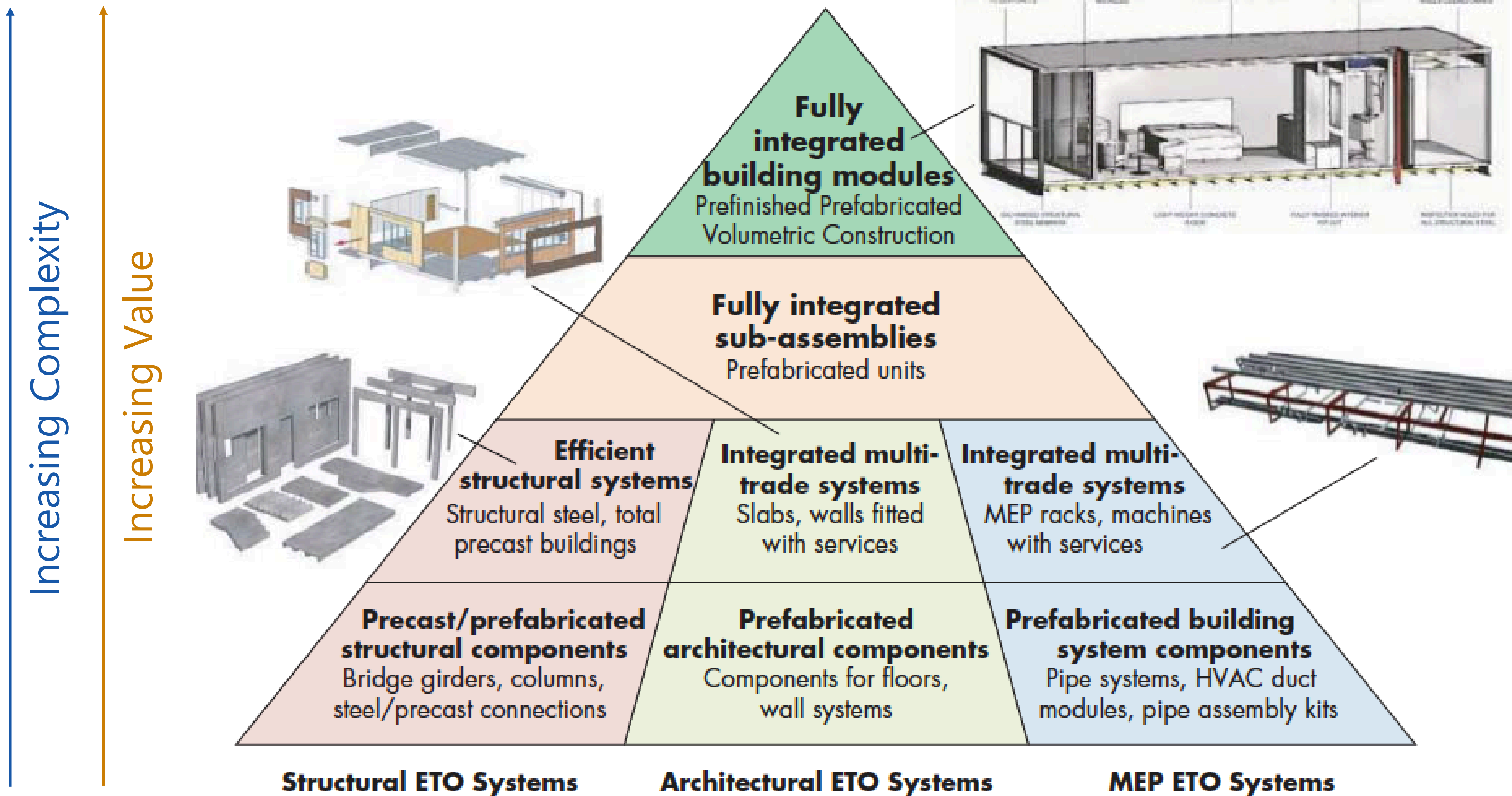
Industrialized Construction Primer



Industrialized Construction

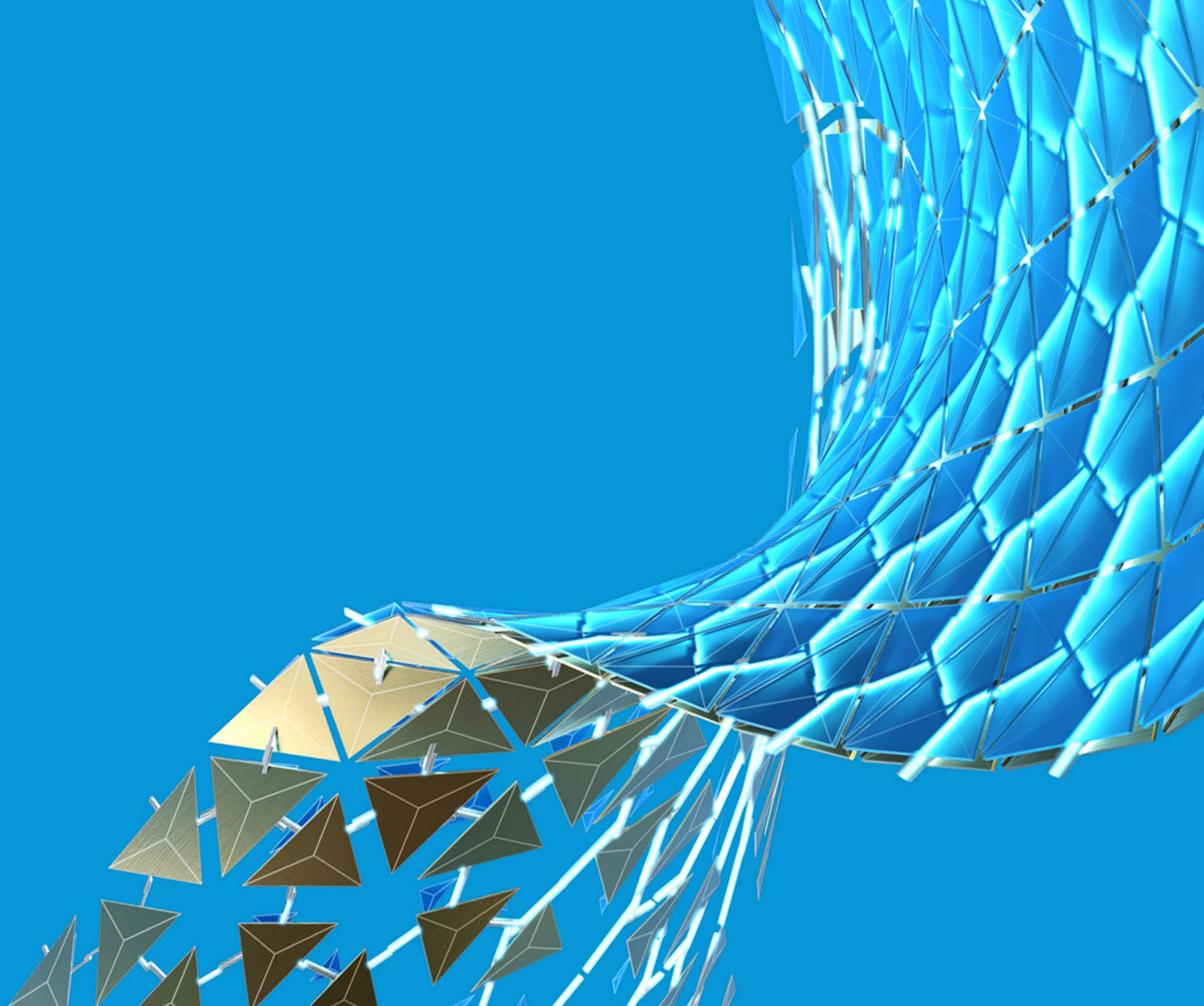
- Industrialized Construction is the framework to apply of manufacturing techniques to improve the traditional construction process, removing unnecessary manual labour
- DfMA is a process enabler for Industrialized Construction
- Prefabrication a continuum that encompasses the creation of building elements in a controlled environment.





Classification of building components, according to degree of system integration and completion

