

Why Timber is Changing the Way We Design and Build

by Katie Rothenberg and Randall Walter

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



Course Description

Change in the construction industry is a notoriously slow process. And yet, due to a confluence of factors that include a skilled labor shortage and the need for greater energy efficiency and a lighter carbon footprint, change is happening quickly.

Advancements in engineered wood products and the technologies used to create them are resulting in higher levels of precision, prefabrication, envelope efficiency, and MEP service integration. This dynamic panel will discuss the use of off-site wood and mass timber construction in the context of completed projects along the eastern seaboard. Reasons for their material selections, challenges and solutions associated with off-site techniques, and unique lessons learned throughout the design and construction processes will all be presented. Attendees will hear first-hand why designers, developers and contractors are looking to integrate off-site and mass timber methodologies, and perhaps leave with ideas on how they too can be part of the positive change.



Learning Objectives

1. Evaluate the code opportunities for cost-effective wood-frame structures in residential mid-rise projects utilizing offsite construction techniques.
2. Understand the distinctive design opportunities in mid-rise commercial construction.
3. Review potential benefits associated with off-site wood construction including cost and schedule savings, worker safety and fire and life safety performance.
4. Discuss unique aspects of mass timber design and construction related to material procurement, on-site inspections, building official interaction, and installation techniques.



