# **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)
    - 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**