# **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?