Leveraging Data and Printing Buildings

Design|Build
information management





“

**Big breakthroughs
happen when what
is suddenly possible
meets what is
desperately
necessary.**

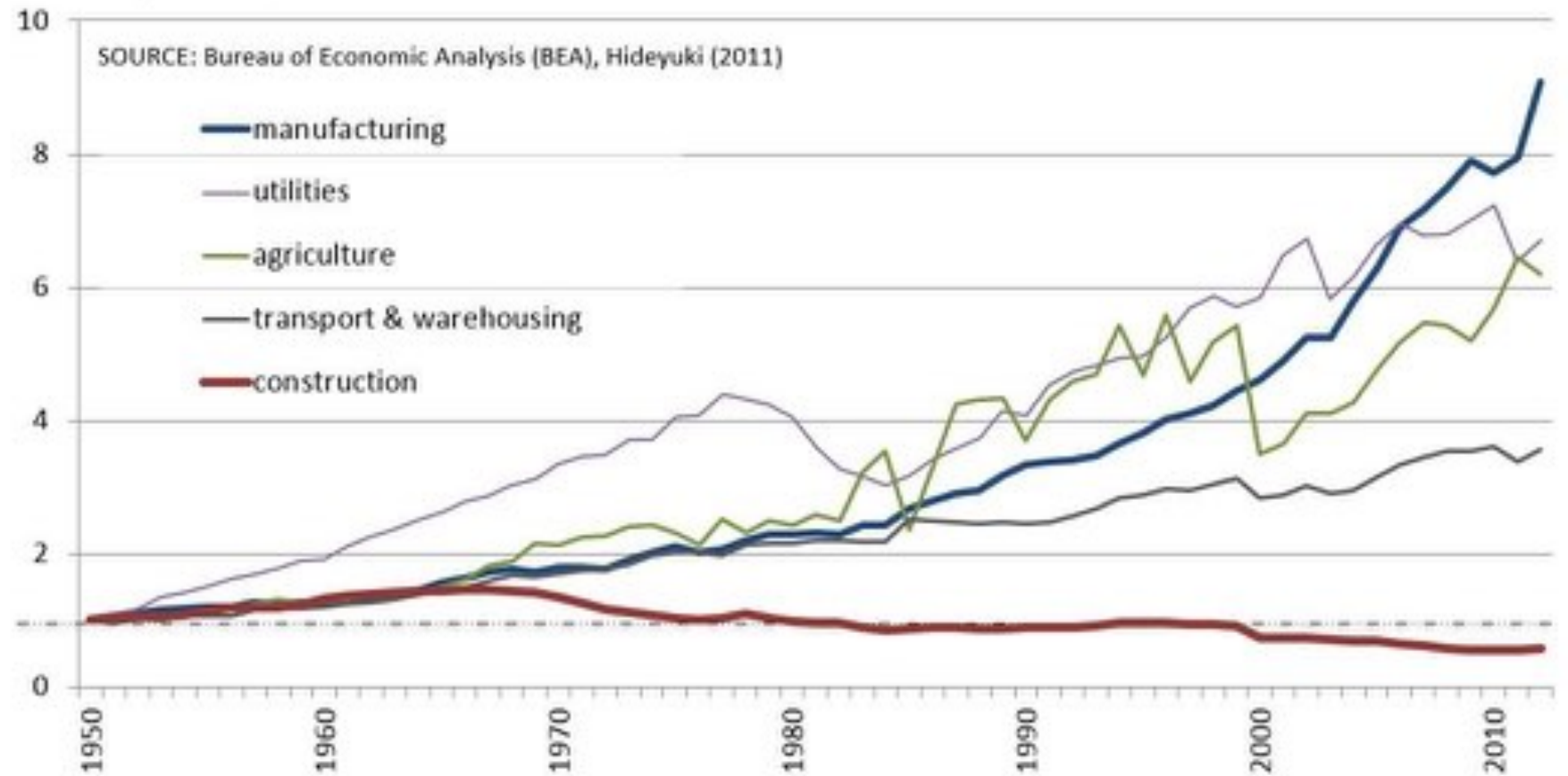
Thomas Friedman

An Industry Unaffected by Other Technology



Construction productivity 1950-2012

Real productivity (GDP value-add per employee) by industry in the US
Indexed; 1950 = 1.0



[www.curt.org]



A Challenged History

Built-in Inefficiency

Weather-based delays and shutdowns
Linear Process
Raw materials to finished product under difficult conditions

Skill Degradation

Extreme personnel turnover rates (20%-60%)
Majority of workers have minimal education
Lack of education, skills & attitude for new demands
Minimal or zero requirements

