Drivetrain Q's, 1 wheel drive or 2?

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Topic: Drivetrain Q's, 1 wheel drive or 2?

Posted By: bigfoot
Subject: Drivetrain Q's, 1 wheel drive or 2?
Date Posted: 21 January 2009 at 21:44

Hi all,

I am new to the pedal car scene, looking to get a car built up and team together this season to enter a couple of races to raise some money for charity and have a laugh.

A few of questions regarding building a car.

Do most teams run 1 wheel drive or 2?

If 1WD, is the 'pull' to one side noticeable?

If 2WD, do you have solid axle or run some type of diff?

If solid axle, how bad does this affect the cornering ability?

Are coaster / back pedal brakes allowed?

If a solid axle is used, can one brake be used to brake the axle & thus two wheels?

Sorry for all the questions, I am on a fact finding mission !!

Thanks....

Replies:

Posted By: Neil
Date Posted: 21 January 2009 at 23:18

> bigfoot wrote:
> Hi all,
>
> I am new to the pedal car scene, looking to get a car built up and team together this season to enter a couple of races to raise some money for charity and have a laugh.
>
> A few of questions regarding building a car.
>
> Do most teams run 1 wheel drive or 2?

Most run 1

> bigfoot wrote:
>
> If 1WD, is the 'pull' to one side noticeable?

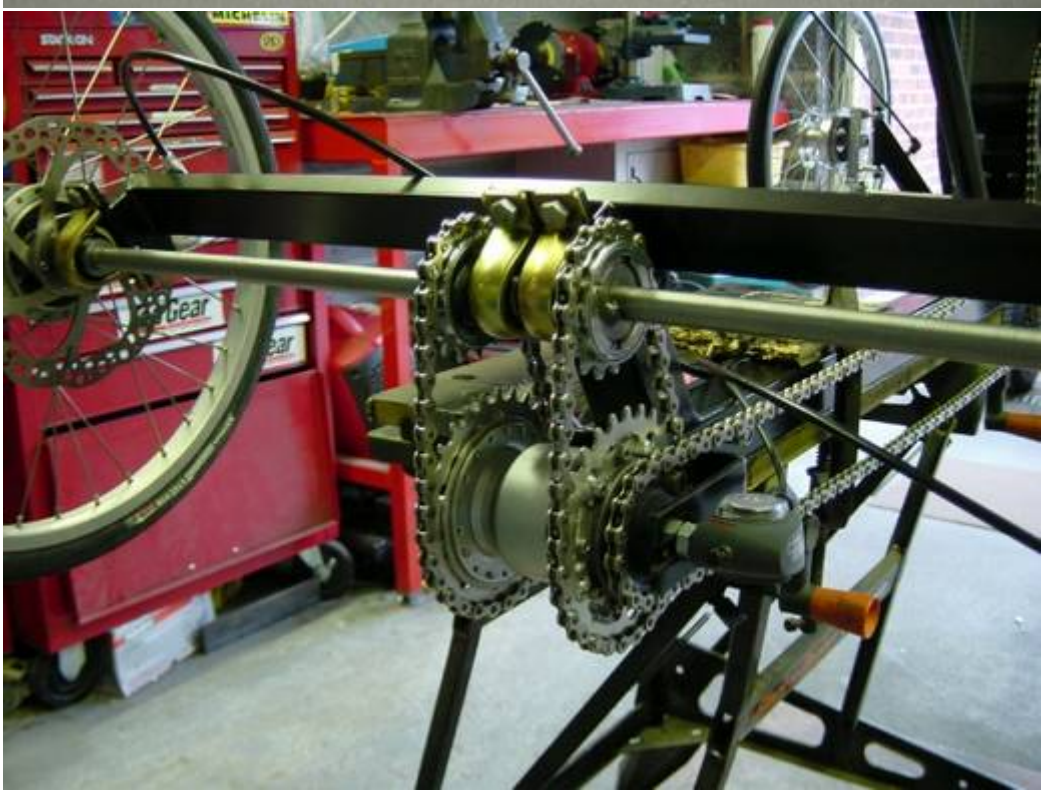
Lack of drive on the exit of corners is - But I am sure people with 1wd will disagree

> bigfoot wrote:

If 2WD, do you have solid axle or run some type of diff?

All current 2WD cars use some form of dominator Drive where the fastest wheel freewheels. There was one car that used a dif but was never succesful - also if the inside wheel lifts you loose drive with a dif.

