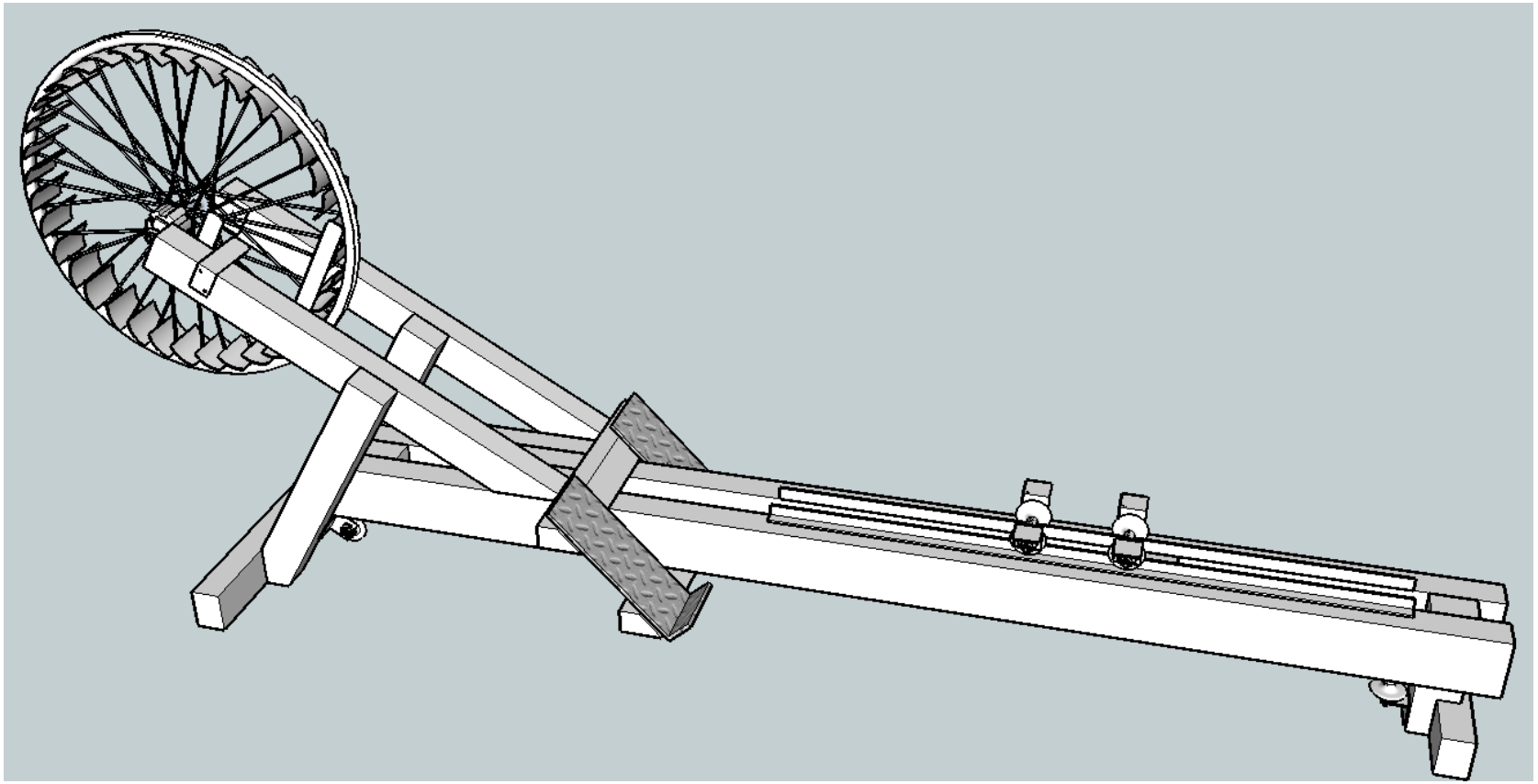
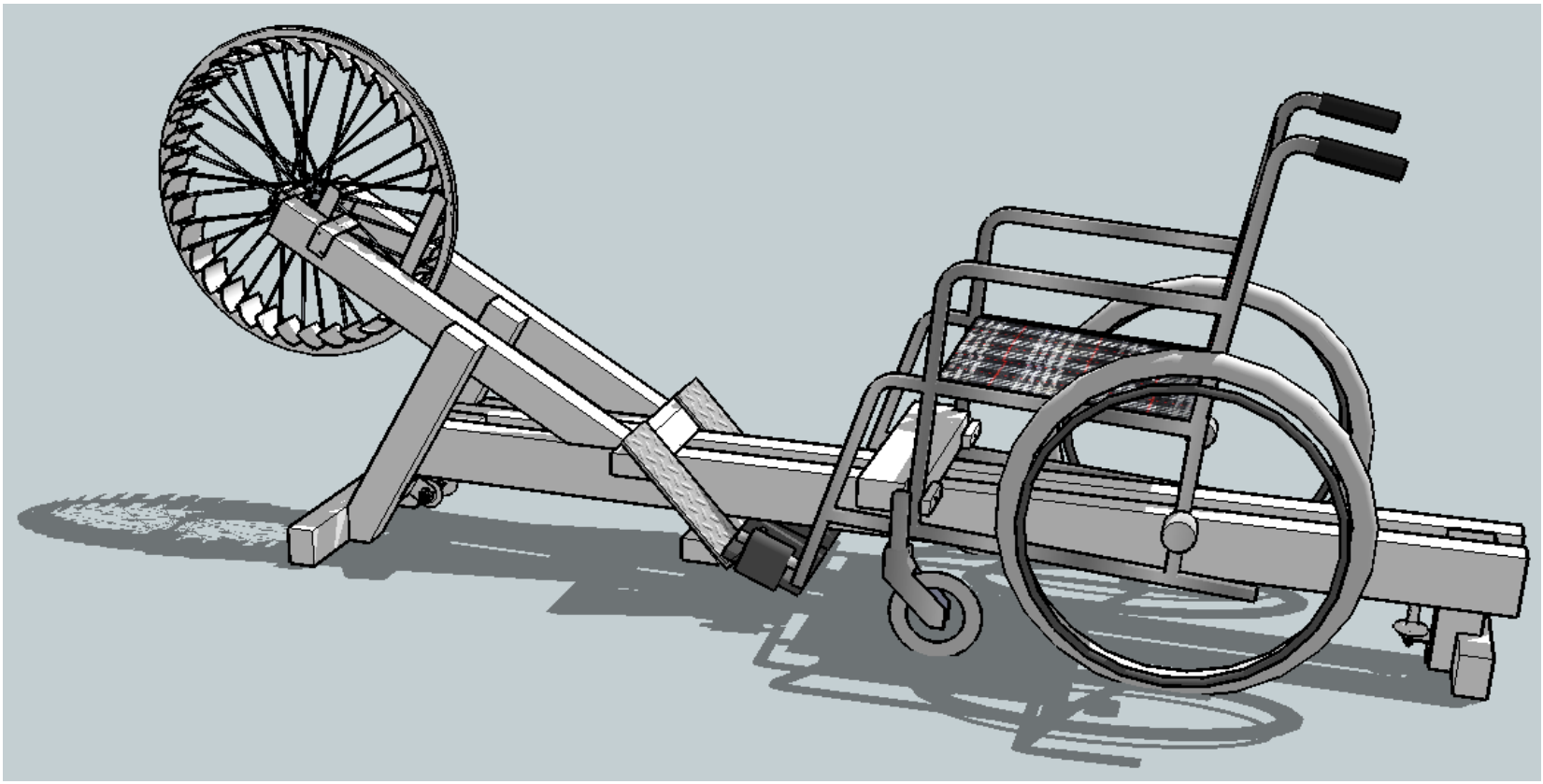
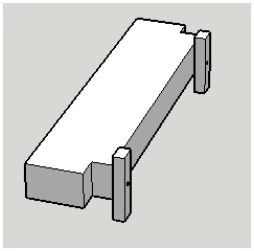
Open ergo Mark 5