People



Design Team



***The best design is the
simplest one that works. –***
Albert Einstein

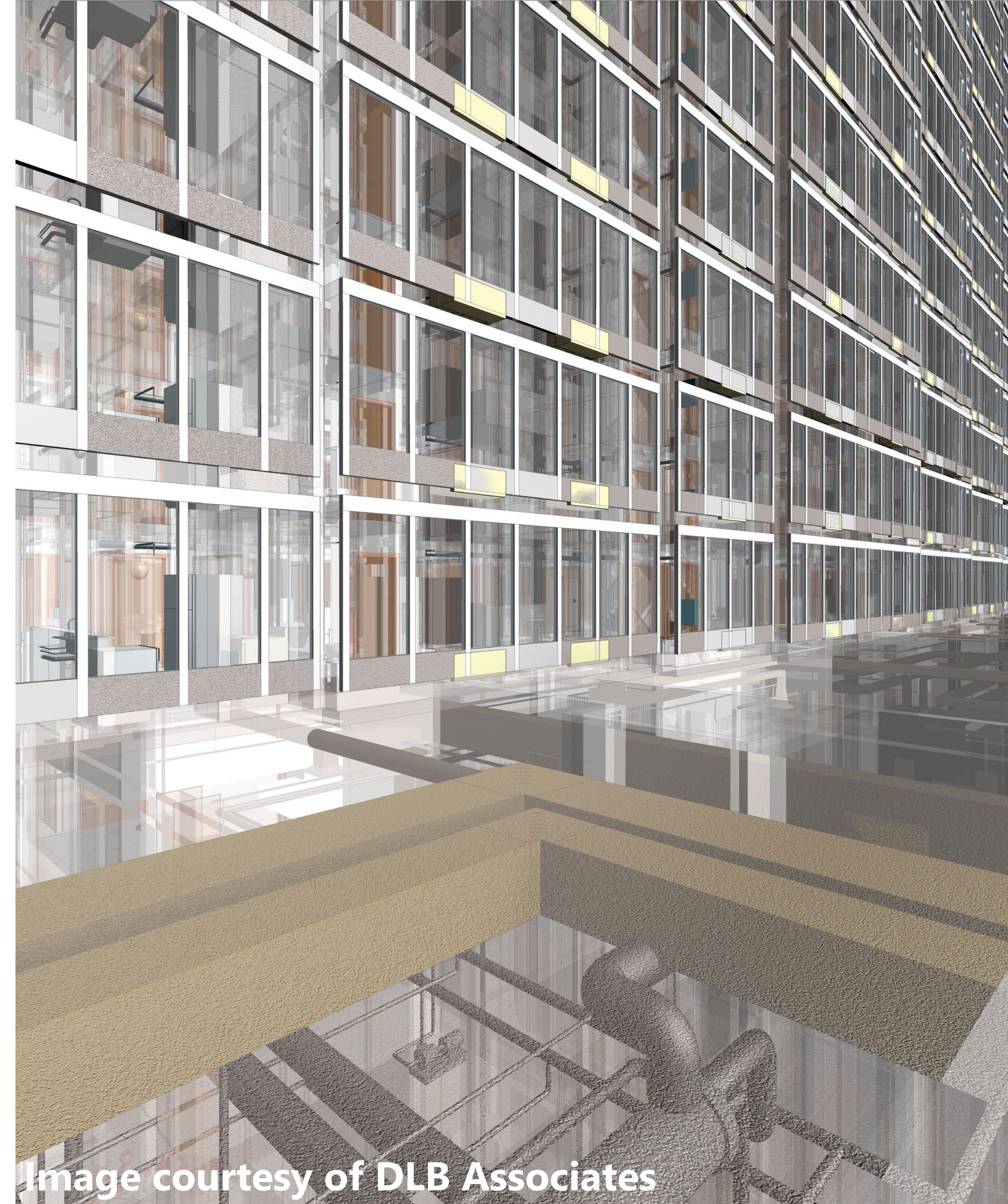


Image courtesy of DLB Associates

Trade Partners/Fabricators

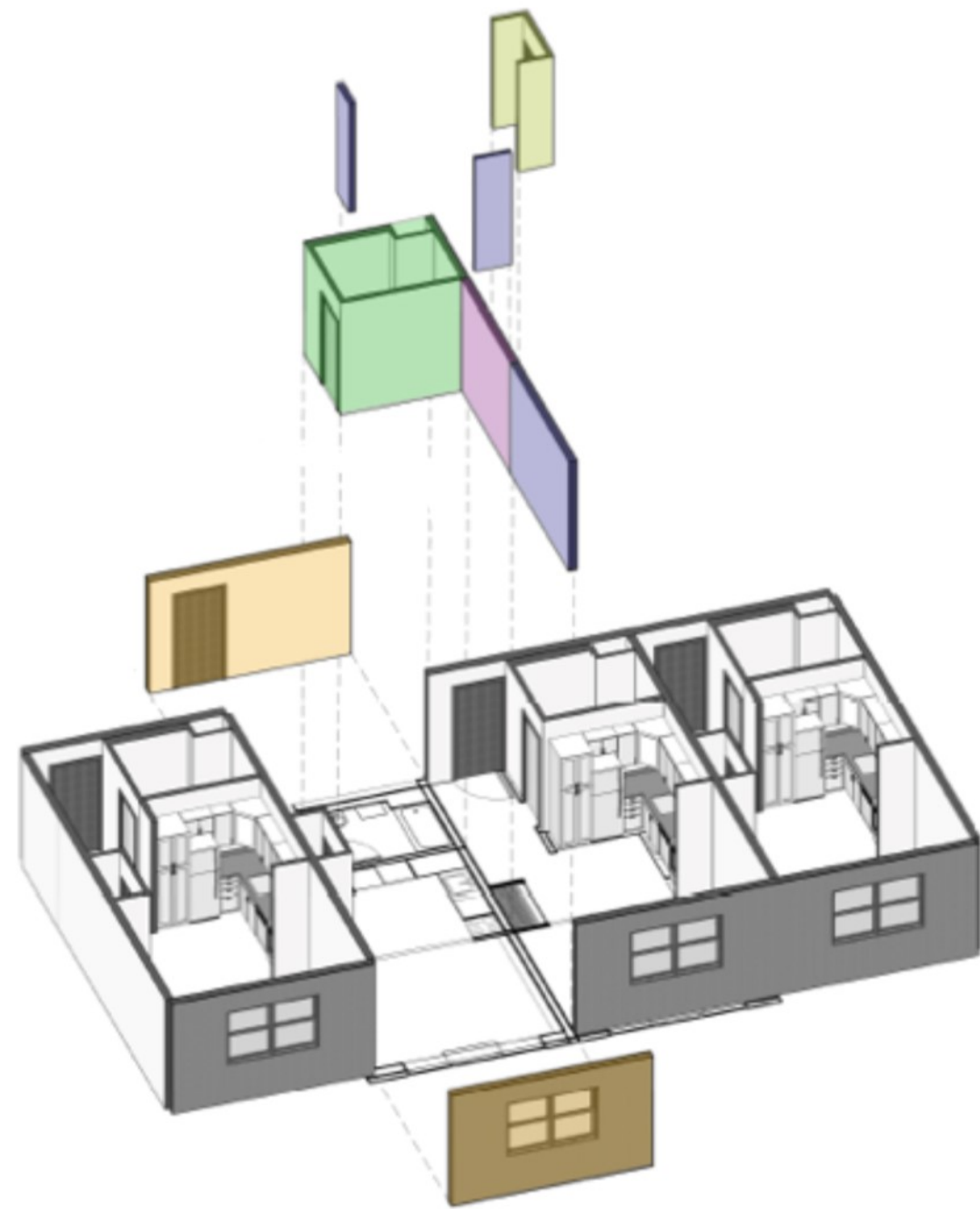


Smart manufacturing employs automated computer-integrated manufacturing techniques and rapid design changes.



Image courtesy of Poole & Kent Corp.

Contractors



Off-site construction and assembly can save resources and time, projects can be completed 33% to 50% faster and *safer* than on-site construction

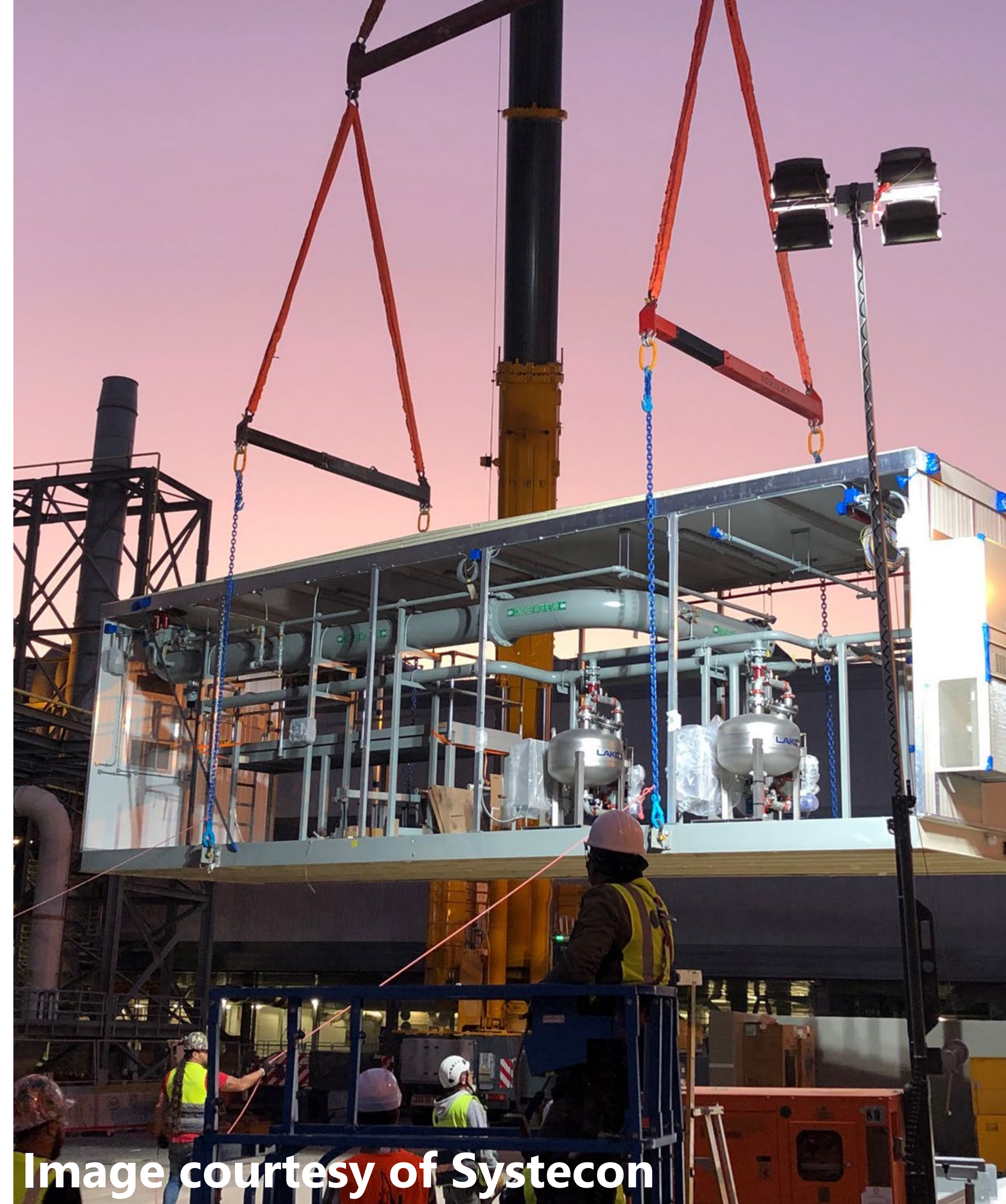
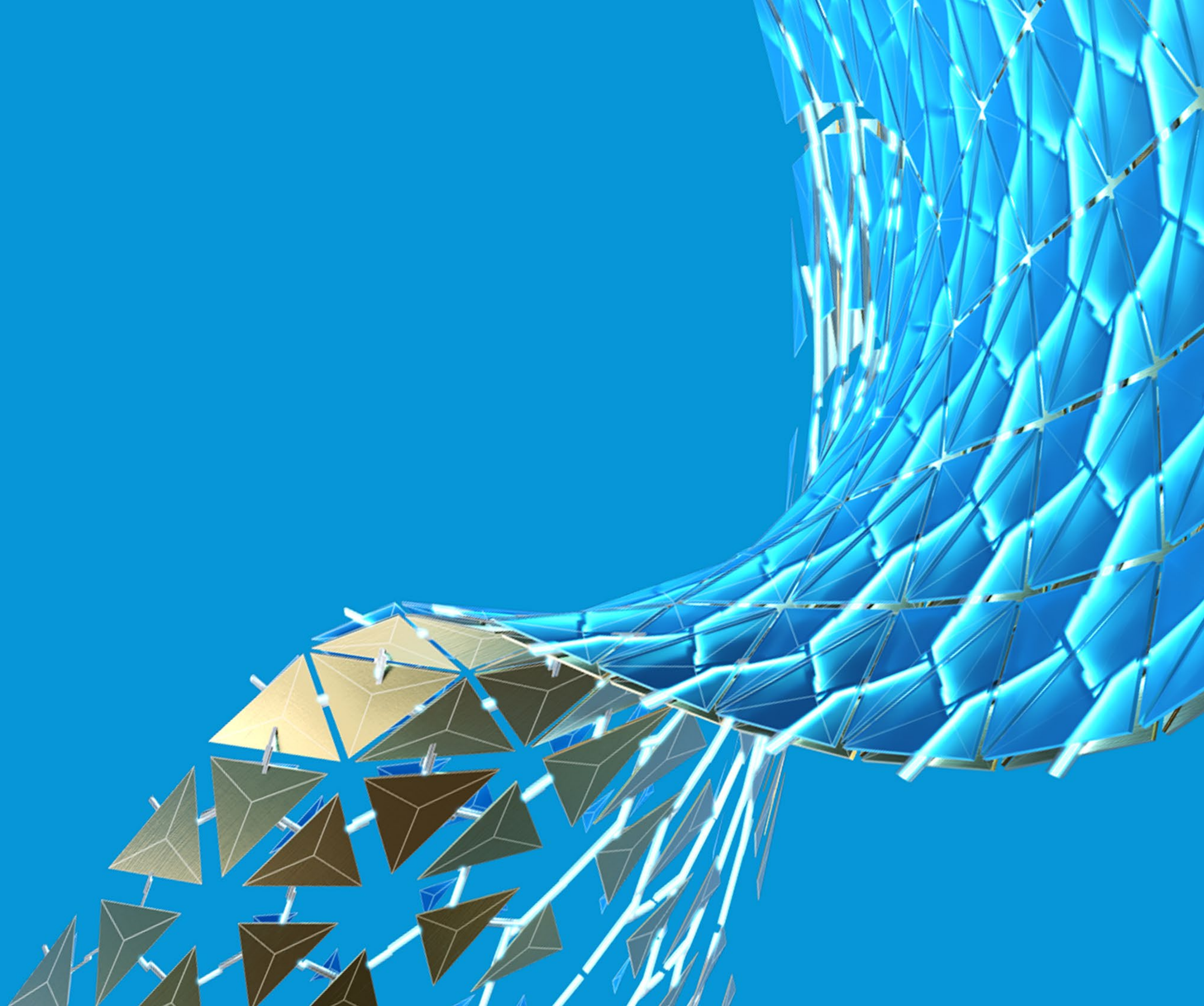
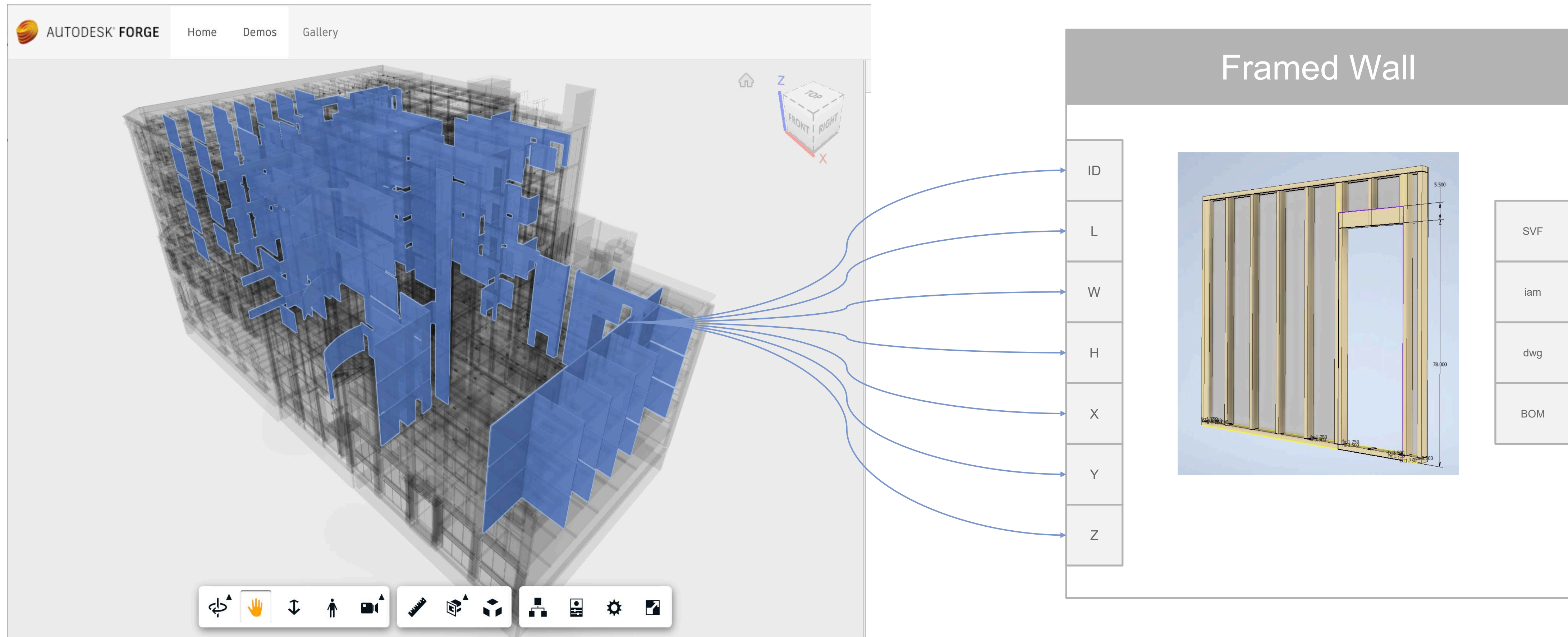