Heres are some pictures of 2WD cars to get you thinking



[/QUOTE]

Neil

Posted By: tookey
Date Posted: 21 January 2009 at 23:22

get a little lack of drive with 1wd, or wheel spin
however it could be said that they are usually more reliable

LIZARD'S HUG!

Posted By: webmaster
Date Posted: 21 January 2009 at 23:26

- Do most teams run 1 wheel drive or 2?

A: Most use 1, but by no means all.

- If 1WD, is the 'pull' to one side noticeable?

A: Not even a little bit. This may change if you have almost no weight on the front wheels, but unless you can pull wheelies like in a Karbyk:

...you shouldn't have anything to worry about!
(and even in a Karbyk you have to sit up the seat back)

As Neil and tookey say, you can lose drive in some corners, for a moment or two, but (a) only those corners that turn to your driven side and (b) generally only the tighter ones and/or those on uneven surfaces.

And it's generally easier to construct 1wd with a greater proportion of "off the local bike shop shelf" bits, simply because most bikes are 1wd...

- If 2WD, do you have solid axle or run some type of diff?

A: As far as I'm aware, no 2wd car has ever run a solid axle. I suspect it would make for an undriveable pedal car that burned through tyres faster than SpaceShipOne.

Are coaster / back pedal brakes allowed?

A: From the http://www.pedalcars.info/info/rules/ipcs.asp" target="_self" target="_self" target="_self - IPCS (car rules): "Braking must be efficient, effective and balanced on at least two wheels with due allowance for wear during racing."

There are no restrictions on brake type currently, so if you can make it work and demonstrate to our scrutineer that it is effective and if your drivers can cope with it, I would think probably yes. Obviously the last word rests with the scrutineer!

Personally I'd be less than keen as there are times a driver might need to, or may inadvertently, backpedal briefly (shoelaces caught in the chain, chain coming off chainring, etc.) and dropping anchor for no apparent reason mid-track is not always a great idea... Also, sometimes you need to go from pedalling to heavy braking in short order, or even tweak a brake whilst still pedalling to control a slide, all of which would be tricky with a back-pedal brake!

- If a solid axle is used, can one brake be used to brake the axle & thus two wheels?

A: See above. My interpretation is that a solid axle brake would be effective on two wheels and therefore probably "yes" by the letter of the law. Of course your drivers may be of the opinion that they're not keen on a potential single brake failure leaving them with no brakes whatsoever...

In the past we have seen one car with a single brake acting on a differential, but this was not an unqualified success. Plus, if you fully unload one wheel - e.g. in a corner or swerving to avoid an accident - stopping a differential from rotating provides zero braking effect until the lifted wheel returns to terra firma.

- Sorry for all the questions, I am on a fact finding mission !!

A: It's what the forum is here for! You're most welcome and feel free to ask as many as you need...

It's chess on wheels

il Padrino

Posted By: bigfoot
Date Posted: 22 January 2009 at 22:16

Corrrr. Pedal Car Porn !! All those cars with their clothes off - great !!! 

Sorry, 'got a little carried away there for a moment!

Seriously, thanks for the responses and I really appreciate the pictures of the cars. Most of the photos I have seen previously have been with bodies on & therefore have been struggling to get ideas for drivetrain solutions other than from recumbent tricycles.

I am really impressed with the level of workmanship and elegance of the designs.

How have people mounted their rear drive wheels to engage onto the drive axle, but also allowing for removing wheels easily? For example, the car on the plastic tressle stands by the shed - it looks like they are just nutted onto the axle, but surely this does not give enough security to drive through?

Also, what do most people use to make the bodies from? Glass fibre? Has anyone done any good designs using Corex board?

Thanks again, Paul.

Posted By: webmaster
Date Posted: 22 January 2009 at 22:36

Look very closely at this shot:

The boss on the driveshaft has two holes (180 degrees apart) machined into the surface that the wheel hub sits against.

The wheel hub has two corresponding bolts screwed into it, whose round, allen-keyed heads then sit in those two recesses.

The sole purpose of the nut on the end of the driveshaft is to keep the hub and boss in contact and thus allow power transfer via the bolt heads.

The other, 6, smaller holes you might be able to pick out on the drive boss are irrelevant on the above car as it has hub brakes at the front, but they "just happen" to be the IS 6-bolt pattern for bicycle disk brake rotor mounting. The same boss design can be (and is) used to fit disk brakes at the rear, with the rotor mounted to the inboard side of the boss.
Com ca:

(Missing the caliper and caliper mounting bracket obviously!)

