

Leveraging Data and Printing Buildings

Design|Build
information management



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



Course Description

The presentation will focus on how to capitalize on the data generated in 3D drawing files during the integrated design process by using it to create building components ready for site assembly. Discussion will focus on differences in the design process when CNC (computer numerical control) technology is used for the purpose of manufacturing building elements and components. When manufacturing components/elements of a building come into play (in addition to drawings), what do the architect and engineer need to take into account? With an emphasis on real-world examples, topics will include constraints and opportunities presented by the use of CNC as well as drawings, and how this affects all phases of the work flow—from design to installation.



Learning Objectives

1. Discuss the use of CNC technology in various aspects of construction fabrication, emphasizing precision, safety, challenges, and benefits.
2. Explore communication efforts required between design team and fabricator when relying on 3D models for data transfer of key information such as fire-resistant details and intersections.
3. Review work flow processes from design through fabrication when off-site construction is employed, and discuss the roles of the building official and site inspectors throughout these processes.
4. Highlight potential benefits of building information modeling and data for multi-family and commercial wood-frame projects, such as worker safety, code-compliance documentation, and speed of construction.





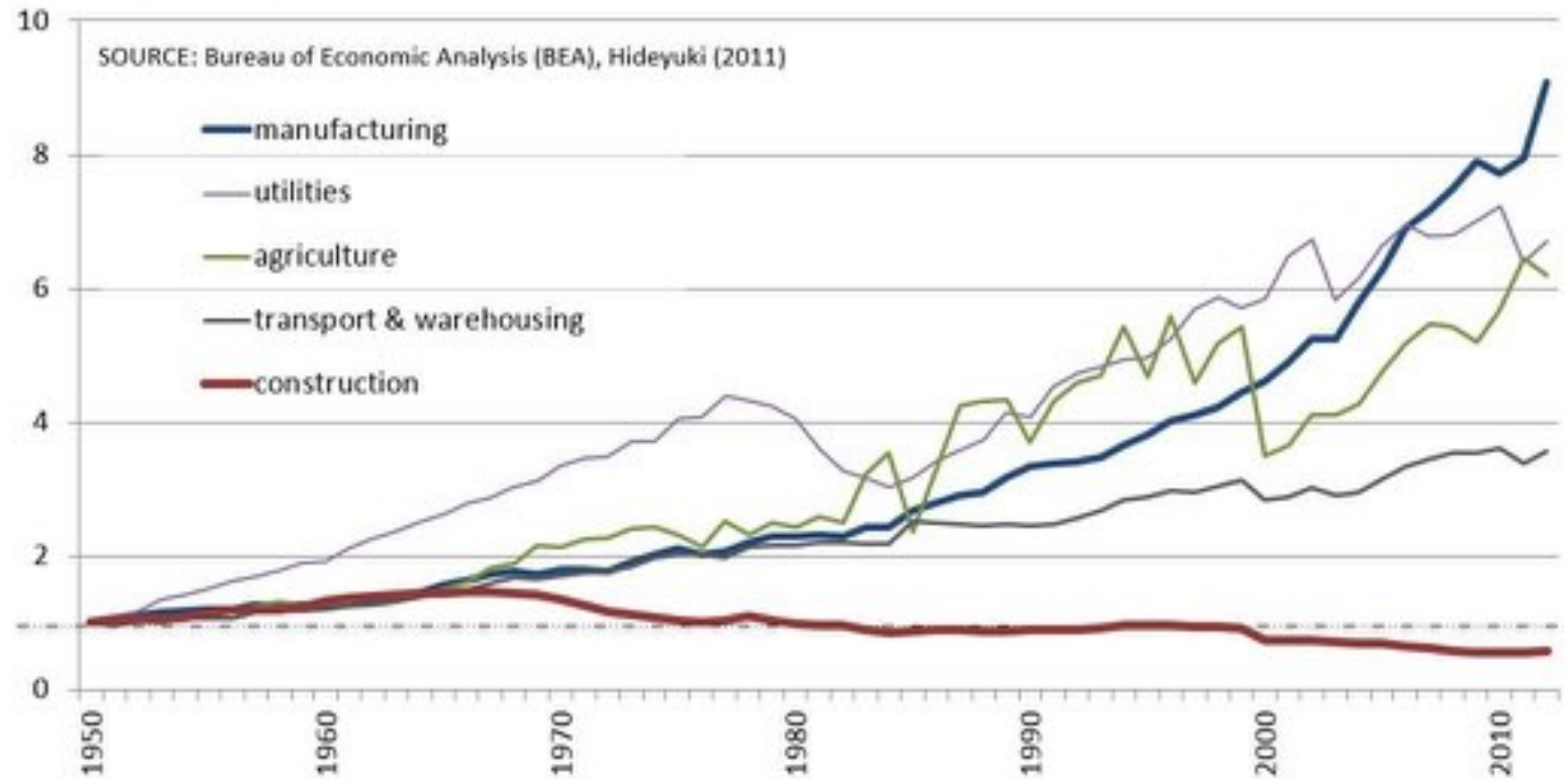
“

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

Thomas Friedman

Construction productivity 1950-2012

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

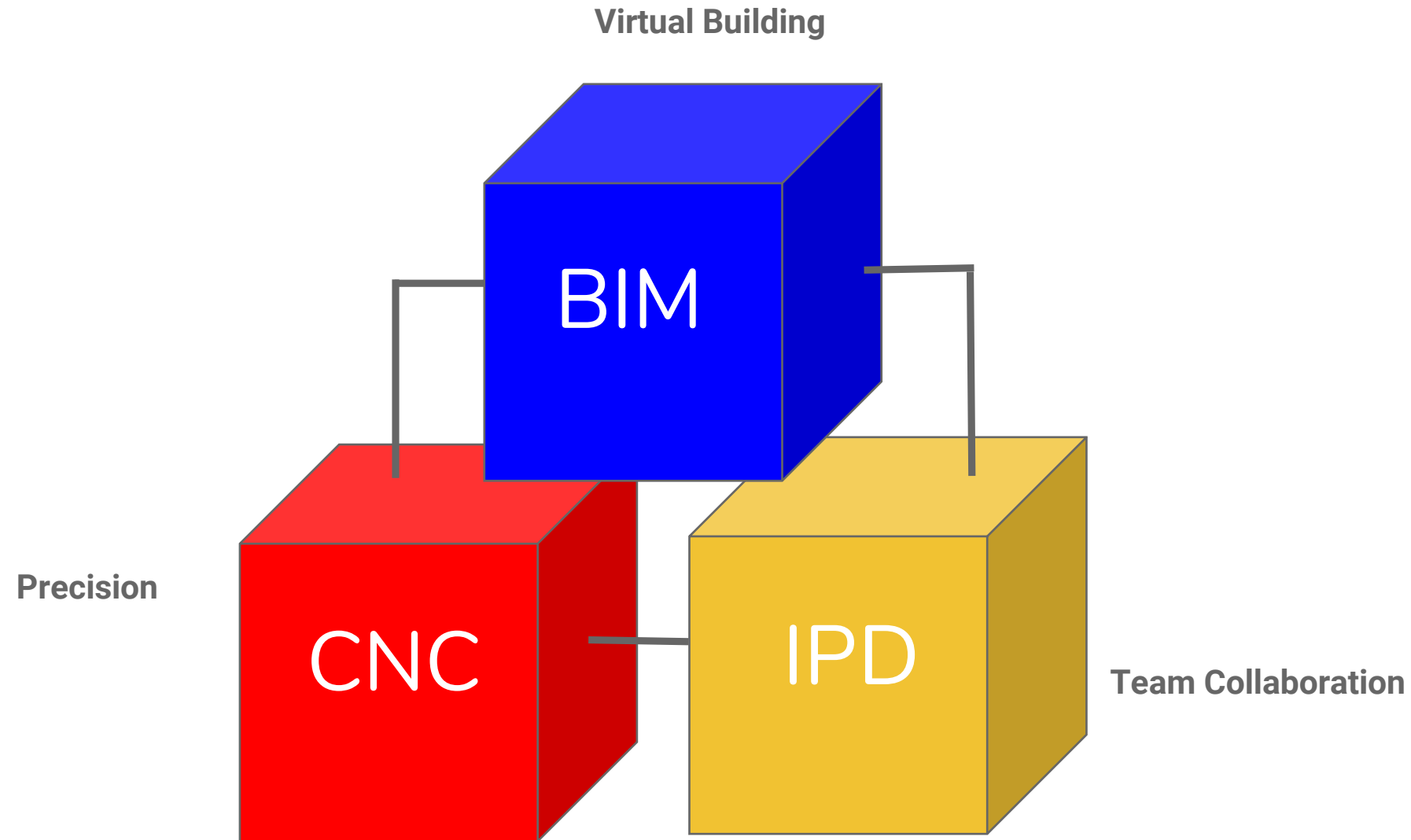


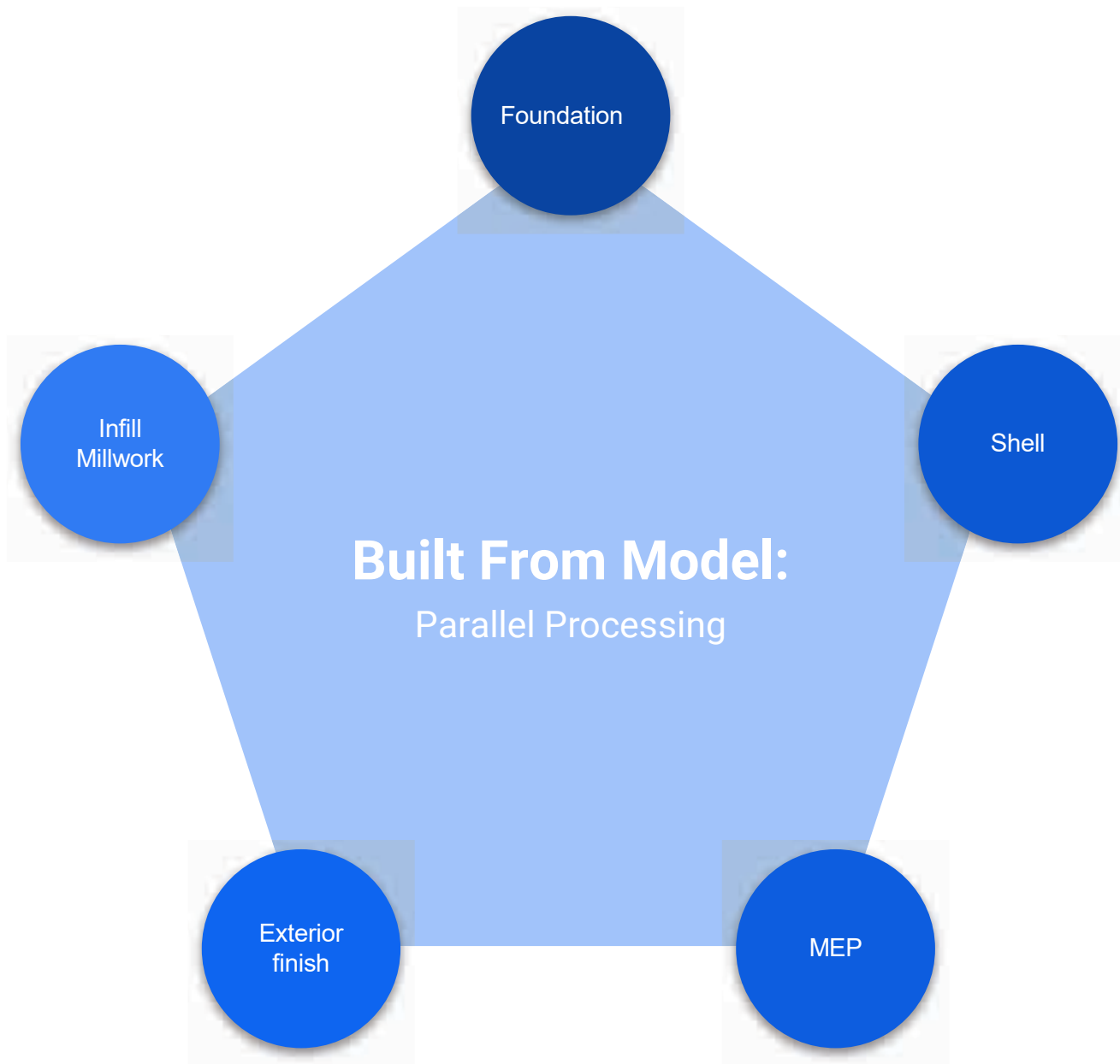
[www.curt.org]



