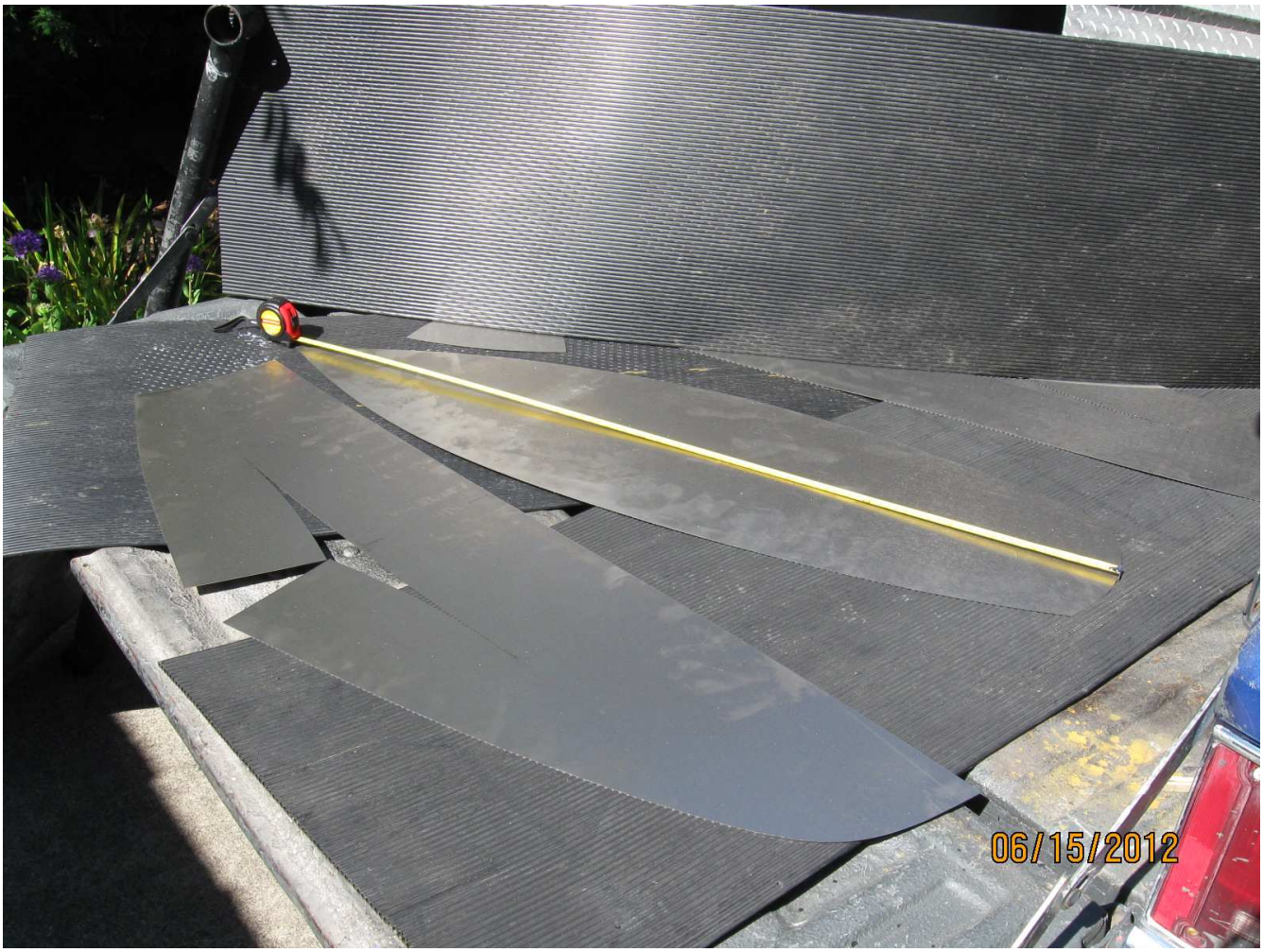
Making 1:10 model of Origami boat (Brentboat style)

by Wild_Explorer (member of Yahoo Origamiboats group)

