CRESCERE
MARINE ENGINEERING, INC.

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February 07, 2007

From: Tullio Celano III P.E.
To: Tom Allison, EPB&B Insurance
Cc: Philip Kazmierowicz, Rolling Boat, Inc.

Subj: **SUMMARY OF ENGINEERING FOR ROLLING BOAT, INC.**

Beginning in mid-July, 2007, Crescere Marine Engineering, Inc., has performed many hydrostatic and structural analyses to support the design and development of a product line for Rolling Boat, Inc. This product line will consist of pontoon-like vessels, characterized by the following special features:

1. Large deck areas, up to 16.5' wide.
2. Ability to carry large numbers of people, and hoist aboard personal watercraft.
3. Legally trailerable without permitting, through the use of foldable wings.
4. Efficient design of trailering structure to avoid duplicity of structure, and increase trailerable payload.
5. Excellent transverse stability characteristics, owing to buoyancy chambers provided on these foldable wings.
6. The use of surplus food-grade polyethylene drums for buoyancy.
7. Vessel fully kitted for end-user or franchise assembly near point-of-sale.
8. Several versions available through modification of basic hull designs.
9. Applications for commercial usage, such as light construction support.

Engineering Tasks Accomplished To Date

The ensuing paragraphs describe the engineering analyses performed to date, and where applicable, describe the progression of modifications proposed.

1. Hydrostatic Evaluation of 29' x 16' Rolling Boat

A numerical hydrostatic model of a standard nosecone and barrel were created, then arranged according to the locations of the first prototype vessel. A full set of curves of form, and cross-curves of stability were generated for general use.

The vessel was checked against the stability requirements for cargo barges (46CFR174), since its wide and shallow hull form generates peak righting arm values at heel angles too low to meet standard passenger vessel requirements of 46CFR170. The vessel was seen to possess outstanding initial stability values, and maintain positive righting arm values out past 60º with a secured payload placed on the main deck. Additionally, the numerical models of the vessel were verified to meet the capacity requirements recommended by ABYC (American Boat and Yacht Council) for pontoon boats.

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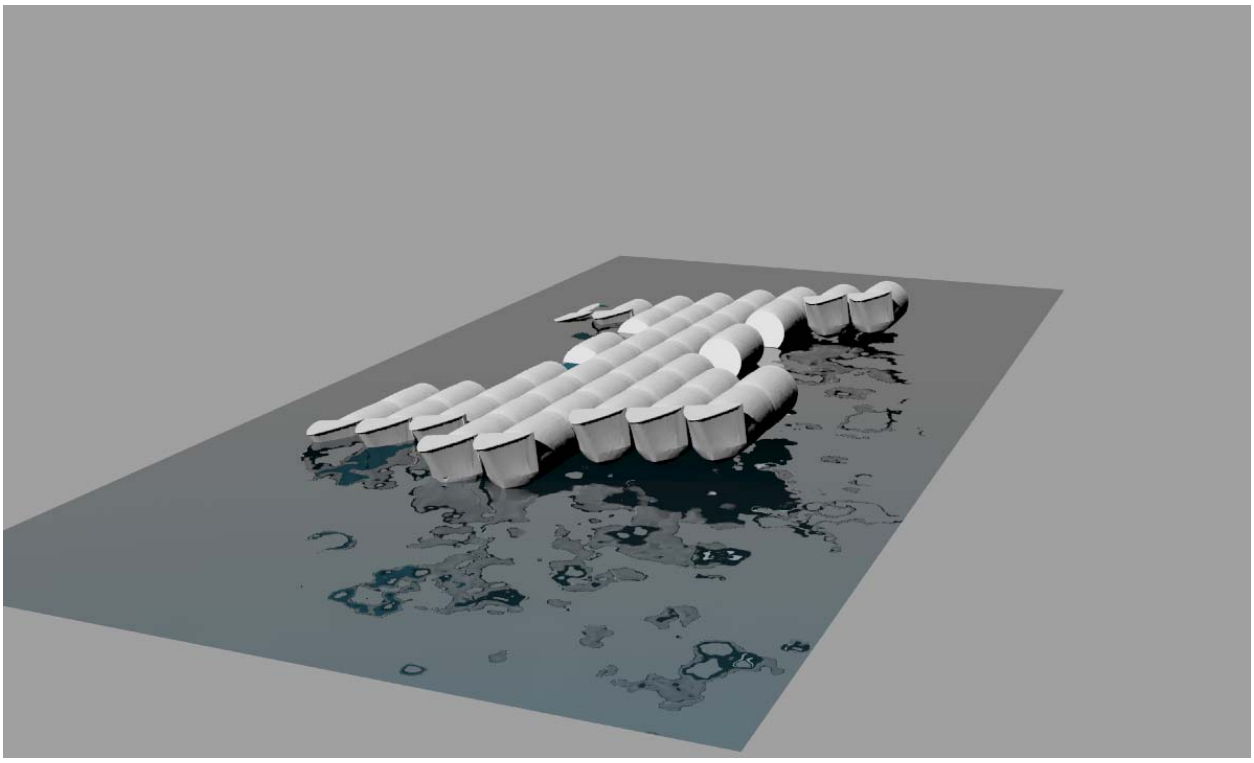
The vessel was evaluated in its base configuration to be capable of safely carrying 20 people, based on a crowding analysis.
The 29' x 16' Rolling boat prototype was satisfactorily evaluated for an additional configuration, one with a 2,800 lb camper and 10 people aboard. The camper configuration, because of its significant windage area, was evaluated using the U.S. Navy's criteria for beam winds and rolling, and found to pass these requirements. The physical vessel was presented on 16 July, 2007 in this configuration, and subject to a simple inclining experiment, which verified the center of gravity location, and hydrostatic calculations generated by the GHS software.



