# **MTRL 466 AGENDA**

| **Project Name:** | Adaptive Architecture  |
| --- | --- |
| **Group:** | Sinclair #2 |
| **Current Meeting:** | September 19, 2014 |
| **Agenda Prepared By:** | Devy Dyson |

Attendees:

Chad Sinclair - Professor

Devy Dyson - Agenda

Lucas Hawath

Lawrence Lam - Minutes

Michael May

Ben Coull

Igor Vranjes

Agenda:

**Revise Need Statement/Objective/Constraints**

Need Statement: A minimum cost and environmentally friendly thermoforming technique for interior wall panels around 4’ x 4’ in dimension.

Objective: Minimize Cost

Constraints:

-Good heat transfer by non-uniform heating

-Deformation of the material by lines

-Have a sufficient thermal expansion coefficient to help deform material under heat (soft)

-Thermal stresses with wire and thermoplastic

-Thermal profile control
-Resistivity of the wires or metal heating up the thermoplastic

-Material must be thermoplastic with a glass transition temperature between 80-150 \*C

-Sufficient melting temperature above 150 \*C to prevent melting under extreme room conditions (soft)

-Absorb/Reflect sound (soft)

-Heat input of the wires causing the deformation of the material

-Restricted by conduction and convection as heating mechanisms

-Produce on site

-Thermal Conductivity of both the wires and the thermoplastic

Free Variables:

-Thickness of the material

-Voltage used to heat the wires and temperature used to heat the material up

-Size of the wires to cause the deformation

-Material choice

**Revise Advantages/Drawbacks of each Method**

**Method 1: heating tape and rod**

Advantages

* Possible to quantify. Biot’s number, Fourier’s law using heat transfer and conductivity coefficients
* Obtain profiles through sag height/width ratio vs. temperature
* Many variables to experiment (thickness of sheet or diameter of wire, ambient temperature)
* Easy to do requires little labour

Disadvantages

* Obtain a uniform temperature gradient at least over the thickness of the sheet
* Is gravity enough or is an external applied force needed
* External electricity source required
* Control the voltage applied and regulating temperature using the tape.

**Method 2: Chemical etching and surface modification**

Advantages

* Etching or removal of chosen lines
* Simple weakening the sheet at specific areas and under load would facilitate the process

Disadvantages

* Chemical aspect safety
* Unsure how much the material can be bent
* Thickness obtained + glass transition temperature
* More manual labour to chemically etch
* Difficult to quantify
* Environmental impact

**Revise Heat Transfer Calculations**

- On Excel

**Revise Literary Research**

-Can we all define thermoplastics (type, properties, etc)?

-Can we all define thermoforming and how it is done?

-Benefits of thermoforming compared to blow forming or vacuum forming?