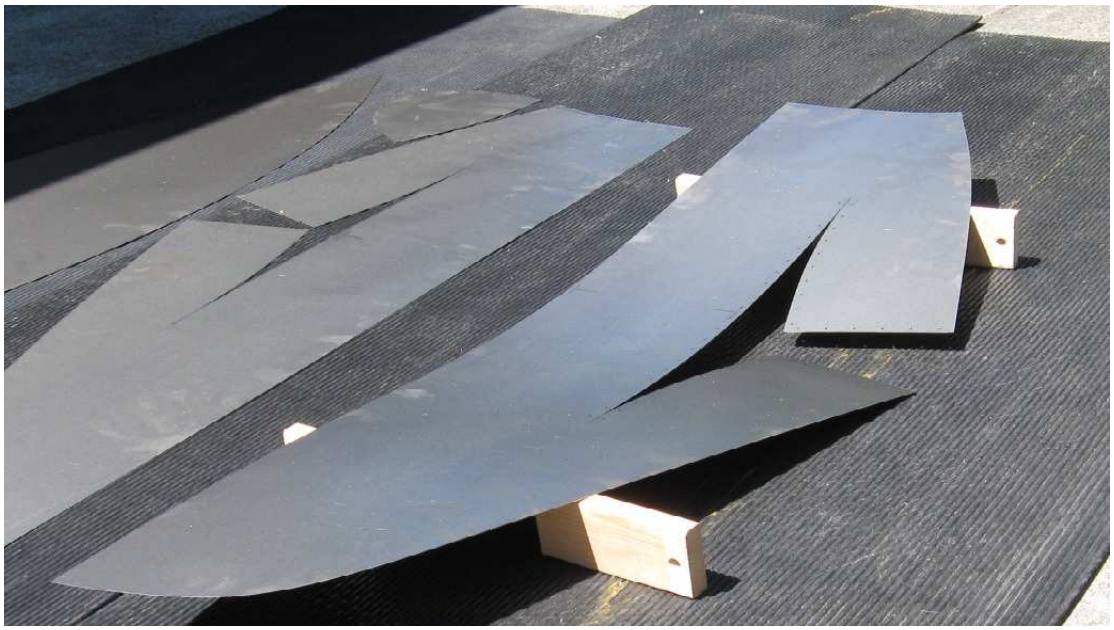
Disclaimer: Inspiration, expertise and help of Brent Swain - designer of Origami sailboats (26, 31, 36 and 40 ft long) made this modeling project possible.

STEP #1

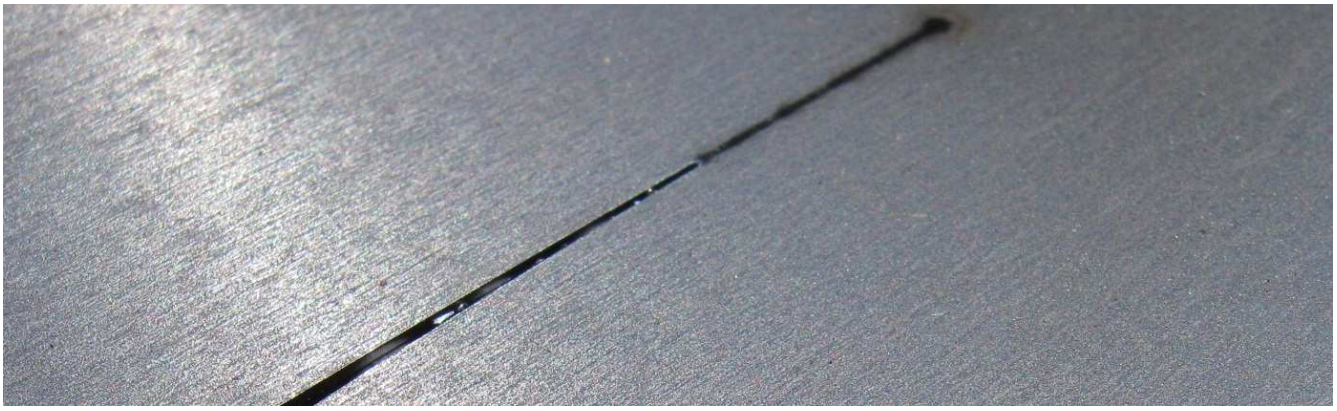
The purpose of this model for me was to see behavior of full size plate and gain experience in folding of the hull. Recommendation for correct metal's thickness for 1:10 model from Yahoo group member Matt Malone was 26ga. I found that it might be too floppy and went for 24ga steel. I hoped that 24ga steel will simulate stiffness of the flat plate with longitudinal reinforcement. Parts were laser cut for better precision.