2. Hydrostatic Evaluation of Rolling Boat Jeep Carrier

A preliminary evaluation of the ability of a newly designed version of the vessel to carry a small SUV was performed. The vessel was designed to be only 12' wide when deployed, and lacked adequate buoyancy and stability to safely carry the SUV. This design was postponed, and attention diverted to the newly designed PWC Carrier, described below.

3. Hydrostatic Evaluation of Rolling Boat PWC Carrier

A shorter version of the boat, designed to be carried on a single-axle trailer, was designed by Rolling Boat. This boat was analyzed hydrostatically in two main hull configurations, one with four wings, and one with only two. The four-wing version is capable of carrying 15 people in its base configuration, or 8 people on an upper platform. The two-wing version is capable of

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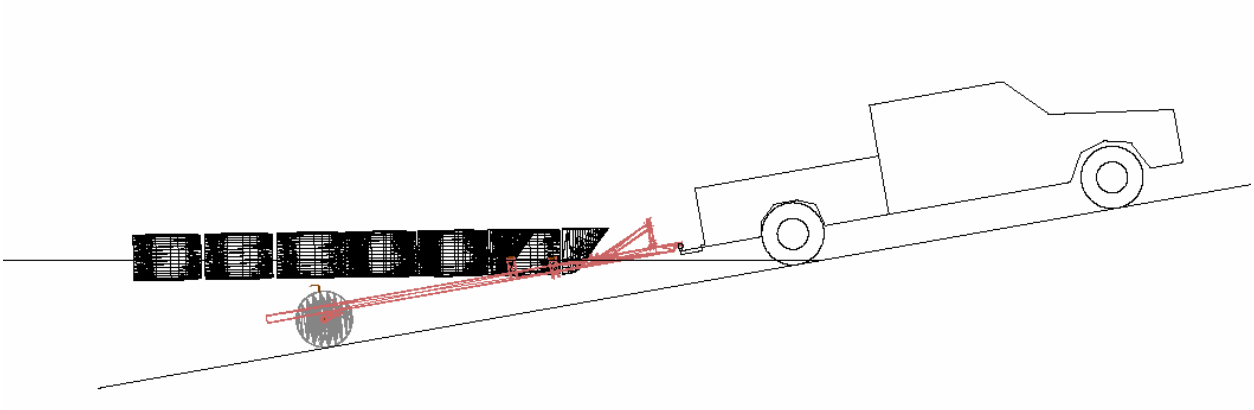
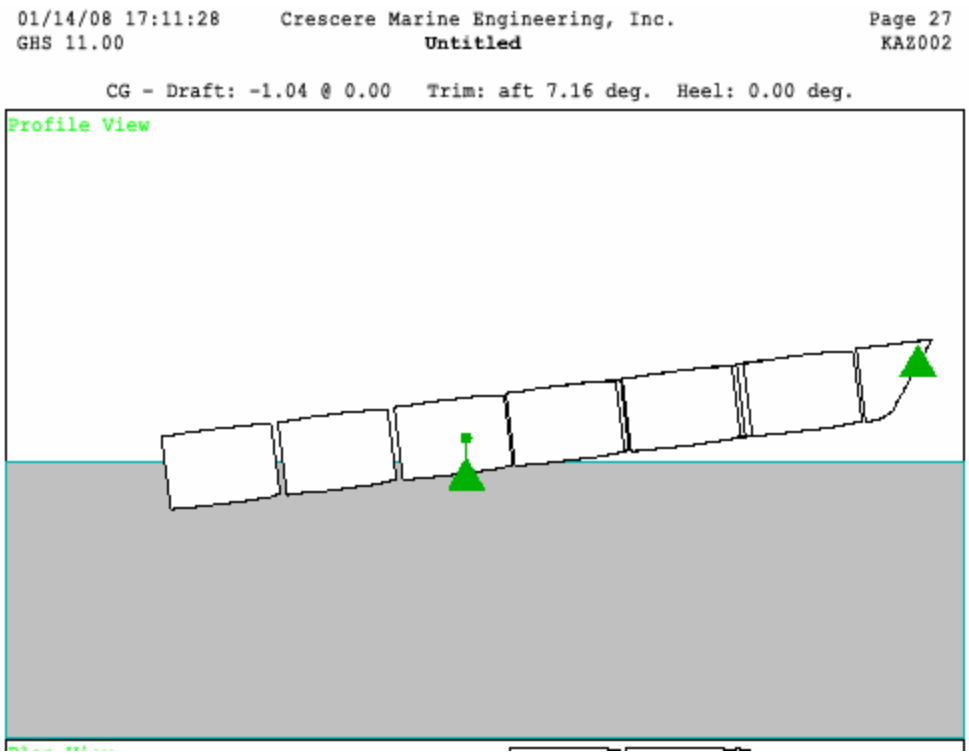
carrying 10 people, or 5 people with two PWC's. The vessel is capable of launching the 1,000 lb PWC's while waterborne.