Image courtesy of Systecon

Processes

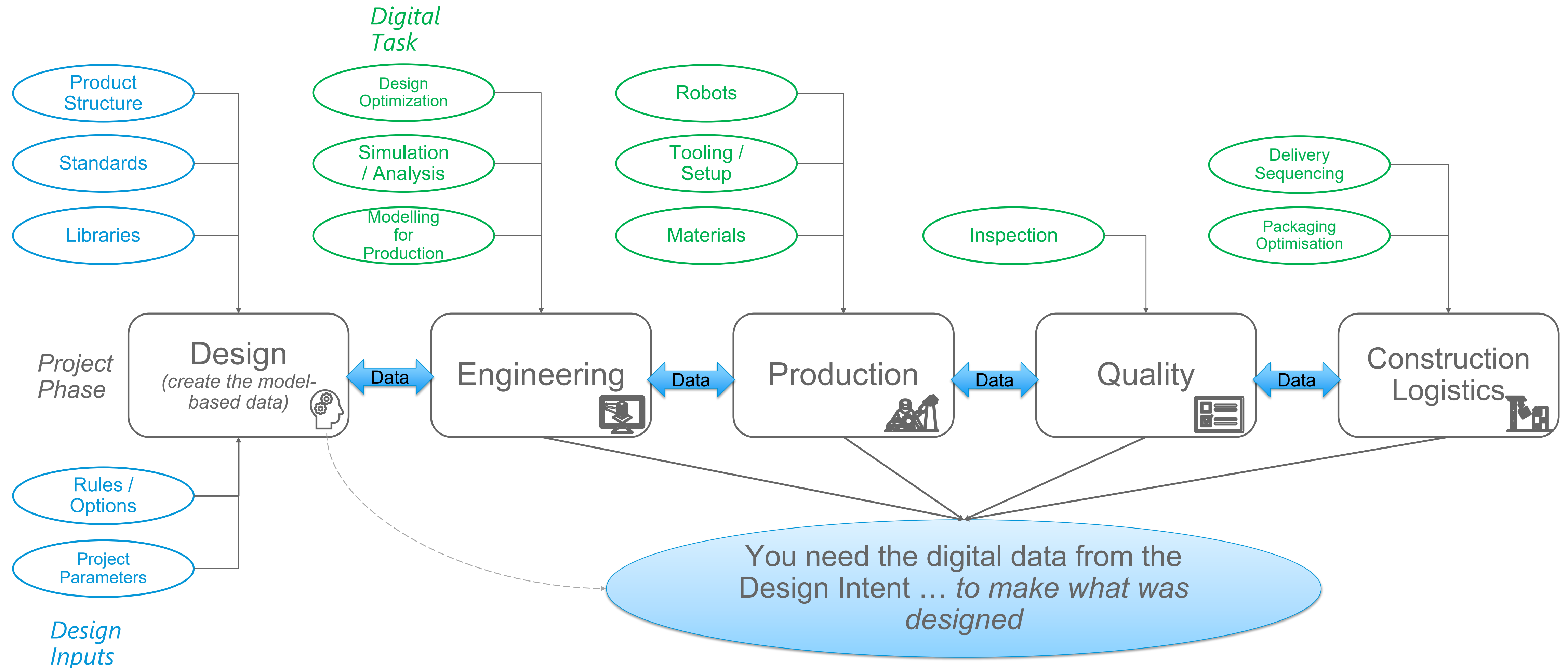


Beyond BIM



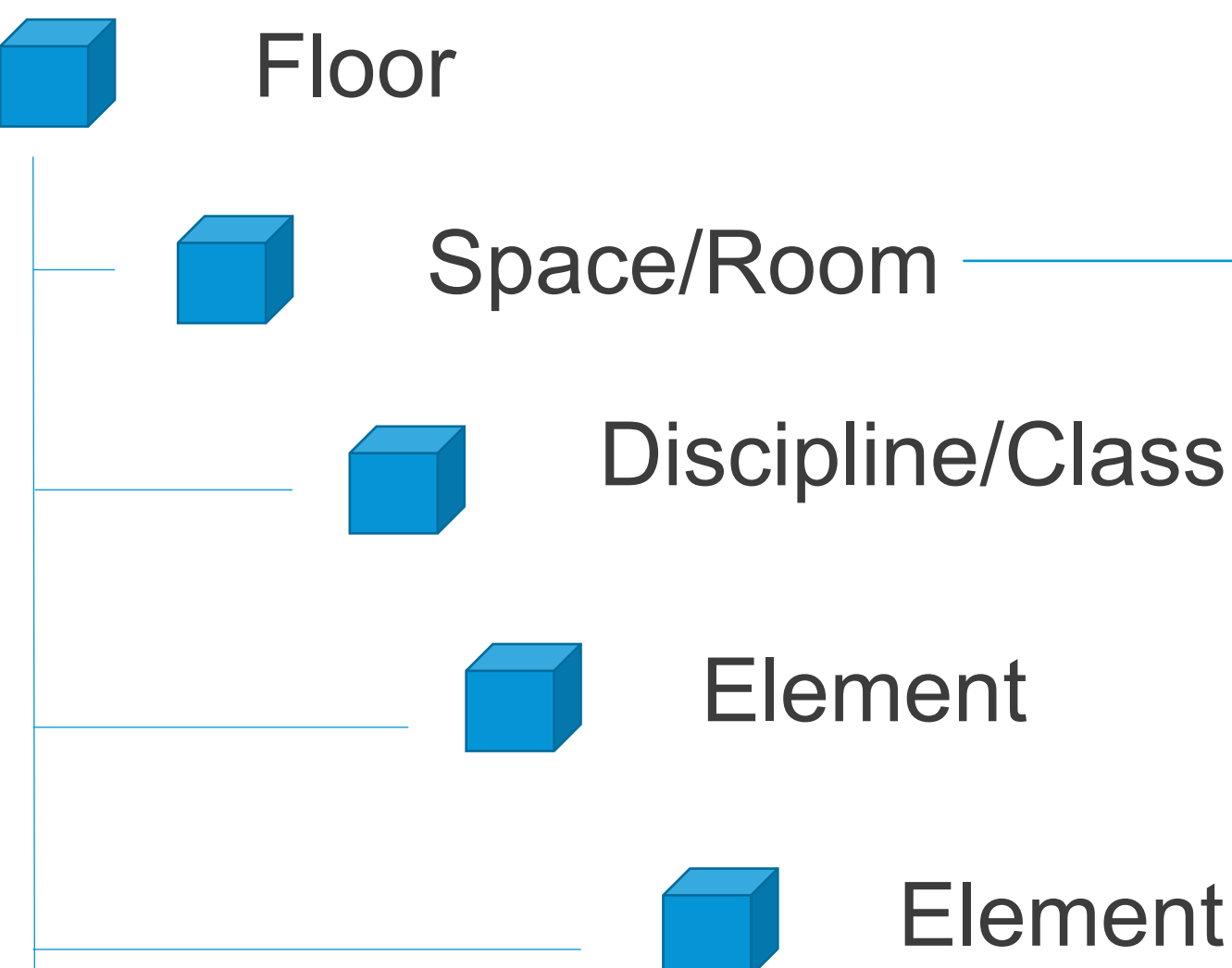
Key Objective: Re-use the Digital Data

Connected data flow across multiple work activities – Starts with Design Models/Data