This has a re-designed impeller that is more efficient and easier to make, also it can adapted to use either a belt or rope drive. The seat is not shown in order to be able to see the rollers.

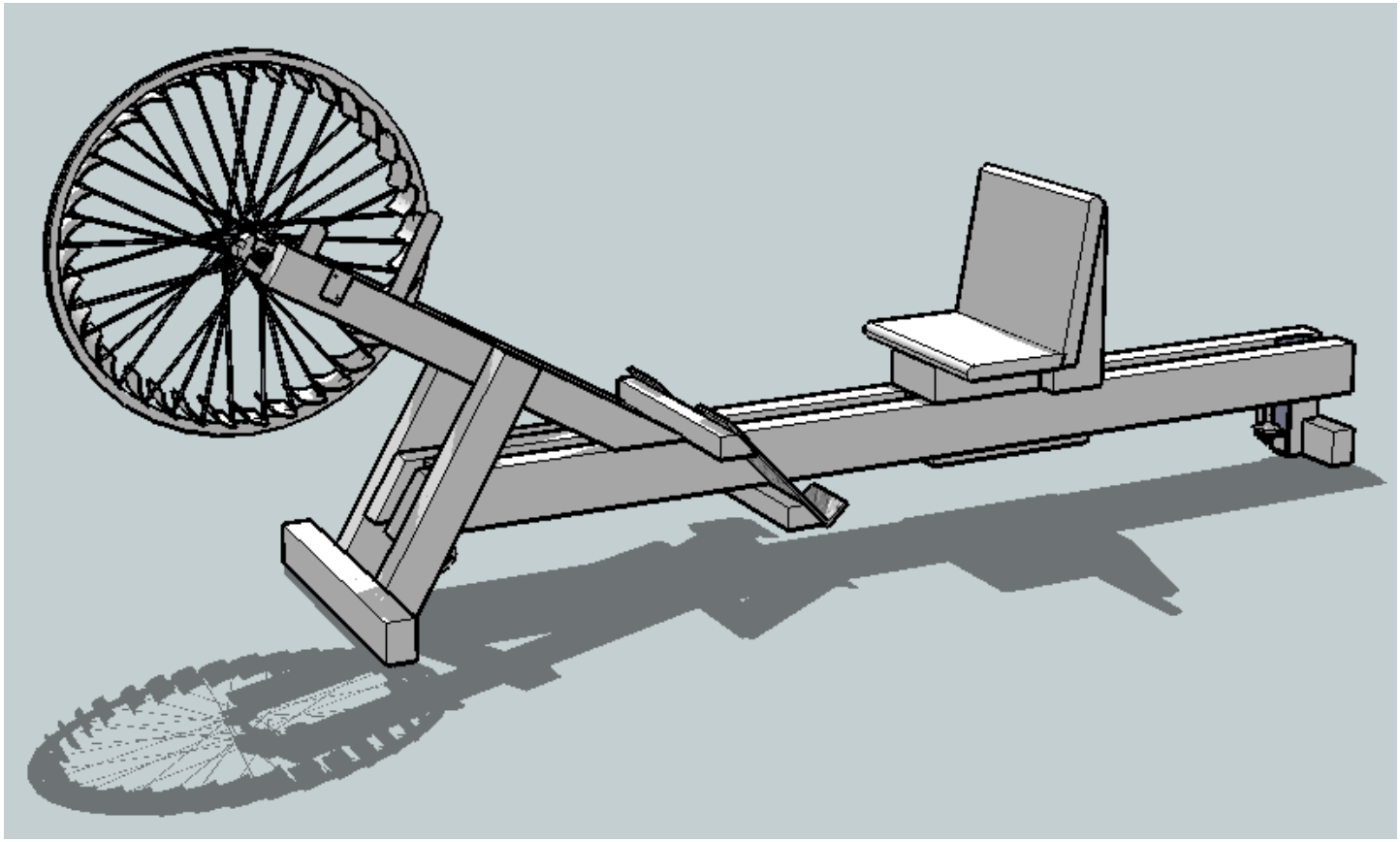
Adapted for a wheelchair

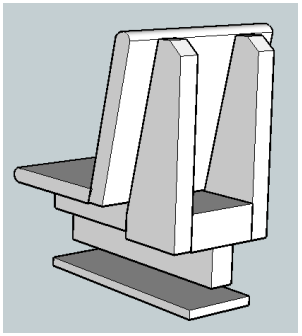