4. Launching Simulation

To determine the maximum expected loadings on the hull girder during launching, a hydrostatic simulation was devised that could simulate launching the 29' x 16' boat on a range of ramp angles from 10º to 15º, with and without the two 1,000 lb PWC's aboard. These computations were repeated for the second PWC Carrier prototype. Several design iterations were performed, including complete redesign of the trailer to mitigate the maximum bow support reactions during ramp launching.





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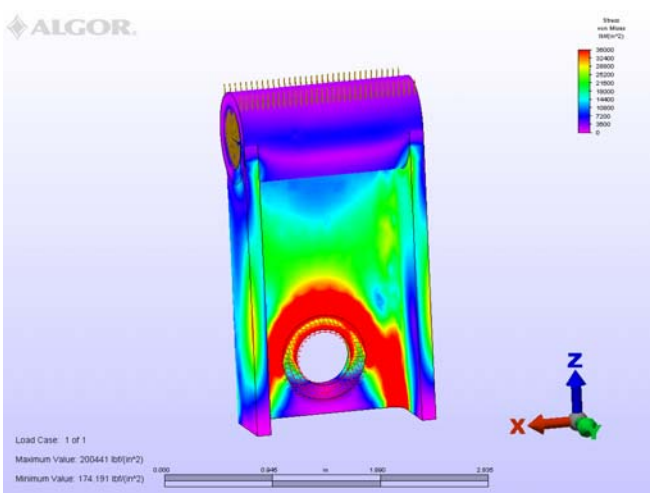
5. Trailering Stability

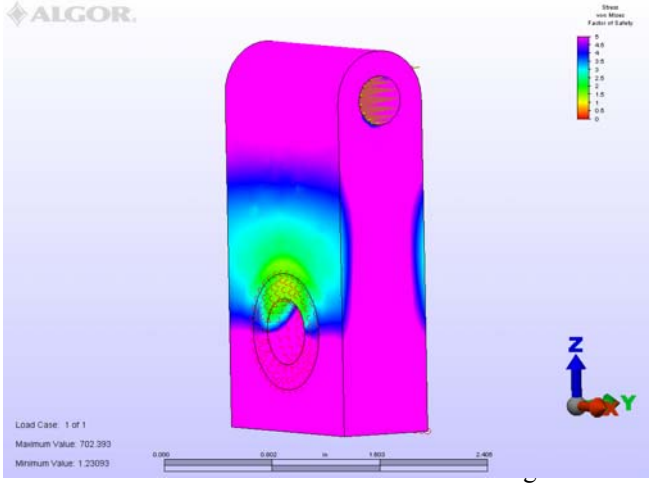
A numerical computational model was devised to predict the cornering stability characteristics of the loaded trailer, based on factors such as the tongue load, height, suspension stiffness, wheel track, lateral coefficient of friction with the roadway, and center of gravity height. It was determined that the axle track width currently planned is too narrow for unrestricted loading of the boat, but could be satisfactorily used, with some limitations. Widening the axle to a more standard track width is recommended for follow-on designs to gain stability for versions designed to carry high VCG loads, such as PWC's, campers, or upper platforms.

