Homebuilt Recumbent Bike Parts

Content:

1 Introduction.

The following is a collection of the design ideas I have gathered while building my recumbent bikes. Some ideas are my own, some are from other recumbent bike builders at "*Aalborg Liggecykel Klub*" (www.hpvklub.dk)

The intention is to give inspiration and to prevent others from making the same kind of mistakes I did while building recumbent bikes.

Most of the design ideas have been tried out, but no garantee for a good result can be given.

Finally please note that almost all of the design ideas do not need special tools, since I don't have them. Then again as a minimum you need the following:

- A welding machine.
- A drilling stand.
- Some kind of grinding machine (to make life easier !)
- Ordinary toolbox with screwdriver, file, adjustable spanner.

The mentioned links at the Internet were checked on the 3rd August 2002. At that time they were valid.

1.1 Abbreviations.

Abbreviation	Description
HPV	Human Powered Vehicle
Liggecykel	Recumbent bike!

1.2 History.

Date	Ver	Description
2002-06-06	1	Initial version
2002-09-12	2	1. Updated version.
2002-11-17	3	Minor changes.

1.3 References.

Reference	Description
1	ChildRecumbentBike20010914-3.doc.

2 Design considerations regarding seats.

This chapter describes something about what I have learned about making seats. Since the seat is responsible for your comfort during the ride, it is important that it is built to fit you.

2.1 Adjustable seat design.

The first bike I made was made for me only. So if you are not at least 180 cm tall, you would have problems riding the bike. If you are smaller you cannot not reach for the pedals, and if you are much bigger than 190 cm, your knees will hit the steer. The bike was someone similar to the one in Ref[1].

So in order to be able to adjust the seat's position depending on the rider, the seat has to be adjustable.

One way of doing this can be seen in the following figure.

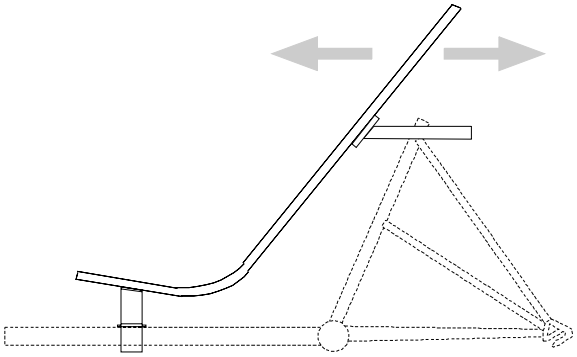


Figure 1: "Odense cykel" with adjustable seat.

The construction of the actual seat can be seen in Ref[1].

In this document the two seat mounts are also shown. The top seat mount and the bottom seat mount can be seen in the next figure.

