

**SSC SR-1457 Aluminum Extrusion Optimization (Alexo) Mid-Term Review Meeting**  
**Minutes**

**Meeting Date:** May 9<sup>th</sup>, 2008

**Prepared by:** Matt Collette

**Participants:**

<b>Name</b>	<b>Company</b>
Christina Wang	ABS
Matthew Collette	SAIC
Bob Sielski	Self
Chris Barry	USCG
Paul Cojeen	USCG
Debu Ghosh	USCG
Jason Smith	USCG

**Minutes:**

Paul Cojeen welcomed the participants to the meeting, and gave an overview of the meeting plan. Matt Collette gave an overview presentation, updating the PTC on the status of the project. Matt Collette reviewed the overall aims and objectives of the project, and the development of the final work plan. Matt Collette reviewed the progress made on un-stiffened plate members in Tasks 2 & 3, which are now complete. The available experimental data for compression was reviewed, and sample comparisons between the experimental data and different analysis methods were presented. Lateral loading and load interaction were also explored. The results of FEA analysis of plates with variable thickness were further detailed. Christina Wang asked about the initial imperfections used in the finite element analysis of these plates, Matt Collette noted that the lowest eigenmode was used, and a similar pattern was used for all thicknesses. Bob Sielski noted that the presentation said that the strength gains of the variable thickness were of questionable value; Matt Collette noted that the largest strength increases tended to occur on plates which had low initial elastic buckling strength, and that these plates may be too slender for practical ship construction. Matt Collette also noted that in stiffened panels where the plate edge support is provided by a stiffener, not the idealized support from FEA, the results may not be as encouraging.

Matt Collette reviewed the progress on Tasks 4 and 5, noting that these tasks are still in process. The available experimental data was reviewed, and the proposed investigative methods were outlined. Sample results were shown for one of the methods. Matt Collette explained the background to the multi-objective optimization problem and Pareto fronts, noting that strength and weight are the two primary objectives for the current work. The genetic algorithm optimization method was also explained, and sample results were shown for panels optimized under compression only. Bob Sielski asked if it was possible to quantify the effects of the

various constraints on the optimum panel with this approach. Matt Collette noted that seeing how close an optimum is to a constraint value is a good indication of the impact that the constraint is having, but there is no easy way to add or remove constraints without re-running the optimizer. Matt Collette reviewed the sample optimization problem and the final report status. The schedule and progress against plan was also reviewed, Matt Collette noted that Task 5 was slightly behind schedule, but that Task 6 was running ahead of schedule and that the overall project remains on schedule. This closed the presentation.

A general question session followed the presentation. Chris Barry noted that the “hat shaped” panels and often even hollow square tubing is used for aluminum in patrol boats and similar vessels as these sections avoid any torsional stiffness problems. Chris Barry noted that extrusions up to 1350mm wide are now available, although from a limited source. Adding shear to the load interaction may be a valuable addition, as well as looking at the impact on cost as well as weight. Matt Collette noted that an extension of the current method to cost would be very valuable, although the work entailed would be too great to achieve this goal on the remaining budget. For high-speed vessels, the final lifecycle cost is a complex combination of build cost, operating cost, and maintenance costs, but such an optimization approach is suitable for investigating these issues if a cost model is available. Chris Barry noted that the methods should be able handle the types of welding distortion typically allowed by the ASTM and Navy specifications, Matt Collette will follow up with Chris Barry about these standards.

A closed executive session followed, the PTC concluded that overall they were pleased with the progress on the project. The PTC asked for a follow up on the distortion standards in the next phase of the work, and the completion of a “Recommendations for future work” section in the final report summarizing how this work could be extended. Matt Collette agreed with these suggestions, and agreed that none of the discussion during this meeting had increased the scope of the project. Matt Collette will also forward the names and contact information of people from the Aluminum Association and ALCOA who may want to join the PTC to Paul Cojeen. Paul Cojeen closed the meeting.

**Action Items**

<b>Number*</b>	<b>Description</b>
2-1	Matt Collette will follow up with Chris Barry about fairness standards.
2-2	Matt Collette will add a section on recommendations for future work to the final report.
2-3	Matt Collette will forward additional potential PTC members to Paul Cojeen

\*Number in form X-Y, where X is meeting number at which the item was first agreed, and Y is a sequential counter for action items in each meeting.