6. Structural Analyses

The following are examples of structural evaluations performed to date. Each of these were based on Rolling Boat's design, and modifications proposed, where required. The design methodology used for all the primary structural elements of the boat is to determine the maximum expected loading condition, apply a factor of safety of 3.0, then maintain these stress values at or below yield for the material. This is a more conservative approach than a standard Allowable Stress Design evaluation, and leaves a significant margin for dynamic loading, and maloperation. The primary engineering materials used in the development of the vessels is 6061-T6 extruded aluminum, and 304 (18-8) stainless steel bolts. Certain design requirements have the factor of safety already built in, such as the specification for hand railings to sustain a 400 lb load before failure. Finite Element Analysis (FEA), which is a method of performing computer-numerical simulation of the behavior of materials under various loading, was used extensively, and checked through the use of traditional hand-calculation methods.

a. Wing hinge design: The existing Stainless Steel hinge assembly was modeled using FEA. An alternative billet aluminum design an analyzed. The billet replacement was seen to have much higher strength and stiffness values, while providing more consistent alignment, and easier assembly.





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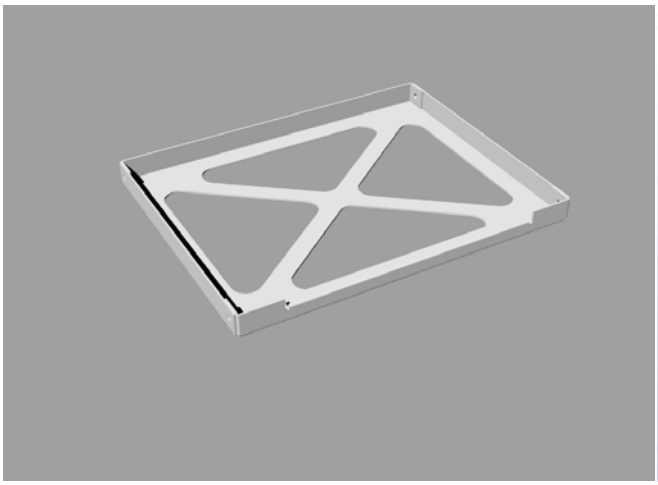
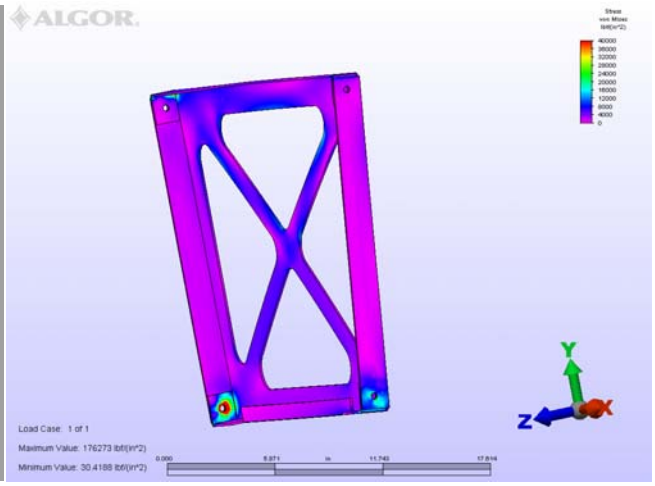
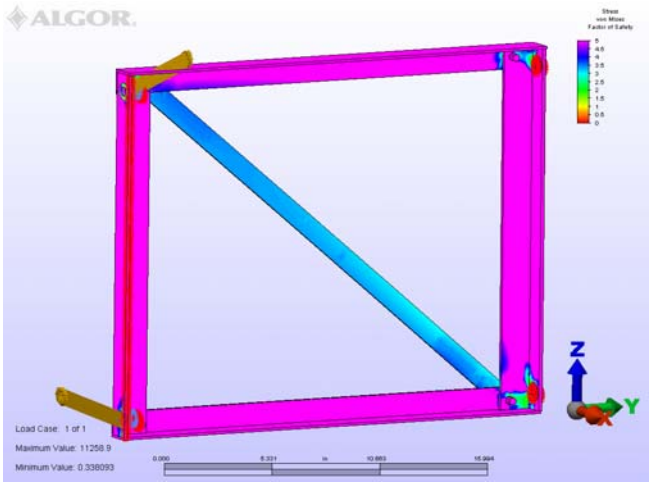
b. A one-piece bent-plate endcap assembly was detailed, modeled and analyzed in several different configurations, including one with an extra lip to provide a smooth bearing surface for the polyethylene barrel. This design was found to be adequate for carrying the maximum loads imparted by the structure.





c. A bolted end-cap assembly was designed that could replace the existing welded structure to potentially reduce fabrication costs, lower shipping costs, and put more of the assembly effort in the hands of the consumer.