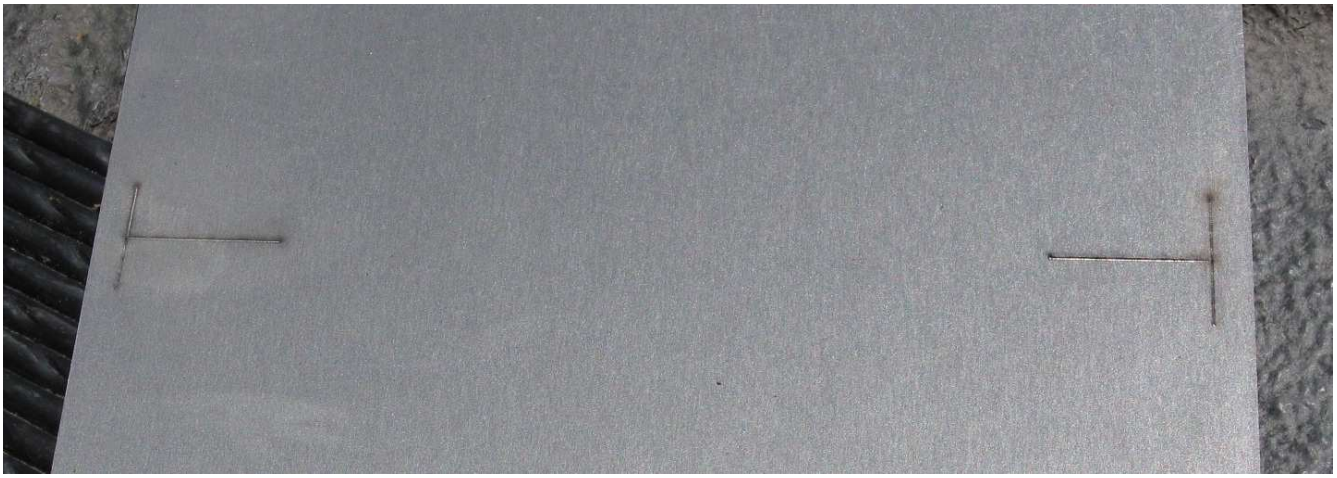


Steel arrived ;-))
Full deck is about 46 inches long. I use full deck to simulate strength of real boat (with foot-well and superstructure - cabin, pilothouse). Making a model will be a good exercise for me before going full scale (building real boat).



As you can see, flat 24ga steel sheet is pretty floppy. Origami hull will gain it strength step by step. Following Brent's recommendations and sequence for folding the hull you should not have any problems to get strong and perfectly fit hull.





Because of limitation of laser-cutting equipment, it was impossible to cut the dart as far as necessary. I had to find a compromise. Uncut portion of the dart was just marked (engraved) by laser for reference (top picture). It gave me an idea to mark midships marks (middle picture) and extend the hull for easier fitting of the transom. Original position where the transom suppose to be was engraved on hull's pattern (bottom picture).

There is a limitation for cutting darts in full-size pattern as well (plasma or oxy-cutting). Brent recommends to “score” plate to extend darts for easier folding of the pattern.