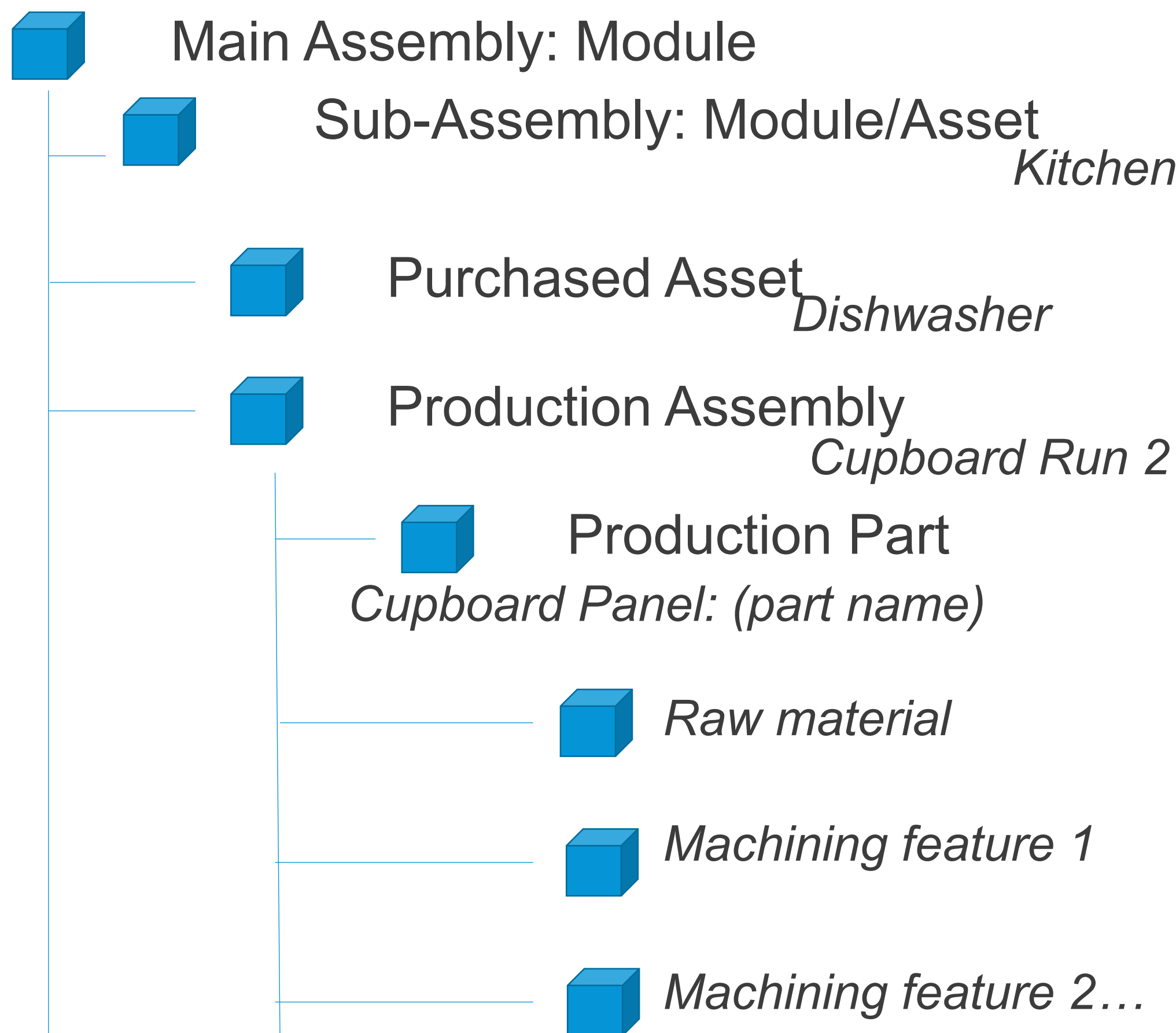
Importance of Stable Product Structures

Building/Construction Structure

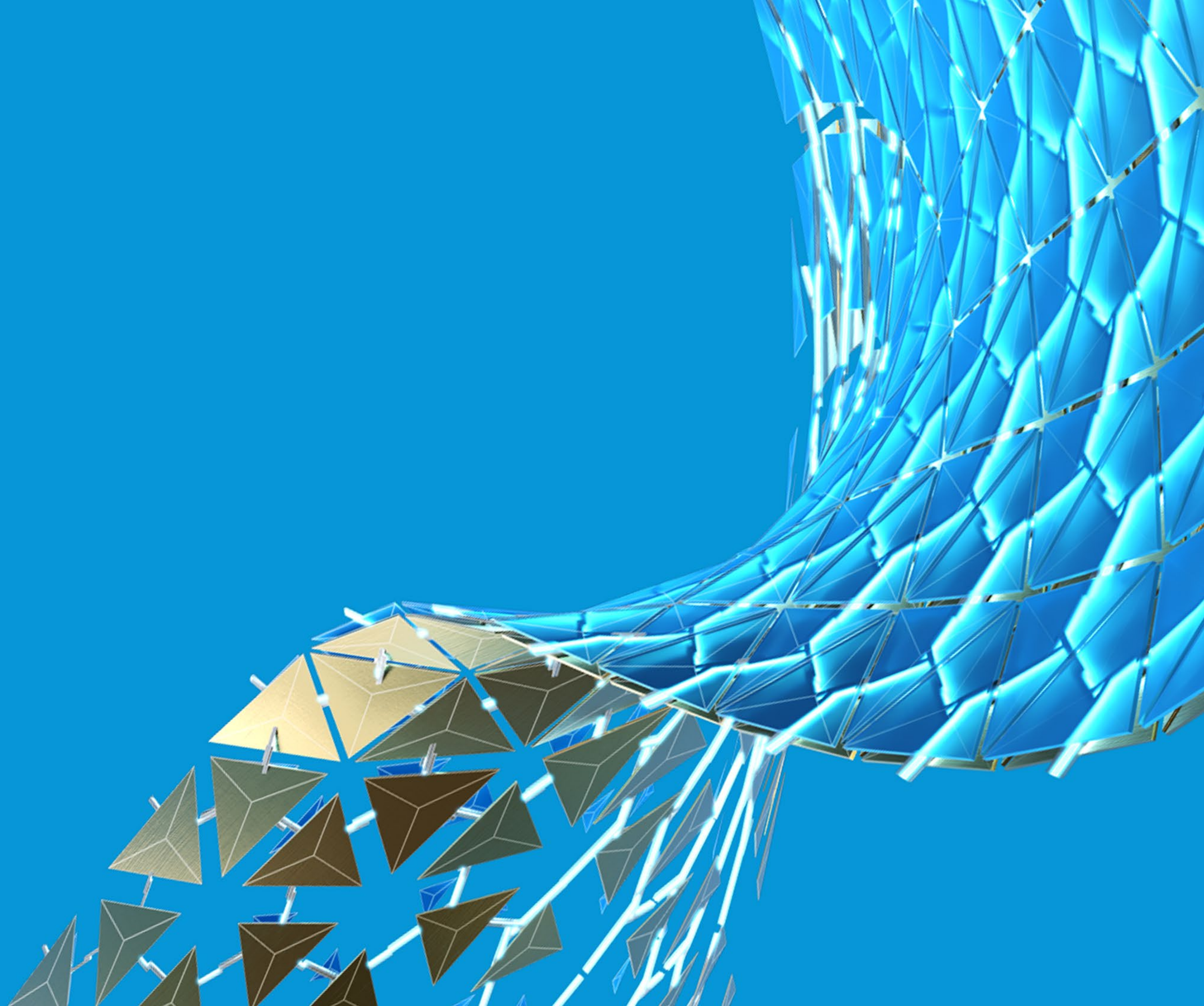


Fabrication Structure

Ground Floor Type XYZ



Technology



DfMA Roadmap – What Tools are available Today?

STAGE >>	Site Planning	Design	Shell	Core	Unit	Fabrication	Installation	Handover	Operate & Maintain
Process >>	Options Development / Building Configuration	Optimized Pre-fabrication Module Design	Building Shell and Structure Design	Core Services and Interfaces Design	Modular Room / Apartment Unit/ Pod Design /Build	Fabrication of Equipment, Parts, Module Components	Offsite Build/Test Site Installation Planning Offsite/Onsite Commissioning and Issue handling	Update As-Built State Compile and Handover Digital Twin Information Pack	Environmental Monitoring Live IoT Feedback Spare Parts Management
Tools >>	Dynamo “Refinery” Revit	Revit Inventor Fusion Custom Tools Configurators	Revit Structure Dynamo Inventor Custom Tools	Revit MEP Autodesk MDS/MDM/MDC	Revit Dynamo Inventor Fusion Autodesk MDS/MDM/MDC	Revit MEP Fusion Production, HSM, Powermill, PowerInspect PlanGrid	Revit MEP Inventor, BIM360 Build / Plan-Grid	BIM360 Docs Forge Client CDE Integrations	Forge Customer Analysis Tools and Dashboards
Autodesk Support Method >>	Definition: Advisory Services Realization: Implementation Services	Definition: Advisory Services Realization: Implementation Services	Definition: Advisory Services Realization: Implementation Services	Definition: Advisory Services Realization: Implementation Services	Definition: Advisory Services Realization: Implementation Services	Definition: Advisory Services Realization: Implementation Services	Definition: Advisory Services Realization: Implementation Services	Definition: Advisory Services Realization: Implementation Services	Definition: Advisory Services Realization: Implementation Services
Inspiration>>	Automation of Site Design Best Options Automation of Building Room/Space best options	Reduce Part Count Assembly Method Simplification Standardization of Design Assets	Optimised Steelwork Assembly Method Simplification	Standardize Building Core Design and Systems Risk-Free Interface Definitions	Fabrication & Assembly Planning Design-to Production Integration & Automation	Optimize Production of Physical Parts	Delivery Sequence Planning Reduce Field Incident Delays Manage Onsite Issues	Data Management Information Handover Ensure Customer Environment is What was Promised	FM Services Environmental Quality Monitoring IoT Integrations

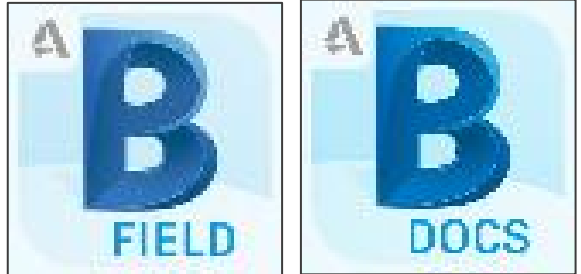
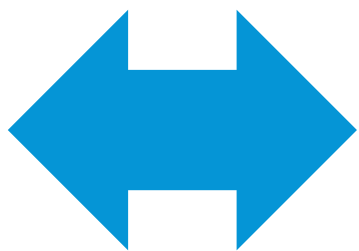
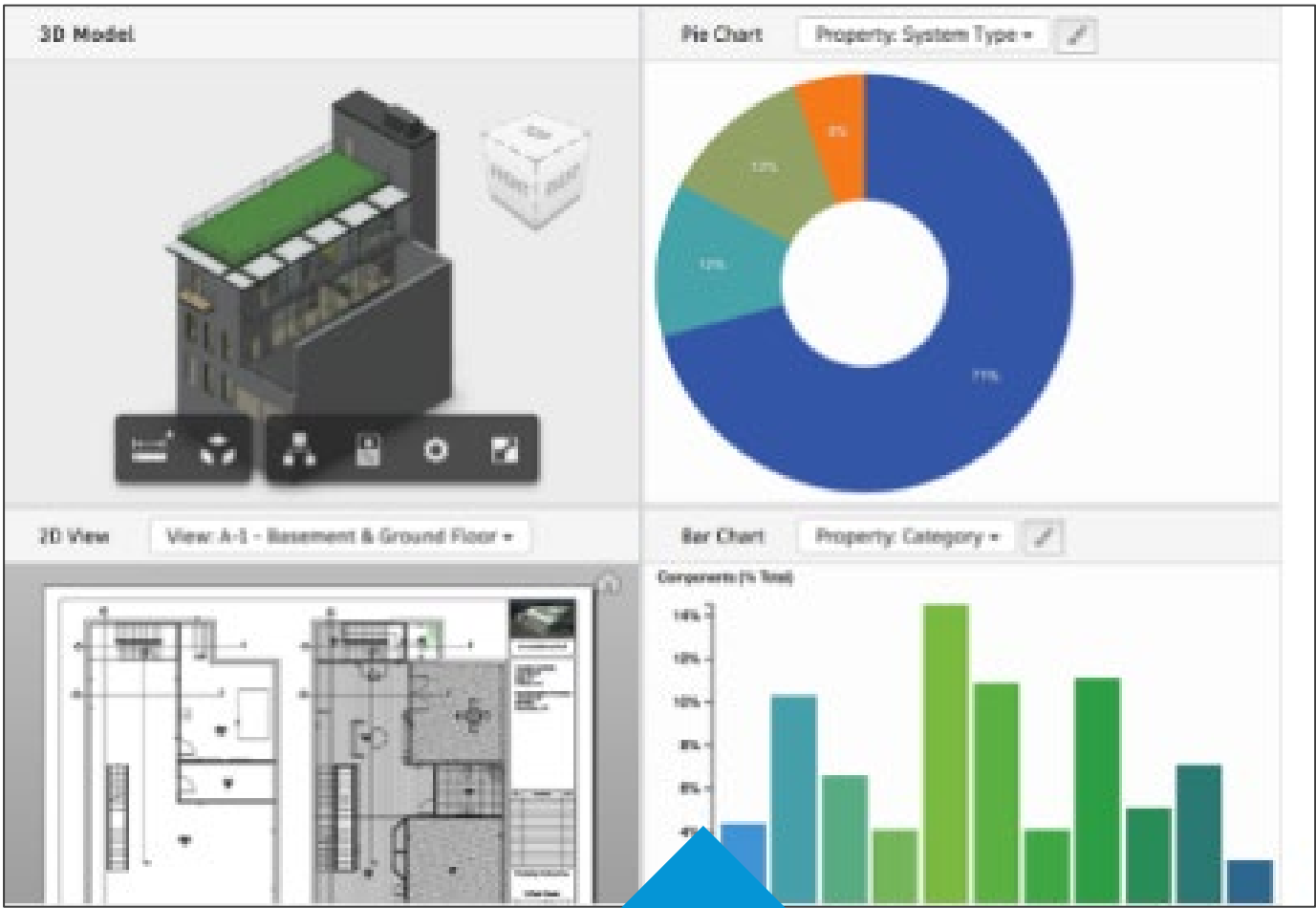
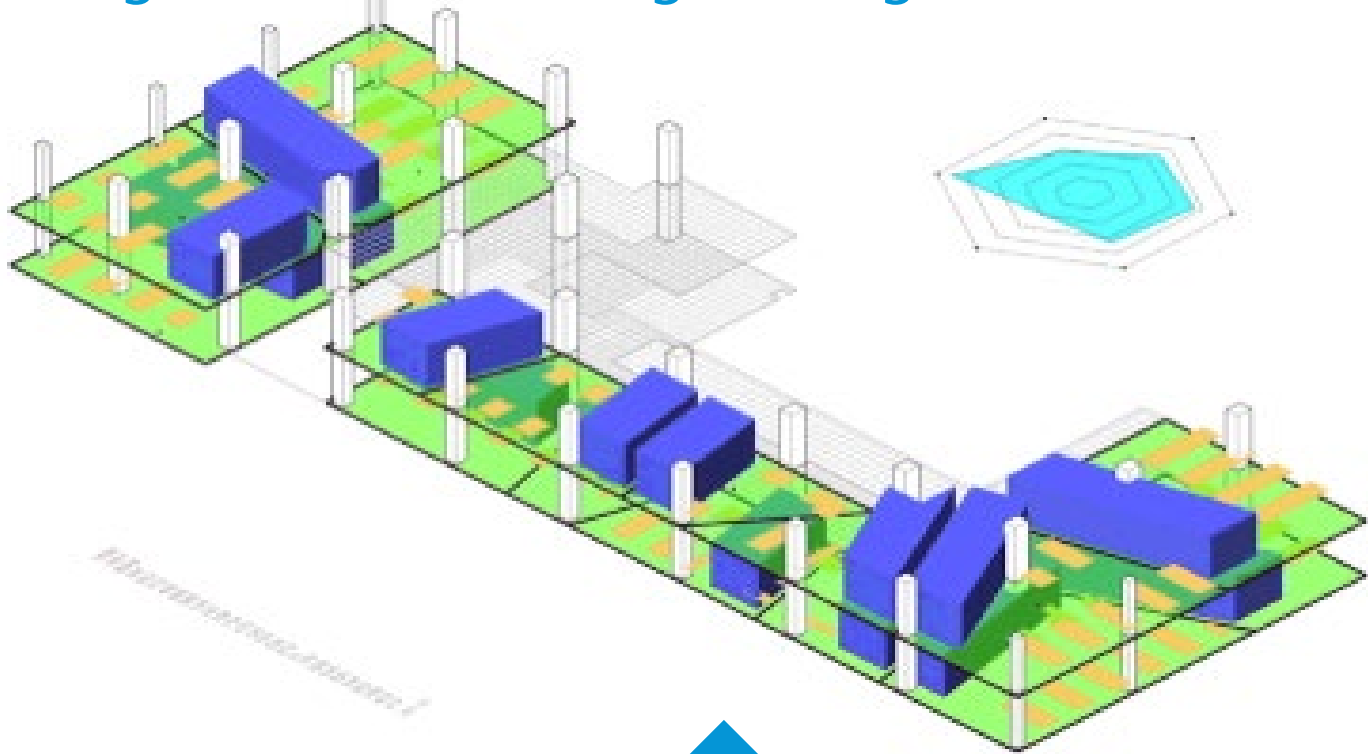
Autodesk Full Lifecycle Platform Support