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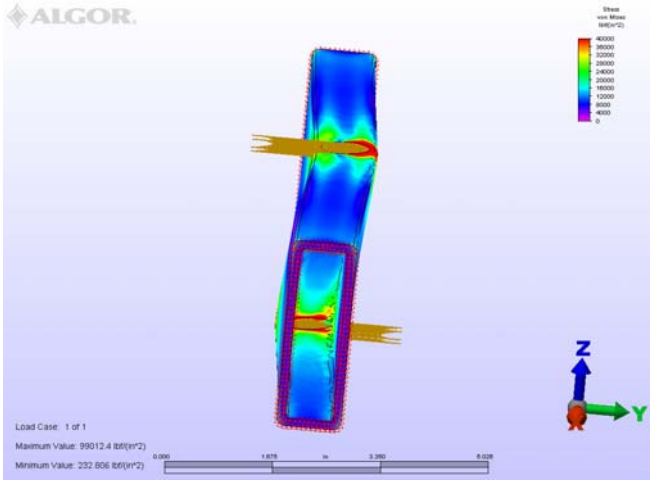
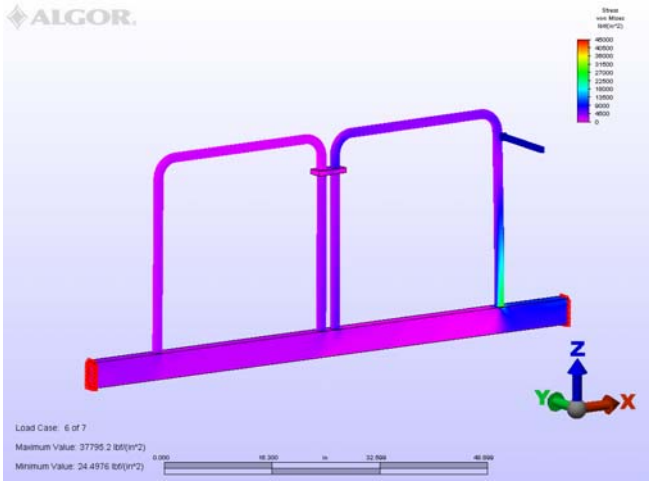
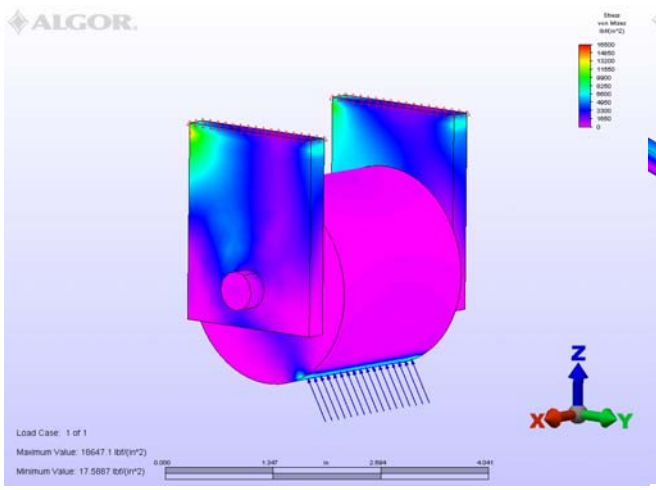
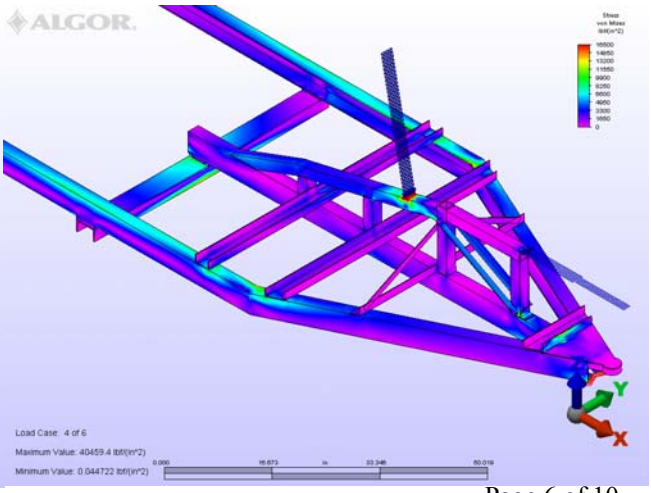
d. The railing was analyzed for point loads of 400 lb to determine if the plug method of attachment to the vessel structure was adequate, and whether cutting the necessary holes in the main frame rails would weaken them. The original design, using a 3" x 1" x 0.125" rectangular tube frame rail was found to be inadequate to bear the loads. Several iterations of analysis were performed, adjusting spacing of adjacent holes. The final railing design for production is constructed from bent 2" x 0.25" wall 6061 tubing, that provides adequate strength to allow the required height and bear the loads required by ABYC





