

Out-of-the-Box

Design Challenge

* Identify the need
* Research the problem
* Imagine possible solutions: quick prototyping
* Plan: select a promising solution
* Create: build a scale prototype
* Test + evaluate prototype: peer / professional critique
* Improve + redesign as needed

Follow the Engineering Design Process

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Your prototype must…

* Serve its purpose; that is, be functional
* Be to scale
* Reflect essential design elements of the selected architect’s style
* Be well crafted

Your team challenge is to design a piece of furniture that is inspired by the style of a famous architect. After researching the architect, decide what type of furnishing you will build—table, chair, bookshelf, etc.—to occupy a particular room or space in your school building—classroom, conference room, student lounge or commons area, library, etc.

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Your prototype must…

* Be made entirely of cardboard
* Maintain the original color of the boxes   
  (no painting or coloring)
* Use no fasteners other than glue   
  and paper Kraft tape

Criteria

Constraints

**Out-of-the-Box Engineering Log**

Document your work by taking photographs, making and attaching detailed sketches, and completing this log throughout the entire design process.

**Team name:**

**Team members:**

**///**

**🡺 Identify the Need**

*What is the problem to solve?*

*What are the project requirements? What are the limitations?*

*Which architect do we want to choose?*

*What furnishing do we want to design?*

*Where will it reside?*

*Who would use it?*

*Other factors to consider:*

**Notes:**

**🡺 Research the Problem**

*What is the function of the furnishing?*

*What are essential design elements/stylistic features of the architecture that we want to include?*

*What are essential structural features that need to be included?*

*What should the furnishing dimensions be?*

*Other questions to research:*

**Notes:**



Example design exploration: Many versions of mini chair designs made from toothpicks and foam board.

*Source*: Karina Larsen + Christina Wadstrom Design, <http://karinalarsendesign.dk/work/chair.html>. Used with permission.

**🡺 Imagine Possible Solutions: Quick Prototyping**

*This is the time to brainstorm since all ideas are viable at this point! Grab some heavy-weight paper, cardstock, chipboard, lightweight foam board, toothpicks, tape, glue, x-acto knives, self-healing mat boards and play! Make as many possible small scale (think 1:1, that is 1 inch =1 foot) models of as many ideas as you can in one class session.*



More design exploration: Many versions of small-scale chair  
designs made from toothpicks and foam board.

*Source*: Karina Larsen + Christina Wadstrom Design, <http://karinalarsendesign.dk/work/chair.html>. Used with permission.

**Notes:**

**🡺 Plan: Select a Promising Solution**

*Spend some time looking at and considering which of the small-scale quick prototypes meet the requirements and seem feasible within the given constraints. As a team, decide which model to develop as your ultimate prototype. Considerations:*

* *Consider* ***design features*** *such as interlocking shapes for support, positive and negative spaces, angles and proportions.*
* *Consider* ***structural features*** *that provide strength and durability, functionality, weight distribution, withstand expected forces and load requirements, brace and support types, and comfort/ergonomics, as applicable.*

*Identify which prototype you have selected to pursue and explain why:*



Example chair design sketches showing top and side views.

*Source*: Karina Larsen + Christina Wadstrom Design, <http://karinalarsendesign.dk/work/chair.html>. Used with permission.

*Create front, side and plan (top) view drawings of your final prototype design.*

* *Include dimensions.*
* *Attach the drawings to this log.*
* *Attach any additional sketches, photographs, inspirational images or other source material.*

**🡺 Create: Build a Scale Prototype**

*Build your full-size, to-scale cardboard prototype! Take photographs along the way.*

*Record any challenges you encounter, and changes you decide to make and why, and attach them to this log.*

**🡺 Test + Evaluate Prototype: Peer / Professional Critique**

*Designate one team member to record feedback during the critique.*

*Share your prototype with the class. Describe your goals for the furnishing, any challenges and solutions, and explain how you met the criteria for aesthetic design as well as functionality.*

*Test the prototype—does it work/serve its purpose? (For example, does a chair support the weight of a person? Is it comfortable? Does a bookshelf hold the weight of books, etc.?*

* *What is working well? Why?*
* *What needs improvement? Why?*

*What (if any) re-designs do we plan?*

**🡺 Improve + Redesign as Needed**

*Record and explain any changes and or improvements here.*