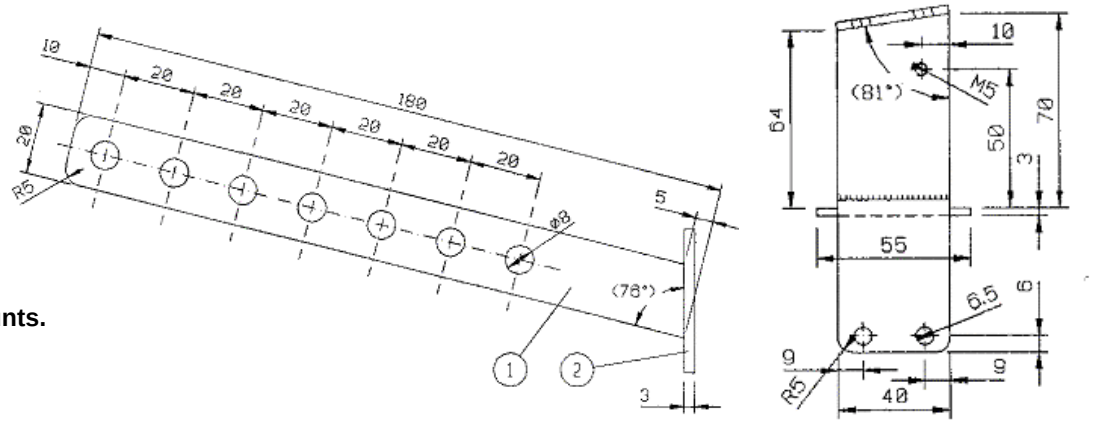
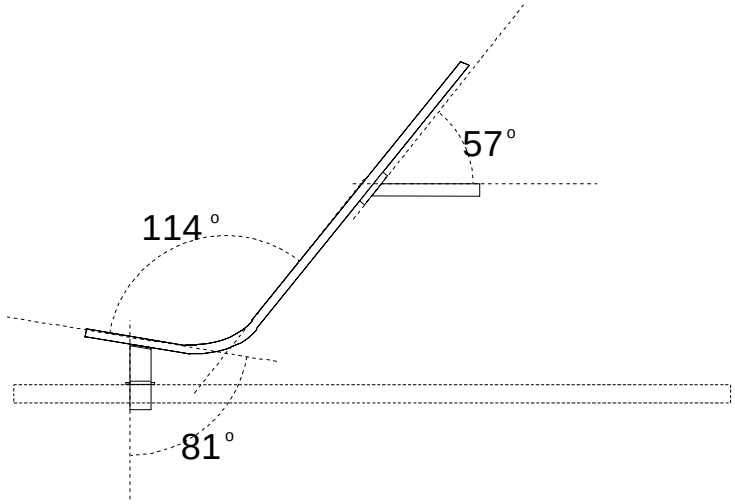


Figure 2: Seat mounts.

In case the seat is going to be able to be adjusted as in Figure 1 there are som angles which need to be aligned.

In figure 2 there is an angle indication of 76^{o} for the top seat mount and 81^{o} for the bottom seat mount. These angles need to be related to each other as indicated in the next figure.

Figure 3: Relations between seat and mount angles.



From the above figure it can be seen that the angle given for the top seat mount is wrong if the seat has to be easily adjustable.

The following formulas can be used in order to calculate the angles:

Top seat mount angle = 90^{o} - <seat angle> + <bottom seat mount angle>

Seat angle = 90^{o} - <top seat mount angle> + <bottom seat mount angle>

Bottom seat mount angle = <seat angle> + <Top seat mount angle> - 90^{o}

My recommendation is to use the angle given for the bottom seat mount and the seat, and then find the angle for the top seat mount, when the seat has dried out and has been mounted to the bottom seat mount. The reason for this is because it can be difficult to estimate the angle of the seat.

Another way out of the problem is to make an adjustable top seat mount as the one shown in the next figure.

Figure 4: Adjustable top seat mount.

There are no design details of the above top seat mount. It is made out of two pieces of “angle iron” which is welded on top of the original plate. The rest is like the original top seat mount.

The above mentioned indications apply to all kinds of seats no matter how they are made. See the next chapter for different seat jigs.

2.2 Different top seat mount.

When I was making the Child recumbent bike I discovered that in some cases the top seat mount was located too low at the back of the seat. This resulted in a seat which was too flexible when I was riding the bike.

From a durability point of view there should be no problems, but the ride was not as good as it would have been if I had had a stiffer seat.

The seat could have been made stiffer by adding a 3rd layer of veneer. The problem was instead solved by adding a T-piece like the one shown in the next figure.

Figure 5: Different top seat mount

The solution is not the best approach, but it works.

There are no design details, but there should be no problems in adding the additional T-piece to the original top seat mount.

2.3 Attaching the top seat mount to the bike.

This is by far one of the most difficult things to do right at the present design (see Ref[1])

The top seat mount is attached to the bike by making a small slit in the frame and then securing the mount with a nut and bolt like shown in the next figure or the picture of the different top seat mount just shown.

Figure 6:
Top seat mount

What happens when the nut is tightned is that the frame tends to be flat. It will soon be noticed that the mount is not secure.

In order to solve this problem a small ring has been attached at the top of the frame above the seat mount. This little ring ensures that the frame will not be flattened when tightning the nut.

One final thing: the small slit must not be much wider than the top seat mount, otherwise the mount will again be unstable.

