Proj.2: WOOD SPAN - Tectonic System

Your charge is to collaborate with a partner to design and build a full-scale, furniture-sized wood structure spanning between two supports that can carry substantial loads from above (e.g., a small person). The emphasis should be on the inventive and elegant joining of multiple thin wood elements to achieve a stable span. The span will be judged for creative and tectonic expression (both the overall span and the detailed joinery and assembly), but also for efficiency, structural performance, and stability.

Design Parameters:
- each team will rest their span on 2 supports, each 8"x5"x16"H
- inside faces of the supports must be exactly 48" apart
- connection of span to supports should be tectonically expressive & structurally sound
- spans may not touch the ground between supports
- spans must be a minimum of 8" wide at all points between supports
- to prevent waste, and encourage efficiency, each team is limited to 8 bd.ft of wood
  (a “board foot” is a volume of wood, 1"x12"x12")
- the wood can be cut, shaped, and bent in any way you wish, but all pieces you make
  must be min. 8" and max 18" in longest direction, except for joinery elements such
  as peg, spline, butterfly, etc. “Sub-assemblies” of pieces may be up to 24" long
- use glue only within a “sub-assembly”; sub-assemblies should inter-lock, telescope,
  or connect without the use of glue to span 48"
- no metal, plastic, or other fasteners are allowed: you should research joinery and
  other inventive applications of geometry and intuitive structural thinking

Advice / Goals:
- collaborate: two minds should be better than one; two people can produce more than
  one; as in an orchestra or sports team, rich and better results come from the
  variety of talents that pool together and maximize different strengths and abilities
- engineers can calculate the optimized solution; we are asking instead for the best
  architectural ideas, a thoughtful balance of strength, function, and delight
- work to create a rigorous, expressive, tectonic system: explore geometry and test
  different wood joints to connect many small pieces to span between supports.
- architects must develop a familiarity and comfort with construction and making:
  spend time in the shop testing ideas, remember your block building skills, get dirty
- work toward elegance, be careful what you design, you will have to build it in wood.

Proj.2, ASSIGNMENT 1, DUE WED. FEB 3, 1:30pm

Each student should invent at least three substantially different span structures using the given parameters. Bring 3 cardboard models and sketches/drawings

Begin with an open mind. Don’t settle on one idea too quickly; keep several equally good and very different ideas going at once. Work within the parameters, but also realize that perhaps at first not all parameters can be satisfied equally… Iteration will lead to better solutions. Research and think broadly about possible inspirations or precedents. Although the project will terminate in a furniture-sized construction, it may be useful to understand “span” flexibly as a “bench,” or a “shelf,” or a “beam,” or a “truss,” or a “bridge” or any other kind of structure or path connecting two points.

Consider the issue of “joinery” right from the start, both how to create “sub-assemblies,” and how to connect several sub-assemblies without glue. Model proper thickness and joinery in your models.

On Wednesday you will be paired with another student and invent other ideas. By Mon. Feb. 8, read the article by Marco Frascari, “The Tell-the-Tale Detail” (1984), which discusses the role of construction details as generators of architectural ideas, performance, design, and interpretation. We also recommend M. Cadwell, “Flooded at the Farnsworth,” Ch.3 in Strange Details (2007) on details at Mies van der Rohe’s famous house; and G. Simmel, “Bridge and Door” (1903), for a more philosophical take on “bridge” and the idea of “connecting” and “separating.”
Proj.2: WOOD SPAN: Tectonic System

PROJECT GOALS, LEARNING OUTCOMES & REVIEW COMMENTS
- Original Charge: to collaborate with a partner to design and build a full-scale, furniture-sized wood structure spanning between two supports that can carry substantial loads from above (e.g. a small person). The emphasis should be on the inventive and elegant joining of multiple thin wood elements to achieve a stable span. The span will be judged for creative and tectonic expression (both overall span and detailed joinery/assembly), but also for efficiency, structural performance, and stability.