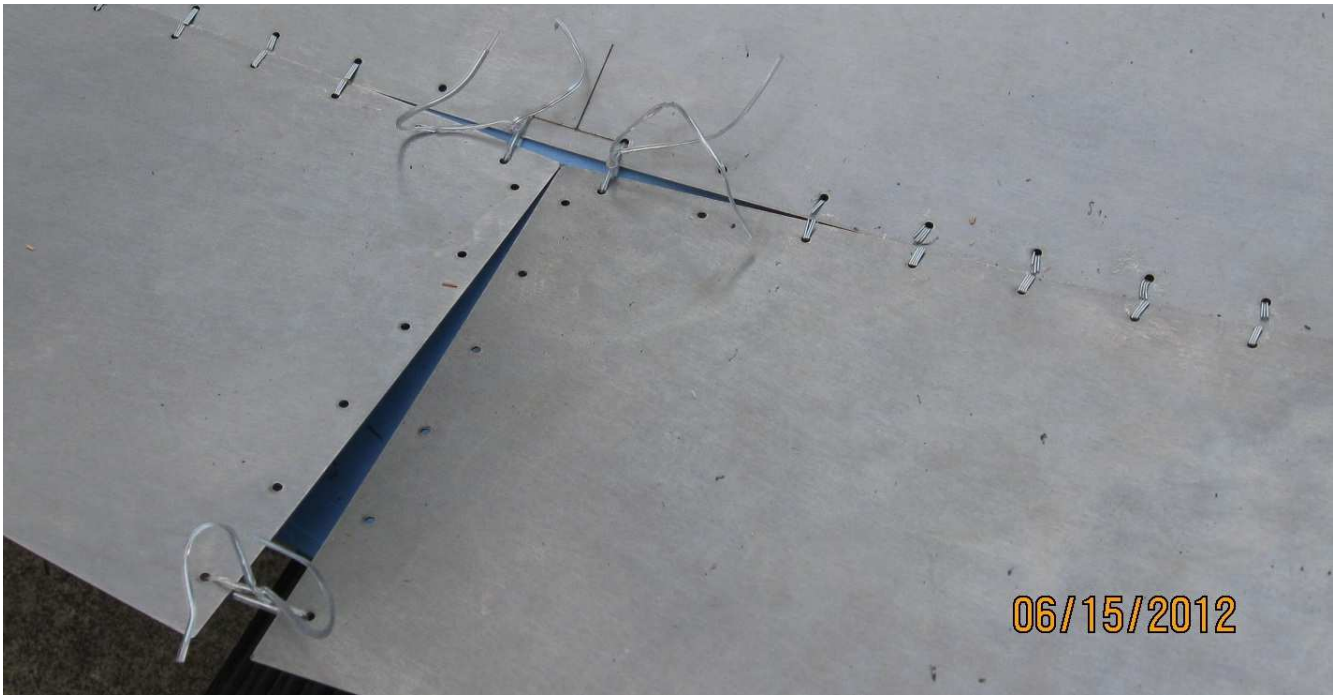
Well... No problem for full size pattern, but it is a challenge for 1:10 model...

This is my first attempt by using micro rotary tool. It did not work good. Line was wide and not deep enough.... As always, the best solution is simple one...

This tool worked MUCH better. I was able to make deeper and narrower groove in 24ga metal than using “micro grinder”. It took some elbow grease to do it, but modeling is serious business ;))

All darts were “scored” to extend the dart's cut to proper length. Next step was folding half-hull's pattern. For easier modeling, I decided to do it by “stitching”. One pattern had holes laser-cut along the edge of the seams. Another one did hot have it (to save on cutting cost). That was a mistake. I had to transfer holes to another pattern, drill holes and grind off sharp edges – it was time consuming.