Intersection of Strategies

Design | Build | Deliver | Digital Fabrication | Offsite



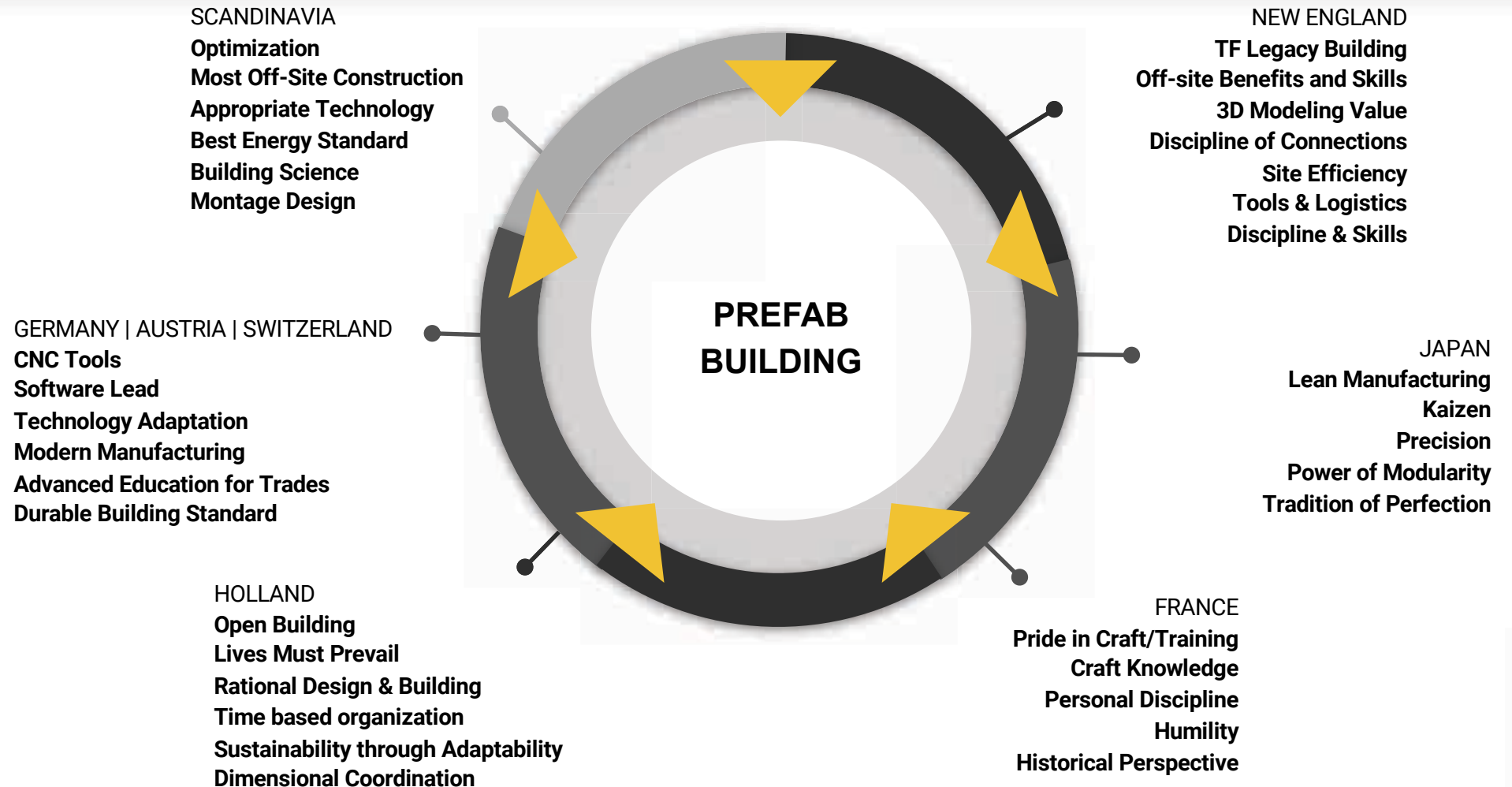


VS

Site Construction

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

Learn From Everywhere



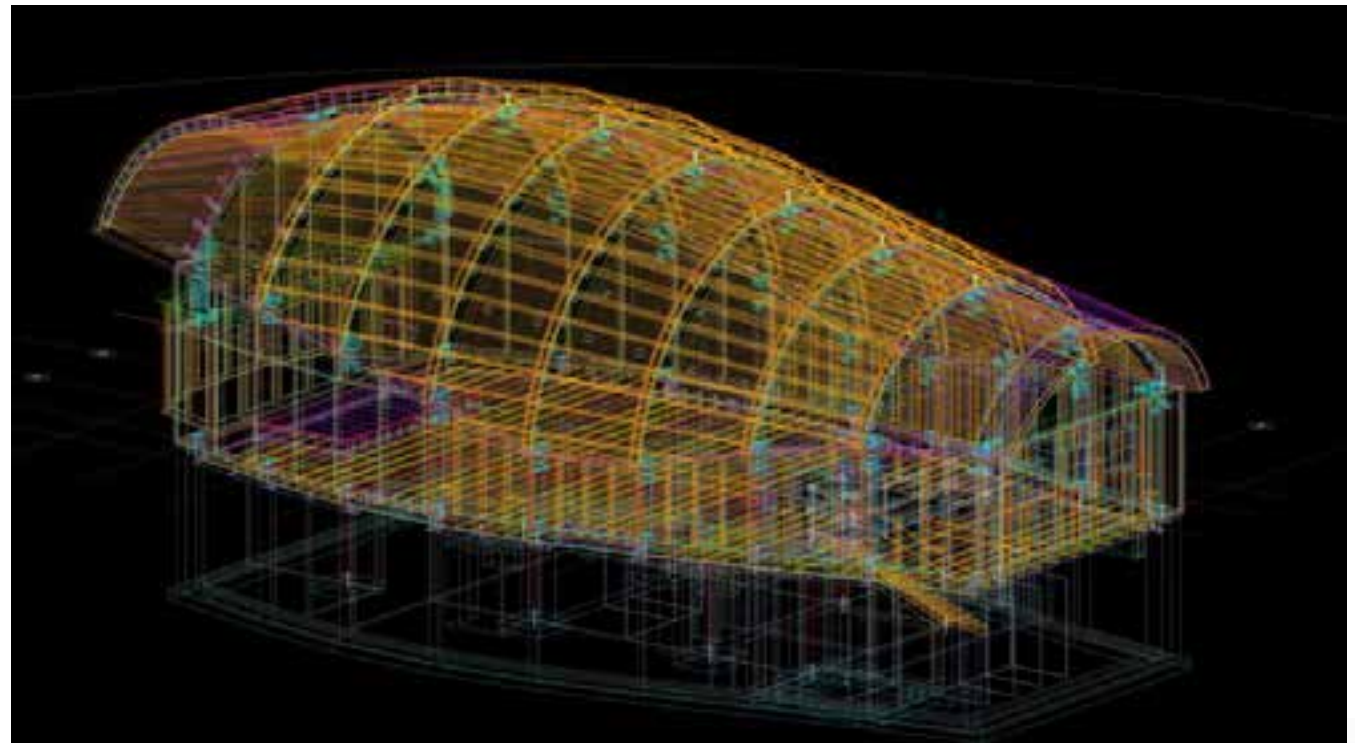


Everything Modeled

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



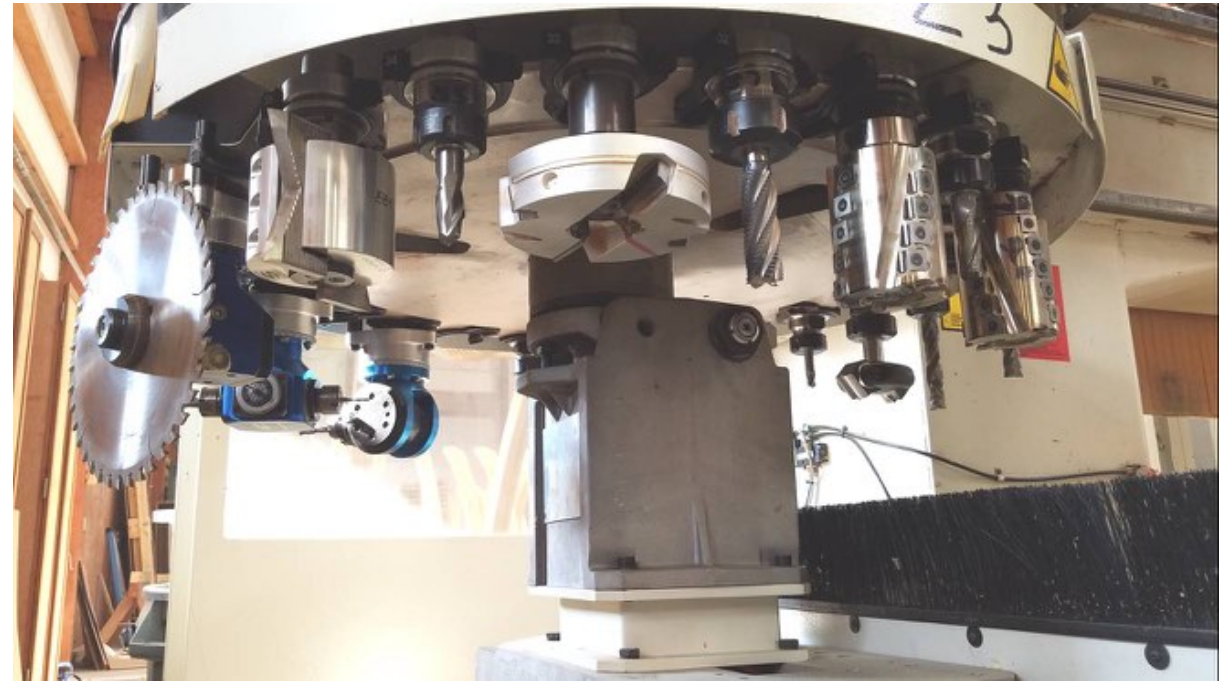
