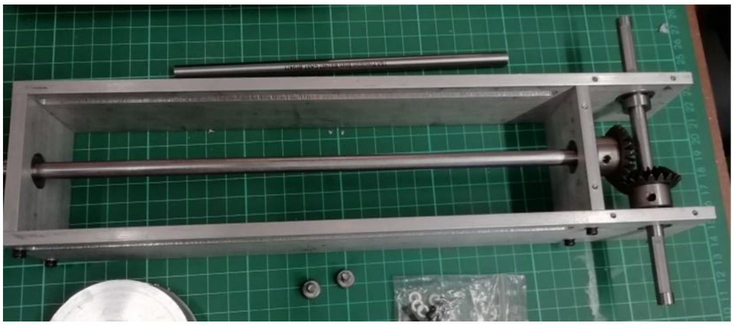
A Simple Rolling Road for Tether Cars

This came about after I changed fuel during a competition and couldn't get my car to keep running, let alone perform. A fellow tether car runner, thanks Jan, sacrificed most of his lunch break to help me achieve working settings on the track. I thought afterwards that there must be a better method to find suitable settings without the push and hope experienced to-date. Obviously, there exists a society of masters who know the arcane ways of the diesel engine and to them this must seem trivial. However, having only ever run glow motors before, I need all the help I can get…



A simple rolling road seemed to be what was required. This needed to be simple to make, adjustable to suit different sized cars and with some form of cooling built in. I decided to rotate the drive through 90 degrees and use a propeller to provide the cooling airflow. The propeller provides not just cooling, but also provides a variable load to allow the rig to be tuned to simulate track conditions.

No drawings exist because it was made up as I went along using materials to hand. However, the principle is simple enough to see with reference to the photographs. As a guide, the length of the side frames is 340mm with a height of 50mm. The distance between the side frames was determined by the minimum size to mesh the gears with a small allowance for a spacer to ensure the gear hubs do not rub on the race outers. The actual size ended up at 62.26mm giving an overall width of 74.96mm because the side panels are ¼" (that's why you have DROs on machines…) The gears were from Amazon – look for 'Mxfans 2 x Modulus 1.5 Silver 8mm Hole 20T Tapered Bevel Gear Wheel with Top Screws' or similar.

The gears determined the size of the shafts at 8mm. These were made from silver steel, straight and a good fit for the bearings. Simply Bearings supplied these 18 x 8 x 6, sealed to keep the dirt out. They were press fits into 5mm deep recesses bored into the frame parts.

All shafts have flats milled where necessary to provide a solid location for the grub screws while making it easy to disassemble the parts in future should that be required.

Originally, the driven wheels were going to be aluminium hubs with 'car starter' rubber rings as tyres. Upon reflection I thought that running these in excess of 10,000rpm might not be such a good idea and decided to use solid aluminium wheels. A light knurl was put onto these to aid traction.

The end of the propeller shaft is threaded M6 onto which is screwed a prop driver which has a plain bored section to locate it centrally on the shaft and a screwed portion to retain it.

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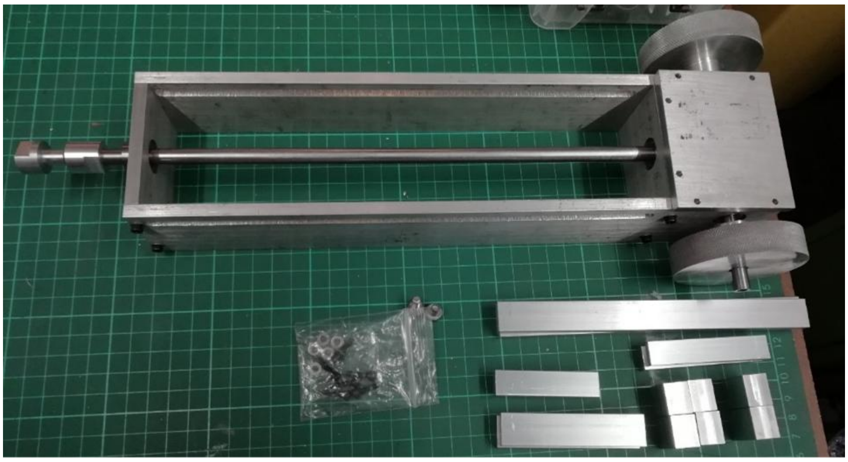


It had to be easy to take the car on and off the road because it needs to be put in place with the engine running. As a result, although the front wheels are used to restrain the car they are not held rigidly. Any attempt to squirrel off the rollers is handled by two uprights located either side of the car just ahead of the rear wheels. These uprights are chamfered on the top half and covered in rubber strip to minimise the chance of any bodywork damage when placing the car in position.