DESIGN PARAMETERS (unranked list)
- **Span**: What is it? Why do it? What can we learn in school?
- **Joinery**:
  - Starting from the additive detail (Frascari) vs. dividing the whole
  - The number and size of pieces (why so many little pieces?)
  - Different types of wood connections: dowels/pins, half laps, dados, etc.
  - Glue vs. No glue
- **Geometry & System**:
  - Arches, triangulation, telescoping as structural forms
  - Symmetry vs. Asymmetry, overall and at small scale
  - Geometry: strength vs. form-making
  - Geometry: system vs. gesture
  - “Open” vs. “Closed” systems; repetition vs. unique
  - “Systems thinking”, computational thinking, systematic change over the span
- **Material**: visual vs. structural
  - Mockup vs. model vs. prototype.
  - Machine tools vs. Hand tools vs. Dfab
  - 1:1, life-size, relation to body... Scale, size, etc.
- **Structure**: Load bearing potential
  - Arrangement of parts to resist compression/tension
  - Orientation of faces and edges of part to contribute to load bearing
  - Connection to piers, transferring loads, turning the corner, resolving loads
  - Using the strengths of wood, avoiding the weakness of wood grain
- **Budget**: amount of material, time, effort, degree of difficulty
- **Visual**: aesthetics, good design, resolving contradictions
- **Self Expression**: intent, instinct, desire, personality
- **Teamwork**: advantage? Disadvantage?
- **Craft**: precision, technique, confidence in woodworking skills
- **Other**: ?

CONFLICTING CONSTRAINTS
- Design goals vs. evaluation criteria
- Structure vs. aesthetics
  - vs. Material, Budget, Craft & other constraints
- Constraints & performance criteria: why they matter for design
- Conflicting parameters
- Design as "Wicked" problems, conflicting constraints & intentions
- “Level of Difficulty” vs. simplicity; risk-taking; cutting your losses
- Working with wood, real friction & resistance,
- Pride of “making” something real, working with hands, “Craftsmanship”
- The goal: clarity
Proj.2: SPAN - Tectonic Systems

MID-PROJECT EVALUATION / FEEDBACK

Student Name: ________________________________
Studio A / B: ________________________________

EVALUATION CRITERIA for the studio (see syllabus):

1) Passionate and collaborative attitude & effort: works hard, eager to learn; a leader in the studio who works well with others, helps classmates, shares and promotes greater understanding in everyone.
2) Comprehension of the problem and goals: asks questions for greater understanding; understands what is being taught, and what should be learned; initiative beyond what is expected in the project statement
3) Rigorous design process: able to understand and explain the individual process and decisions-making; uses tools (especially the computer) in a sophisticated and professional manner to achieve clear result
4) Seeks feedback & responds well to criticism and multiple points of view; not stubborn. But also self-motivated, self-directed, does not wait for answers, shows initiative.
5) Integrates research into the design process, from a broad range of resources, including precedents and ideas from beyond the present studio and other courses; bring your own background & interests to studio.
6) Works willingly within constraints, asks questions about, and balances between multiple (sometimes conflicting) design parameters, understands the power of limits, concision, and editing.
7) Dedication to iteration, ability to create and distinguish between multiple solutions; seeks to develop a systematic and methodical process, creating rule-bound solutions, with rigor, refinement, and richness of detail
8) Commitment to imaginative exploration and creative problem-solving, a willingness to explore unfamiliar ideas, take risks, and a growing comfort with uncertainty, ambiguity, and multiple truths; open minded.
9) Clarity of communication, excellence, and rigor in graphic, written, and verbal modes, both analog and digital, 2D and 3D; work goes beyond the merely factual, and expresses ideas and a particular point of view
10) Strength of idea and conceptual clarity in design solutions; a high degree of challenge, quality, resolution and completeness in all phases of the work; able to articulate "why?" each aspect of the design exists

PROJECT FEEDBACK ON:

1) Process & Teamwork: Analog and Rhino -- . . . ✓ - . . . ✓ . . . ✓+ . . . ++


3) Drawings & Ideas: Analog & Rhino -- . . . ✓ - . . . ✓ . . . ✓+ . . . ++

4) Overall Comments -- . . . ✓ - . . . ✓ . . . ✓+ . . . ++