e. Trailer Tongue Structure: The forward portions of the trailer were analyzed to determine if the bow reaction load due to launching could be borne by the existing structure. A complete re-design of the trailer resulted in the current design, that incorporates a bow-roller track, which permits a more conventional launch and recovery procedure.





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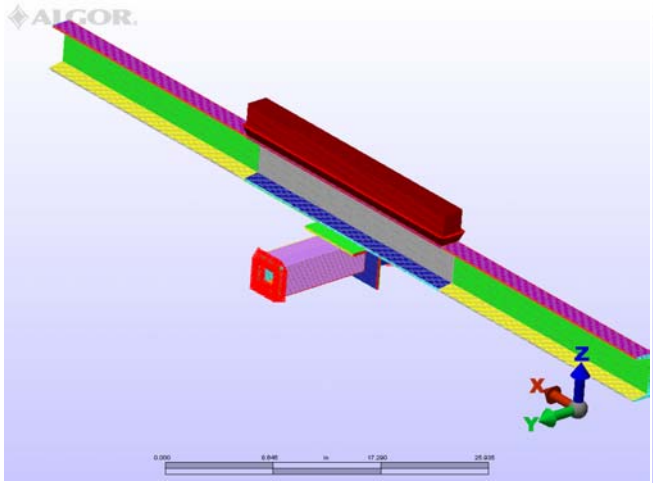
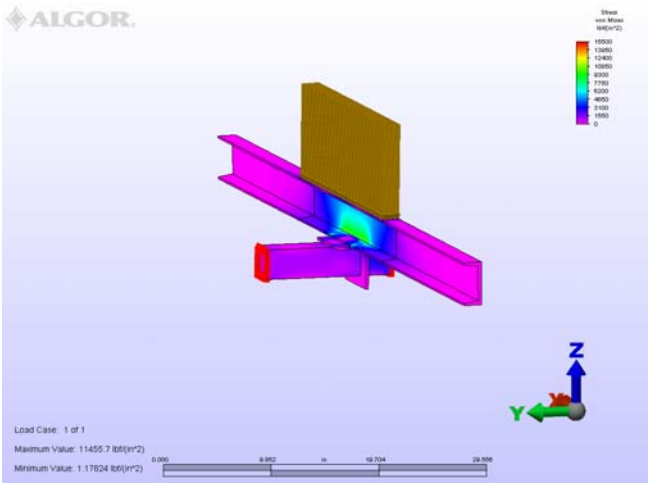
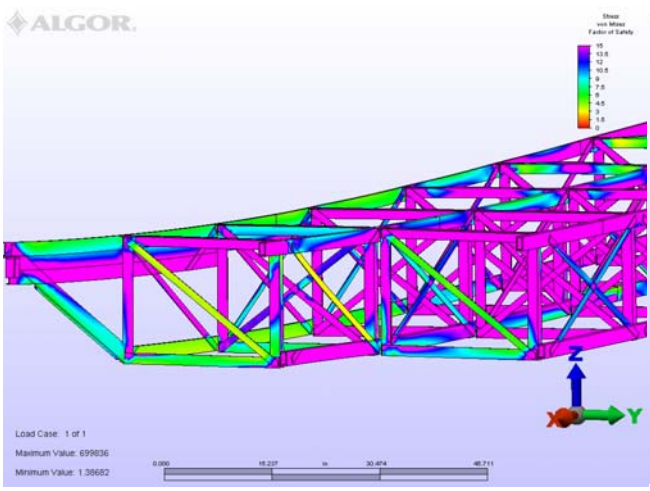
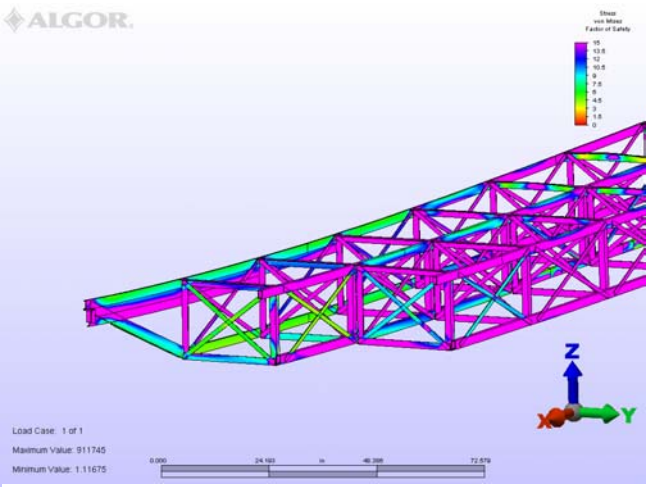
f. Trailer Axle Mounts: The trailer frame rail in way of the existing axle mount was analyzed to ensure that the channel web would not cripple under load. It was found to be satisfactory. The PWC trailer design analyzed requires a narrow track axle as discussed above.





