# **MTRL 466 MEETING MINUTES**

| **Project Name:** | Process Modelling for Adhesive Bonding of Aluminum Automotive Sheet |
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| **Group:** | 1 |
| **Current Meeting:** | Friday November 18th, 2011 |
| **Minutes Prepared By:** | Adam Ohashi |

**Attendees:**

*Dr. Chad Sinclair*

*GROUP 1: Jerry Chang, Michael Fu, Judy Makmillen, Adam Ohashi*

**Agenda:**

* **Gantt chart / timeline review:**
	+ Progress update
* **Economic analysis:**
	+ Capital costs
		- Only counts heating booths
		- All other capital costs remain constant
	+ Production rate
		- Must be equal between both methods
		- Need enough 3-in-1 booths to match output of 1-1-1, depends on time per car
	+ Production parameters
		- Have approximate times, 30 minute average
		- Oven temperature @ 160C
	+ Energy costs
		- Natural gas about $4.75/GJ
		- Need gas consumption rate to heat and maintain a booth per car
* **Isothermals:**
	+ Done at several temperatures
* **Coupled models:**
	+ Progress on code
	+ Output/results?

**Minutes:**

Meeting start time: 1:45pm

Meeting end time: 3:00pm

* Economic analysis:
	+ Oven goes to temperature (pre-heat), oven opens, loss of heat, re-heat back to temperature for next piece
	+ Old process time and temp.
		- Consider 150C, 30 minute steps
	+ Compare 2 scenarios
		- 1-1-1 vs. 3-in-1
		- Fixed production rate (ie: 10 cars/day)
		- Capital costs, energy costs 🡪 balance!
	+ Can address over-ageing of 6xxx during the 1-1-1 process
		- For 1-1-1, assume proper amount of ageing, curing
	+ Cost comparison (MTRL 280)
		- $C=C\_{o}+\frac{C\_{c}}{n}+\frac{\dot{C\_{o}}}{\dot{n}}$
		- Total cost = underlying costs + capital costs/quantity + operating costs/production rate
		- Compare relative costs
		- Compare scenarios $ for $, determine which is better
* Models:
	+ Autocatalytic Q of epoxy makes internal temperature over 500C
	+ Problem is heat moving out rather than getting in
		- 1 sided heating wouldn’t solve anything!
	+ Solutions:
		- Can we remove the piece after a set time, let the epoxy heat generated finish curing/strengthening?
		- Have a slower heating rate?
		- High h constant, allows heat to move out faster
		- Lower furnace temperature
	+ Optimization parameters
		- α ≥ 0.8
		- σ6111 ≥ 0.6
		- σ5754 ≤ 0.6
			* “soft” parameter, meet other 3 parameters then choose the least softened material/time (maximum recovery)
				+ Due to initial drop in YS
				+ Secondary optimization
		- Tepoxy ≤ 200°C
	+ Can we feasibly do 3-in-1 process?
		- If so, what can we improve in the process?
* Final Presentation:
	+ Continue to use global motivation (CAFE, attention grabber)
	+ Thoroughly explain constraints/free variables
	+ Objectives 🡪 reason behind numerical models
	+ Briefly cover each model (1 slide each)
	+ Coupling of models
	+ Results
		- Isothermals
		- T vs. h table
		- Explain why we see this certain behaviour
	+ Economics
		- Costs
		- Production capabilities
	+ Recommendations
		- Economic aspects
		- More sophisticated models?
* Stance:
	+ Act as a consulting firm
		- Process 1: 1-1-1, we know that it works
		- Process 2: 3-in-1, investigation
		- Can choose to construct slides this way

**Action Items:**

* Continue to revise midterm report section for use in final report
* Have data from models, analyze
* Finalize the results, conclusions, recommendations
* Have rough final presentation slides ready for Wednesday
* Begin writing the new sections for the final presentation
* **Next meeting: Wednesday, November 23rd, 2011 @ 1:30pm**