2.009 Product engineering processes

the only thing worse than no help is unreliable help
2.009 Product engineering processes today

tech logistics getting ready for Thursday

final presentation looking ahead
Assembly quiz
last class
Assembly quiz

*types of fasteners*

![Bar chart showing the number of different kinds of fasteners in various ranges from 1-5 to many.](chart.png)
Assembly quiz

**total number of fasteners**
Assembly quiz

total number of improvement suggestions

drew beller
emily young
Assembly quiz
list 4 design for assembly guidelines

- Reduce part count
- Reduce part types
- Eliminate adjustments
- Design parts to be self-locating
- Consider access & visibility
- Design parts to be easy to handle
- Design parts to be only installed correctly
And now...

when a product fails during testing...

describe the faulty behavior in an ____________—____________ form
## Mini quiz  Key attribute and specification: Animo

### Value proposition: improve hand writing?

<table>
<thead>
<tr>
<th>Need</th>
<th>Attribute</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>needs to be adjustable</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>resizing</td>
<td>moveable parts</td>
<td>yes</td>
</tr>
<tr>
<td>fits wrists of a variety of users</td>
<td>adjustable</td>
<td>yes</td>
</tr>
<tr>
<td>fit a variety of wrist sizes</td>
<td>bracelet size</td>
<td>5th-95th percentile wrist size</td>
</tr>
<tr>
<td>wrist size</td>
<td>accommodate 5th percentile woman to 95th percentile man</td>
<td>13.5-19.5 cm?</td>
</tr>
<tr>
<td>does not move around once in place</td>
<td>tightness adjustability</td>
<td>yes &gt; 5 hrs?</td>
</tr>
<tr>
<td>reduce tremors by over 50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>reduce hand tremors</td>
<td>improve performance on writing test</td>
<td>yes</td>
</tr>
<tr>
<td>reduce hand tremor in Parkinson’s</td>
<td>typing test</td>
<td>50% improvement reduce error rate &gt;= 50%</td>
</tr>
<tr>
<td>quiet during use</td>
<td>sound level</td>
<td>&lt; 50 db @ 0.75 m?</td>
</tr>
<tr>
<td>battery lasts full day</td>
<td>time watch used without battery dying</td>
<td>&gt; 5 hrs</td>
</tr>
<tr>
<td>lasts throughout day</td>
<td>battery life</td>
<td>&gt; 5 hrs/charge</td>
</tr>
<tr>
<td>used without assistance for full day</td>
<td>battery life</td>
<td>&gt; 6 hours</td>
</tr>
</tbody>
</table>

**Mini quiz**

**Value proposition:** improve hand writing?

- **Needs**: needs to be adjustable, resizing, fits wrists of a variety of users, fit a variety of wrist sizes.
- **Attributes**: moveable parts, adjustable, bracelet size, accommodate 5th percentile woman to 95th percentile man.
- **Specifications**: yes, yes, yes, 13.5-19.5 cm?.

**Questions**:

- Does not move around once in place?
- Use time without adjustment?
- Quiet during use?
- Battery lasts full day?
- Lasts throughout day?
- Used without assistance for full day?
Logistics
Tech review details

Detailed tech review schedule posted on the website

Red: Pappalardo south conference room
Green: team area
Blue: classroom 3-370
Yellow: Kresge oval, remote camera feed
Pink: music room
Orange: Pappalardo south parking lot, brick wall
Purple: Pappalardo south conference room
Silver: Pappalardo north parking lot, hot door handles
Logistics
Tech review contract plotting

scheduler posting today for Wednesday evening, strictly self-serve Thursday

have a well prepared 5 minute demo for your video

email final contract by midnight Thursday
2.009: a product development story

- **Three ideas presentation**: September 25, during class. 3 ideas per section.
- **Mockup review**: October 19. 2 mockups per section.
- **Assembly review**: November 1 & 3. 1 assembly.
- **Sketch model review**: October 5. 3 models per section.
- **Final selection**: October 23-26. 1 concept per team.
- **Technical review**: November 16. 1 (almost) prototype.
- **Final presentation**: December 11. 1 alpha prototype.

realistically know where the problems are!
Prototype Launch!
aka 2.009 final presentations 2017

a polished event

seating for 1100

~250 in little theatre
live webcast, 15,000 unique IPs online
250,000 facebook live
you will receive email to invite people
Final presentation

**general format**

a new product launch
but more technical and less sales

7 minute presentation
4 minute discussion
5 minutes for transition

a reception
Final presentation expectations

good product
good presentation
design, testing, (a lot of) practice

compendium of 2016 presentations
Final presentation

Timing

Presentations start at 7:30 PM sharp, December 11

Scheduled run-throughs 3-6 PM in auditorium

Reception (with dinner) at 9:45 PM, mingling at booths

Program is not over until the guests leave

Details will be posted on course website
Final presentation

**general format**

**all should attend and be on time**

display the merits of your design:
- the prototype
- key needs and user experience
- technical innovations
- business case
- outstanding issues

design of the presentation and its execution is graded
Final presentation review form

Guest: 
Project Name: 
Team: Blue

1. Quality of Presentation (25%)
Was the overall structure of the presentation honest and effective?

Was the customer need clear?

Was the market clear?

Was the product concept clear?

Was the presentation of technical challenges clear?

2. Business Assessment (15%)
Was the manufacturing cost assessment plausible and meaningful?

Was the development plan and market assessment plausible?
Final presentation
review form

3. **Technology (25%)**
Were major technical challenges/innovations identified (one or two)?

Were the challenges appropriately understood and engineered?

4. **Prototype (35%)**
Were design details well executed?
   (e.g., structures, bearings, actuators, controls)

Were the human interfaces well resolved?

Were subsystems well defined, integrated, and reliable?

I believe the prototype could be refined to become a real product.

5. **Overall Comments:**
Final presentation

time allocation (not prescribed order!)

the product, where and how it is used, use experience

who it is for and why should we care

how it works, principle of operation

market and preliminary business model
Final presentation

**typical presentation media**

demonstration/role playing

slides

video if needed

animations

**examples in gallery**
Final presentation

presentation props/set

think about what type of setting you would like

provide a context and demo platform

abstracted to not compete

self contained and rolling, transport constraints

I will lead on implementation, with help

meeting with your teams next Tuesday (thanks-giving week)
Final presentation

booth/reception area

locations after thanksgiving
Final presentation

**typical booth**

product set as platform to demonstrate product

an online brochure, URL and QR code in brochure

**name tags for all team members**

(with timeline and instructions)
And finally

this week +

keep your team working effectively
if your task is done and you have time, offer to help

machine shop 6-9 PM T, W.

team areas 6-9 tonight.

tutorial on product costing: tonight at 7 PM in Pappa

30 minute design reviews next Monday

no lecture Wednesday, watch for emails