This is the additional component required (shown with the latches open) to fix the wheelchair in position. The dimensions need to fit the particular wheelchair but as a guide it will be about 410mm long. The centre of the wheelchair needs to be in line with the chain/rope/belt.

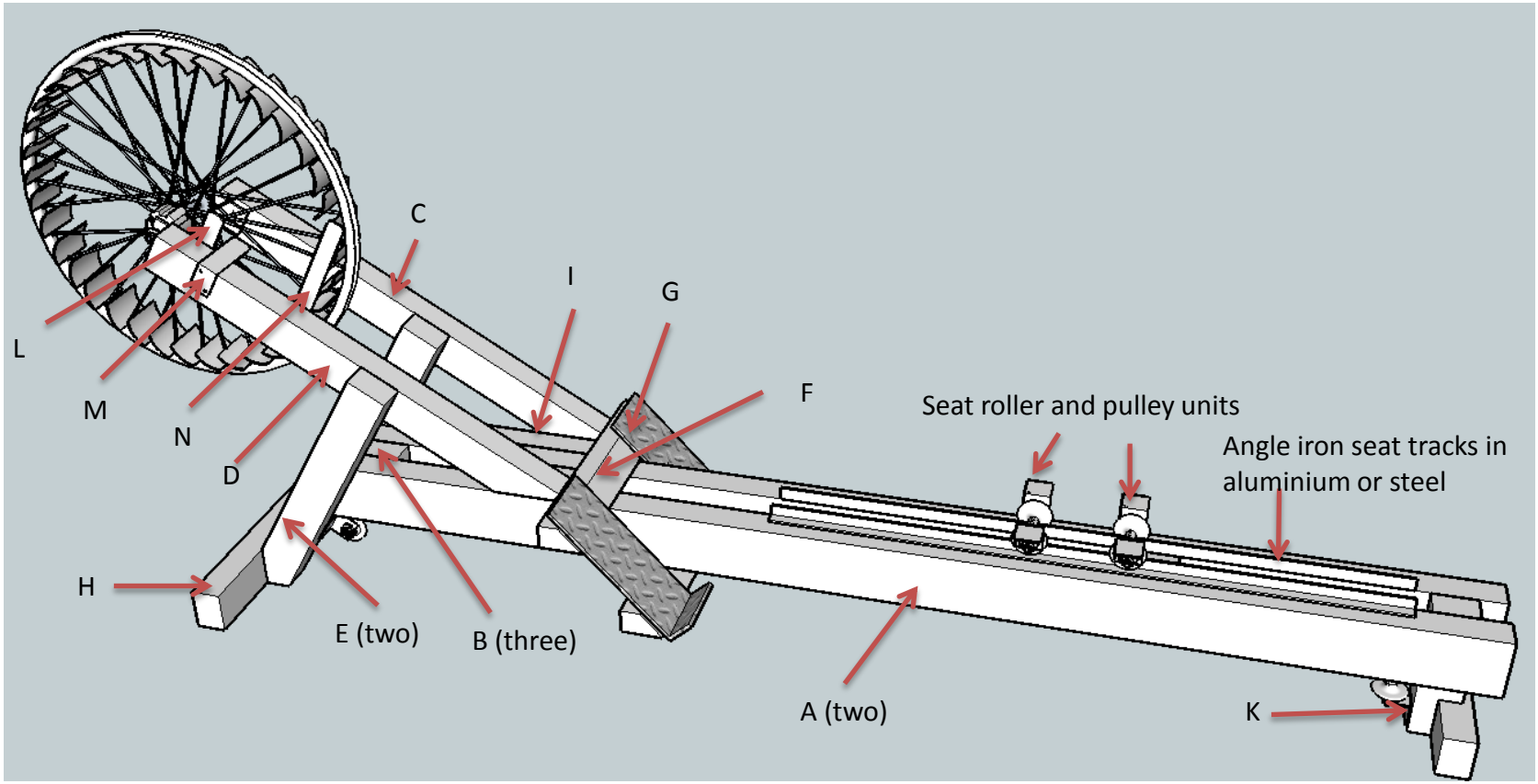
A fixed seat system for adaptive athletes