BIM to CNC

Our Tireless Workers



BIM to CNC

Our Tireless Workers

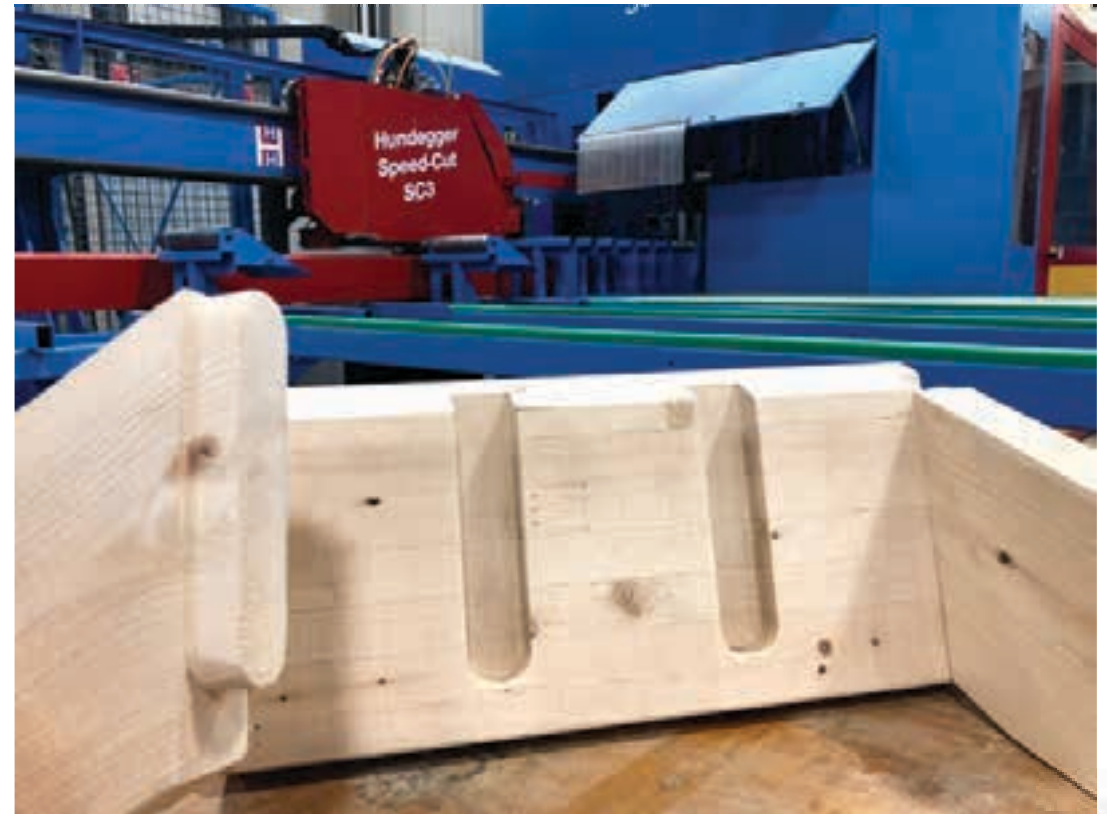


Material Handling

Automated inventory management



Layout, cutting and optimization



Cellulose Insulation

Isocell ISOBLOW





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

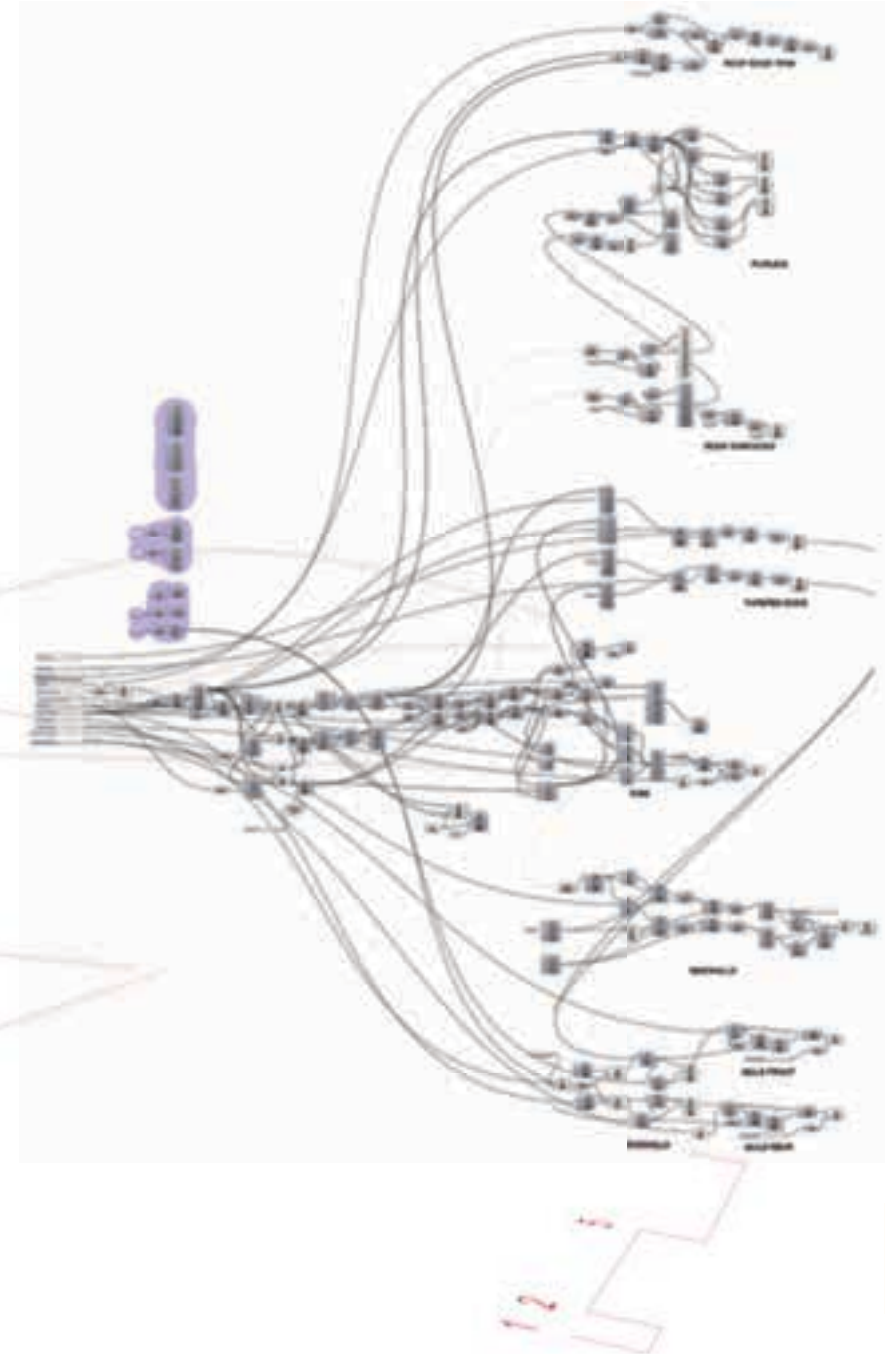
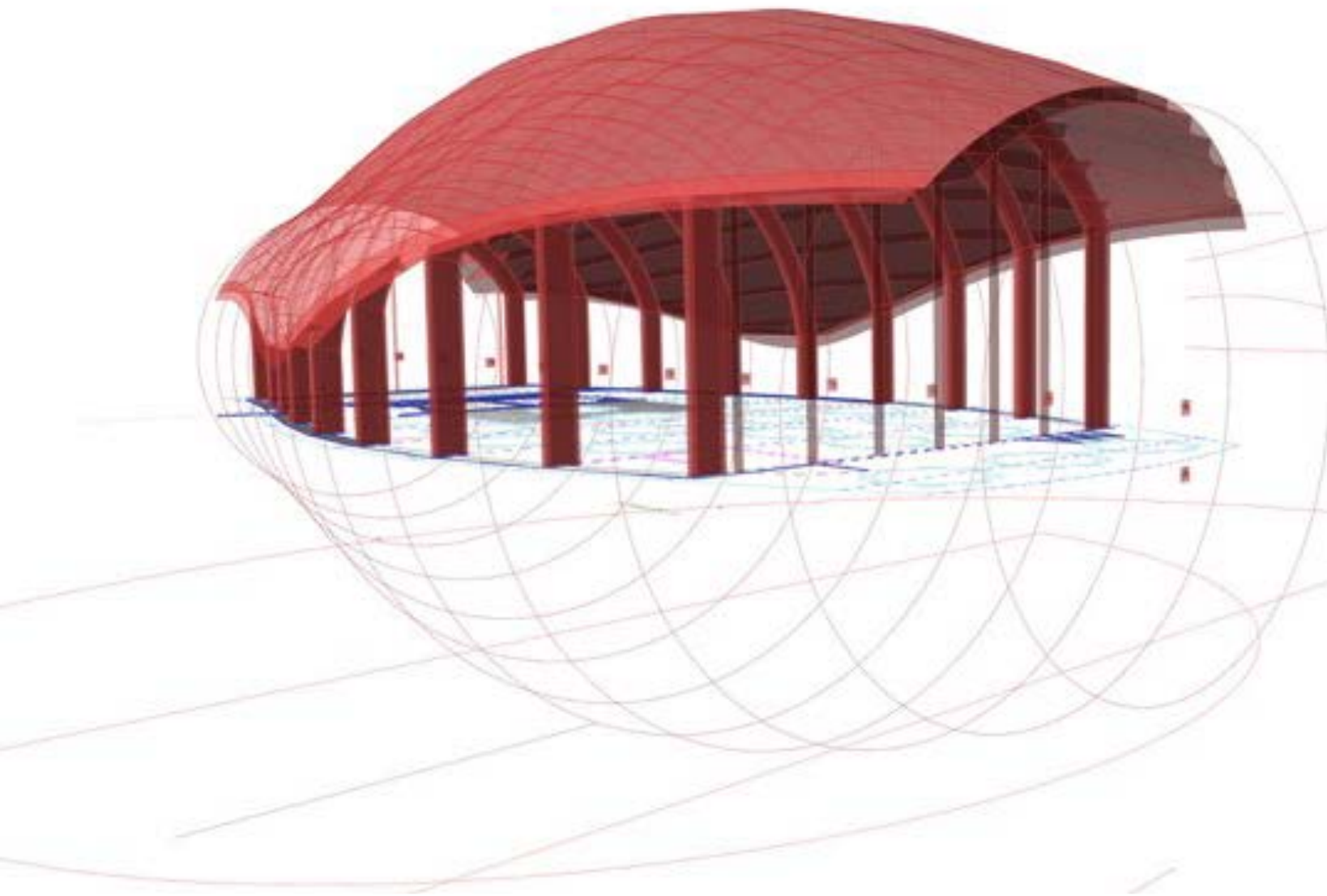