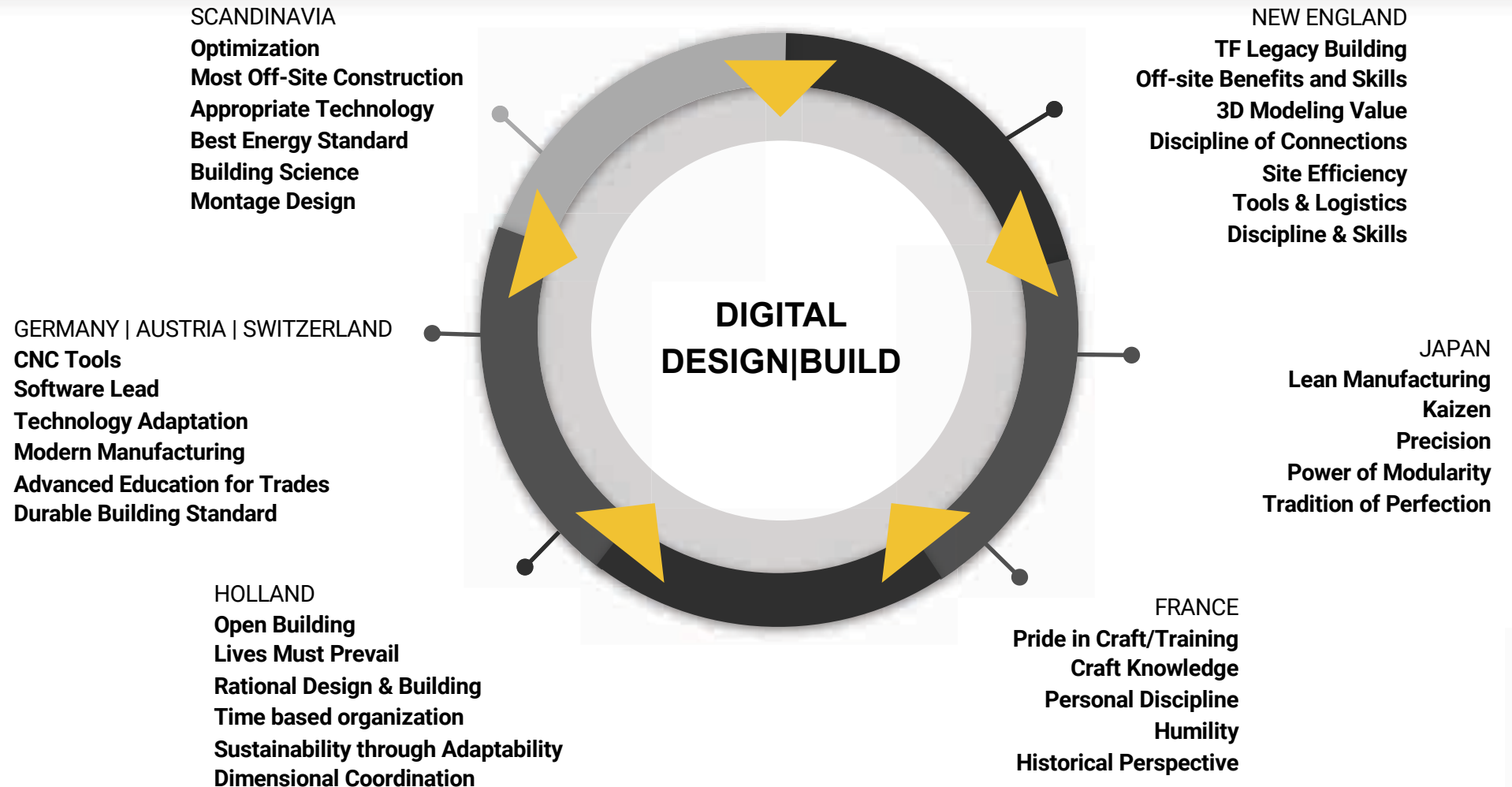
Poor Quality

Most defective products consumers purchase.
15% - 80% serious defect rate
Decades-long industry culture of accepted compromise