g. Vessel Primary Girder Response: To ensure that the main hull girder of the vessel was adequate, the structural characteristics were computed. It was found that for the PWC design, the entire loaded vessel could be safely balanced over one transverse frame, without causing damage due to bending moments. The loads were checked both using the GHS hydrostatics program, as well as with a full FEA model of the structure.





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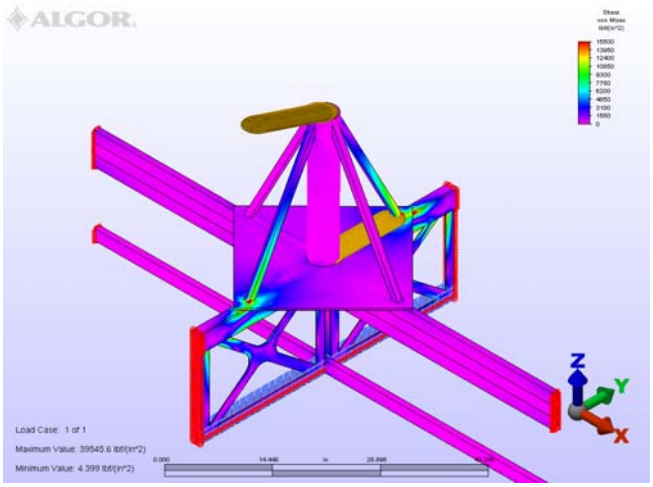
h. The vessel's bow structure was modeled and analyzed to ensure that the bow reaction force during launching and recovery could be focused directly on the main spar. This analysis was completed satisfactorily.
i. Crane Foundation: The boat's bow structure was also subject to loading due to lifting a PWC using the installed crane. For lifting over the side, much of the load is transferred to the adjacent end caps. The crane mounting was found to be adequate for a 1,000 lb lift.



j. Wing Analysis: The longitudinal members of the wings were originally designed as angle extrusions. An analysis revealed that these could be satisfactorily replaced with flat bar. The design criteria for the wing structure is to be able to statically submerge all the attached barrels, while maintaining a safety factor of 3.0. The structures to which the cantilevered wings are attached were fully analyzed as well.