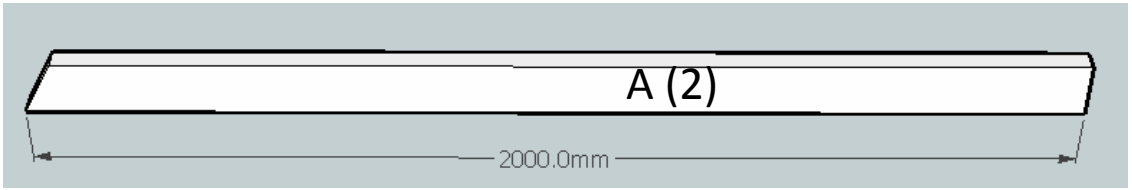


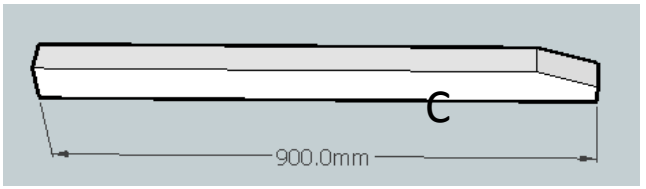


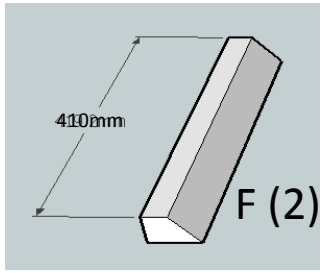
The dimensions of the seat need to be determined by the athletes using the machine. The lower plate is screwed to the main part to clamp the seat in the required position.

Parts list

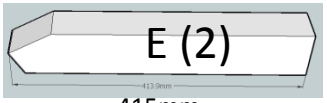

C
I
G
L
M
N
D
F
Seat roller and pulley units
Angle iron seat tracks in aluminium or steel
H
E (two)
B (three)
A (two)
K