Autodesk toolsets at the core of the end-to-end process

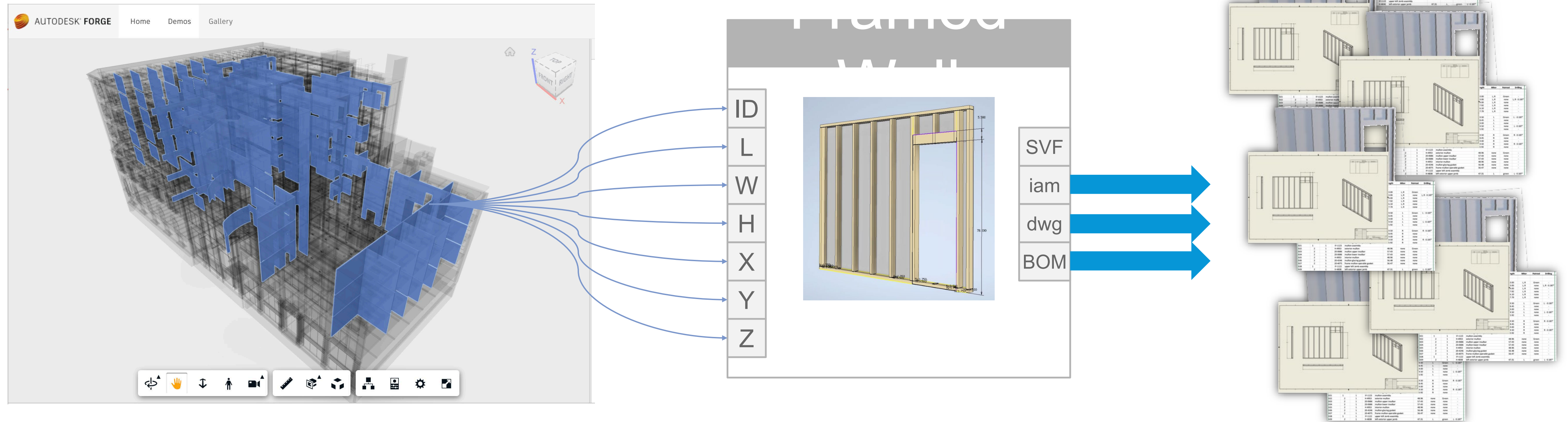
GENERATIVE DESIGN
FOR ARCHITECTURE,
ENGINEERING &
CONSTRUCTION



<https://www.autodesk.com/solutions/generative-design/architecture-engineering-construction>