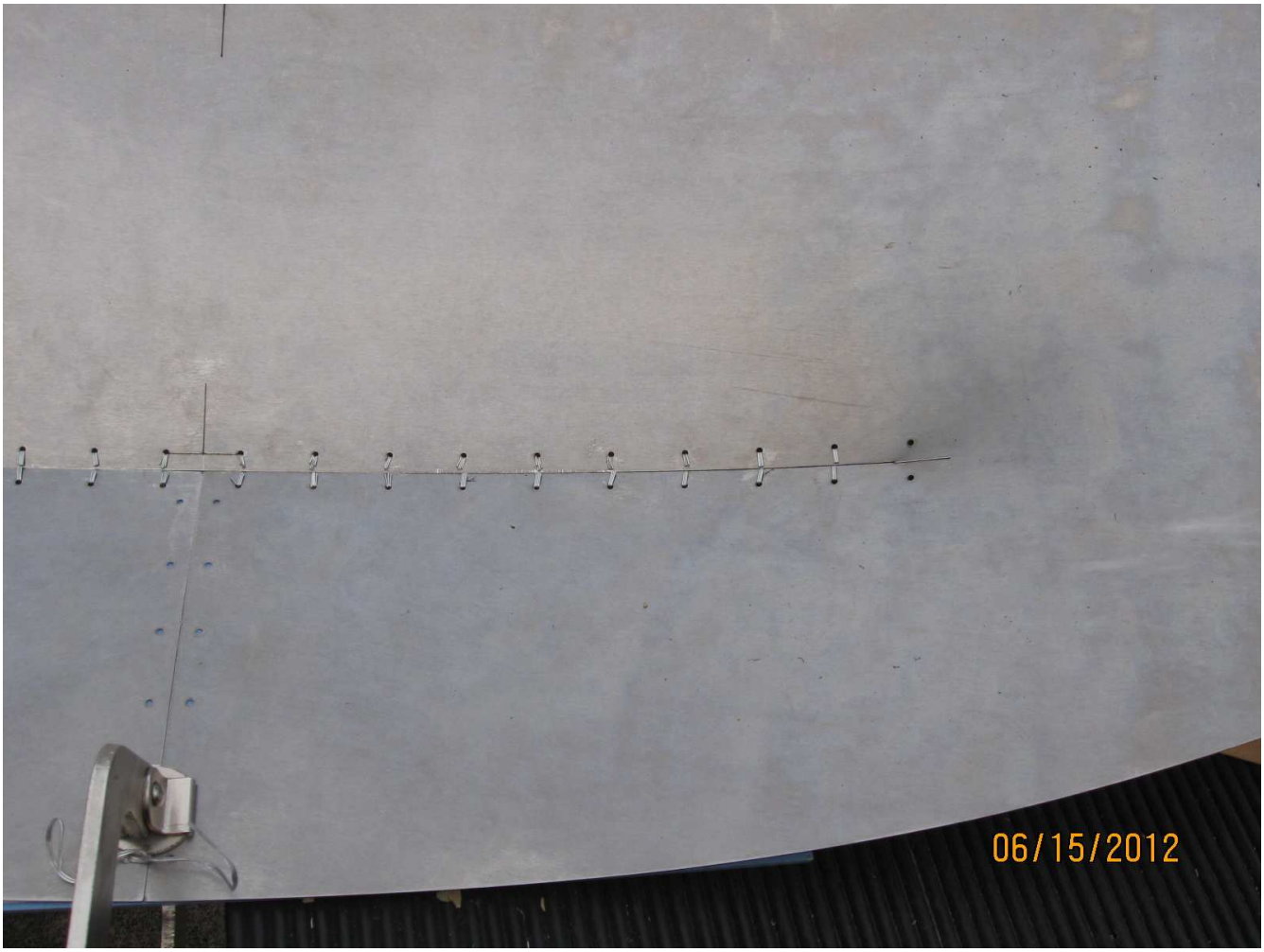
Transferring holes with auto center punch from one pattern to another. I forgot that I had set of transfer-punches (you just need to choose the one which perfectly fit to original hole).



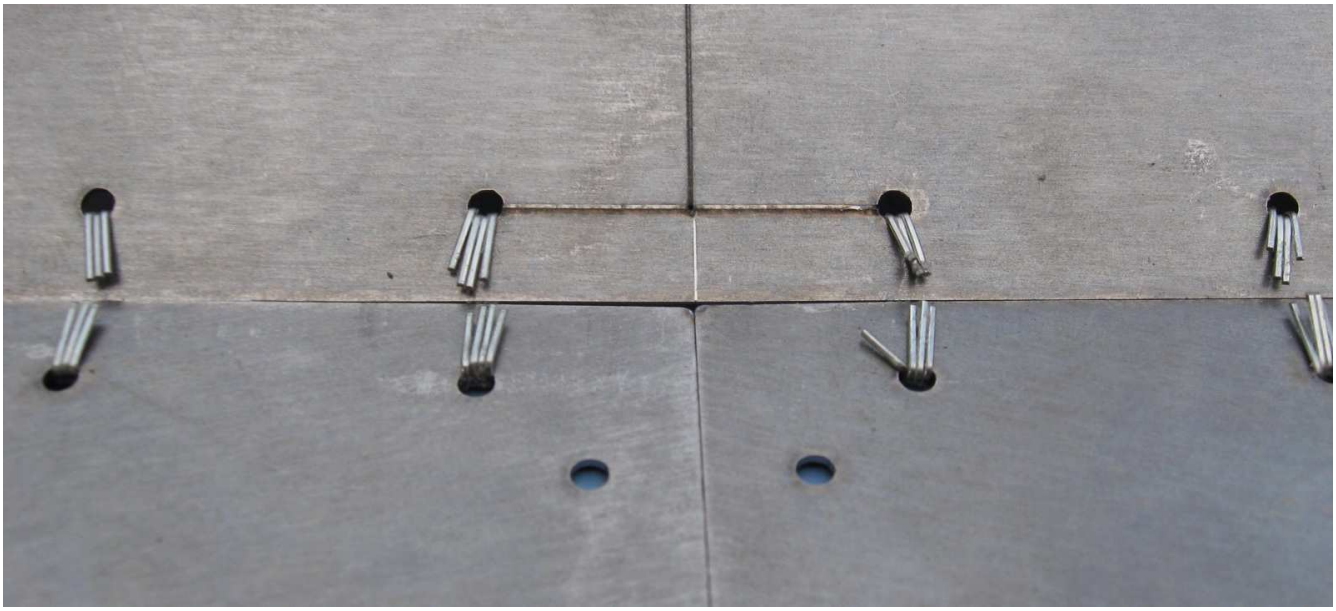
Low-tech meets High-tech ;))