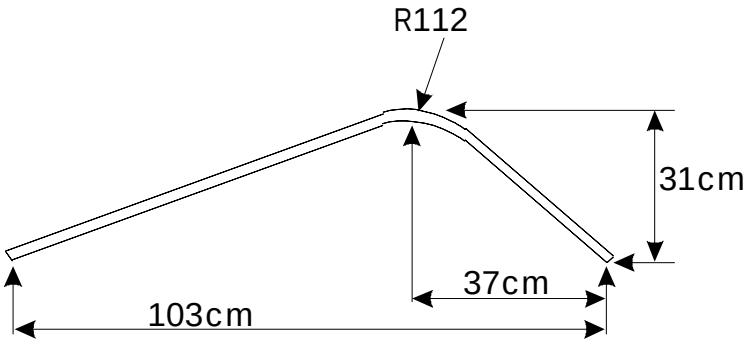
2.4 Seat jigs

In Ref[1] the first seat jig is presented. This has been replaced by the one shown in the next figure.

Figure 7:
The authors seat jig.

The dimensions for the above shown jig are given in the next figure:

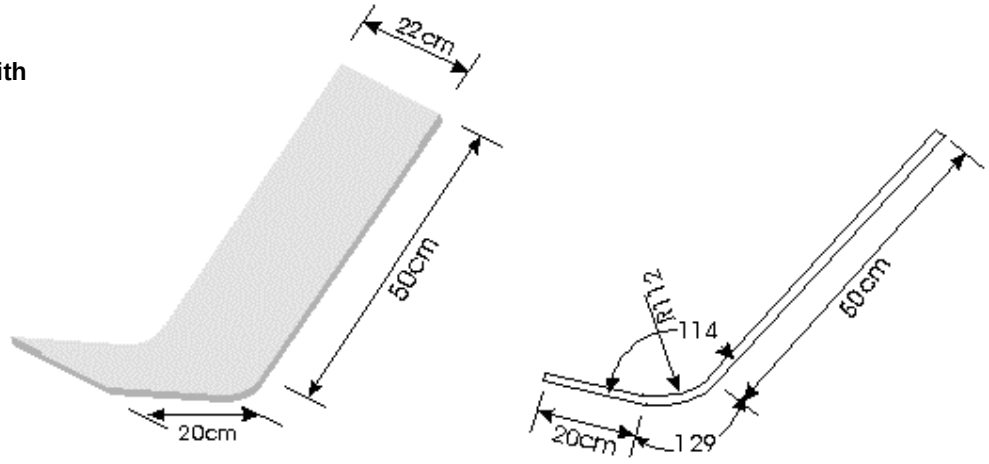
Figure 8: Dimensions of the seat jig.



What's most important are the angle and the radius of the jig.

It is by far easier to bend the wood over the jig, than trying to press it down into it. The shown jig will result in a seat like the one shown in the next figure.

Figure 9: One simple seat with one bend.



At "*Aalborg Liggecykel Klub*" (www.hpvklub.dk) another jig has been made for seats with two bends. The jig is made by one of the experienced builders Jørgen Pedersen. This jig can be seen in the next figure.

Figure 10: Metal seta jig, with two bends.

There are no measurements of the jig. It is made by best practice and by comparing the shape with a seat that Jørgen Pedersen has bought elsewhere.

If correctly built to the user, it is actually a better seat, since it has a better support of the rider's back. In case you are in doubt you can start making the seat in figure 5 and then add the middle section like shown in the next figure.

Figure 11: Seat with back support in the middle.

2.5 Suspension.

While riding a recumbent bike you will soon notice that some kind of suspension would be nice. It's not that it is uncomfortable to ride a recumbent bike, but it's not nice to ride over too many bumps. In order to solve this problem one of the builders at "Aalborg Liggecykel Klub" Tom Jensen has made the following suspension design.

The design is based on four springs taken out of an engine from a car. Not all springs are equally suitable for the purpose. In the next figure the present suspensions spring dimensions are shown.