Automate Production of Shop Drawings



Building
Model

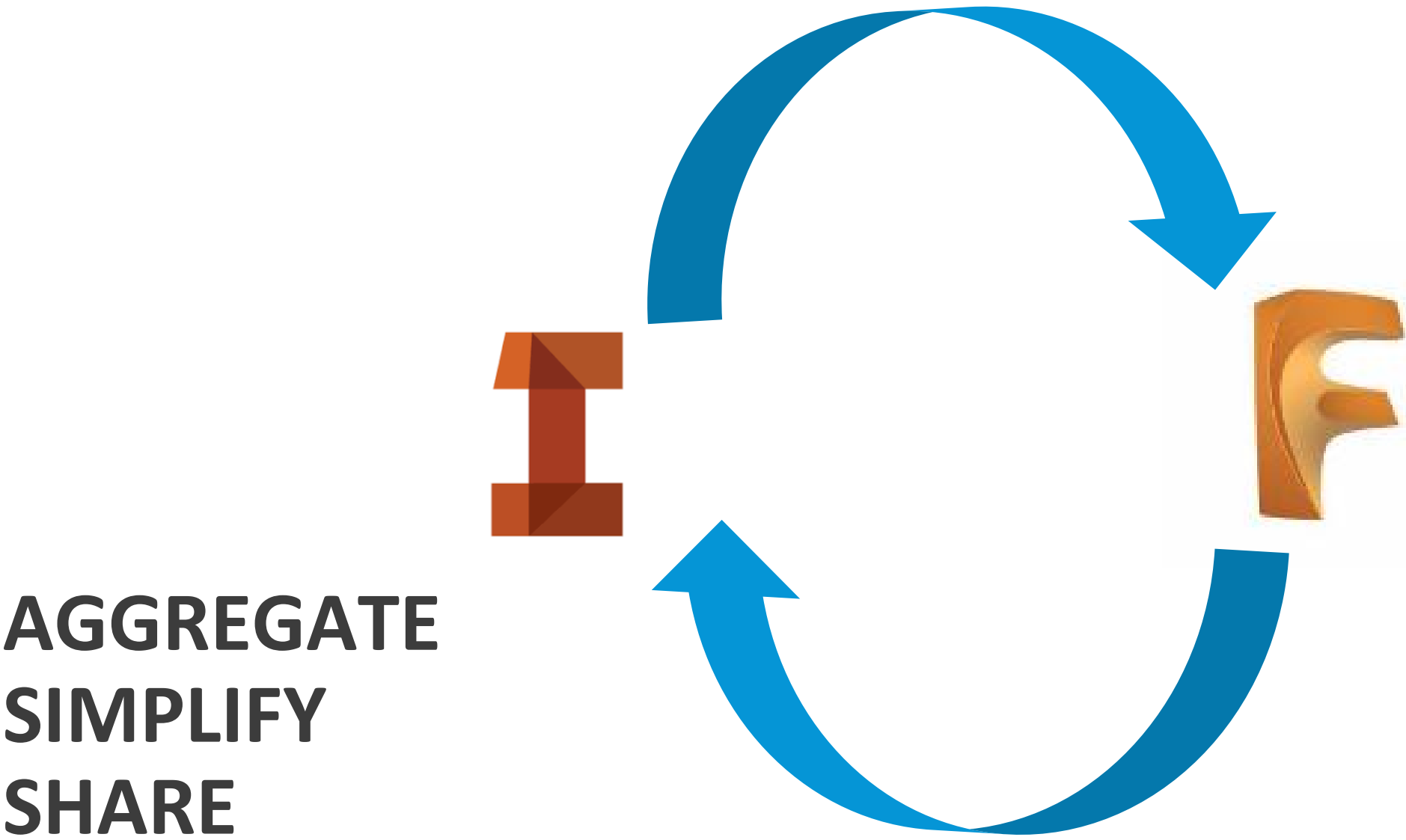


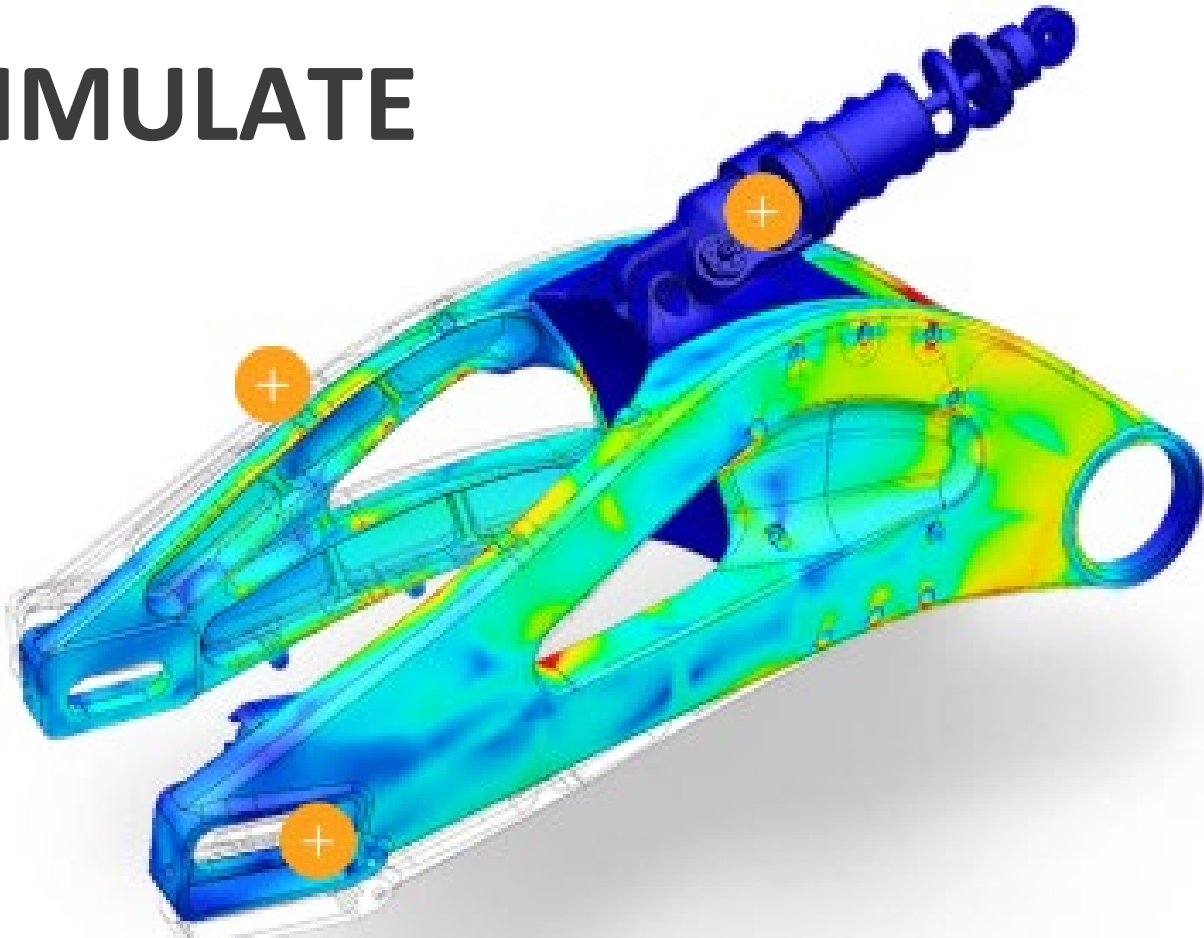
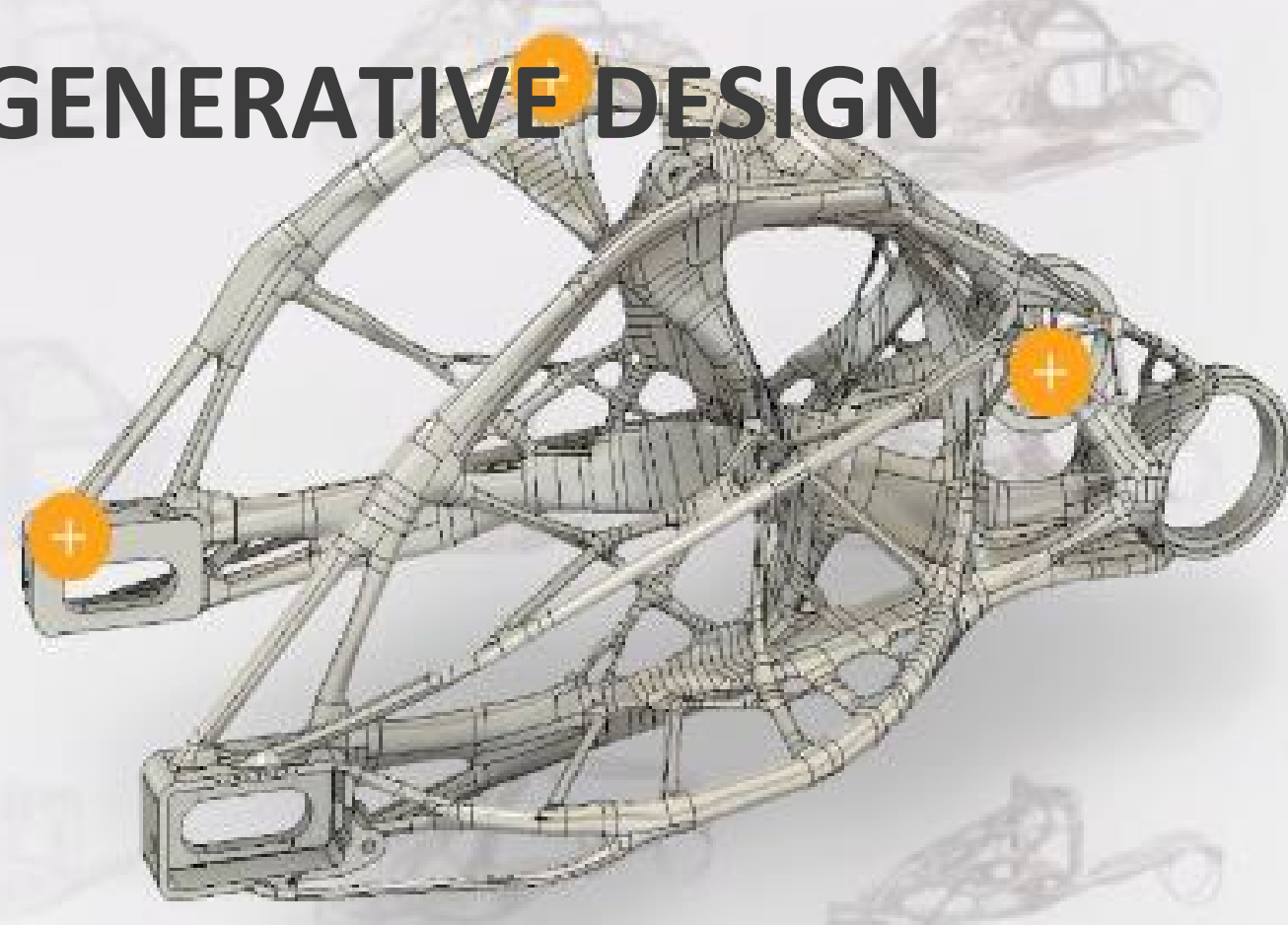
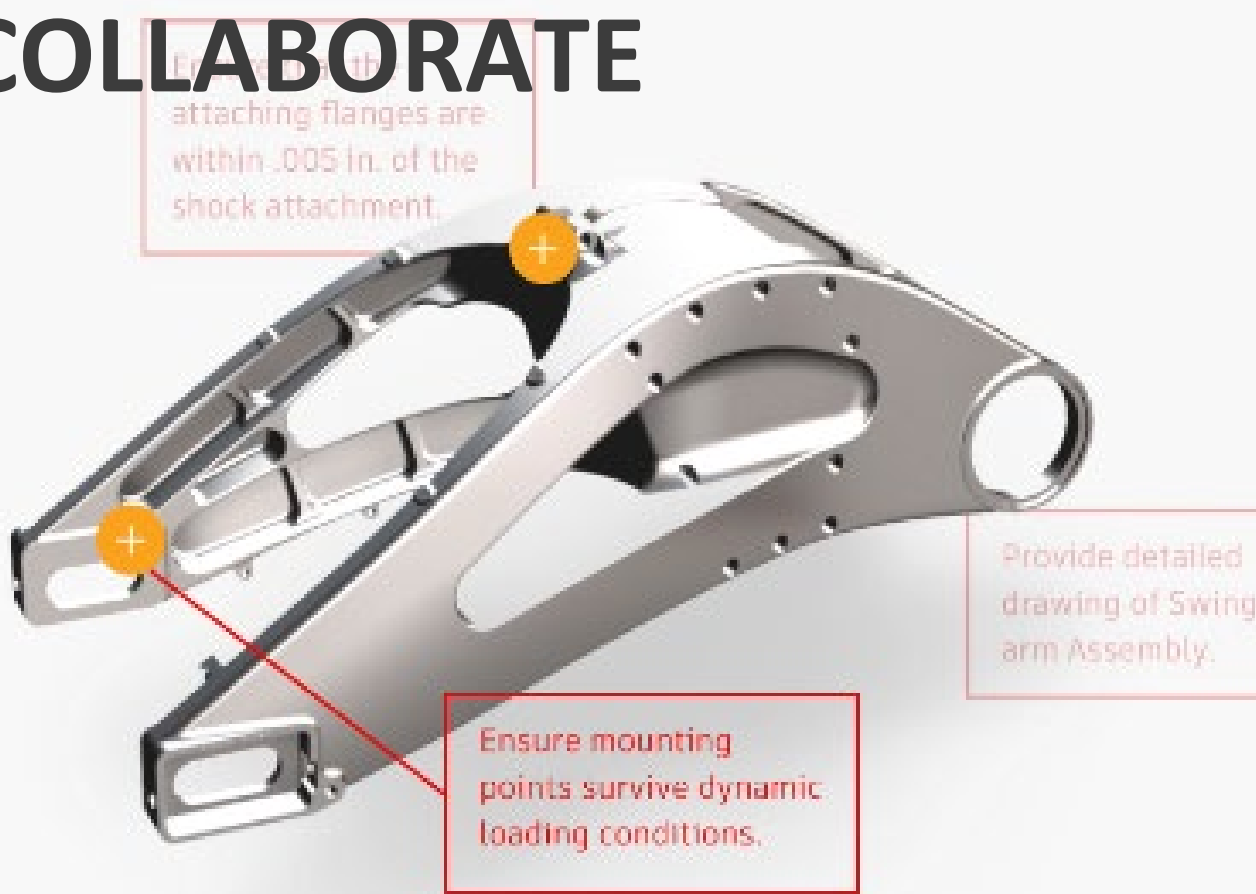
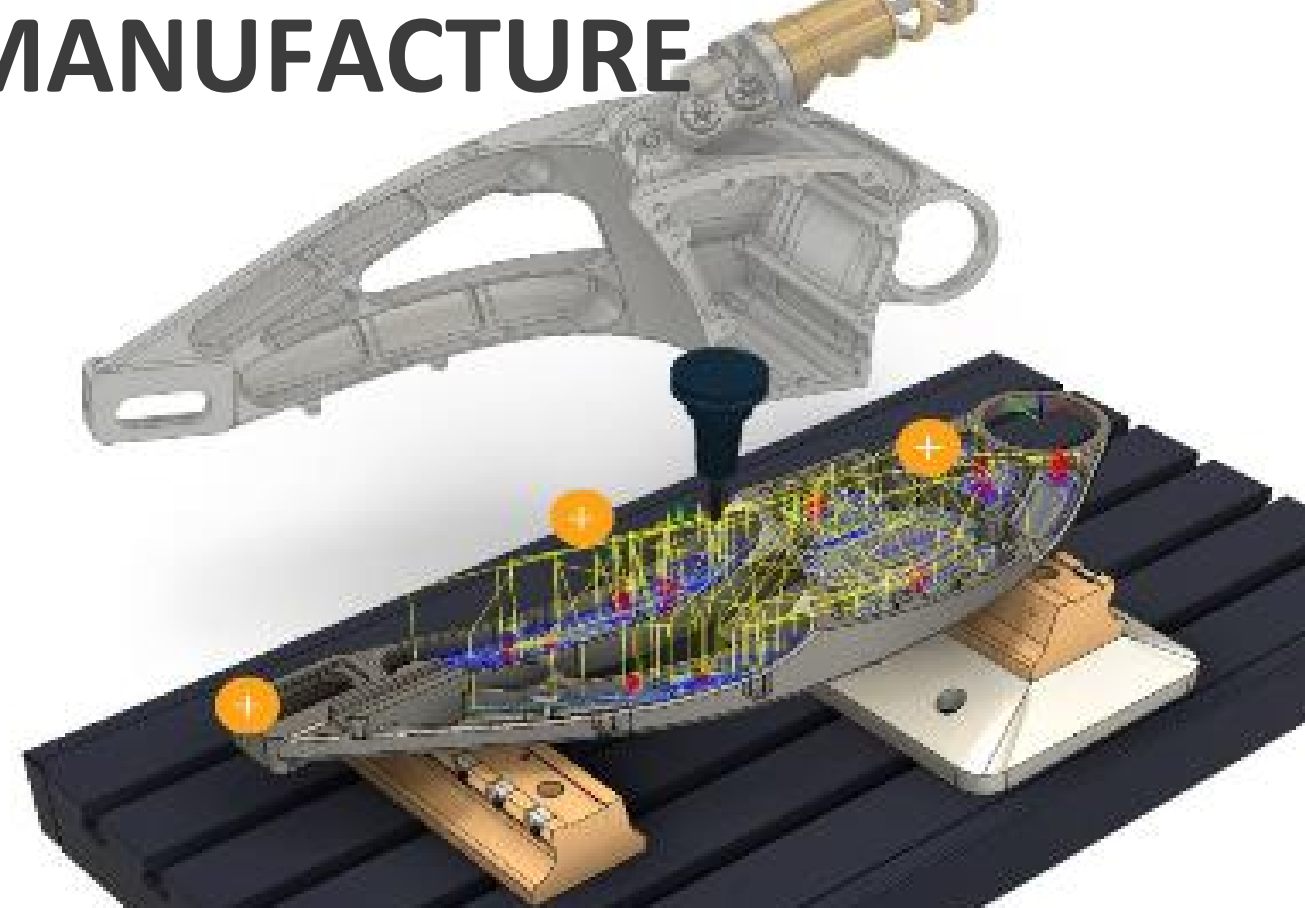
iLogic
Model



DA for
Inventor

Fusion 360

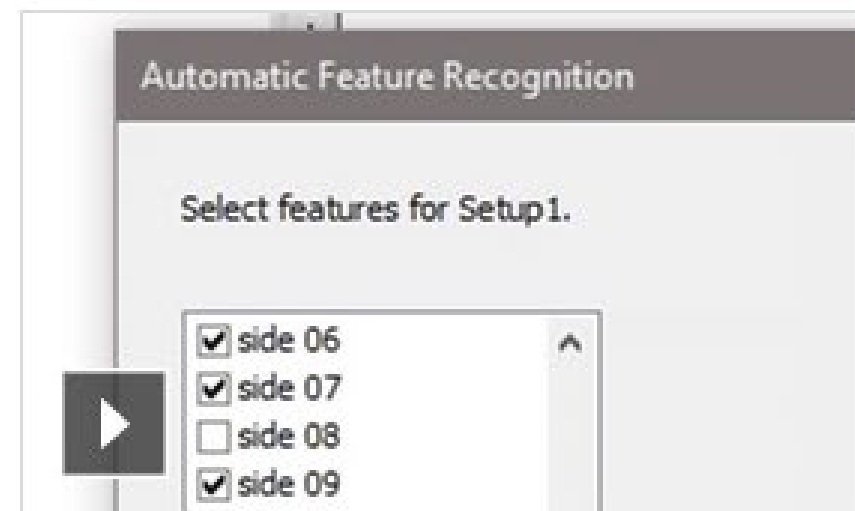


SIMULATE 	GENERATIVE DESIGN 
COLLABORATE  <p>attaching flanges are within .005 in. of the shock attachment.</p> <p>Ensure mounting points survive dynamic loading conditions.</p> <p>Provide detailed drawing of Swing arm Assembly.</p>	MANUFACTURE 

Manufacturing Machining

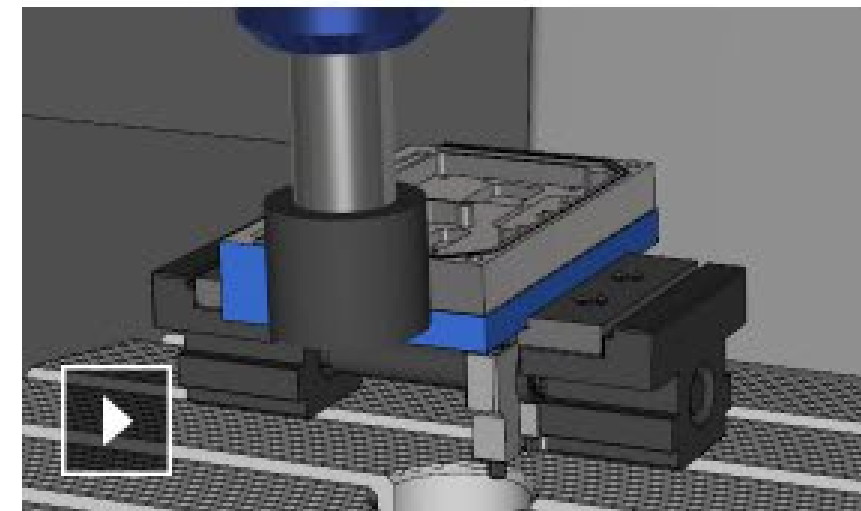
Use 3D Model to plan, simulate, and program parts machining