Other Industries Get It



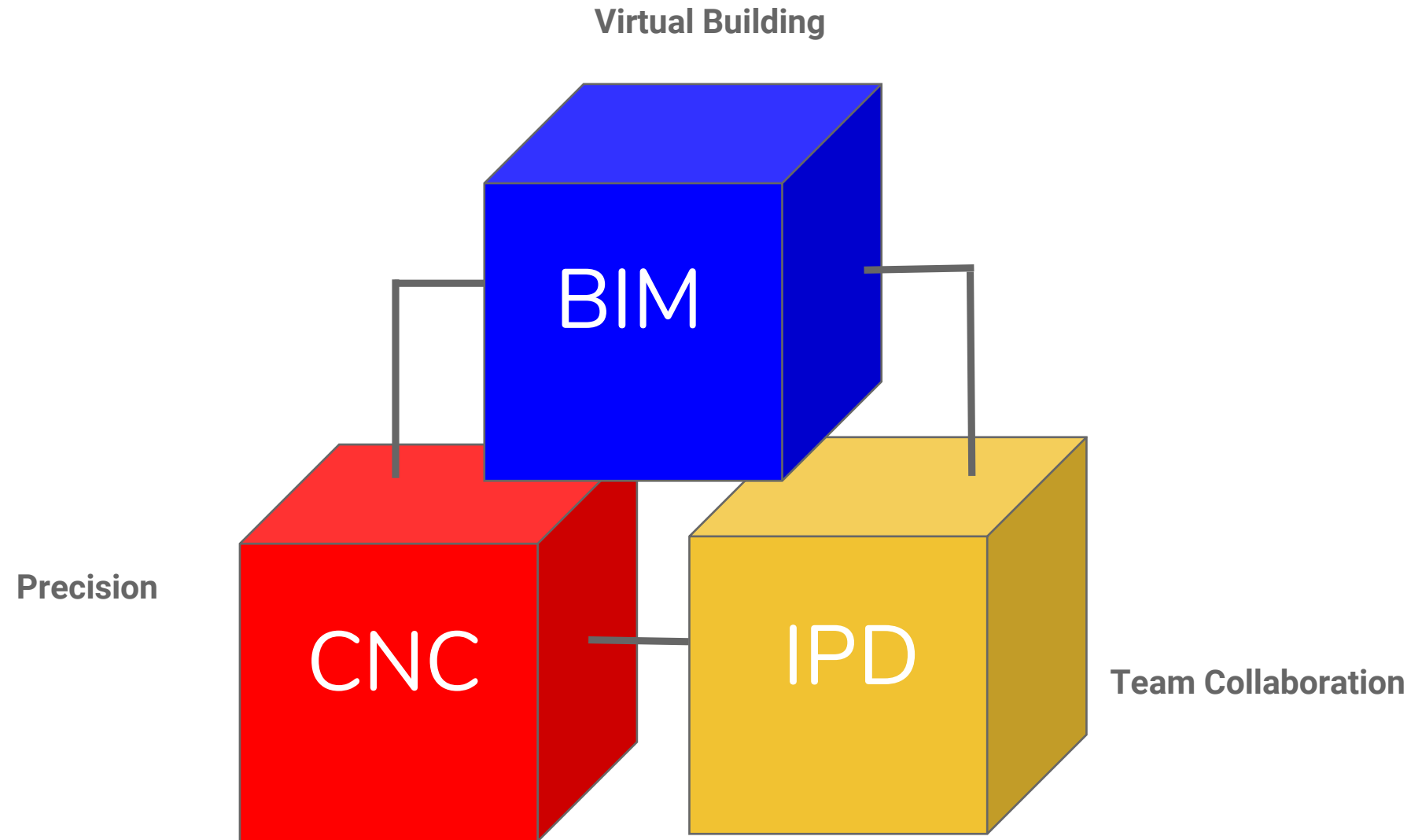
Learn From Everywhere

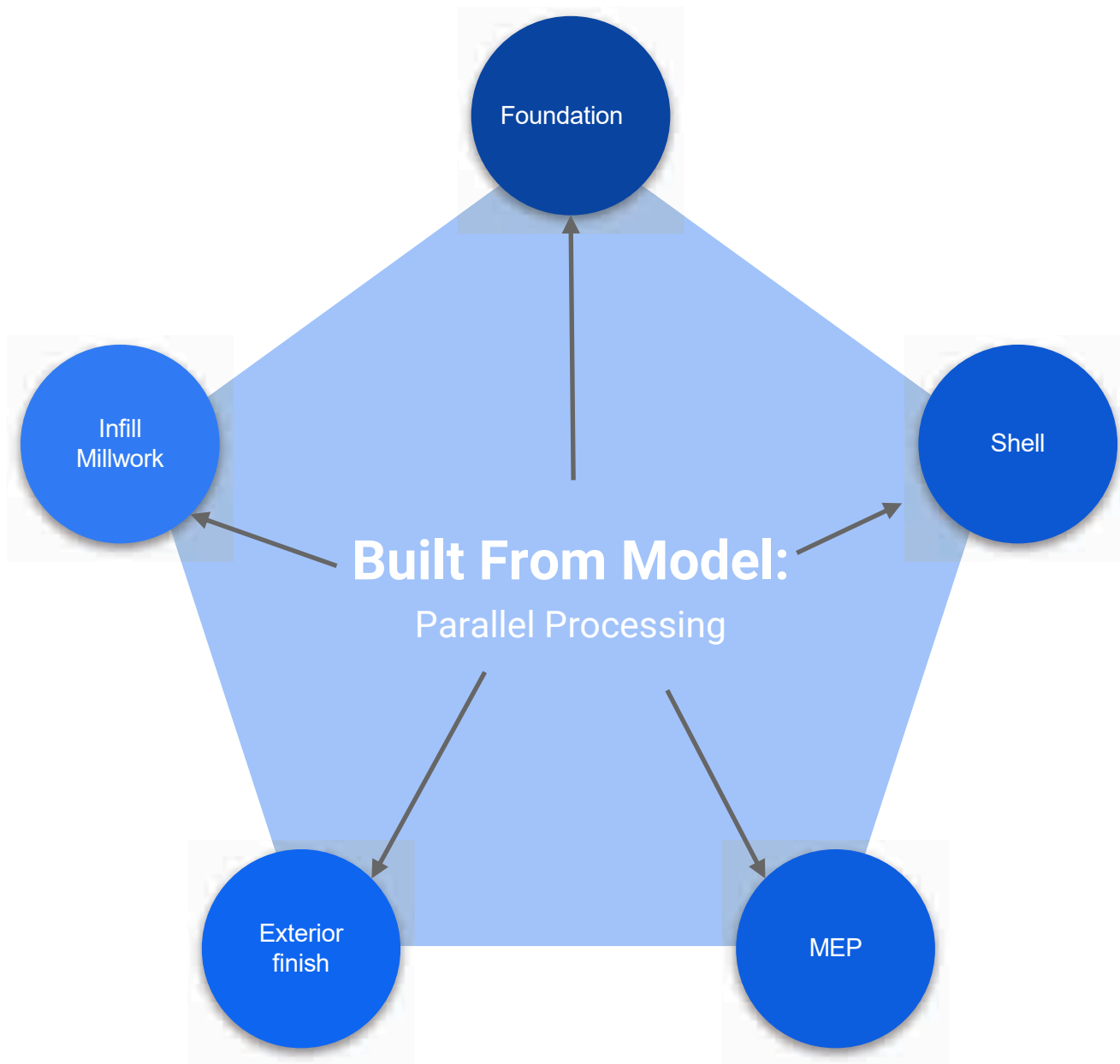




Intersection of Strategies

Design | Build | Deliver | Digital Fabrication | Offsite