Data Data Everywhere

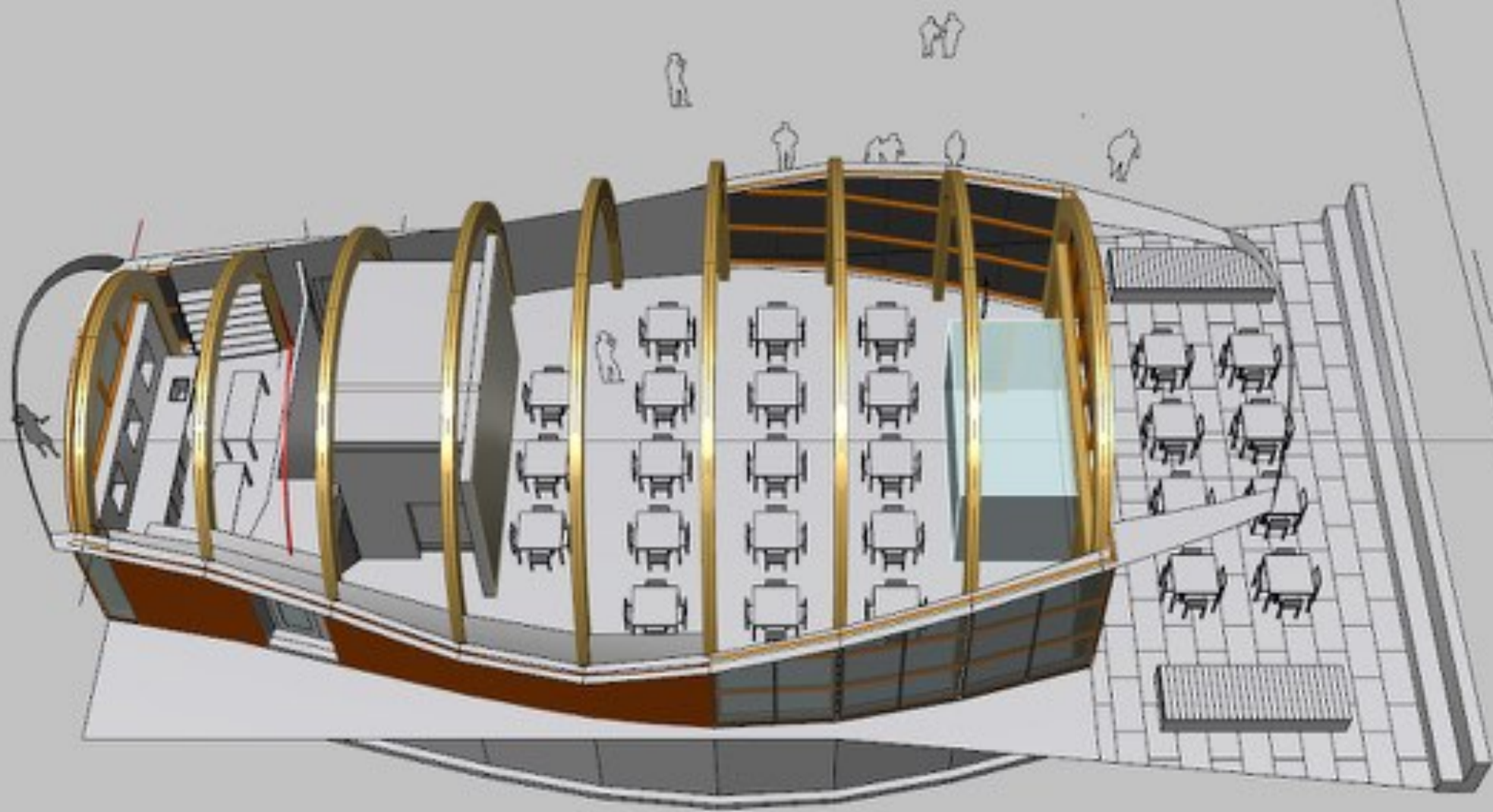
All Based on 3D Model

1. Design
2. Engineering
3. Estimating
4. Ordering
5. Cutting
6. Fabrication
7. Trucking
8. Site
Assembly

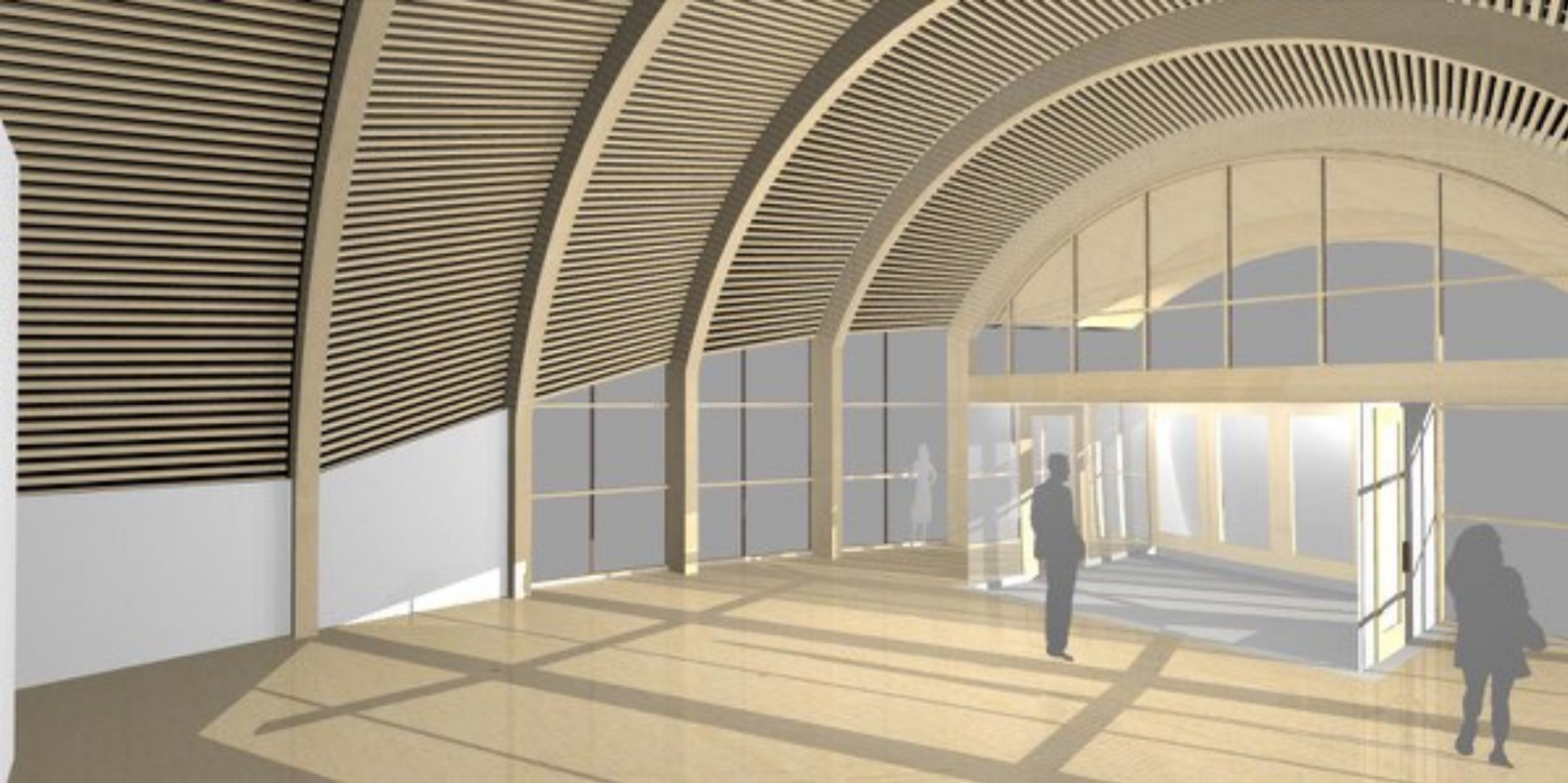
1.Design

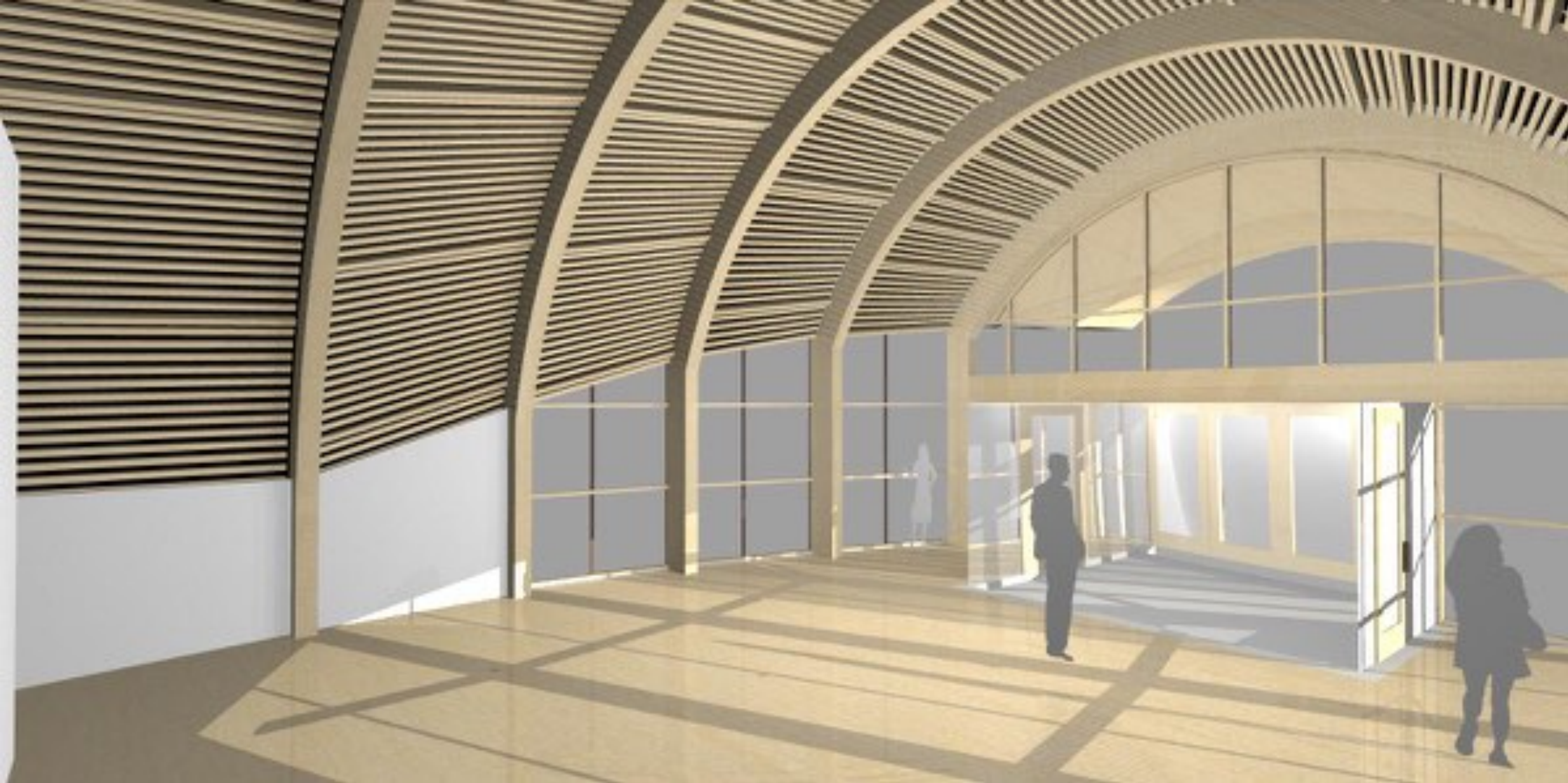