Automated CNC programming



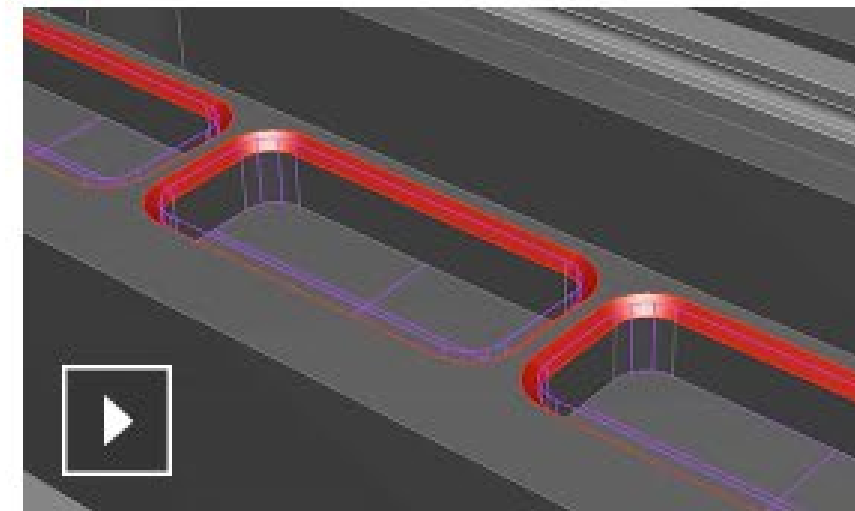
Program parts faster

Automate your workflow from design to NC code to help reduce programming time. (video: 1:16 min)



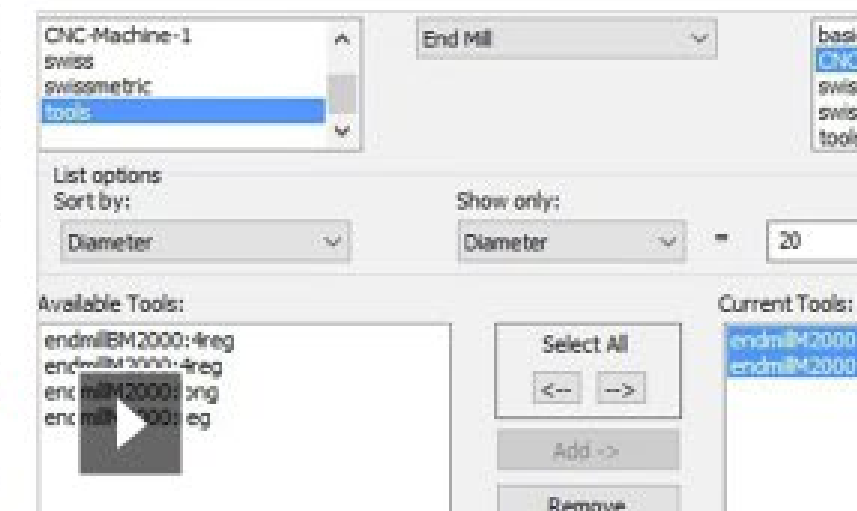
Feature recognition

Use feature recognition to scan, identify, and create machinable features from your design. (video: 2:04 min.)



Built-in intelligence

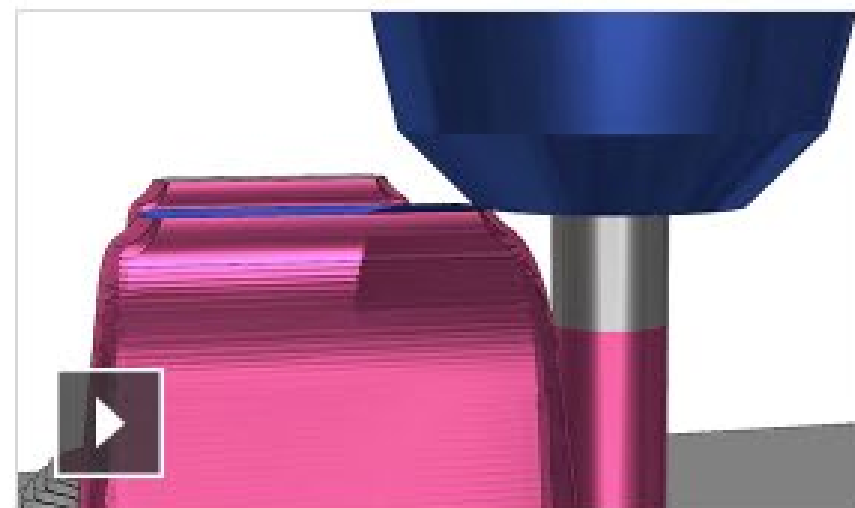
FeatureCAM can help select your tools, stepover, stepdown, and more, providing programming consistency. (video: 1:43 min.)



Programming control

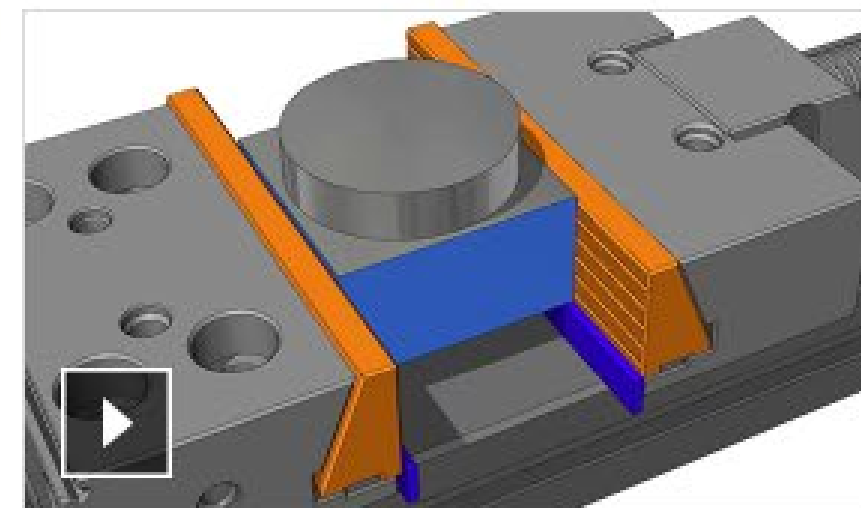
Standardize and produce the results you want with libraries, configurations, and attributes. (video: 1:32 min.)

Simulation and safety



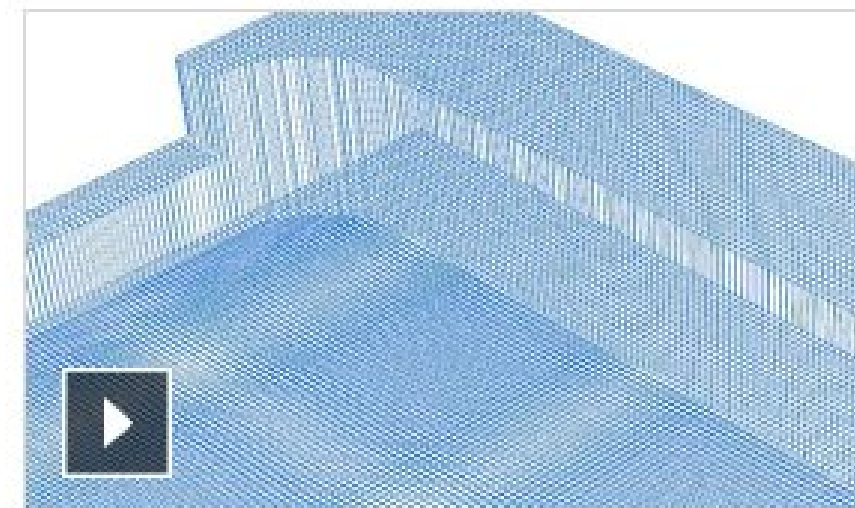
Collision avoidance

Use collision avoidance to trim toolpaths, tilt tools, and avoid selected regions of your model. (video: 1:46 min.)



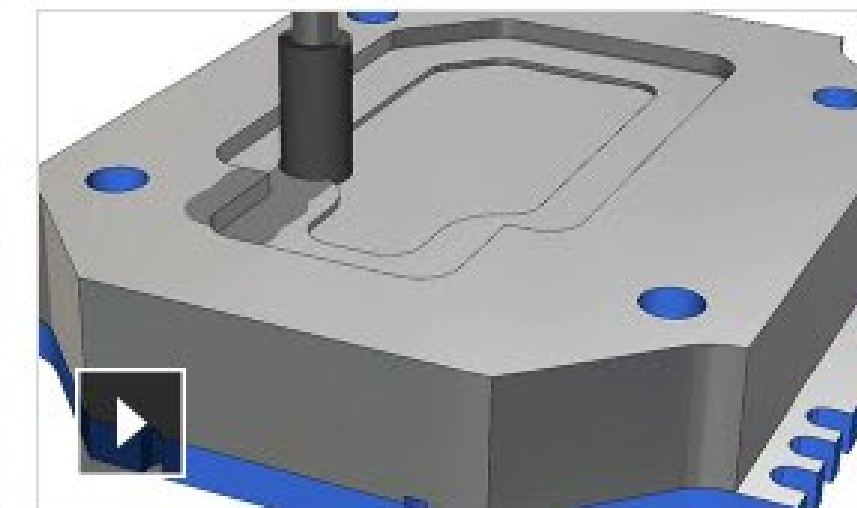
Clamps and fixtures

When programming parts, FeatureCAM updates toolpaths to help avoid collisions with workholding devices. (video: 1:38 min.)



Stock models

Monitor the amount of remaining stock to avoid fresh air cutting and potential collisions. (video: 1:56 min.)

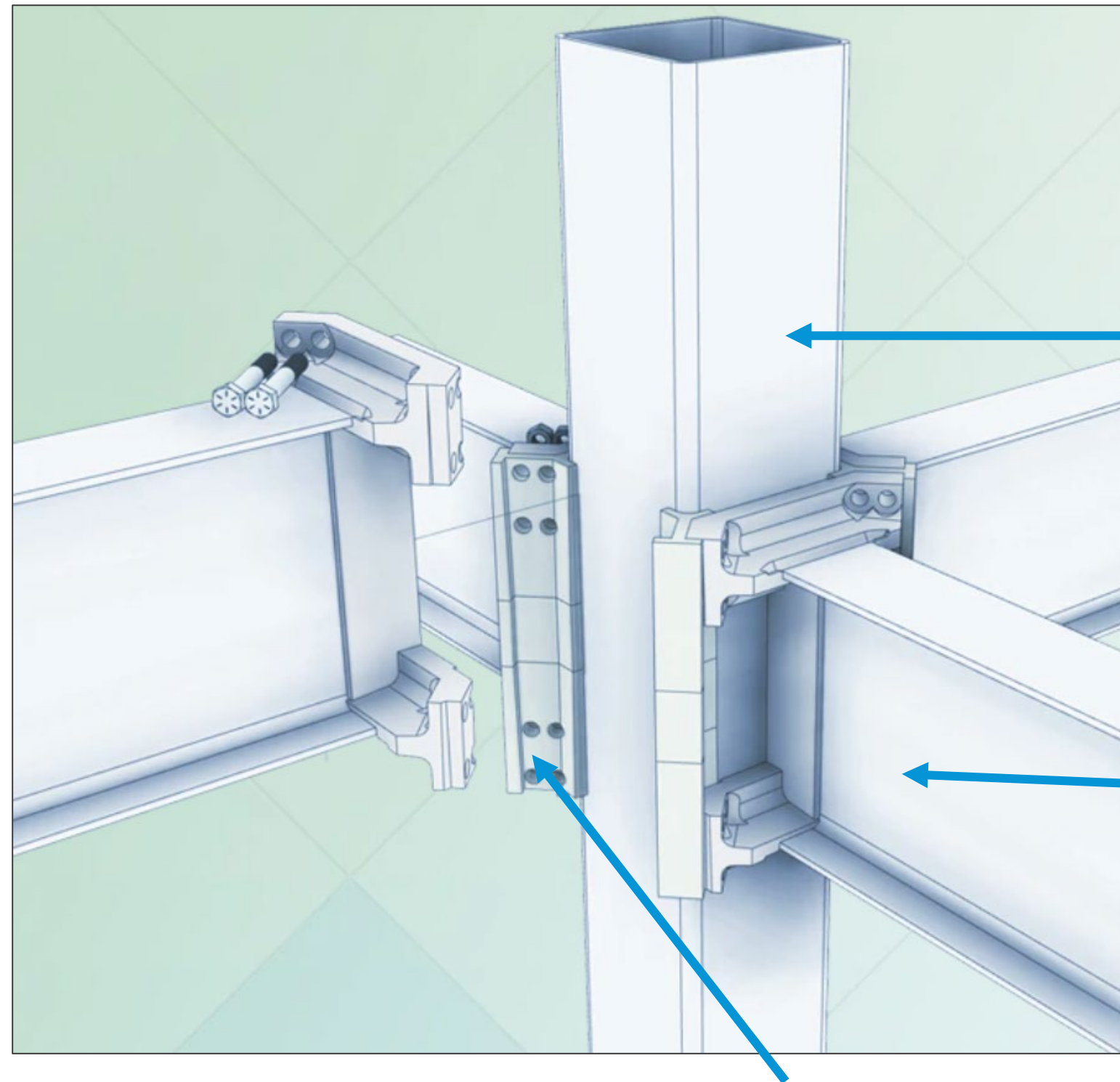


Simulation and visualization

Avoid machine downtime. Highlight deviations between your programmed part and nominal design. (video: 1:16 min.)