The wheel stops and uprights are mounted on slotted cross pieces, which, in turn, can slide forwards and backwards along the frames to offer the adjustability required to suit different sized cars.

In operation, the speed is determined by measuring the rpm of the propeller using an optical tacho and then dividing this by a ‘magic number’. The magic number is the rpm that equates to a speed of 1mph. Given a 2.5” wheel diameter on the rig, this is ((1760 x 3 x 12)/(2.5 x pi))/60 = 134.454

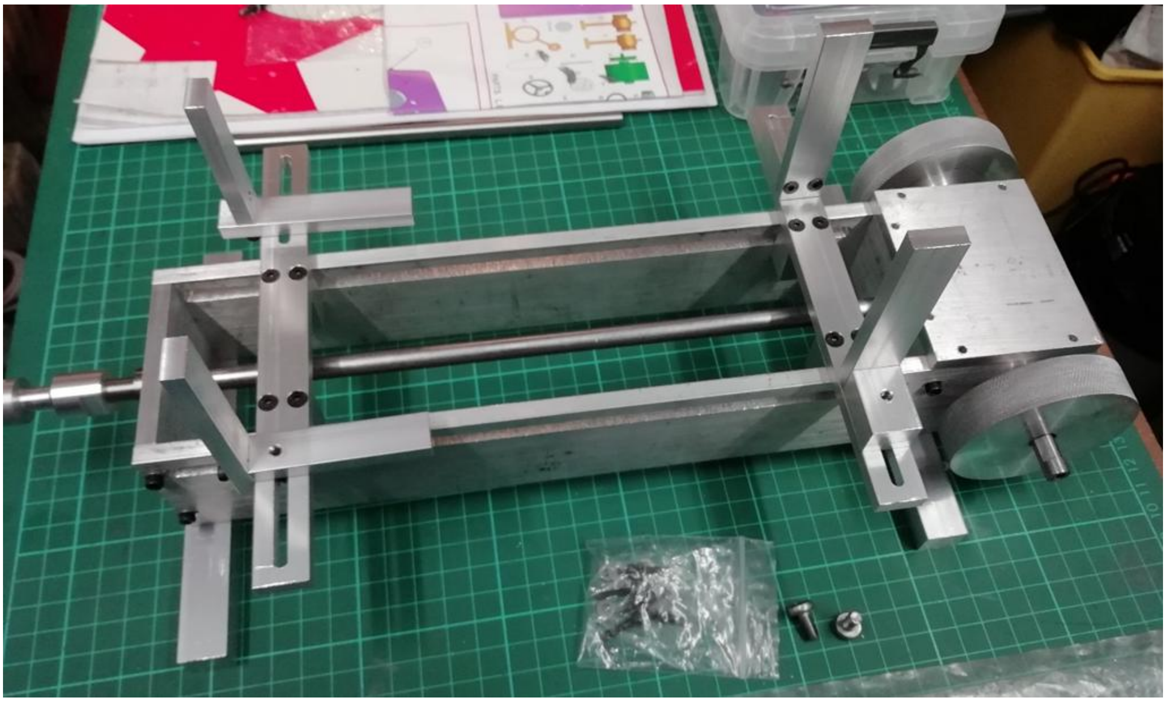
Eg: At 10,000rpm the equivalent speed is 10000/134.454 = 74.37mph

The rpm of the engine is determined by the ratio of the driving wheels to the driven wheels.

Engine rpm = measured rpm x (rig wheel diameter/car wheel diameter)

Eg: For 10,000 measured rpm, 2.5” rig wheels, 2.25” car wheels

Engine rpm is 10000 x (2.5/2.25) = 11,111 rpm



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With the addition of an electric motor to provide a variable load, a load cell to measure the torque, a hall effect sensor to measure rpm and a bit of software to link it all together it should be possible to develop this into a dynamometer, but that is for another time…

Rolling road video here (from about 3:20) https://www.youtube.com/watch?v=gAYpPjWNy4o