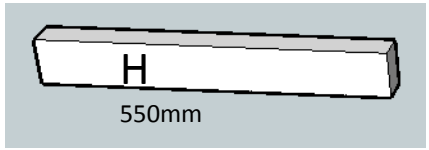


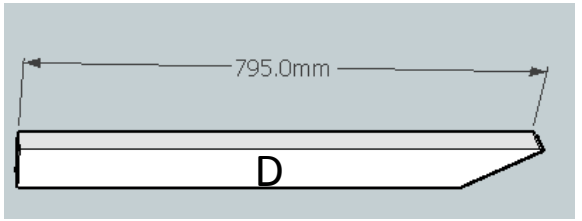


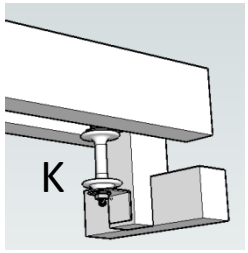
The angle is 40 degrees

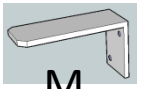


415mm

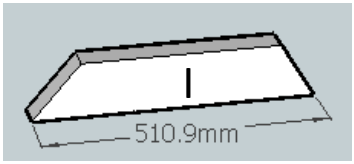


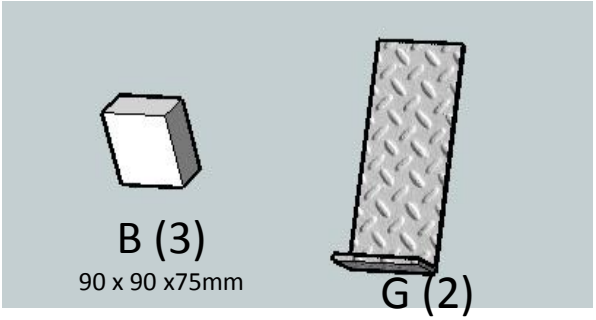




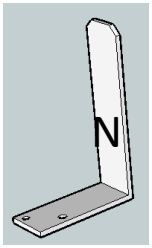


Bracket to deflect the belt or rope around the free wheel
115mm x 45mm x 3mm aluminium or steel

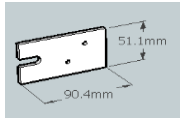




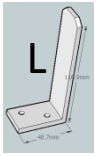
300 x 100 x 4mm
Aluminium (or 12mm plywood



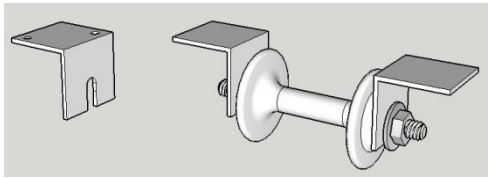
Bracket to protect the impeller
225mm x 85mm x 3mm aluminium or steel



Two plates carry the spindle of the bike wheel and is made from 2mm steel or 3mm aluminium. The slot is cut to fit the spindle.



Bracket to direct the rope or belt
120mm x 55mm x 3mm aluminium or steel



Seat roller and pulley units (4). The dimensions of the brackets will vary with the bicycle wheel hubs used. My thanks to Jack Owako in Kenya for this idea.

Part G is aluminium sheet 1000x 40 x 40mm
Parts A and B are timber 100 x 75mm, all other parts are 75 x 50mm
Any angles shown are either 60 or 30 degrees
All parts are screws together

Some of the details

Note how a bracket M is used to deflect the rope or belt around the freewheel unit. With one and a half turns around the free wheel the deflector for the rope is not required. The belt drive requires much more tension on the return system.

Bracket N protects the rope or belt from the impeller vanes

If using a rope, a large washer needs to be fitted to the freewheel unit. The size and fitting will vary with the unit used.

The freewheel unit with sprockets removed – specialist tools are needed

Most freewheel systems have a threaded collar to hold the sprockets in place.. This can be used to secure the washer.

The freewheel unit screws on to the wheel. This unit is 'stepped'. The straight ones are better

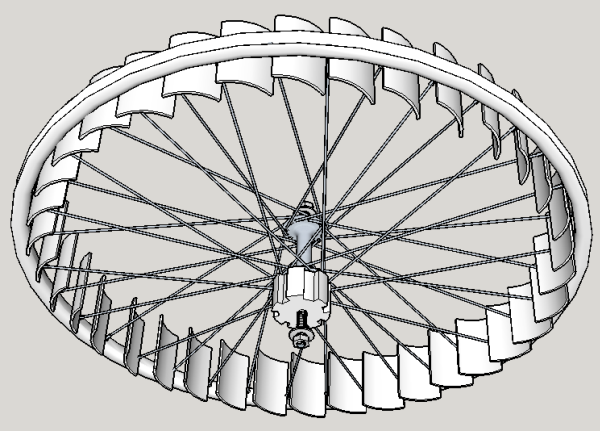
Front wheel hubs are needed for the seat rollers and pulleys but note that a matching pair is needed for the seat

The front pulley

The rear pulley

The handle return action using a bicycle inner tube. The last piece of rope adjusts the tension

You might notice that these photographs show a Mark 4 frame – which was used as a test bed for the rope drive, the belt drive and an inner tube as an alternative to shock cord.