Use the Right Tool for the Right Job

Multiple Integrated Tools Are Key to Connecting the Data (Example ConXTech)



REVIT: Structural Design, (LOD 350 Model)



ADVANCED STEEL: Manufacturing Model



VAULT:
Manufacturing,
R & D



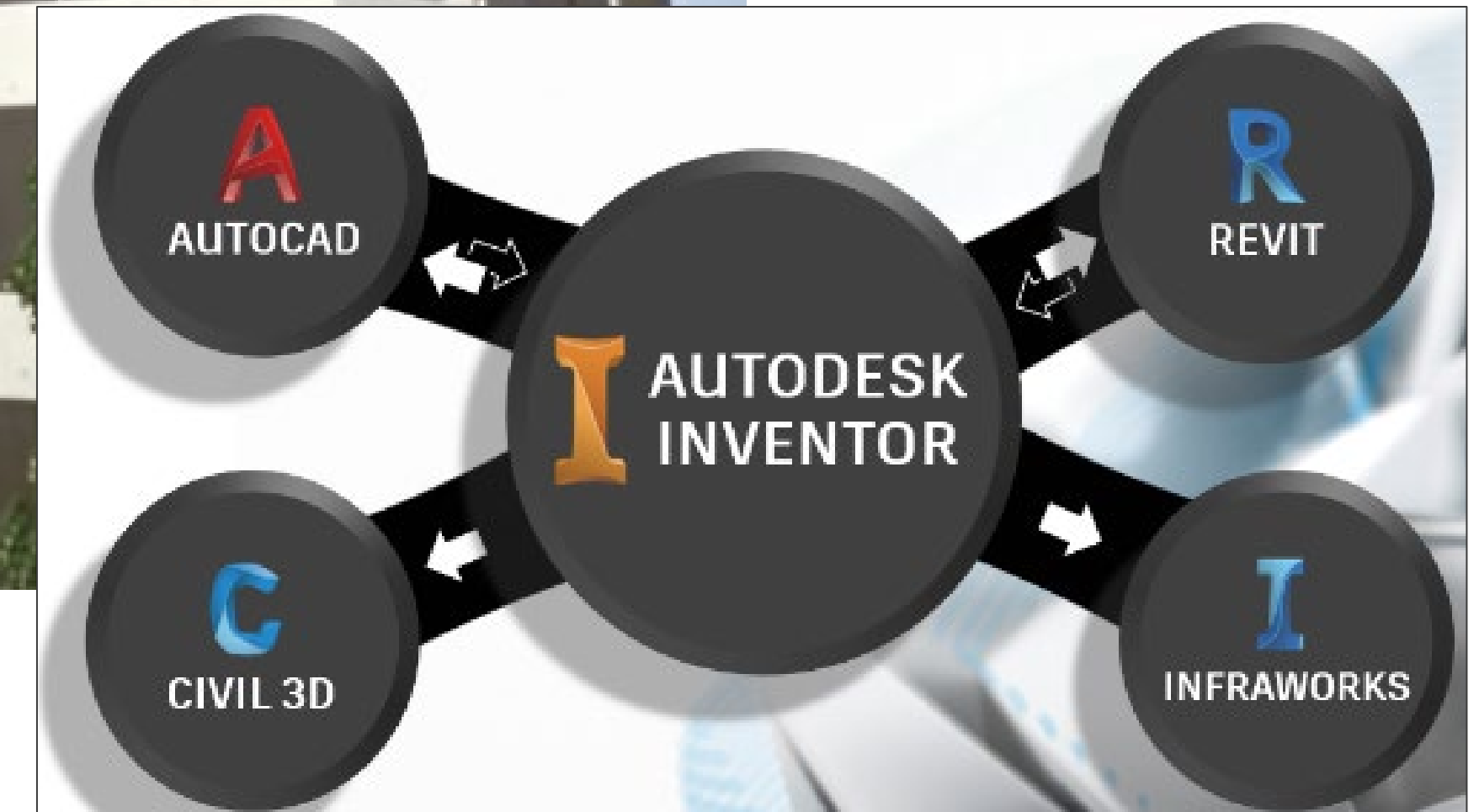
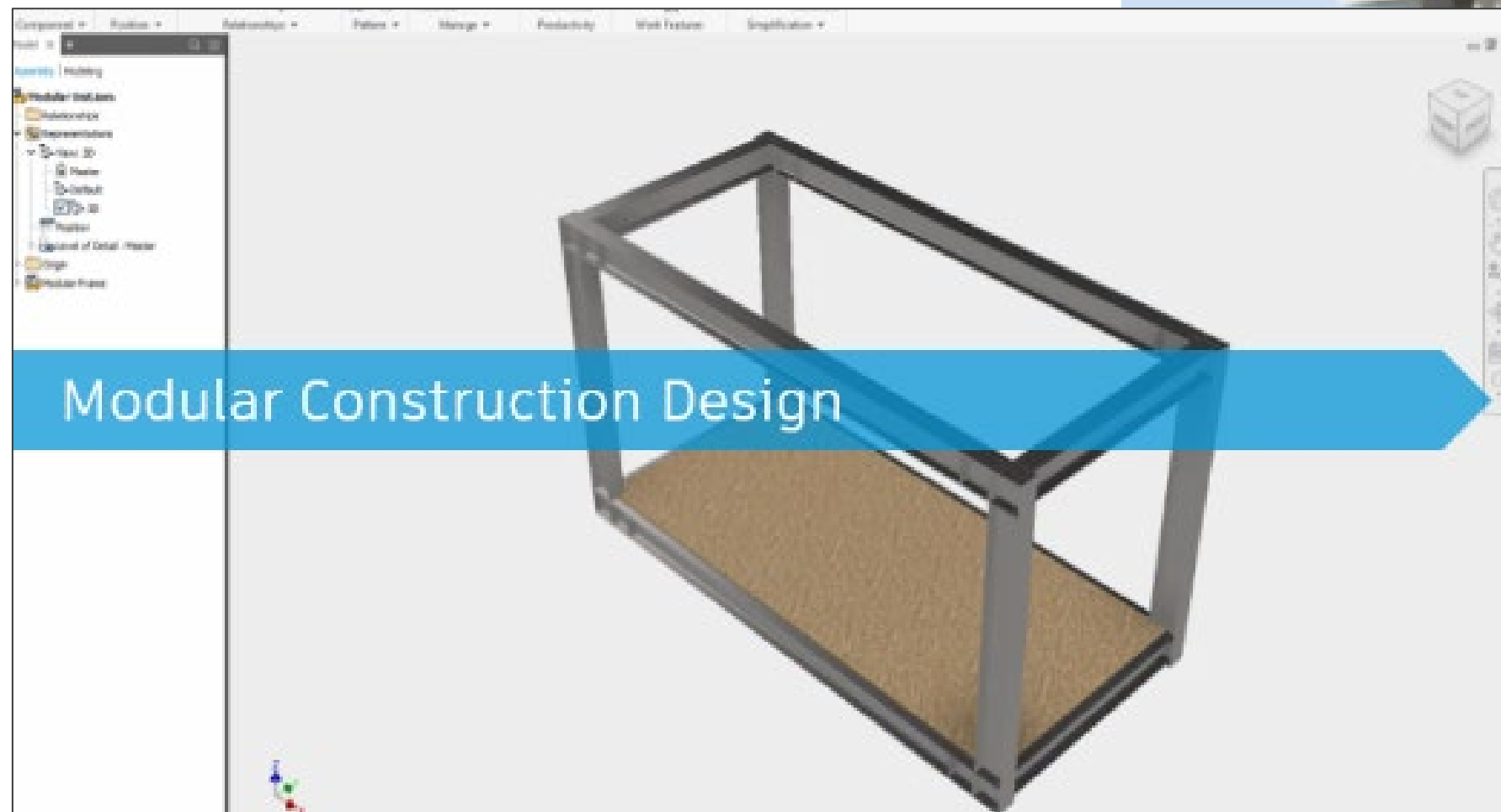
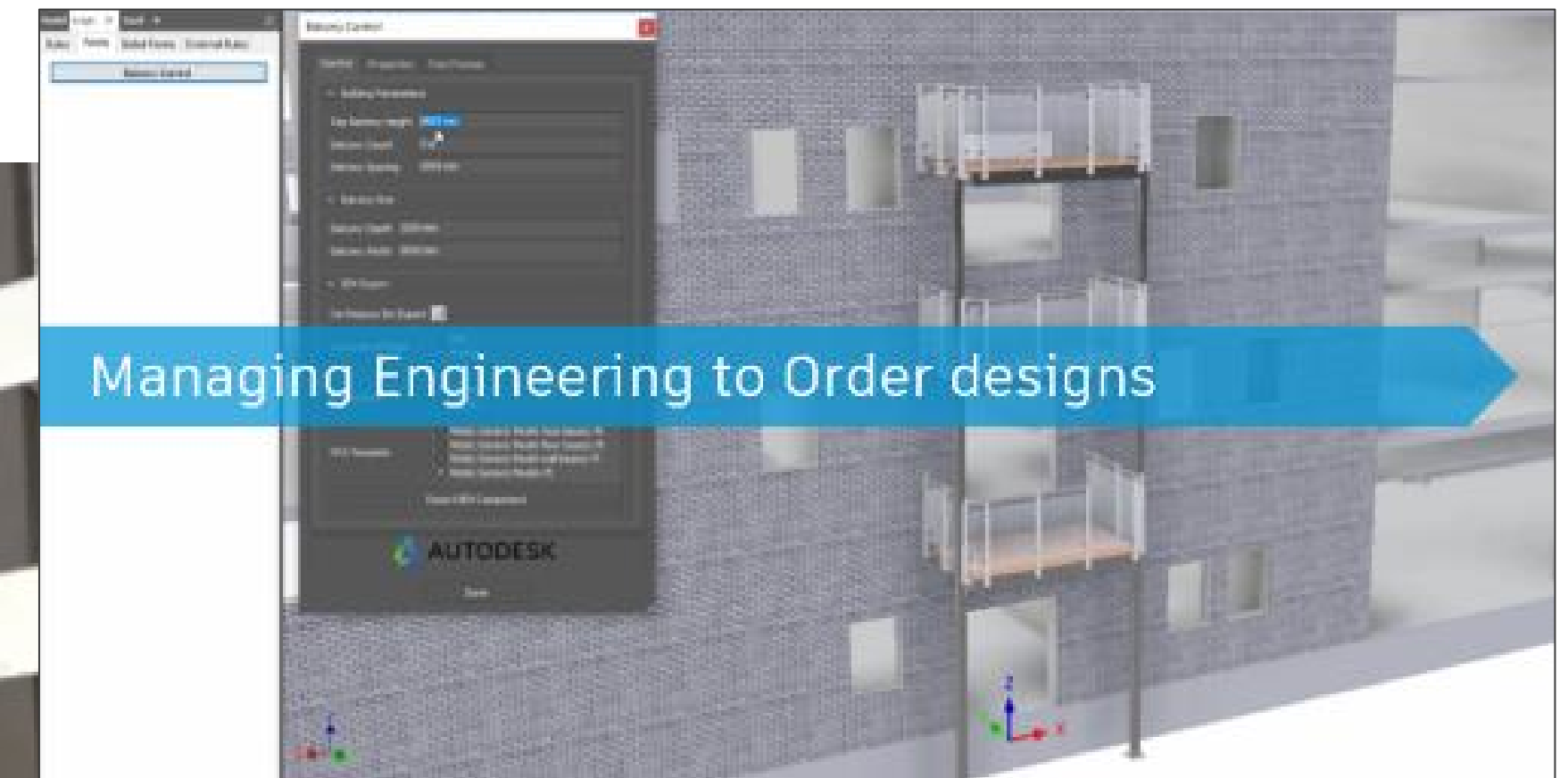
INVENTOR:
Product & Fixture
Design, R&D



NAVISWORKS Project Coordination
Schedule Planning

Autodesk Strengths – Integrated Toolsets

Inventor is an Important Component in BIM Workflows





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