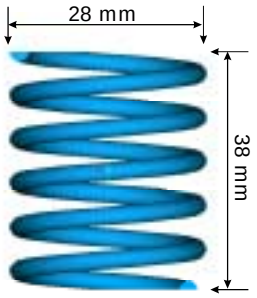


Figure 12: The used spring taken from a car engine.

The springs have to be secured so they can work freely but stay in posistion. In order to do so the design in the next figure was made. It consists of four small tubes, which fits inside the spring. They are 22 mm wide and 10 mm high and are welded to the two pieces of metal. In order to hold the design together two bolts are welded to the metal which is attached to the seat. At the other end a nut is placed.

The next figure shows how the top seat mount is made.

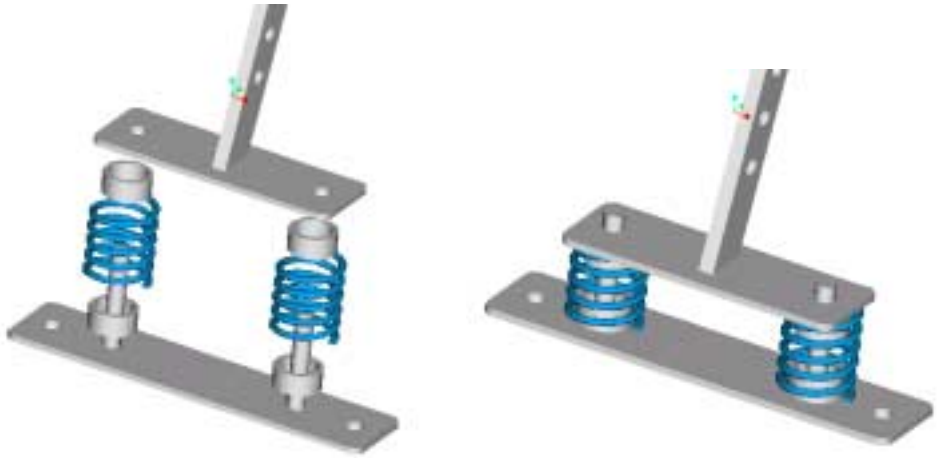


Figure 13: Exploded and assembled views of the top seat mount suspension.

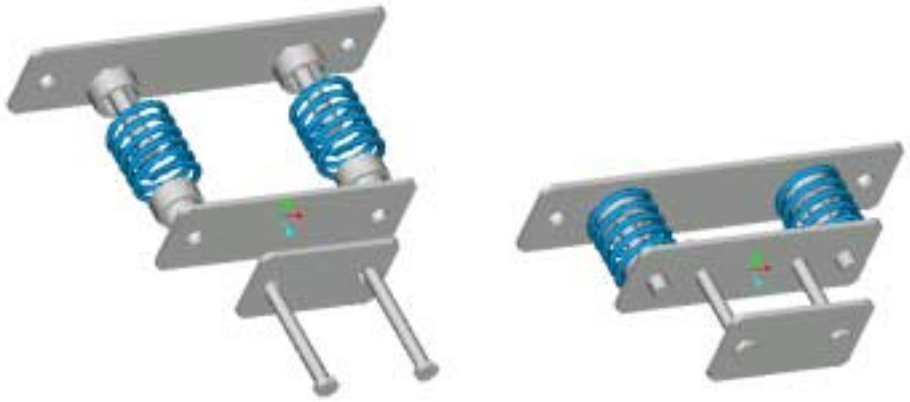
The next picture shows what the final design looks like.

Figure 14: Top seat mount with suspension.

The mounting which sits at the bike frame is the same as mentioned in Ref[1].

The next figure shows how the bottom seat mount is made. As seen on the figure it can be seen that it is much like the one made for the top seat mount. The principle and the dimensions are the same.

Figure 15: Exploded and assembled views of the bottom seat mount suspension.



The above implementation in real life can be seen in the next figure.

Figure 16: Bottom seat mount with suspension.

There is no design description of the suspension. The suspension is based on the original design mentioned in Ref [1] and ought not to cause any problems.

Remember to use nuts which do not unwind when you ride. !

