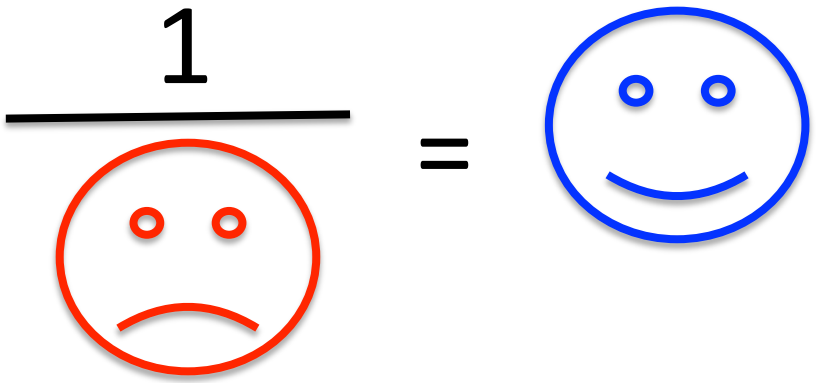

2.70/2.77 Week 4

Spring 2017

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Reminder!

- As advanced students soon to enter the real world:
  - Allyall are reading the class materials and building your design neural net…
    - just as you would as working professionals
  - You do NOT need hand held to walk through every single step…
    - There is not enough time anyway! It would take 4x the class time….
  - You can read and trust Alex that it's a good thing to do….
    - How you document what you do is critical for:
      - Glade in class when your website is reviewed
      - Getting better job!
      - ISO 9000
      - FDA…

Reminder of what we did last in Week 3
Laying out the design using FUNdaMENTALS

- *Axis error apportionment gives us "hunting license"*
- *Thought process:*
  - *FRDPARRC*
  - *PREP*
  - *Preliminary calculations of structure and bearings*
- *Strategies*
  - *Desk:*
    - *Wall mount*
    - *Desk mount*
    - *Freestanding*
  - *While thinking of some concepts*
    - *Rotary joints*
    - *Linear joints*
    - *Hybrid*
- *Preliminary analysis of overall structure for a strategy (i.e., stick figure) can help determine if a strategy was even feasible…*

- *CONCLUSION: ALEX THINKS HE CAN DO BEST WITH A WALL MOUNT SYSTEM*

Week 4 Theme: Components

- **Week 4**
  - *Reading: FUNdaMENTALS Topics 9, 10, PMD Chapter 5, 6*
  - *Brainware:*
    - Based on last week's results, evolve linear motion system design (if needed) so this week you can mount and test the actuator
    - Now that you have a single axis system, use what you have learned to layout concepts for the full machine
      - Create stick figures for concepts
      - Assign errors (error apportionment) and create preliminary error budgets for "best" concepts
      - *Make sure to DESIGN it (write the spreadsheet—predict performance and size elements)*
    - Seek & Geek Exploration
    - Update website
  - *Hardware:*
    - Modify the linear motion system as needed so you can mount and test the actuator in the system.
      - Use a laser pointer mounted to it and record change in position on piece of paper placed far away
    - How do results differ from last week?
    - Make your kinematic coupling and use a laser pointer attached to it that projects down the hall to measure repeatability.

Next Week 5 Theme:

- **Week 5**
  - *Reading: PMD Chapter 7*
  - *Brainware:*
    - After building and testing your linear motion system designed last week, evolve your initial spreadsheets to predict performance.
      - This is closing the loop on your designs and helps to build design intuition
    - Layout concepts for the full machine
      - Create stick figures for concepts
      - Assign errors (error apportionment) and create preliminary error budgets for "best" concepts
      - *Make sure to DESIGN it (write the spreadsheet—predict performance and size elements)*
    - Design a simple system to test at least one idea you plan to use to preload bearings and actuators to eliminate backlash in your machine's bearings
      - *Make sure to DESIGN it (write the spreadsheet—predict performance and size elements)*
    - Seek & Geek Exploration
    - Update website
  - *Hardware:*
    - Make sketch models (foam core and/or wood) of your top concepts to get a feel for the performance, errors, etc.

Developing Concepts

- Thought process (ONCE AGAIN!):
  - FRDPARRC
  - PREP
  - Preliminary calculations to select potential components
- Concepts (must do first order analysis to sanity check each)
  - Wall mount
    - Overall Structure
      - One rail or two?
  - Vertical moving carriage and desk surface tilt
    - Structure
    - Bearings
    - Actuator
- Preliminary analysis of components for a concept can help determine if a concept is even feasible…