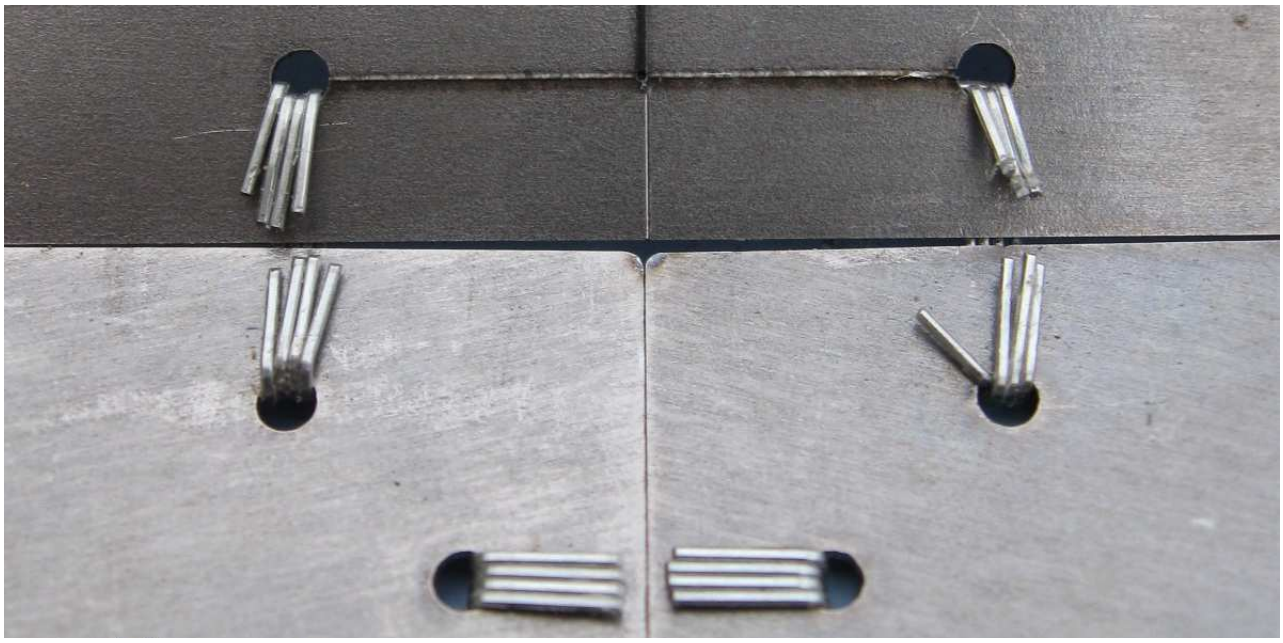
This picture shows pulling hull with wire-ties and stitching with staples from paper stapler (feed it trough the holes and bend). Surprisingly, it worked well enough. It required 2 people, one for folding and one for stitching. It is possible to do it by one person, but it is not as easy as with 2 people. I did not want to simulate winches ;))

I tried to use different technique for folding that Brent recommends. It did not work well. Back to original “Brent style” pattern's pulling.



I found that making lower midships seam flat when you fold the hull, make the seams edges much easier to fit correctly. It could be done by welding temporary straight edge (or angle) to the pattern before pulling pattern together.