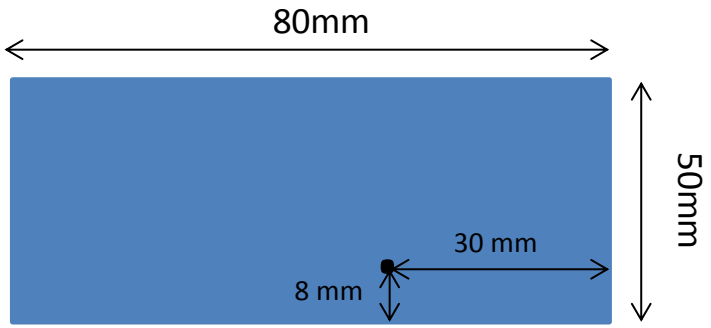


This impeller is more efficient and easier to make than the one used in previous models. The vanes are made from plastic guttering and held in place with self-tapping screws. Note the direction of rotation – which is clockwise as seen from this side







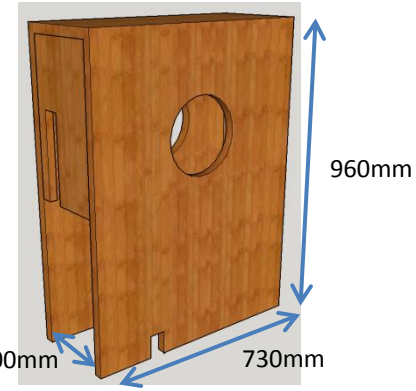


Clearance holes for the screws need to be drilled through the rim of the wheel 8mm in front of each spoke. 36 vanes are required so it is useful to use jigs to ensure uniformity. A starter hole for the fixing screw is best made with a nail – but only make a deep mark in the surface. The vanes are set asymmetrically to give clearance to the belt or rope. The can be symmetrical if using a chain with a large cassette.

Making a protective cover for the impeller

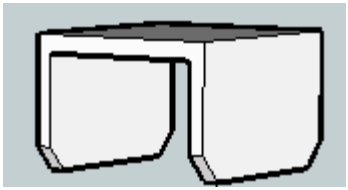
The impeller need a cover to prevent accidental contact with the impeller vanes. This could be a plywood box like the one shown below, or a cage made from weldmesh (http://www.meshdirect.co.uk/) .

One 'funky' solution is to use a car tyre to enclose the impeller. The one shown is a Michelin tyre with an outside diameter of 700mm and a width of 220mm. Most garages that fit tyres will give away scrap ones like this free of charge. Because of the steel wire and mesh belt embedded in the tread, cutting is only practicable with an angle grinder fitted with a disc for cutting metal – I wore out six cutting disks to achieve the effect above. Note the need for a supporting bracket to take the weight of the tyre.



Notes

The seat is not shown as it needs to be fitted to the particular wheel hubs used for the seat rollers. I suggest that the sides of the seat are deep enough to prevent it tipping sideways.



Previous models used a chain to drive the impeller and bungy (shock) cord for the return system – a works well if you have easy access to the necessary components.

Videos of previous models can be seen at http://openergo.webs.com/ also the instructions are still available.

Videos of both the belt drive and the rope drive can be seen at http://youtu.be/AspYWV14CCE and http://youtu.be/QDughn4vRCc

If you would like copies of the Sketchup files so that you can examine the design in closer detail – just ask. A free trial of Sketchup can be downloaded at http://www.sketchup.com/

Please contribute your ideas and send the details for inclusion on the website – also photographs and videos of the ergs you have made.

For any further information or questions, email me jimflood42@gmail.com