VS

Site Process

1. Layout from plans
2. Cut
3. Attach
4. Measure
5. Order
6. Wait
7. Install
8. Measure
9. Cut
10. Fit
11. Repeat.....

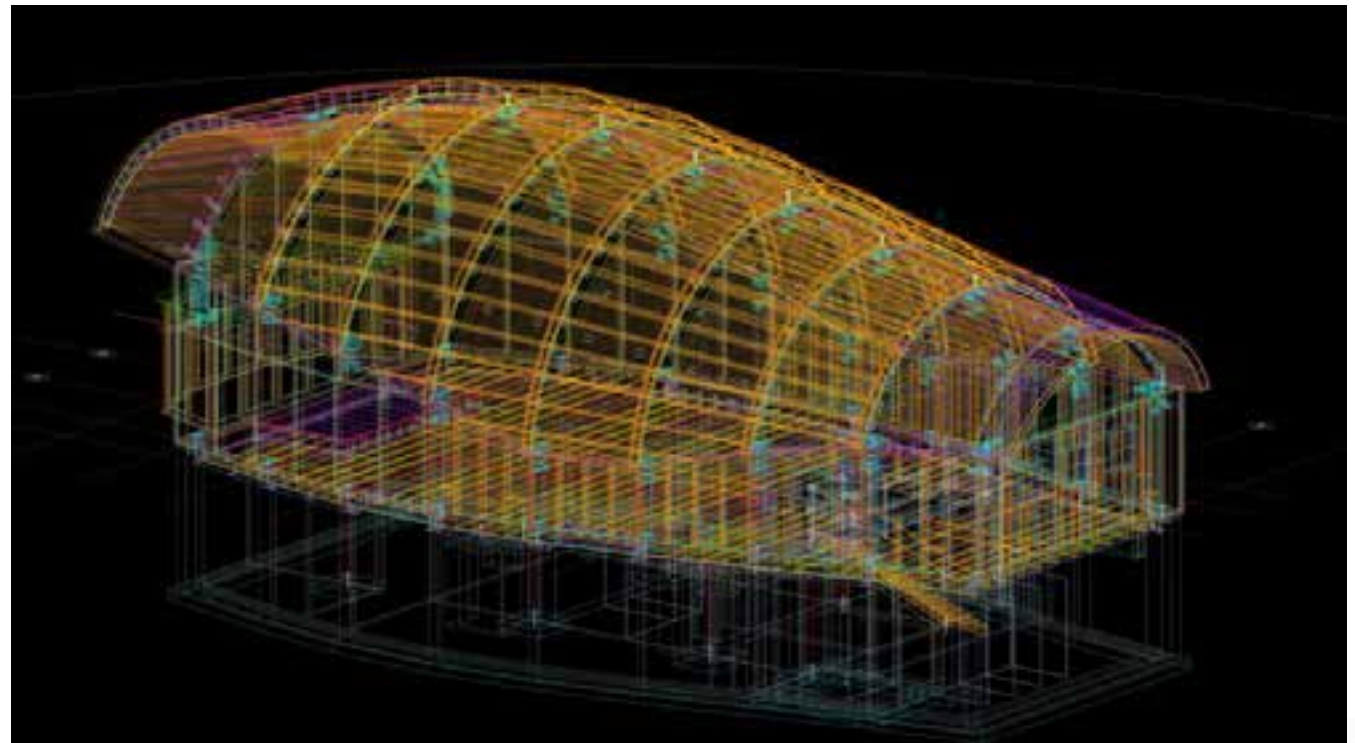


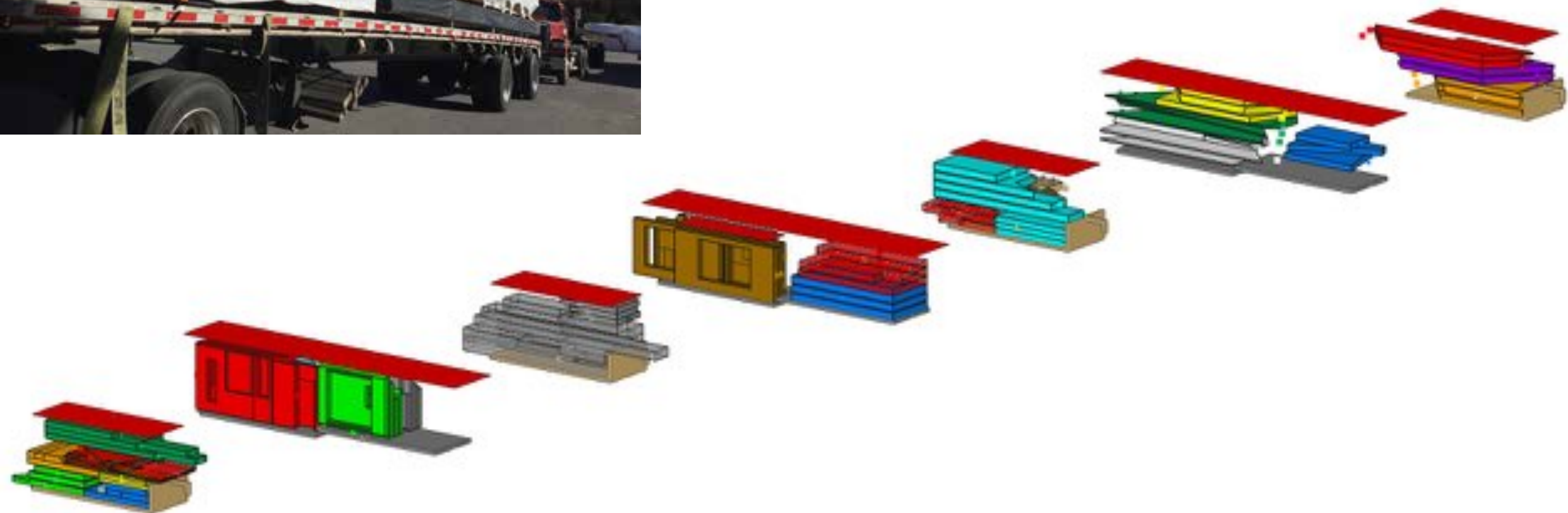
Everything Modeled

Plan, Deliver, and LEAD

THE POWER OF BIM

- Design = simulated building
- Automated PM information - costs, supply chain, shipping, etc.
- Automated cutting and shaping machine code





