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Miss Daytona build – 8

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I can now focus on fixing the propeller shaft, tube and skeg to the hull, along with the mounting of the gearbox to suit. I made up a 1mm brass plate with M3 bushes soldered in for the vibration absorbers, and drilled loads of holes in it to help the glue get a grip. I then epoxied it into the bottom of the hull on the doublers I added earlier, using the gearbox to get it in the right place. The mount ended up as shown in the photo, hopefully the epoxy on its own is good enough to hold it down, there is not much wood depth for any screws etc. You can see the shaft on the left, although its tube is not yet glued in place. I then added the gearbox to check it is all OK. In the second photo you can see the gearbox snugly in place, mated to the shaft with the red commercial coupling. Also in the picture is a steel universal joint on the input shaft, with an extension piece 'loctited' onto the gearbox shaft to get it clear of the shaft coupling. This joint (actually I bought a pair, one for the motor end of the drive shaft as well) is also a commercial part:

unfortunately, I had to get one with a 4mm shaft hole as the next size up (6mm) was too large for the shaft, but also for the clearance between gearbox shafts. I should probably have used larger gears to get more separation (at the price of size and weight) as this has been a little problematic. It all turns freely with the propeller shaft, although the tube for it has yet to be glued in. The shaft to the motor is only illustrative as it will probably be 5mm turned down at the ends for the universal joints and of a length yet to be determined. I have only used two rubber mounts as you can see: it allows some flexibility in angle, I hope that they will stand the vibration and torque when in use. If I turn the propeller shaft, the gearbox does move slightly on the rubber mounts as it revolves, and inspection seems to suggest that the commercial red coupling is responsible, so some vibration seems likely.

While waiting for the gearbox mount epoxy to set (I used 24 hour glue), I thought again about the propeller. I decided it was no use *not* trying to make it, and I had suitable bits of material around. The hub was turned up from a piece of 8mm stainless steel rod with a 5mm hole in it for the shaft. The two blades were cut from a piece of 16 gauge stainless sheet I had but 'too large' deliberately for later trimming. I filed the mating surface with the hub on each with a round file of 8mm diameter at an angle and contrived a jig to clamp the blades in place on the hub while I TIG welded them. Although I find TIG welding quite easy in some ways (I am used to oxy-acetylene welding and it is similar in technique), I

do not know it well enough to choose the best current rating and know it's peccadilloes. If I don't do it though, I never will, so onwards. The welding went more or less the same as with *Sundowner*: the application of loads of blobs of weld in more or less the right place followed by the use of files and grinding stones (for my mini drill). Apart from having to re-drill the shaft hole because it got some weld in it, it went OK and produced a propeller. It seems to balance quite well (I mounted it on a stub bit of 5mm shaft and turned it gently in the lathe) and when mounted on a shaft in my minidrill at top speed (around 2500 RPM) it did not vibrate and moved the air quite well at least. I need to make the mounting arrangements to secure it to the shaft, but the photo shows the finished propeller, although I might grit blast it for appearance. The view shows it trailing edge uppermost: I may have to file down the leading and trailing edges more to help efficiency, time will tell. My goal, if you remember, is to make a boat that planes well but is not going to be the last word in performance!

It appears sizing a motor, propeller etc is a bit of an art form: there are two applicable sizes of motor, 29mm diameter 'cans' and then 36mm… and there is a measure called 'KV' that is NOT power but is the shaft RPM per volt. A lower KV means slower propeller but more torque. For example, a 29mm 1100 KV motor I found would turn at around 10000RPM unloaded with a 10 volt battery pack. The rub is that a 40mm propeller might overload it (depending presumably on the propeller pitch too – and no doubt the prop efficiency). This seems to have the sort of parameters I want, but it would be a costly experiment if it ended up too small! I could fit a smaller propeller I suppose, but will the boat plane? Given the light weight of the boat (I hope) this might be worthwhile to try. Watch this space.

Out of curiosity, I weighed the boat with the hull below the deck almost completed and with the shaft, tube and gearbox in place: it was 450 grammes, so still reasonably light (but with a lot of weight to come).

The next job is to glue the shaft tube in place. This pierces the step and is otherwise housed in a closed slot in the keel, making it slightly harder to fix in place. I need to glue it in firstly so it can stand having the shaft (and gearbox) removed without moving, so I can then fill the cavity with epoxy resin to finish the job. Epoxy glue sufficed to hold it in place by removing the shaft and smearing the quite stiff cold glue up the hole through the step, then pushing the tube through this mess (without blocking it obviously), re-inserting the shaft (including cleaning off excess that appeared on the end of the shaft and tube inside) and gearbox to hold it in line. By supporting the hull vertically and warming up the area with a hot air gun made the stiff glue runnier and it ran to the step on the inside leaving a fillet around the hole in the step where a bit leaked. This, when hard, meant I could remove the shaft and gearbox to pour runnier epoxy resin in the slot. The result is more or less invisible, but the photo shows the shaft, tube and skeg in place from the hull bottom. I will remove the skeg (it is secured with two small wood screws at present) for hull painting later and then epoxying and screwing it place for keeps. Hopefully after all of this, the shaft will still turn!

At this stage, the main hull build up to deck level is more or less complete: the rear end of the construction (aft of the step) has the large horseshoe shaped opening for the motor and the driver: that should allow access room to fit the motor and other bits, while the gearbox has the smaller hatch over it. I thought about painting and sealing the inside of the hull before the deck makes this harder to do. The real thing is varnished, natural (presumably) wood the colour of the outside, on the model this is so marked with glue overspill that stain might not cover it, so I might paint at least the internal bottom and sides a 'mahogany brown' type of colour mixed up from an assortment of acrylic colours prior to clear coating it with epoxy resin. I did this on *Sundowner* and it ended up OK: with some lessons learned about the use of epoxy resin that this boat should benefit from. I decided in the end to wait for this maybe until I had added the numerous brass 'screws' in the planking as these might be visible inside the hull. This means that the logical next step is modifying/cutting away the beams around the horseshoe opening and fitting stringers at least around this shape to hold the stub ends of the beams in position. The horseshoe shape itself (see article 1 pictures) has a varnished darker wood surround that I will need to bend some suitable wood up for and so it is necessary to measure up and decide what to do. And now comes the bit I didn't believe until I measured it a few times: when I made *Sundowner* I made up a thick chipboard former to bend the cabin bits, with an 'inner' horseshoe cut out to allow clamps to be applied. This inner bit happens to be exactly the size required for this boat to mould the opening around… The photo shows the evidence! On *Sundowner* the wood being bent was 12mm thick and needed some care, here it is only about 3mm thick so should present an easier task. I could laminate it from thinner wood too if required, using mahogany veneers: I need to make this cosmetic addition now really so I can make the cutouts to fit, and that is for next time.