

Fill-in the blank
proposal to conceive, design, prototype, and evaluate a
name/describe/define/identify your solution device
to keep coffee hot for two hours

fill in your name here

Summary: In order to keep coffee warm during a 2 hour class so that the instructors will not become grumpy, I propose to conceive, design, prototype, and evaluate a name/describe/define/identify your solution device. Conception and design is accomplished via a collaborative, fractal, recursive process of brainstorming and idea selection as documented in my notebook. The resulting design concept is characterize your design concept. The design must list your FRs. These requirements are addressed by, DPs. Analysis method(s) is(are) used to predict the performance of device. Risks are taken into account and addressed by coutermeasures. When implemented, the device will make the world a better place by contributing to the happiness of Elizabeth and Dave. If wildly successful, the device could contribute to the happiness of millions of hot beverage consumers.

Introduction (problem definition)

A name/describe/define/identify your solution device that would keep a cup of coffee hot for two hours is of significant importance to Elizabeth and Dave (E&D) as well as the larger customer base of drinkers of coffee and other hot beverages. It is commonly observed that hot coffee, once served in a coffee cup, cools. Once cooled, coffee drinkers such as E&D are saddened, and the world would be a better place if they were not sad. To increase the net happiness in the world, this 21W.732 project is to conceive, design, prototype, and evaluate a name/describe/define/ device that will keep a cup of coffee hot for two hours. In addition to the requirement that the coffee remain hot, the product must satisfy three subsidiary requirements:

- The product must not expose the coffee drinker to undo hazard
- The product must be ergonomic and aesthetically pleasing
- The product must have a small ecological footprint, both in terms of the materials used to construct the product and the labor required to produce the product.

These requirements are weighted with the ultimate requirement that the coffee remain hot according to the rubric in Table 1. For environmental and economic reasons, the name/describe/define/identify your solution device shall be constructed of cardboard. If the design is successful, E&D will be happy the name/describe/define/identify your solution device can be marketed to the billions of consumers of hot beverages.

Table 1 “cost” of subsidiary requirements

requirement	cost incurred
Safe	The product must pass the tilt test, the pour test, and the roving eye test of due diligence. Any product that does not pass these tests is disqualified.
Ergonomics & Aesthetics	A panel of experts will judge your prototype and place it in one of three categories: top quartile, middle quartiles, and bottom quartile. <ul style="list-style-type: none"> • Products in the top quartile will have 10 minutes deducted from the time at which the temperature is measured. • Products in the bottom quartile will have 10 minutes added to the time at which the temperature measured.
Eco-friendly	<ul style="list-style-type: none"> • If the mass of the product is less than the mass of the coffee, 10 minutes deducted from the time at which the temperature is measured. • If the mass of the product is more than twice the mass of the coffee, 10 minutes will be added to the time at which the temperature is measured. • If the product can be assembled in fewer than 15 minutes, 10 minutes will be deducted from the time at which the temperature is measured. • If the product requires more than 15 minutes to assemble, 10 minutes will be added to the time at which the temperature is measured.

Background (model—how you think about keeping coffee hot)

Each of the functional requirements of the name/describe/define/identify your solution device need to be investigated to guide the device design.

Thermal model

How you model the temperature and heat transfer of a cooling cup of coffee. Best to define hot here.

Safety analysis

How do you “think about” (model) safety? What is your benchmark for “safe”?

Aesthetics and ergonomics

How do you “think about” (model) safety? What is your benchmark for “safe”?

Materials and labor costs

How will you estimate materials and labor costs?

Methods (your plan)

Design overview

What is your design? Include a figure. Reference it in the text. Reference the selection and FRDPARRC tables.