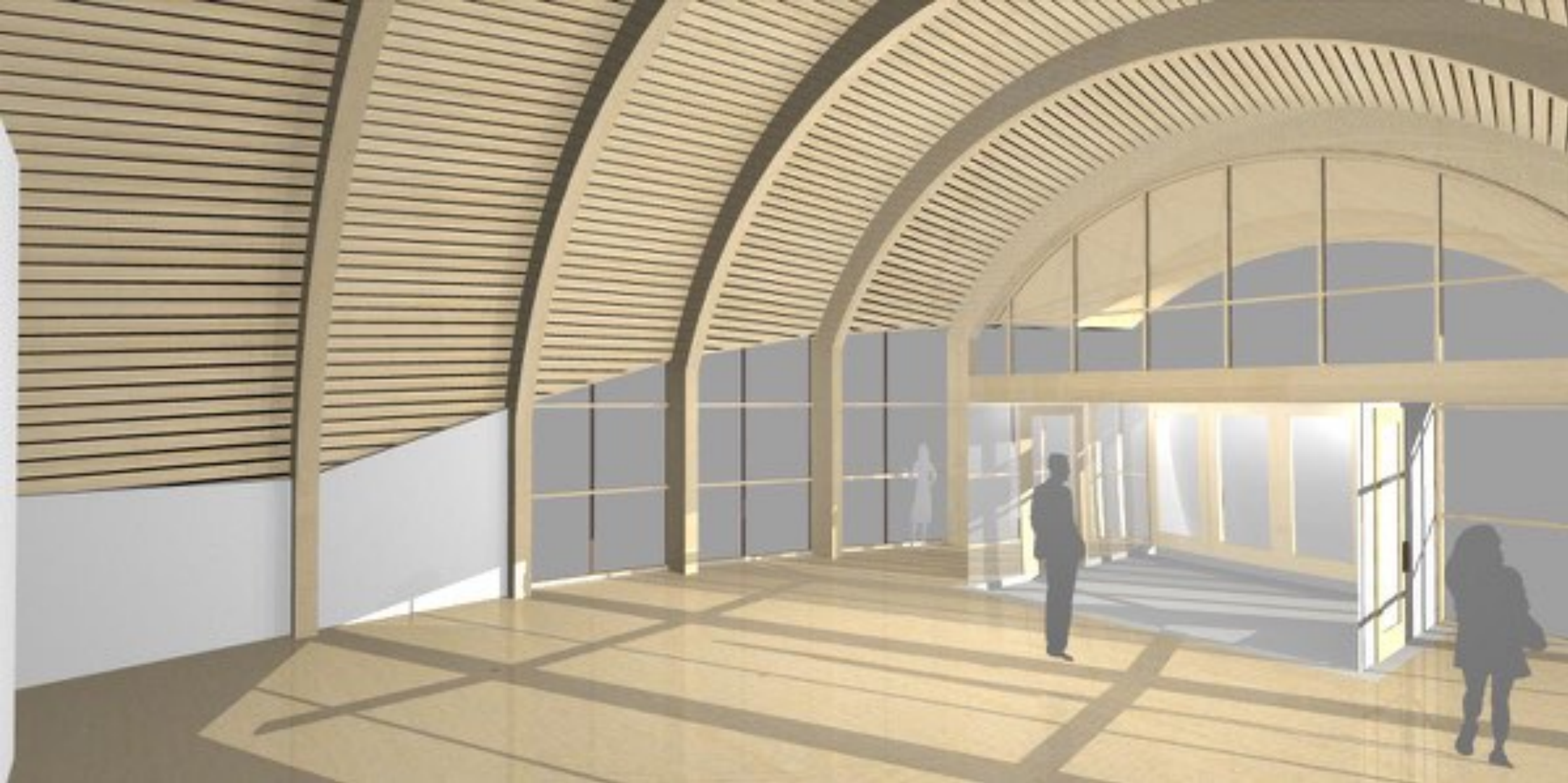




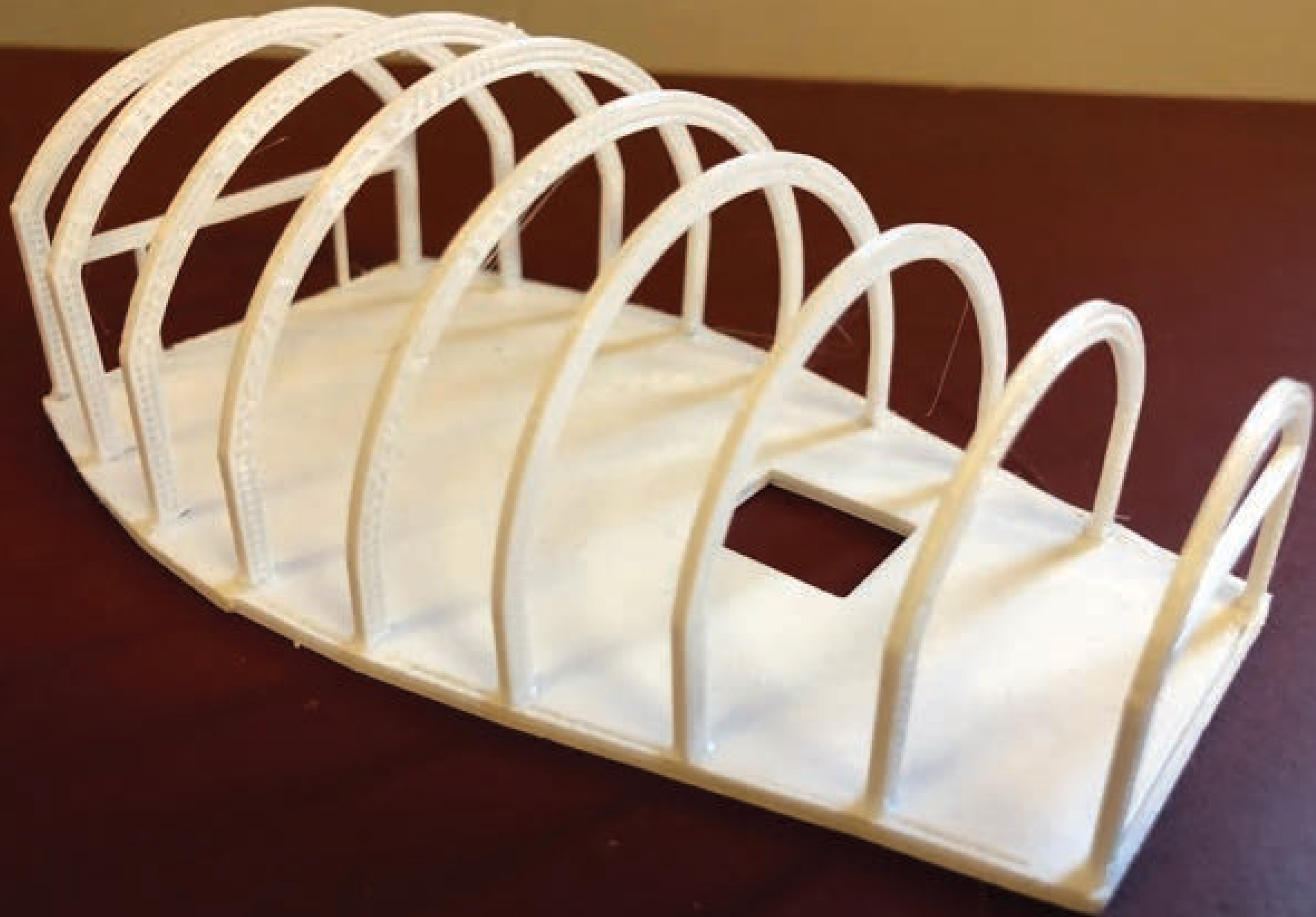






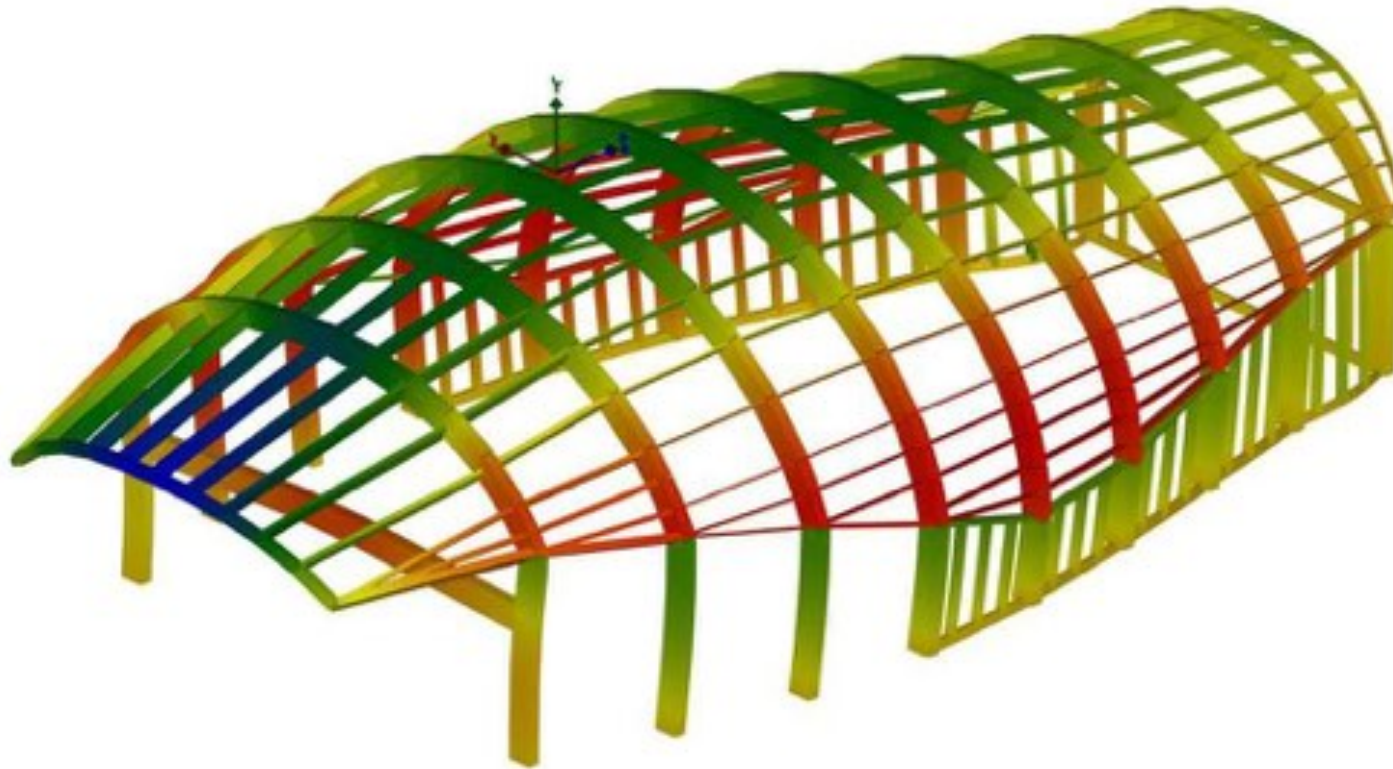






Dec21 WBHD ACROSS_working.vap
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IES VisualAnalysis 18.00.0004
Wednesday, October 24, 2018

