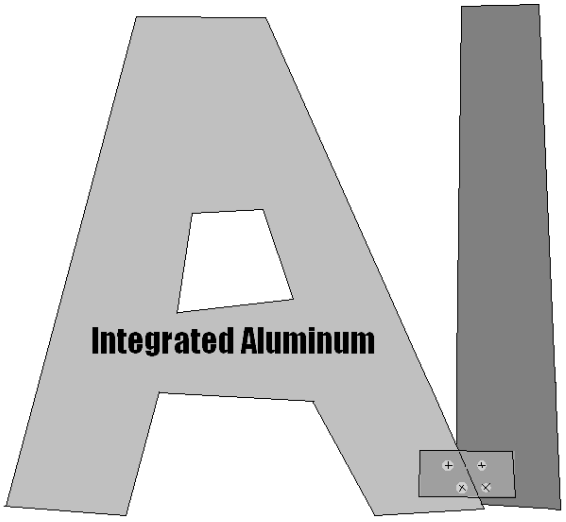
SNAME Boat Design Competition

2008

Integrated Aluminum

Design History Notebook



Meeting #1 (October 17)

Goal:

- Establish team – name, member, leader
  - Register for SNAME Competition

Team members:

- David Tubbs
- Josh VanTasel
- Logan Vaughan
- Kyle Svetecz

Team name: Integrated Aluminum

Team leader: Josh VanTasel

We enter all required information into the registration form, and then submit the form.

Meeting #2 (November 20)

Goal:

- Develop design statement

- Gather knowledge about task

Purpose of vessel (Mission statement):

-A boat designed for high speed and maneuverability, and to carry a payload of 100 pounds.

Measure of merit for vessel:

-Maximum speed, maneuverability and stability.

Owner's design requirements:

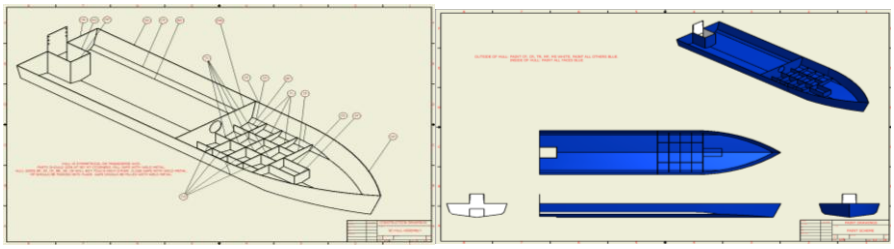
-Design requirements (In decreasing importance)

- Small, seaworthy vessel
- Lucid manufacturing design (No complex curvature)
- High speed and maneuverability
- Payload capacity (100 lbs + propulsion system)

-Owner's description of boat's tasks

- Drag-race
- Speed/Maneuverability test course

-Pictures of previous competition boats for reference



Design constraints:

- (2)- 10' x 5' , 1/8" thick steel sheets
- (2) paint colors
- (2) paint zones
- 3/4" plywood

Meeting #3 (November 21)

Goal:

- Develop design concept

Trade-offs:

-Weight, hull shape vs. speed

-Weight, hull shape vs. maneuverability

-Weight, hull shape vs. stability

Possibilities:

-Outrigger canoe

- High stability
- High speed
- Low maneuverability
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-“Point-nosed-boats”

- High speed
- Average stability
- High maneuverability
- Complex curvature

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-“John-boat”

- High speed
- High stability
- Low maneuverability
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We choose a design concept that incorporates elements of speedy “John-boats” and maneuverable, conventional “Point-nosed-boats”.

Meeting #4-5-6-7(November 24-27)

Goal:

- Sketch preliminary design concepts (ACAD)

Design elements:

-Hull (Length)

-Hull shape

-Beam

-Draft

-Bow shape

-Side shape

Iterations:

-1st

- Shallow draft
- Flat, short hull
- Stunted bow
- Medium beam
- Angled sides

-2nd

- Deep draft
- Flat, short hull
- Stunted bow
- Medium beam
- Angled sides

-3rd

- Deep draft
- Flat, medium-length hull
- Pointed bow
- Wide beam
- Angled sides

-4th

- Deep draft
- Flat, long hull
- Pointed bow
- Wide beam
- Angled sides

-5th

- Medium draft
- Flat, long hull
- Pointed bow
- Small beam
- Angled sides

Meeting #8 (December 3)

Goal:

- Choose and refine design concept

After examining the elements of the various design concept sketches, we decide on Iteration #5, while acknowledging the need to refine certain elements.