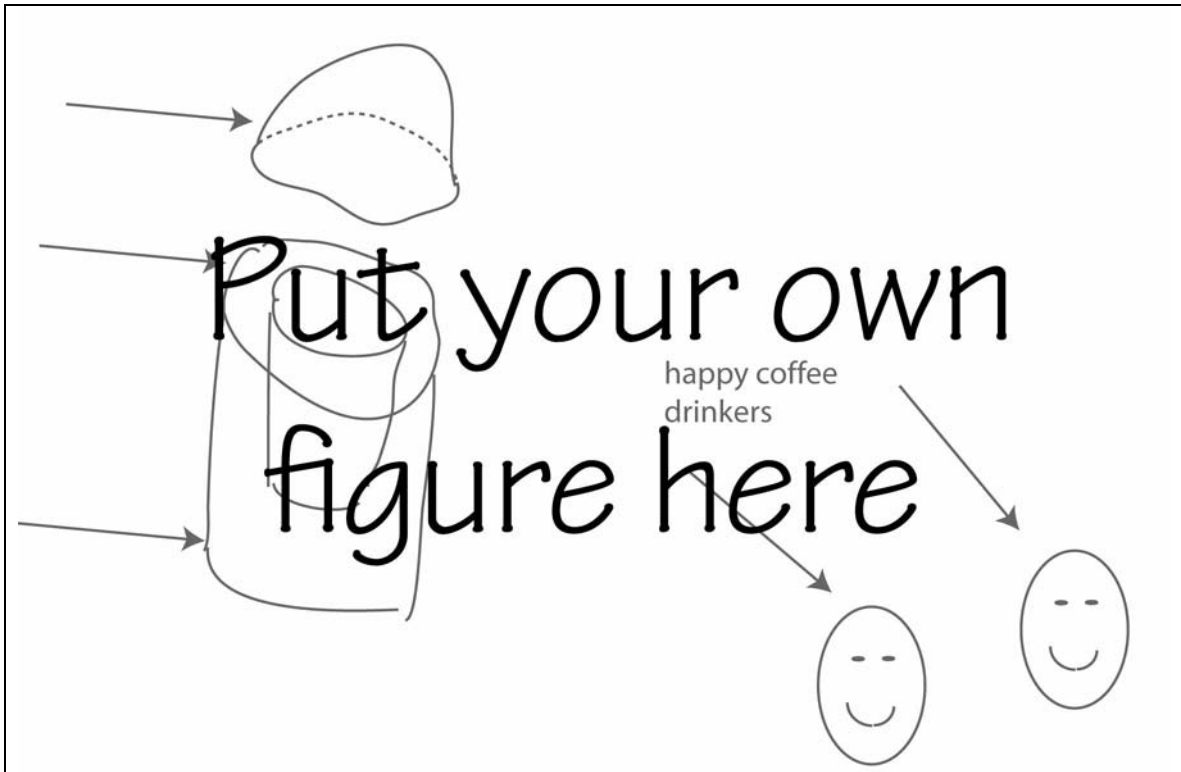


Fig 1 Big picture overview of the name design

Table 2 Design space selection criteria

	technical slam dunk (or challenge)	personal interest	time commitment	sure to produce best result (highest coffee temperature)	sure to impress parental units, significant others, and potential employers	total
<u>space 1</u>	+ x -	+ x -	+ x -	+ x -	+ x -	#
<u>space 2</u>	+ x -	+ x -	+ x -	+ x -	+ x -	#
<u>space 3</u>	+ x -	+ x -	+ x -	+ x -	+ x -	#
<u>baseline</u>	+ x -	+ x -	+ x -	+ x -	+ x -	#

Table 3 Design FRDPARRC (fill this in)

Functional Requirements	Design Parameters	Analysis	Research	Risks	Countermeasures
keeps coffee hot					
safe					
ergonomic and aesthetic					
economical					

Include text detail and perhaps figures for each functional requirement.

Device recipe

Provide a brief recipe (procedure, step in temporal order) for constructing your device.

Device testing

The ability of the name it device to keep coffee hot will be evaluated by measuring the temperature of a cup of coffee two hours after the coffee container $\frac{3}{4}$ full of freshly brewed coffee (or hot water) has been placed in the device. Aesthetics, ergonomics, and economics will be factored in as noted in Table 1. The tilt test is executed by tilting the surface to the angle at which the coffee would pour from the coffee container. The tilting should be gentle and occur over a period of 3 to 10 seconds. The pour test requires that the coffee can be poured from the name it device into another coffee cup without spilling coffee. The roving eye of safety test is intentionally left vague.

Other Stuff

Qualifications of primary investigator

every so briefly note that you are a 1st year student at MIT and that your “design experience” is XXX (as per the discussion on the way to Carberry’s)

Deliverables and project schedule

Table 3 project 1 workflow, roughly in order of occurrence

activity	deliverables	delivery dates
brainstorming	<p>sketches and scrawlings in your notebook that identify:</p> <ul style="list-style-type: none"> • functions and configurations suitable for cardboard (~10) • design spaces for coffee container insulators (~3) in notebook • designs of container insulators (~3 for each <i>space</i>, ~9 total) 	<p>Sept. 9 (done in class) Sept. 10 (for class) Sept. 10 (for class)</p>
FRDPARRC & selection	<ul style="list-style-type: none"> • rough FRDPARRC table for each design space (in notebook) • selection criteria table (in notebook) • typed FRDPARRC table for chosen design space & design • informal presentation of spaces and designs • at least one back of the envelope calculation • at least one each of the following references of importance to your design: <ul style="list-style-type: none"> ○ web site ○ refereed journal article ○ patent ○ standard ○ book or textbook 	<p>Sept. 10 (in class) Sept. 10 (in class) Sept. 14 (for class) Sept. 14 (for class) Sept. 14 (for class) Sept. 14 (for class)</p>
propose design	<p>madlib project proposal pitch for review (semi-formal presentation)</p>	<p>Sept. 14 (for class) Sept. 14 (for class)</p>
prototype	<p>product prototype documentation of the construction (photos and notebook)</p>	<p>Sept. 16 (for class) Sept. 16 (for class)</p>
test	<p>test results in notebook photo documentation of results</p>	<p>Sept. 16 (for class & done in class)</p>
report	<p>oral presentation written report graphics package</p>	<p>Sept. 21 (for class) Sept. 21 (for class) Sept. 21 (for class)</p>
other things	<ul style="list-style-type: none"> • weekly progress memo for week 0 • reading commentary on in your notebook http://web.mit.edu/sp.784/www/DOCUMENTS/Process%20of%20Design%20(Slocum,%20MIT).pdf • reading commentary on Oakley's effective teams article and Philip's member of a team article, and question you might ask (courtesy of the MIT leadership folks); available at https://web.mit.edu/21w.732-esg/www/reading/ in your notebook • Take the myers-briggs test, printout the results, and read how to interpret the results. <p>Test at: http://www.engr.ncsu.edu/learningstyles/ilsweb.html field guide to the results at: http://www4.ncsu.edu/unity/lockers/users/f/felder/public/ILSdir/styles.htm</p>	<p>Sept. 14 (before class) Sept. 10 Sept. 16 Sept. 16</p>