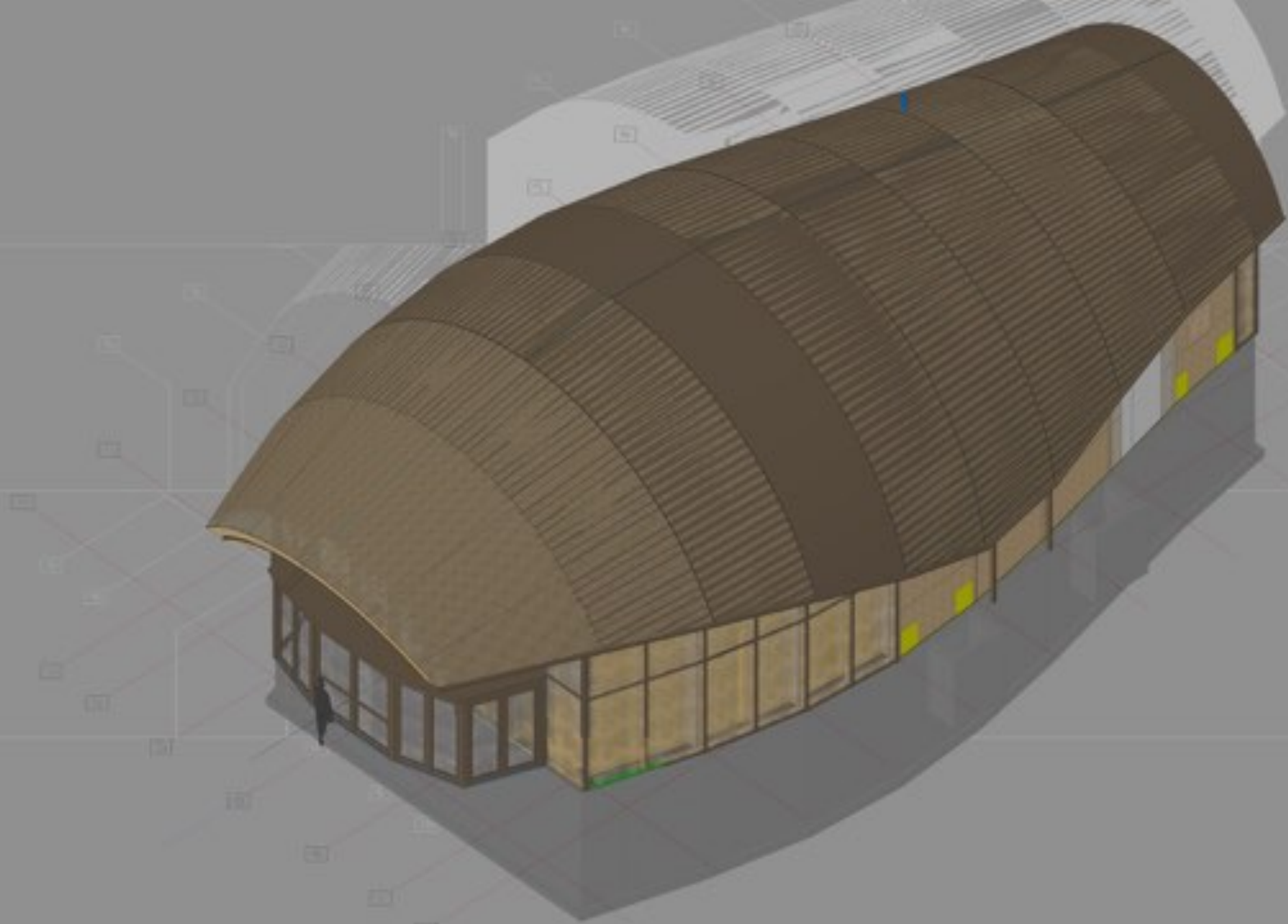
2.Engineering

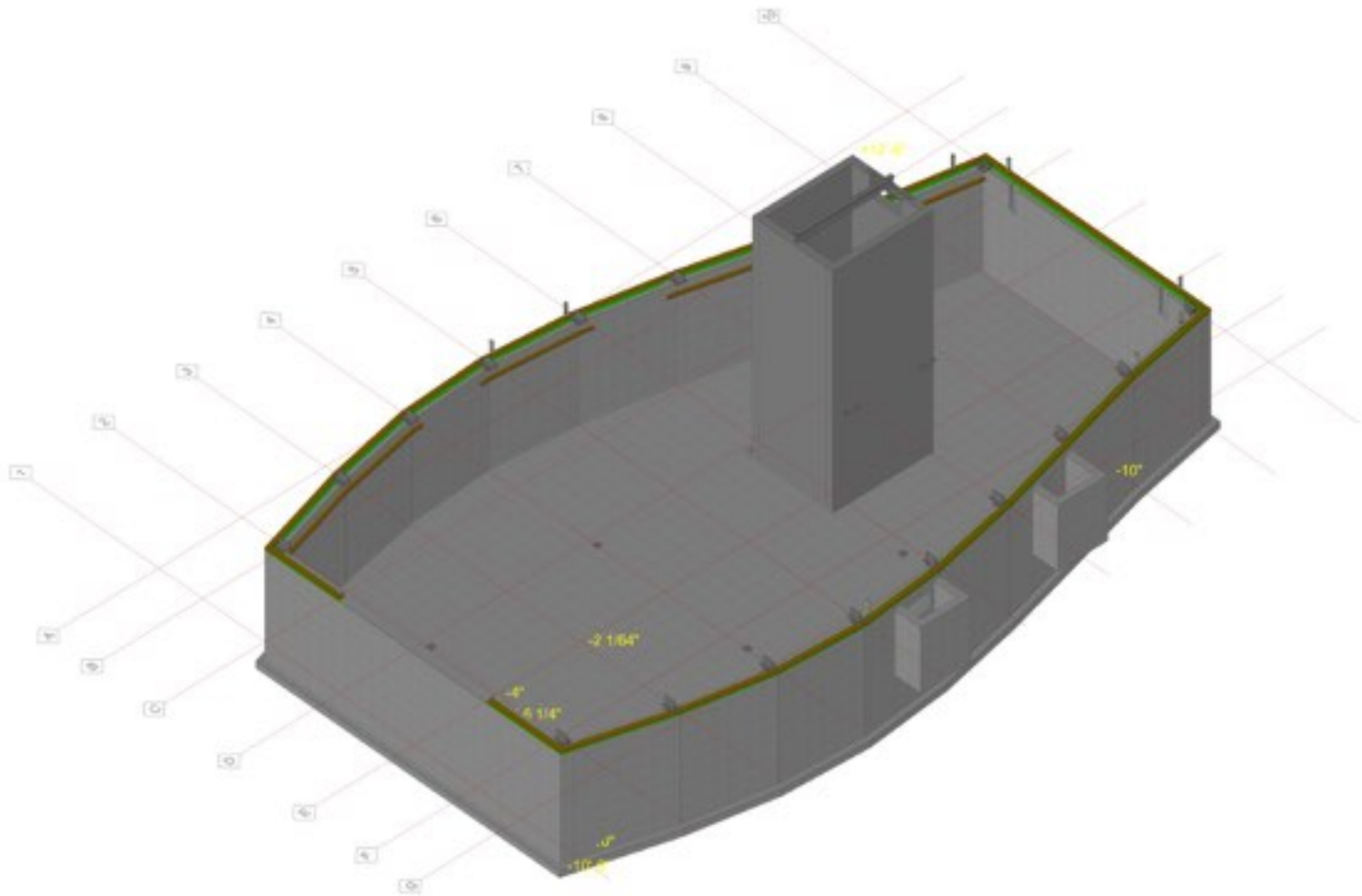


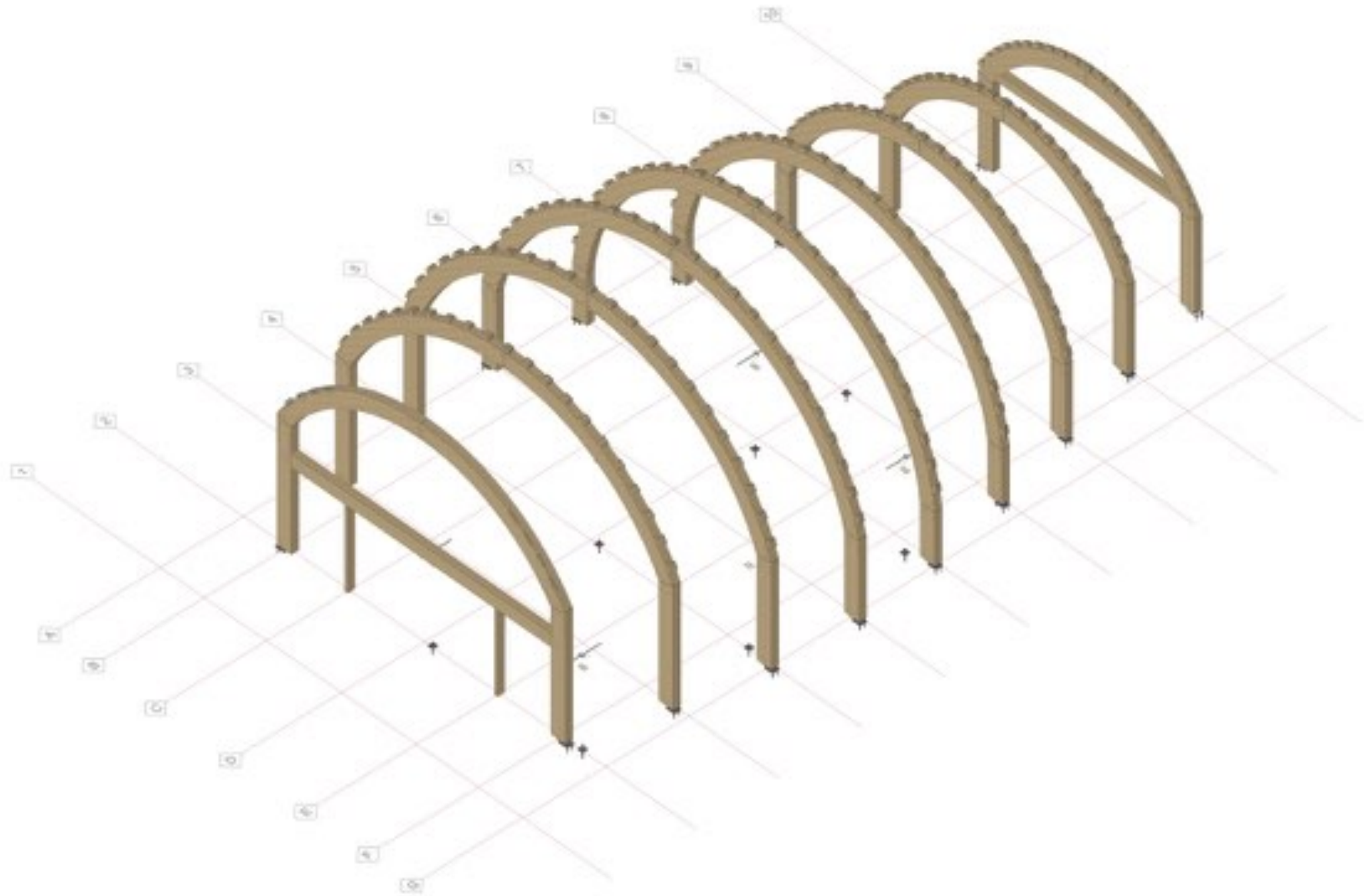
3.Estimating

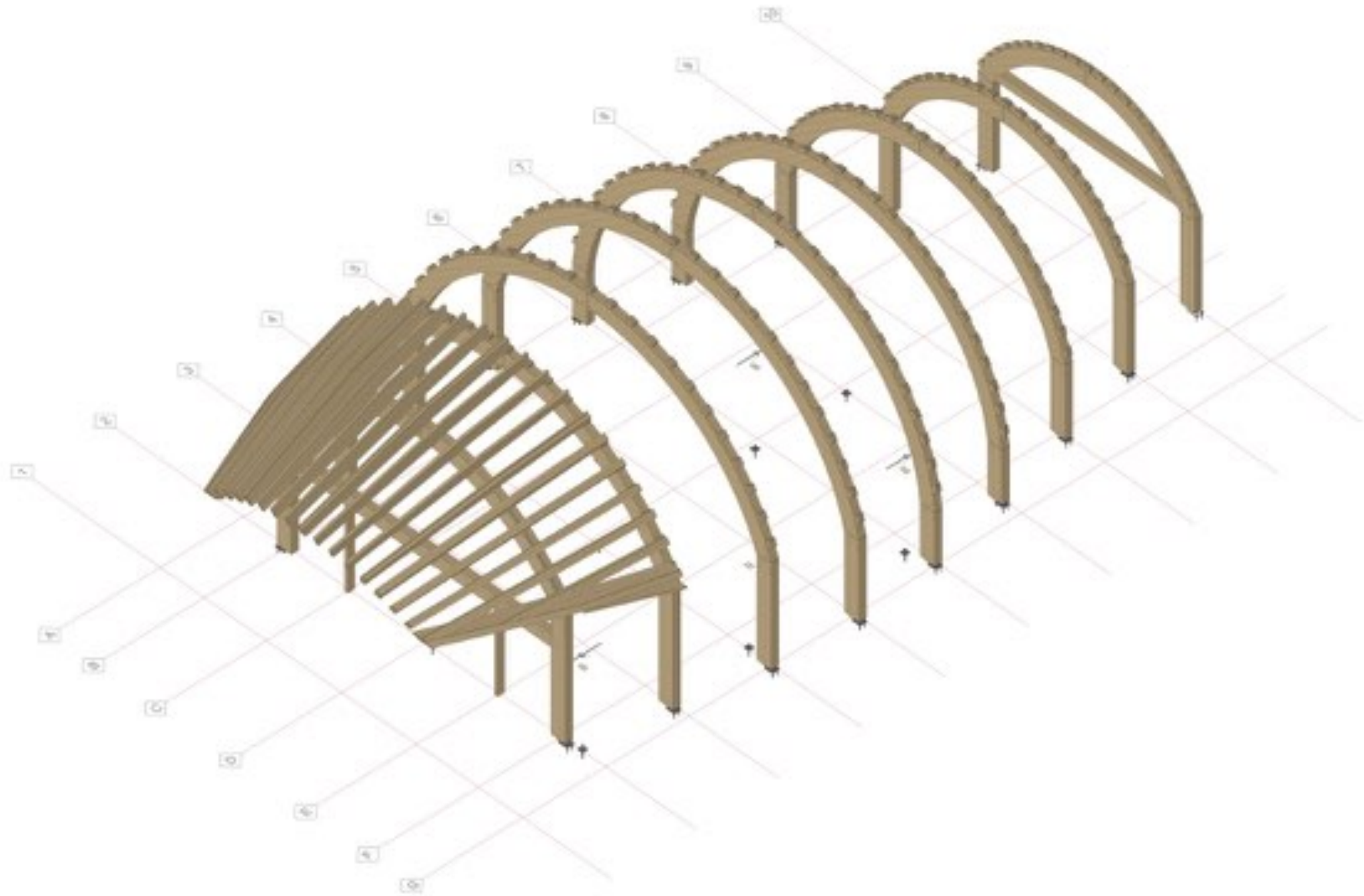
CADWORK List[Z:\Bensonwood\Client - Build\Porches Bldg 9, The Shell Package\Shop Components\List\Hardware\The Porches Hardware for Order.cwl.m] - Production lis

