Base-X Locking Hub Redesign

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The research that was completed was a structural analysis and comparison of three Base-X hubs. The hubs connect several wires and tubular framing members to support a M305 military expedition shelter. The research was conducted to compare three hubs that include a stamped and welded hub (in current use), an extruded and welded hub, as well as a cast hub. The research was conducted in order to eliminate the timely and costly trial and error process of producing tents with each of the three hubs. The finite element analysis program ANSYS™ will be used to evaluate stresses for comparison of the different hubs.

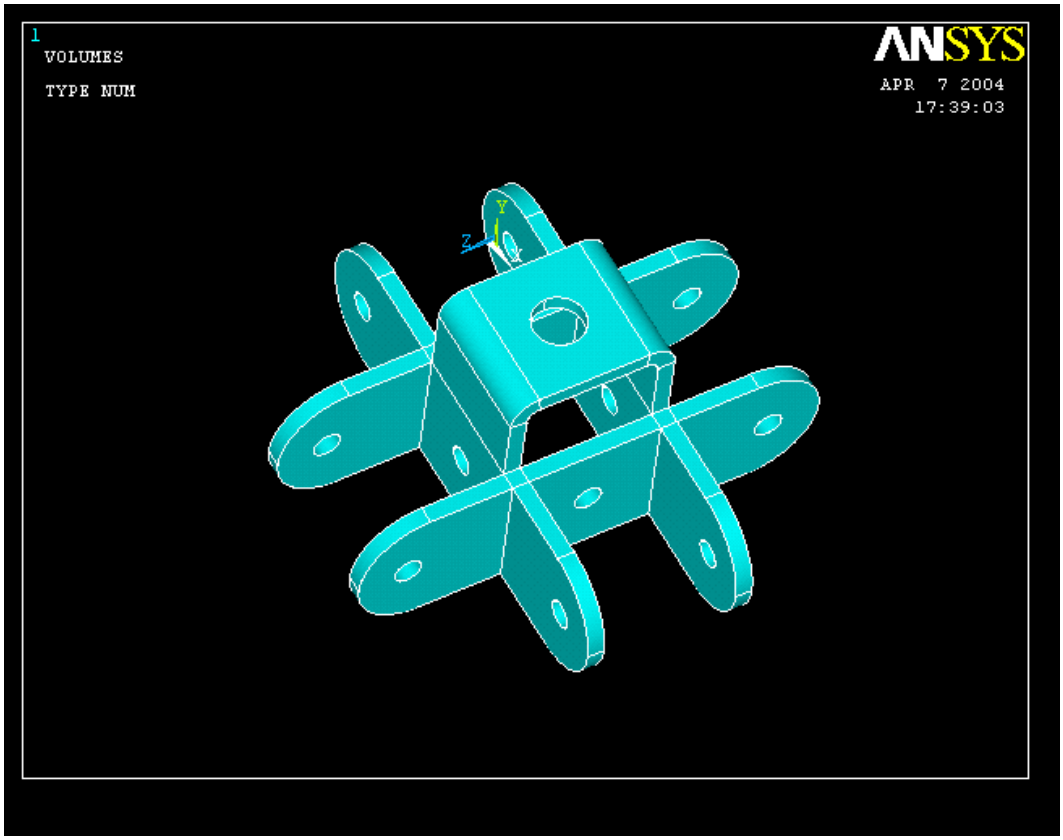
The client, Bea Maurer Inc., is an expedition shelter manufacturer based out of Fairfield, Virginia. They manufacture shelters for both civilian and military use. Their shelters are of the highest quality and outperform their competitors. Currently, Bea Maurer Inc. is looking to improve their shelters by altering the manufacturing process of the locking hubs to increase the amount of stress that the hubs can handle.

The locking hub acts as the joint on the frame of the shelter. It is the point at which all of the frame's tubing and wiring come together and are attached. The current hubs are manufactured from Aluminum. They are stamped and then welded together. The process of stamping and welding the hubs is lengthy due to the extensive welding that needs to be done in tight corners of the hub.

Our task, given by Mr. Dan Gilbert, Director of Bea Maurer Inc., was to compare and contrast three different manufacturing techniques for the hubs: stamping, casting and

extruding. We were to compare various characteristics of each technique such as: strength, ductility, cost, weight, volume and ease of manufacture. Based on the previously listed characteristics, we were to recommend the optimal manufacturing technique for the Aluminum hubs.

The objective was to determine the technique, which gave the greatest strength and yet, was relatively easy to manufacture. For the problem, our group used the modeling program, Gambit, and the finite element analysis program, Ansys 7.1.



(The Locking Hub for the Base-X, M305 tent)