Bodies: glass fibre is quite common currently. Correx has been also been used and evidence from the HPV racing world shows it is possible to make wonderful things from it!

It's chess on wheels

il Padrino

Posted By: Neil
Date Posted: 22 January 2009 at 22:53

As far as Bodies are concerned - the new British Human Power Club website will have a detailed how to on creating a fibreglass body - and soon hopefully on creating a correx body

Neil

Posted By: Jes@GCRE
Date Posted: 23 January 2009 at 14:20

During last season, we were getting around about a quarter of a turn of wheel spin on the exit of 2 corners (and 1 of them was only in the wet) with one wheel drive.

Saying that, we have spent several years dialling the understeer and oversteer out of the chassis design to get something with almost neutral handling* so it used to be a bigger problem.

But a short wheel based car which has less weight on the rear wheels will suffer from it a lot more so it makes sense to drive both wheels.

This car:

used to suffer from quite a lot of wheel spin because it was 1WD and short and had a high centre of gravity.
I once slipped to a standstill going up a hill at my local reservior in it which was rather embarasing as the 2 mountain bikers I ha recently whizzed past over took me again...

I once saw a similar car at Wolverhampton get it's 1 "drive" wheel stuck over a drain and just sit there with the driver pedalling and going no where!

So wheel spin or not is a question of weight distribution as well.

Given the flexibility in the rules, cars can be long, short or in between on wheel bases and you will all sorts at races. There is no correct answer as such.

1WD has the advantage of having less parts to go wrong but if it does go wrong then you have lost drive and you are going home whereas if you drive both wheels and lose 1 side then at least you can continue in the race.

Don't know if any of this helps.

Jes

*On slippery tarmac in the wet something will slide whatever you are driving! That's what makes it fun...

It's on fire.
It's on FIRE!!
IT'S ON FIRE!!!!

82:46

Great Central Racing
15/5/1993 - 27/9/2008
"It was a hell of a ride."

Posted By: Neil
Date Posted: 23 January 2009 at 15:44

> Jes@GCRE wrote:
>
> But a short wheel based car which has less weight on the rear wheels will suffer from it a lot more so it makes sense to drive both wheels.

Actually thats not entirely true - Being short wheelbase doesnt have to mean less weight on the rear wheels - Its all down to weight distribution.

Neil

Posted By: webmaster
Date Posted: 23 January 2009 at 17:40

He said "a short wheel based car which has less weight on the rear wheels", not, "all short wheel based cars have less weight on the rear wheels"!

But yes, weight distribution is the important bit.

Karbyks understeer lots, particularly powering out of turns, as the relatively unweighted front goes even lighter.

Whereas car 3 in this picture from Hong Kong:

...has almost no weight on the rear, despite being a massive 47kg of bomb-proof composite. It's short wheelbase (shorter than pretty much any UK car) with the front axle a long way behind the nose and the rear wheels behind, rather than under, the driver.

Being front wheel drive it handles OK right up until you get nerfed in the rear or need to lose some speed in a corner. Or on a straight for that matter...


Ahem, sorry...

As previously pointed out, there is no single "right" answer - it's a combination of chassis design, weight distribution and (mainly!) whether you have the ability/facilities/design/desire to have one system rather than another. Mostly desire, as you're going to have to build a transmission either way!

Don't get me wrong, many 2wd systems are devilishly clever, cunning and elegant, but in terms of performance and enjoyment, I don't believe any race has ever been decided on the number of driven wheels, nor does this number affect the size of the grin on a driver's face.

Which is normally approximately 

It's chess on wheels

il Padrino

Posted By: Jes@GCRE
Date Posted: 23 January 2009 at 17:47

It is also worth pointing our that if a car has too much weight on the rear wheels it will either understeer (front wheels carry straight on when you try and turn) or possibly even pendulum (back end swings round on you when you aren't expecting it!). Or sometimes it will do one and then the other like this car did before we hit it with a big hammer until it stopped:

It's on fire.
It's on FIRE!!
IT'S ON FIRE!!!!

82:46

Great Central Racing
15/5/1993 - 27/9/2008
"It was a hell of a ride."

Posted By: bigfoot
Date Posted: 23 January 2009 at 21:41

Again, many thanks for all your replies and photos, most helpful.

Now I am armed with lots of ideas, i'll have to put some time in pulling a design together.

Hope fully will get to meet you at an event this year.

Paul.
