Obaminoes – Construction Issues Julian F. Fleron, Ph.D. Westfield State College 13 May, 2009

On Tuesday, 12 May I met with students and faculty/staff in the gym/auditorium/cafeteria to talk about construction issues related to our Obaminoes project.

In particular, we talked about the need for a structure that could be moved but that was also strong and light enough to support the 100+ pounds of our completed project.

The students had many different suggestions and we talked about some of the limitations.

I asked how many students had been on an airplane before. We then talked about how airplanes fly. The students had many wonderful ideas and I tried to use them to focus the discussion on the engines for thrust and the wings for lift. There are several interesting sites that students can go to to learn more about these principles, including:

http://www.grc.nasa.gov/WWW/K-12/airplane/bga.html

http://en.wikibooks.org/wiki/Wikijunior:How_Things_Work/Airplane_Wing http://www.paperairplanes.co.uk/planes.php

I suggested that we use the wings of an airplane as a possible model for our mounting panels. We then experimented with wood as a possible material. We noted that the mdf (medium density fiberboard) strips I brought in were flexible in one direction, but not the other.

I then showed students **I-beam** like beams that I had constructed from three lengths of $\frac{1}{2}$ " mdf. I talked about I-beams, often steel, and their frequent use in construction. We supported our mdf I-beam on two chairs and had several students sit on it. There was no deflection – pretty strong considering it weighed only about a pound. Some pictures of I-beams are below:







Returning to airplane wings we talked about how the ribs, spars, and skins of airplane wings performed similar roles to the structures that make up grids of I-beams in buildings, bridges, and towers:



Skeleton of an Airplane Wing



Model Airplane Wings and Tails

I then showed them what I had begun constructing to support Obaminoes. It is a structure that woodworkers call a **torsion box**. It is related not just to airplane wings, but also hollow core doors, crumple/crash zones in automobiles, etc. A photo of the skeleton of our torsion box is below:



In our case the skin is 3/16" hardboard front and back and the skeleton ½" medium density fiberboard. We suspended a completed torsion box over two chairs and had as many as a dozen students climb on top all at once. Our tosion boxes certainly are strong enough for our Obaminoes project!!