# **MTRL 466 MEETING MINUTES**

| **Project Name:** | Adaptive Architecture |
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| **Group:** | Sinclair |
| **Current Meeting:** | November 8, 2013 |
| **Minutes Prepared By:** | Jeremy Leung |

Attendees:

Chad Sinclair

Vicki Pistner

Jeremy Leung

Lauren Day

Juan Gerardo Ellorin

Ted Hung

Kush Shah

Agenda:

Minutes:

* Jeremy nearly done assigned work, will create outline for presentation
  + Presentation does not need as much background, don’t need full equations and explanations
* Bi-materials update
  + Worked on percentage open vs. temperature plot – combined equations to find relation
  + Relation is linear between temperature and percent open
  + Should determine maximum and minimum temperature for a given month
  + Examine possibility of changing hinge attachment location to customise operation temperature range
  + Or some other way of having customisation “built-in”
* Shape Memory Update
  + Looked into suppliers – find mostly for medical applications, we need sheets for our application
  + Need to know martensite and austenite finish temperatures
  + Can change finish temperature depending on heat treatment
  + Just need hot end above the austenite finish temperature and cold end above the martensite finish temperature
  + Can say what it is for other similar alloys – good enough
* Set SMA to be right angle, deform to acute (or straight) when weight is attached.
* Need to know starting and flat radius (infinite). Determine change in length of top and bottom surface
* Cantilever beam model for lifting force
* Don’t need to calculate overall forces, just need top and bottom surfaces
* Stress must be enough to lift frame, to provide necessary deformation
* Determine what strain would be in the object and calculate resulting stress
* Can change radius of curvature and thickness to find the strain
* Find stress-strain plots of similar materials
  + How much strain do I need? (top and bottom surface)
  + Check stress-strain curve and determine force needed for that strain
* Phase stability – aging time
  + Degrades less rapidly with time
* Ruled out polymer shape memory materials due to low force and no suppliers
  + Most importantly is the inherent low force limitation
* Ted making mock up with SMA sample
  + Diagonal SMA across corner so that straightening will induce closing
* Works with radiative heat – need actuator to hit change temperature
  + Will it open and close repeatedly on a cloudy day?
  + Sensitivity?
* Actual implementation needs to be included in final report – logistics and other details
  + How the product will be mounted, how it will function practically
  + DISCLOSE ASSUMPTIONS
    - Explain all assumptions made in the final report!
* Life-cycle update
  + Real & economic side is super important this year
  + Environmental aspect is covered with eco-audit
  + Assume adiabatic room with a window
  + Conduct a rate of return calculation
  + Cost of air conditioning – keep cost of product below a certain amount so that it has attractive period of return
* FOR FINAL REPORT
  + Change template of report?
    - Change tech review section
  + Presentation is showing what the project is
  + Calculations moved to the appendix, the design itself is most important
  + Explain design and commonalities first
    - How it will work simply – how it will look etc.
    - Differentiate the two actuation options clearly
  + Assumptions and technical stuff
    - Once all done, explain environmental aspect and economic basis of product
    - Cost savings due to our product
  + Choose one final design, which is more technically/economically/environmentally feasible
  + Combine tech review with later sections?
    - Concept? Use to clarify the concept
    - SMAs heated with sunlight, hinge decisions, pictures etc.
    - Not a variant design, so there is not much of a technical review
    - Current solutions (2 pages) -> concept (3 pages)
    - Benefits and downsides to design options
      * Bring up to Daan – should have a better template in mind
  + Lauren will create bullet points under each section for a rough template of what will go where
  + Want recommendations – will designs work, which one is better and why?