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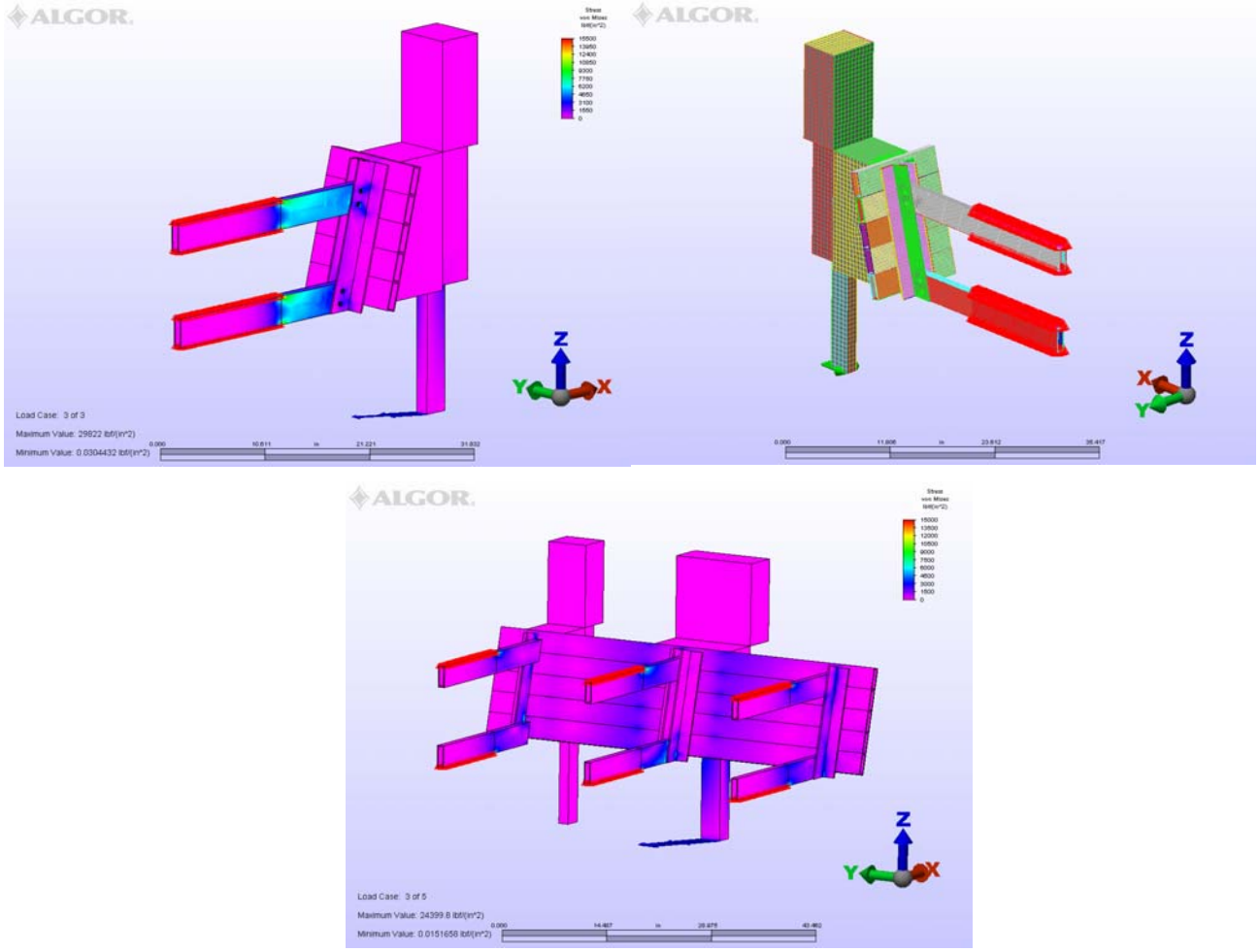
k. Transom/Motor Mount: A model of the existing motor mount design was created, and subject to transport loads, as well as maximum thrust and steering loads. A smaller, single mount intended to be used with a 15hp motor was also analyzed. Both designs were found to be satisfactory. A revision to the design, which included shifting the upper members down to accommodate a larger frame rail, and reduction of the size of the angle supports was performed as well.



7. Follow-On Designs

The majority of components developed for the Rolling Boat prototypes will be adaptable across the proposed product lines. Certain structural items, such as the wings, motor mounts, crane mounts, and other parts that are not length-dependent, can attached to standard mountings for any size boat, without any further engineering being required.

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To certify a new configuration, a hydrostatic and longitudinal strength analysis must be performed. The design will allow for the longitudinal structural members to be sized up as necessary to support longer boat lengths, or heavier loads, without changing the configuration of the basic boat. This is similar in concept the offerings see in light and medium-duty trucks. It is possible to purchase very similar looking vehicles, that share many common parts and dimensions, but one has heavier frame members and running hardware.

As part of these analyses, the maximum payload capacities are determined, with respect to stability, and well as strength. Certain dense cargoes placed close to amidships, for instance, can cause significant bending stresses. For certain applications, different cargo payload limits may be specified for launching than for regular waterborne operation. For such cases, the owner's manual will clearly state these limitations.

8. About Crescere Marine Engineering

Crescere Marine Engineering, Inc., engages in marine consulting and engineering. Its recent projects range from Naval Architecture for small business boat-builders, such as Rolling Boat, Inc., to large general contractors engaged in marine-related projects requiring the transportation, placement and launching of large marine structures. The firm provides new vessel design services, modifications, and repair planning. The firm has one Oregon-Licensed Professional Engineer on staff, and carries professional liability insurance, as well as a comprehensive errors and omission policy.

Conclusion

Crescere Marine Engineering, Inc., has, and plans to continue to provide technical guidance and analysis services as Rolling Boat, Inc. grows and brings its products to the marketplace. Rolling Boat's design and fabrication team has shown excellent know-how and ingenuity in solving the many challenges that have presented themselves during development. At each and every step in the process, Mr. Kazmierowicz stops to ask what the right way to do things is. When not satisfied with the form or function of any particular aspect of the project, he has not hesitated to invest to make the necessary changes. It is apparent to me, as an outside and independent consultant, that his number one objective is to build a safe and reliable product, with many applications for both recreational and commercial markets.

Sincerely,

Tullio Celano III P.E.
President, Crescere Marine Engineering, Inc.