Iteration #5 design elements:
-Long hull
-Small beam
-Pointed bow
-Flat hull
-Angled sides
-Medium draft

Changes:
-Decrease draft of the vessel to increase speed
-Add additional plates in hull, making it more angled to increase maneuverability

Meeting #9 (December 4)

Goal:

- Draw design concept (ACAD)

Drawing dimensions:

-Length (10 ft)

-Width (3 ft)

Meeting #10 (December 5)

Goal:

- Dimension design drawing for Sectional Area calculations

Using AutoCAD we “slice-and-dice” each section of the boat then transfer each waterline to the various sections.

Meeting #11 (December 8)

Goal:

- Enter measurements for Sectional Area
- Evaluate results of Sectional Area calculations

After entering all figures, the resulting DWL lies at 0.83 ft.
The displacement value lies at ca. 680 lbs, which cannot be achieved by the weight of the boat, sandbags and propulsion system.
We opt to change the distance between waterlines to obtain a smaller displacement.

Meeting #12 (December 9)

Goal:

- Dimension design drawing for 2nd iteration of Sectional Area calculations

Meeting #13 (December 10)

Goal:

- Enter measurements for 2nd iteration of Sectional Area calculations
- Evaluate results of Sectional Area calculations

After entering the 2nd set of measurements, the DWL changes slightly.
The 2nd displacement value is significantly lower, at ca. 400 lbs.

Meeting #14 (December 11)

Goal:

- Dimension design drawing for Moment calculations

Meeting #15 (December 12)

Goal:

- Complete dimensioning for Moment calculations

Meeting #16 (December 15)

Goal:

- Evaluate results of Moment calculations

The weight of the boat is near the displacement value, which indicates the best possible DWL.
The trim is ca. 15; furthermore, the number indicates that the boat trims by the bow even though most of the boat's weight lies at the stern.

Meeting #17 (December 16)

Goal:

- Check accuracy of Moment calculations

We confirm the measurements, yet the trim still signals that the vessel trims by the bow.

We review the Competition Guidelines and online FAQ's and determine that we probably had been using the wrong reference point.
Therefore, we pick a new reference point on the bow instead of on the stern.

Meeting #18 (December 17)

Goal:

- Enter measurements of 2nd iteration of Moment calculations

Meeting #19 (December 18)

Goal:

- Evaluate results of 2nd iteration of Moment calculations

After entering the new measurements, the trim value still informs us that our design would lean towards the bow.
Due to this problem, we conclude to compile an e-mail including our drawings and calculations, which we will send to the Shipbuilding Competition contact so as to ascertain our mistake.

Meeting #20 (December 19)

Goal:

- Review and send materials to Shipbuilding Competition contact

We send a drawing of our boat design, along with the drawings used for the Sectional Area and Moment calculations, and the Excel spreadsheet containing all of our entered data.

Meeting #21 (January 5)

Goal:

- Enter measurements of 3rd iteration of Moment calculations
  - Evaluate results of 3rd iteration of Moment calculations

Finally, after three attempts, our boat actually leans in the direction that weight is added.

Meeting #22 (January 6)

Goal:

- Plan and draw arrangements for propulsion system and load

Because of the weight of the steering assembly and motor at the stern end of our boat, we counterbalance it with the 2 sandbags and battery at the bow end.

The steering box will be housed on a projection from the stern plate.
The motor will clamp to the stern plate.
To accommodate the battery and sandbags, a plate will be welded inside the hull on which these items will rest.

Meeting #23 (January 7)

Goal:

- Plot “Deliverables” to drawing template

We format the drawing template, and begin “cleaning up” our drawings to place them on the sheet and print them.

Meeting #24 (January 8)

Goal:

- Plot “Deliverables” to drawing template

We still have to plot the Paint drawing, Loading diagram and Nesting plan.

Meeting #25 (January 9)

Goal:

- GET THIS BOAT DONE!

On the last day, we finish the touch-ups for the three remaining drawings and then finally are able to send our design package to the judges.
Now, we wait…