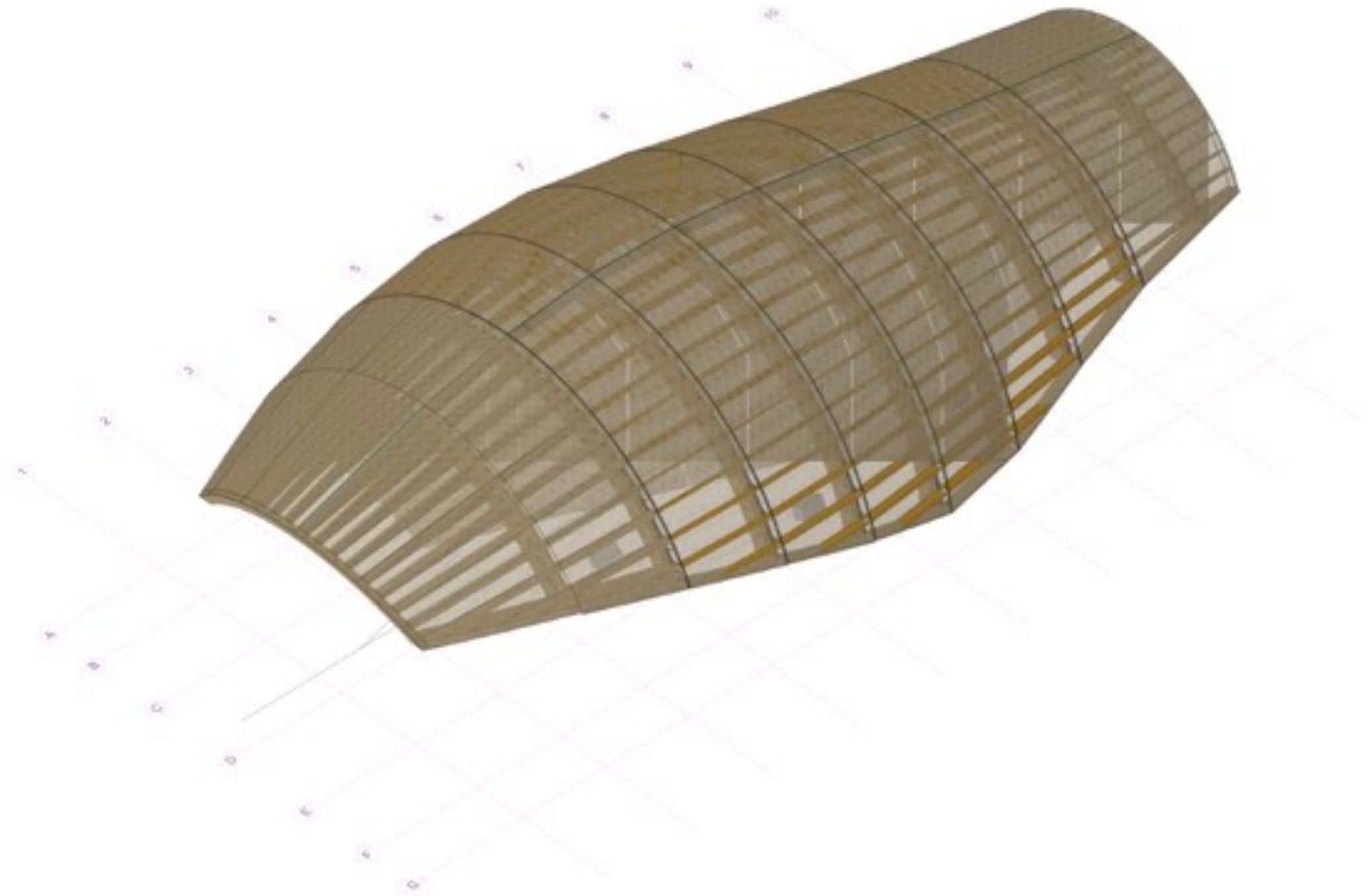
	04 MANUFACTURER	05 DESCRIPTION	Material	Group	Real length	Quantity	Name
					[inch]		
30	SIMPSON	LTP4	GALVANIZE	TF MAIN	1/8"	16	FASTENER
05 DESCRIPTION:LTP4						16	
31	SIMPSON	MSTA36	GALVANIZE	TF BASE	3"	4	STRAP
05 DESCRIPTION:MSTA36						4	
32	SIMPSON	SDS 3"	STEEL	1ST FLR	1 3/4"	36	FASTENER
05 DESCRIPTION:SDS 3"						36	
33	SIMPSON	SDS 6"	GALVANIZE	ROOF	6 1/4"	1	FASTENER
34	SIMPSON	SDS 6"	GALVANIZE	TF MAIN	6 1/4"	835	FASTENER
05 DESCRIPTION:SDS 6"						836	
35	SIMPSON	TITEN HD 5/8"x6"	GALVANIZE	1ST FLR	6 3/4"	59	FASTENER
05 DESCRIPTION:TITEN HD 5/8"x6"						59	
36	SPAX	POWERLAGS 9"	STEEL	EXT WALL	9 7/16"	84	FASTENER
37	SPAX	POWERLAGS 9"	STEEL	ROOF	9 7/16"	12	FASTENER
05 DESCRIPTION:POWERLAGS 9"						96	
38	SPAX	POWERLAGS 16"	STEEL	TF MAIN	1'-4"	64	FASTENER
05 DESCRIPTION:POWERLAGS 16"						64	
39	SPAX	TIMBERLAG 9"	STEEL	TF BASE	9 7/16"	8	FASTENER
40	SPAX	TIMBERLAG 9"	STEEL	TF MAIN	9 7/16"	4	FASTENER
05 DESCRIPTION:TIMBERLAG 9"						12	
41	SPAX	TIMBERLAG 13"	STEEL	ROOF	1'-1 7/16"	10	FASTENER
05 DESCRIPTION:TIMBERLAG 13"						10	
42	TAYLOR	CRB 2	STEEL	1ST FLR	14'-7"	1	LEDGER
05 DESCRIPTION:CRB 2						1	
43	TAYLOR	CRB 2-3	STEEL	1ST FLR	8'-6"	2	LEDGER
05 DESCRIPTION:CRB 2-3						2	