You can see some gap at the join of the seams. This is because it is hard to bend several staples and keep uniform tension. Another problem is that the ends of staples are not connected and the links expand slightly under the force of pre-tensioned metal. The joints are exactly where it suppose to be. Small gaps will be eliminated with better holding media.

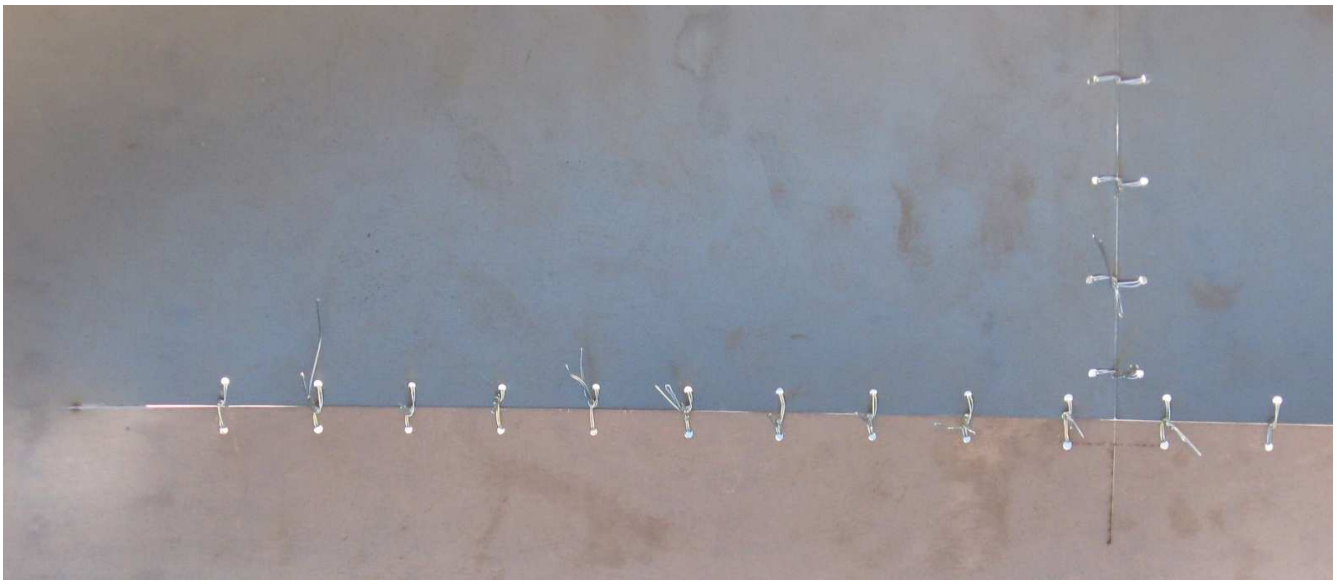
This was “First try” ;-)

Finished first half. Looks pretty good to me so far...

Pulling second half

For stitching second half of the pattern I used 24ga galvanized steel wire from Home Depot. I made 2 strands from it and secure it by twisting together. It made pretty strong connection.

This picture just shows twisted wire connection. Seams fitting looks much better because of stronger pull. The joint is exactly where it suppose to be according laser's mark.



You can see some gap at the end of the dart. This is because it was need to open the dart's end a little bit more. My “scoring” allowed to fold pattern easier, but it did not cut metal deep enough to go all the way through and make the dart narrower. There is almost NO GAP between the seams of the pattern edge to edge along the seam away from the end of the dart.

Wire connection works better than staples – stronger pull. It is more flexible and gives better pulling control. But staples prevents seams from “overriding” and keep metal edge-to-edge.

You can see that folded patterns (pictures on this and next page) are not floppy anymore. It already pretty strong compare to flat metal sheet. Compare picture above and 2 pictures on next page to the pictures of floppy flat pattern (on page 2). Look at the curves of the hull's halves – it is very fair. Step #1 (folding patterns of hull's halves) gave Origami boat strength of arc-bent metal and nice appearance.

Notice the difference in the shape at the transom area of left half of the hull on bottom picture on next page. I used a wrong sequence and pulled transom area ends together before Step #2 (joining hull's halves). It should be done after pulling and joining halves together with transom in place. This step will give additional strength to the hull's shell and almost final curves of the hull. Step #3 (fitting transom and deck) should be followed to establish final curves of the hull.