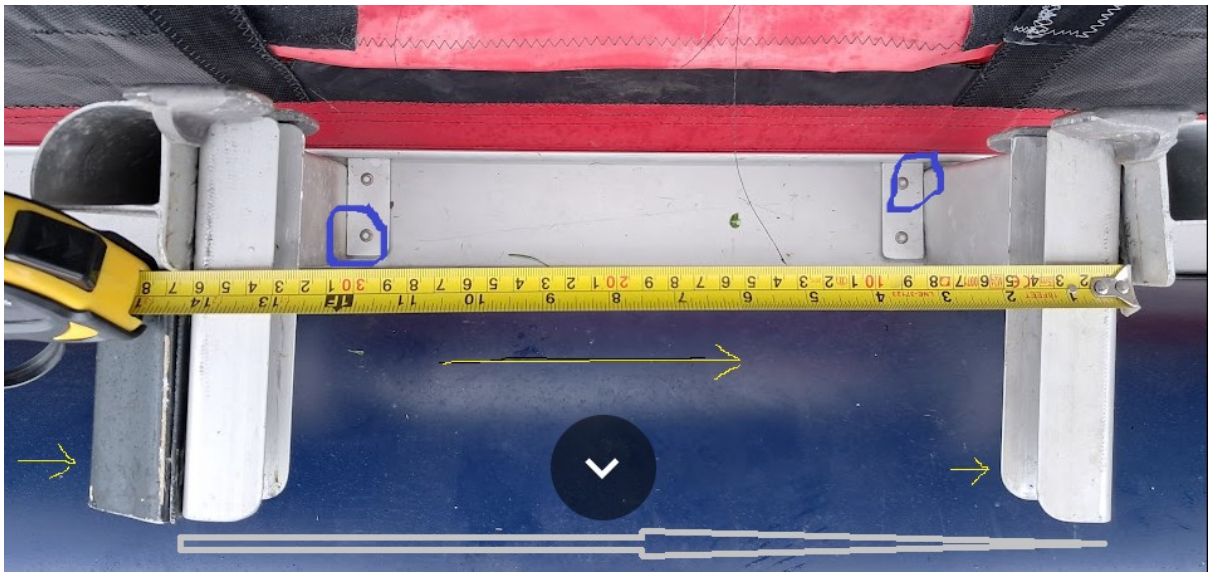
Catapult 1036 – Developing weakness on Daggerboard runners

All, as some of you may be aware, after taking ownership of 1036 and having a full season, I went through a short period of breaking a number of daggerboards. These appeared to partially come out of the runner on the front edge then pivot around on the rear edge, causing them to snap. Whilst I initially put this down to my lack of experience and maybe gybing too fiercely, a couple of other failures (when just having forward momentum) including one caught below the tramp by my Gopro whilst a hull was flying identified the source of the problem:



- Water pressure applies force in the direction of the yellow arrows
- Force on the daggerboard causes tension in the arms and forces the arm to press against the locating plates in the places marked in blue
- This is more predominant on the rear arm
- As the holding plates wear the distance between the bottom of the runners (grey arrow) increases
- About a 10 deg rotation out of parallel to the right on the bottom of the rear arm results in about a 15 to 20mm non parallel splay on the rear arm which is enough when the daggerboard is under water pressure (or as I found out, also when flying a hull), results in the front edge coming out of the front runner as the dagger board is pushed against the rear arm in a non-parallel fashion
- This is actually compounded as the daggerboards are designed to rotate back in the event of grounding which expedites the lack of front runner depth quicker

My fix – apply extra blanking plates that connect at the points of key pressure and contact

Step 1 – Align arms and template up

- With the arms in place and slightly slack they were placed in a parallel position, a daggerboard slid in place to ensure it was not to tight and then the “blanks” drawn up (in green).
- Sizes were 5mm thick x 40mm long and 20mm wide

Step 2 – put plates in place (the end game)

I thought it best to show the finished result first before I take you through the simple steps (and gotchas)

The aim is to use the existing vertical plate then position the new horizontal plates to both maintain parallel arms but also ensure that the pressure touch points as per the blue and red marks are as snug as possible. This provides two points of contact and should reduce the risk of rotation

Step 3 – Putting the plates in position

Start with the front arm as you are more likely to have this one vertical and you will be taking up the splay on the back arm

- Plates were drilled with 5mm holes before offering them against the beam
- Put them in position **with the arms attached** and rotated to get both parallel runs and sufficient gap (as marked in blue) for the arm flange to slot in
- Maximise the contact points as per the previous diagram
- Holding the plate in position (clamp if you can) drill a 3mm pilot hole into the beam
- Remove the plate and open the beam hole up to 5mm

- Affix plate with pop rivets and bolt arm in place
- Note – if the gap closes up slightly when you drill or pop rivet in, you may need to take a few mm off the seating flange in order for it to drop into place. I was lucky and only had to do this on 1 arm but due to the “manual” nature of creating these plate positions it is best to anticipate it

Note – before committing the drilling for the rear arm, if possible, pinch the arm into position and test them for parallel (measure distance across the arms at both top and bottom) and lower a board in to check clearance

Step 4 – Assess the outcome

If things have gone according to plan, you should have a tight parallel fit on the front edge, and a small gap on the base of the rear runner, allowing enough movement for the board to push back and pivot down (within the channel) but not pop out on the side edges.

If anyone is thinking about doing this and wants to talk it through feel free to contact me.

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