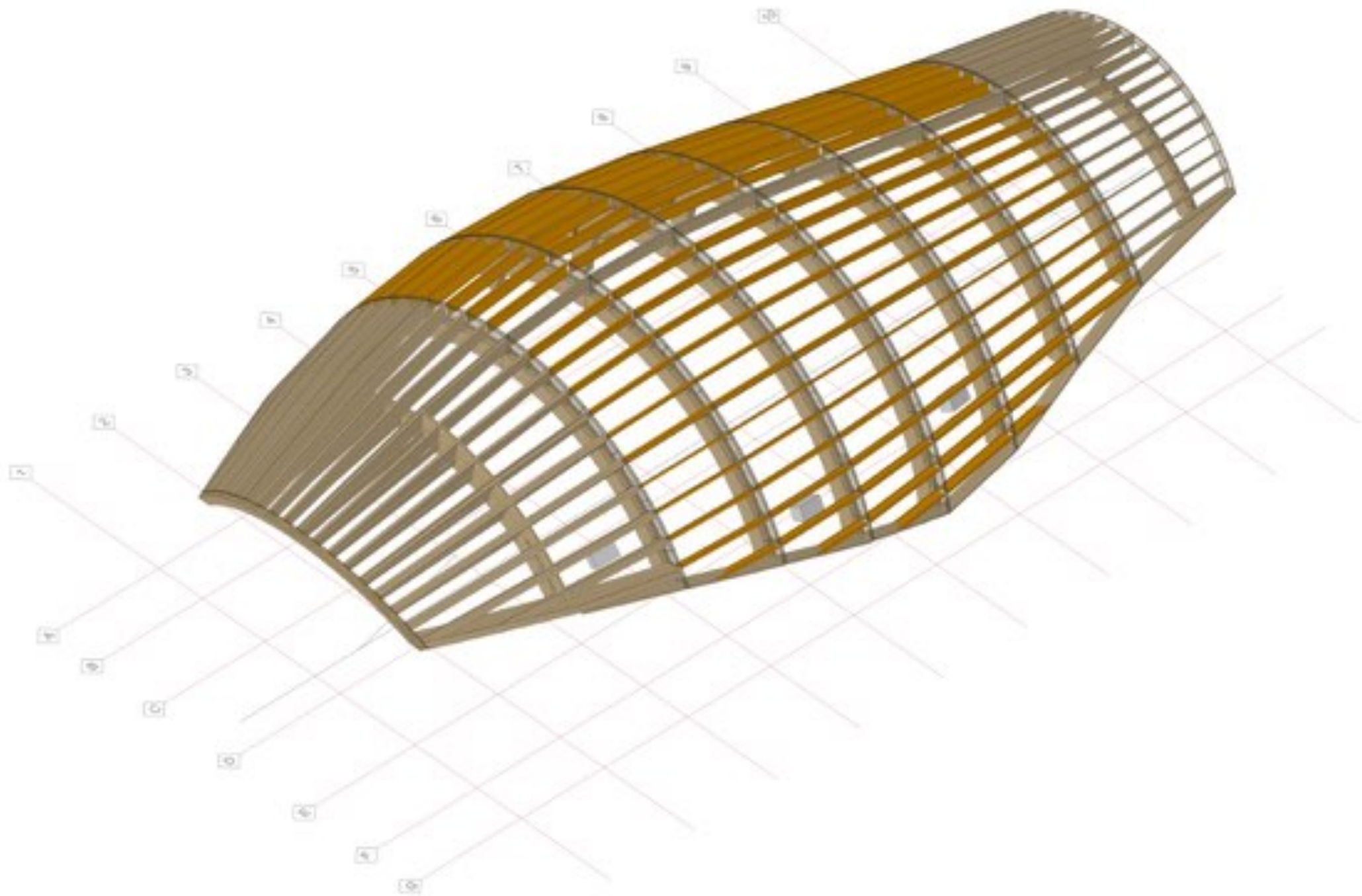




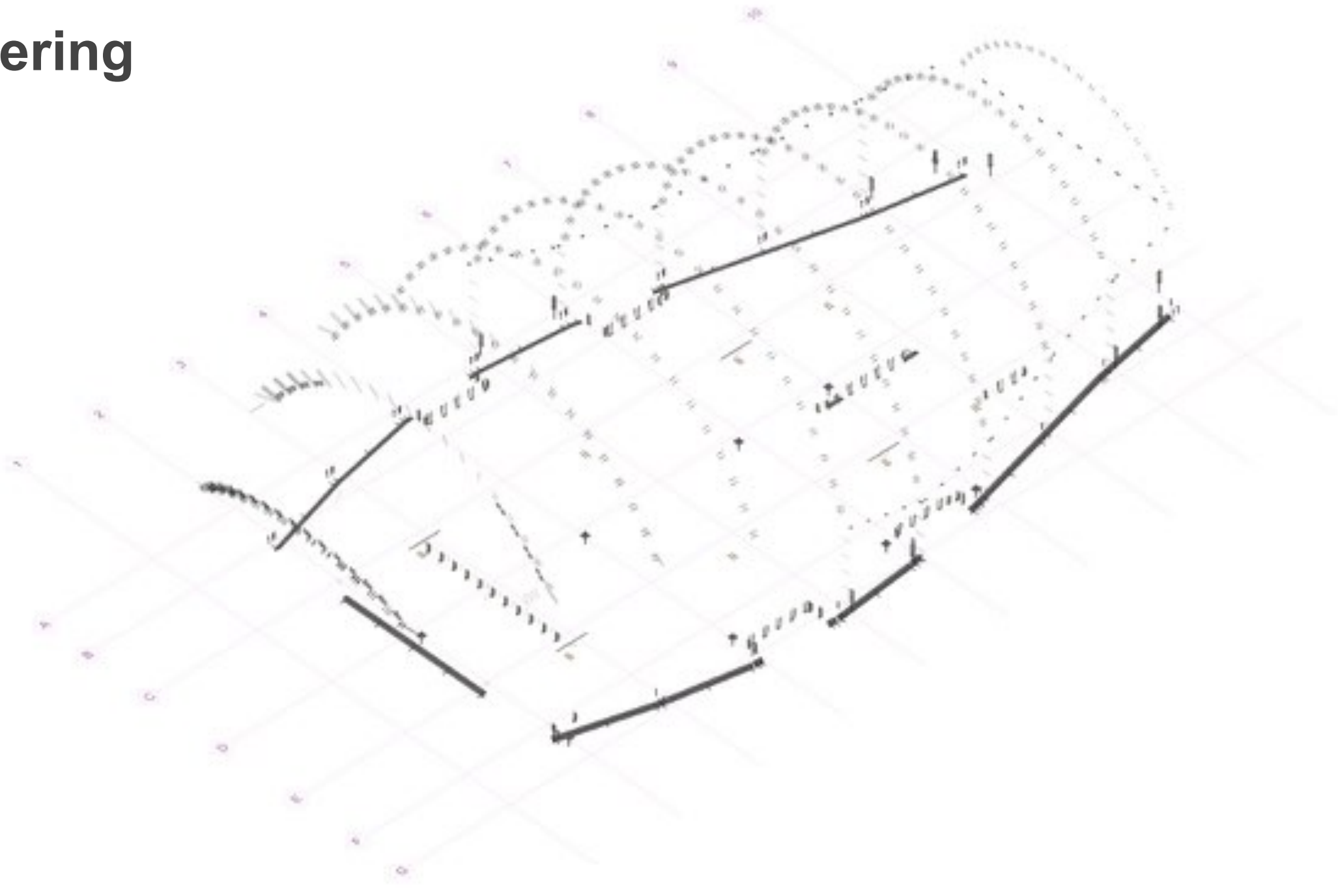




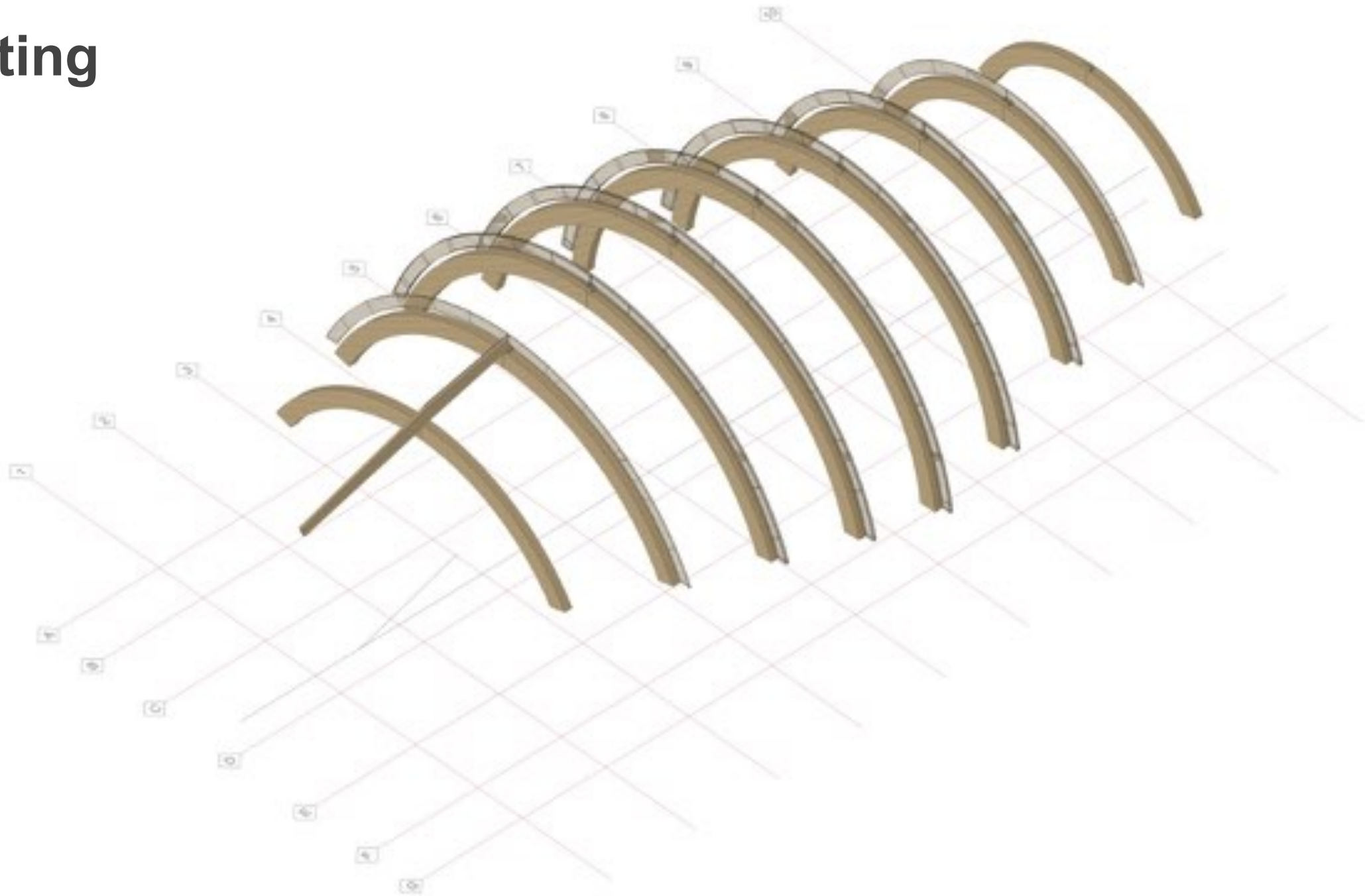




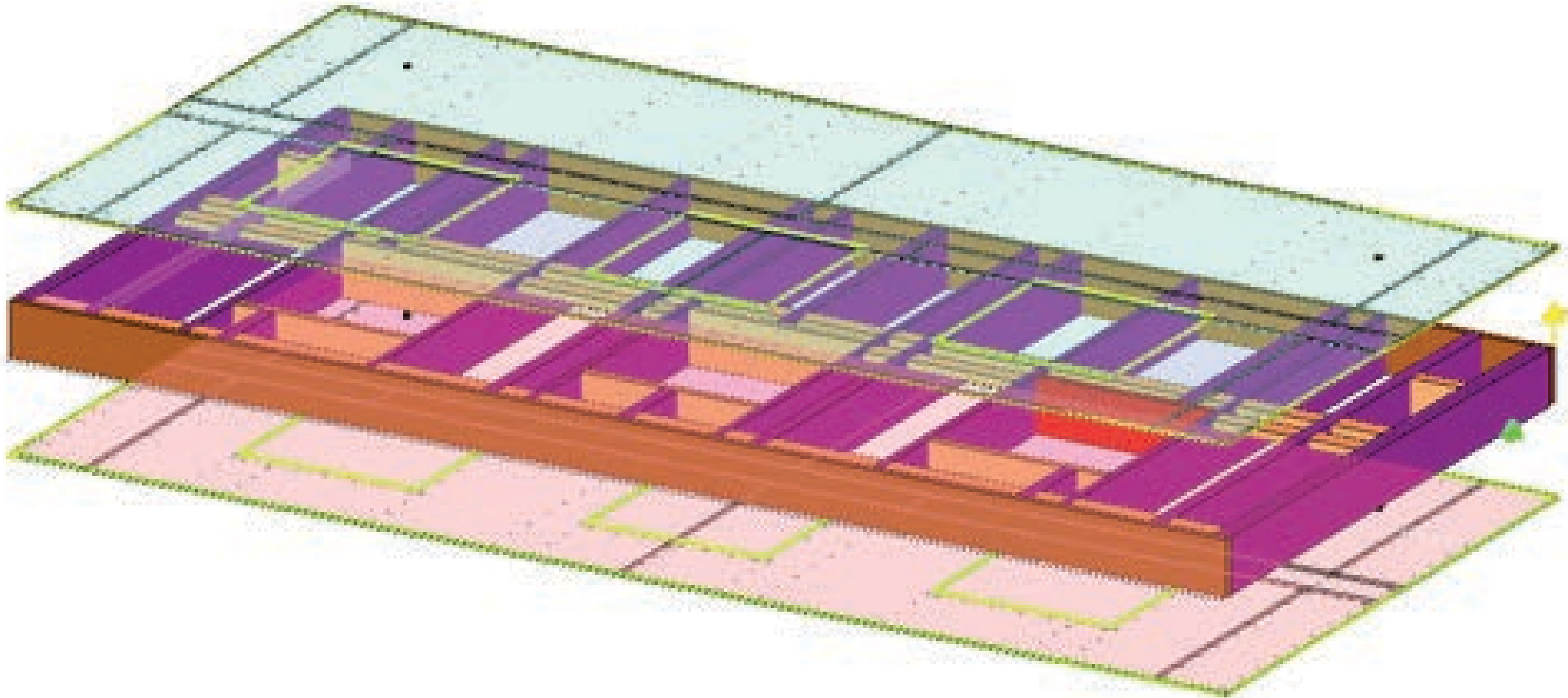
4.Ordering



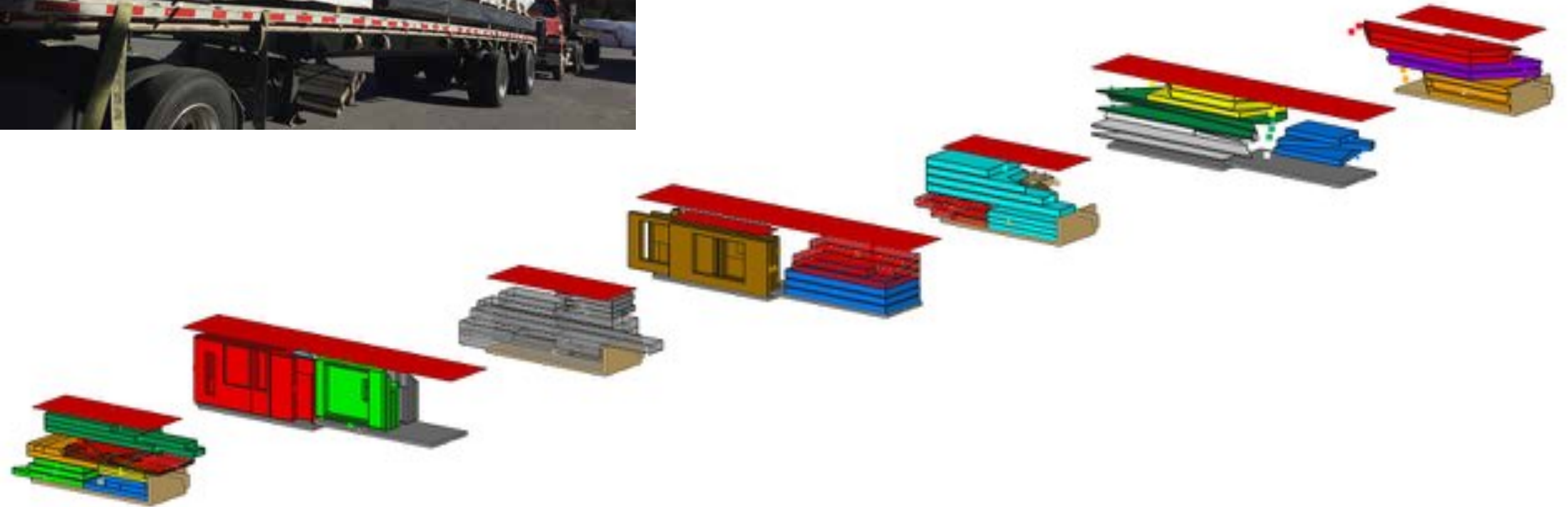
5.Cutting



6. Fabricating



7. Planning



8. Site Assembly





Model based DESIGN|BUILD

21st 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



Questions?

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