Material Handling

Automated inventory management

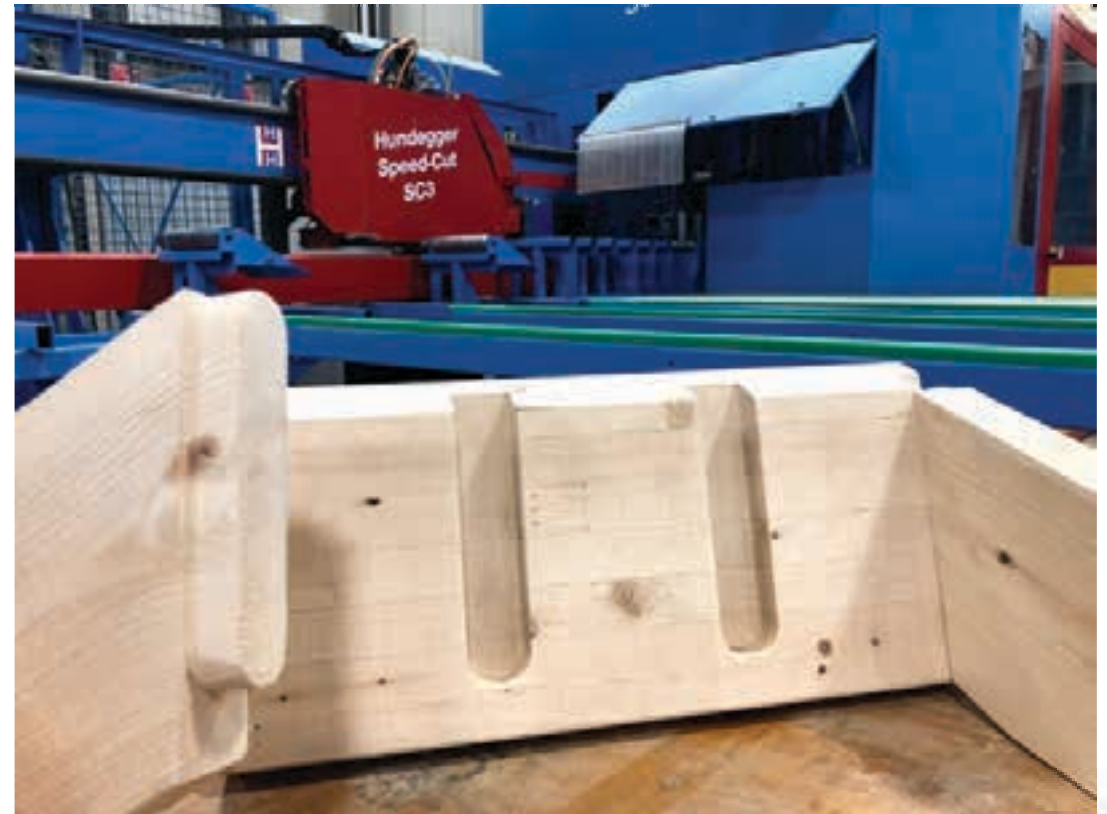


BIM to CNC

Our Tireless Workers



Layout, cutting and optimization

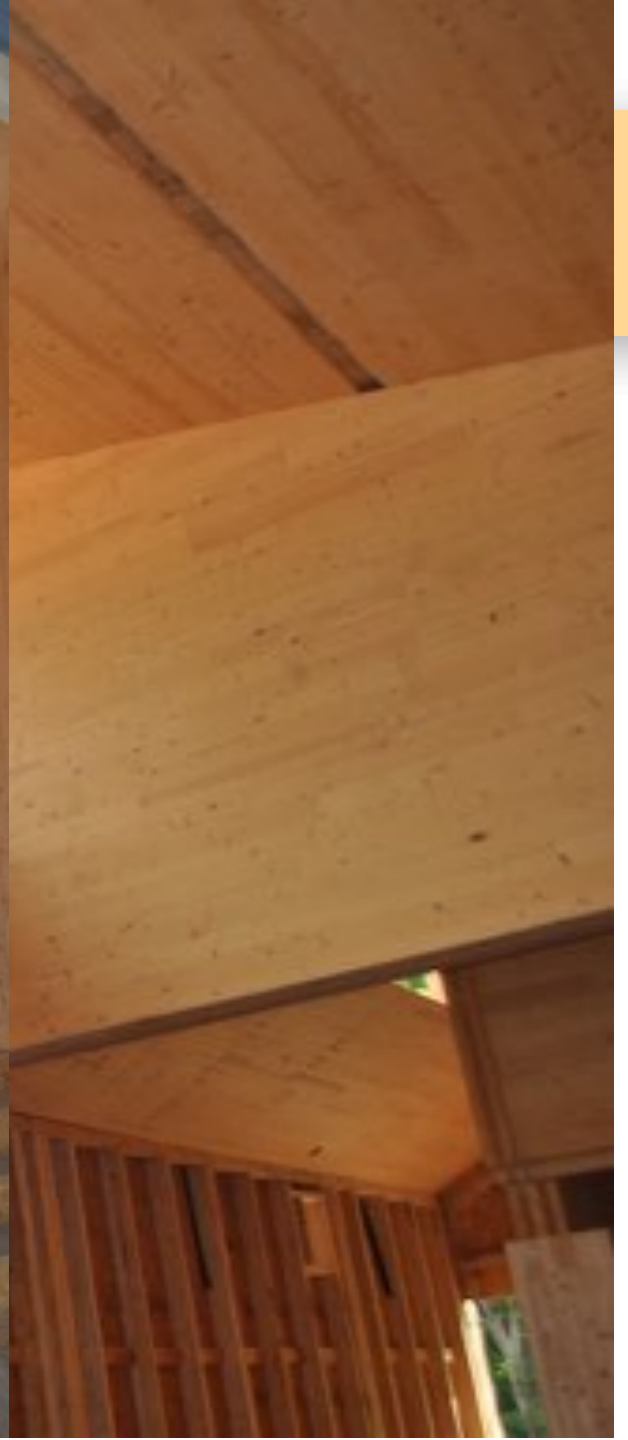




















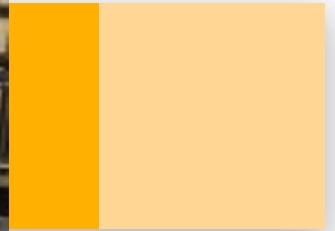
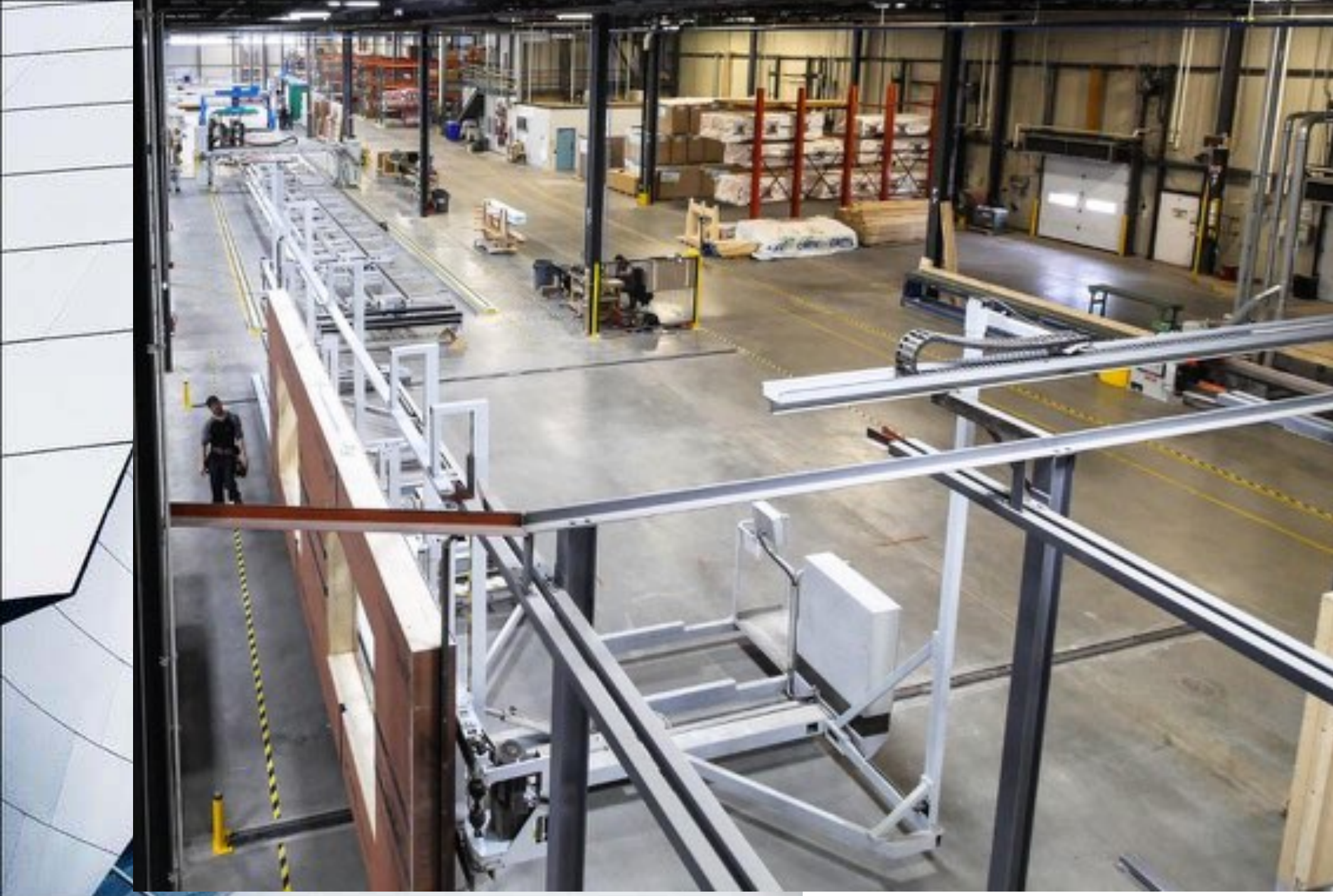












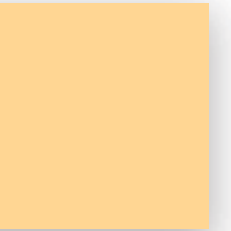


























Off-Site, Digital driven, Model-Centric

Precise

- 1/32" tolerances (thickness of a business card)

Consistent Quality

- Industrial manufacturing process instead of in-situ (on site)
- The equivalent of ISO9001 type assurance

Lean Manufacturing

- Ideal workspace
- Repetition

Develop Sub-Assemblies

- Added value through integration
- Packaging waste control

Continuous Improvement

- Interface Control
- Feedback Loop

Model based DESIGN|BUILD

Century Skills, Old World Craft Attitude



OPERATING SYSTEM

3D software automation
OBGrid: Montage Design
CNC cutting and shaping
Open-Built disentanglement

LEAN MANUFACTURING

Constant improvement
Custom production
Mass Customization

BUILDING SCIENCE

High-performance
Net Zero
Passive House

HIGH SKILL AND CRAFTSMANSHIP

Discipline
Pride
Service to society



How to Get Started

NEED SITE SPACE

- Deliveries
- Boom truck or crane
- Evaluate Access

PARTNERS

- Build a team
- Decide where info will live

DECISION MAKING AND COMMITMENT

- Get everything in model early
- Work the model
- Rely on model

Important Differences

ON-SITE

- Schedule allows for field changes
- Each step adjusts to previous dimension and (in)accuracy

V
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OFF-SITE

- Less design flexibility
- Accuracy is paramount - site portion affect install fit
- Cost may or may not be higher, however time=\$
- Anticipate need to protect installed finish materials
- Design the schedule and share extensively

Questions?

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