3 Over seat steering.

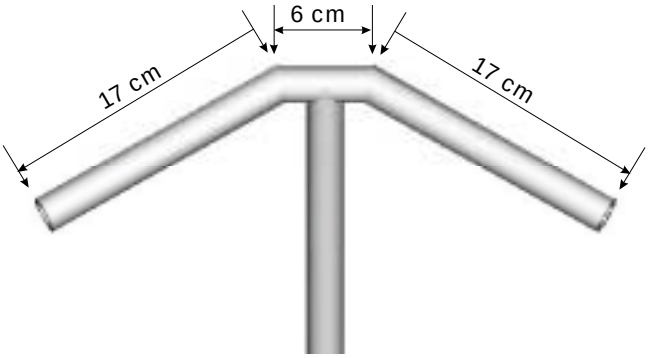
In case you want to use overseat steering as shown in Ref [1] there are several ways to make one.

The one shown here is very simple to make since it is only made out of 22 mm iron tubes. No bending needed.

Figure 17: Simple steer for over seat steering.

It consists of 5 pieces of 22 mm iron tube cut into the dimensions shown in the following figures.

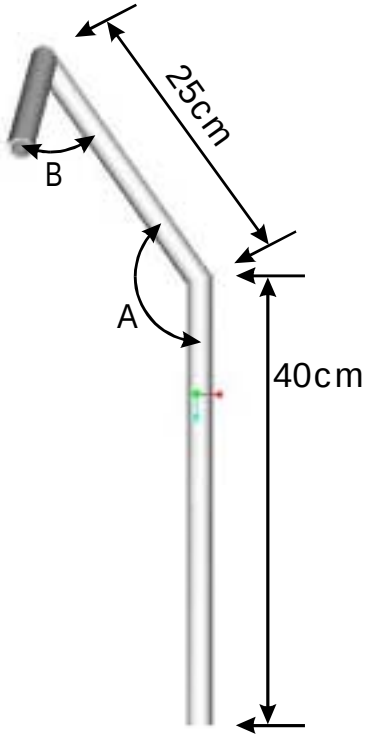
Figure 18: Dim for the upper part of the steer. The angle between the 17 cm and 6 cm piece is appr. 160 degrees.



The 6 cm tube can be omitted, but it can be difficult to weld it to the rest of the steer.

Remember to make the 17 cm piece long enough to hold all the breakhandles and the gearshifters.

Figure 19:
Dim for the lower part of the steer. The two angles are app. A: 145 degrees and B: 80 degrees.



Both the angle A and B can be changed according to personal likes. Some experimentation must be expected since it is individual from person to person which position of the steer is the best.

The 25 cm and 40 cm piece can be made out of one 22 mm iron tube and bent into shape instead. The only requirement is that the top and bottom of the bent tube are at the same position as the one shown in the above figure.

If the steer is combined with the adjustable steer mentioned in chapter 3.1 a compromise must be expected since the steer changes charateristics when moved up and down.

3.1 Adjustable steer.

When riding a recumbent bike with over seat steering, some riders like to be able to adjust the steer during the ride. Jørgen Pedersen has come up with the following design.

Figure 20: Adjustable steer fitting.

The steer fitting is attached to the front fork like on an ordinary bike. The rest of the steer is fitted in between the two remaining holes.

Figure 21: Assembly of the adjustable steer.

The steer can now be moved up and down. It is tightened with a nut and bolt.

There are no design details. All that is needed is a U-shaped iron tube, which has the right dimensions, which depends on the thicknes of your steer.

The following figure shows one implementation of Jørgen Pedersen's design.

Figure 22: One implementation of adjustable over seat steering.

4 Additional spare parts.

In this chapter there will be descriptions of spare parts which can be made at home.

4.1 Single cable stops.

The following figure shows how a single cable stop can be made.

Figure 23: Front and end view of a single cable stop.

This cable stop is made out of a 10 mm round metal piece. In the middle of the metal piece a 2-3 mm hole is drilled all the way through. At one end a larger hole is drilled size 5-6 mm. This hole is drilled 6 mm into the first and smaller hole. The dimensions can be seen in the next figure.

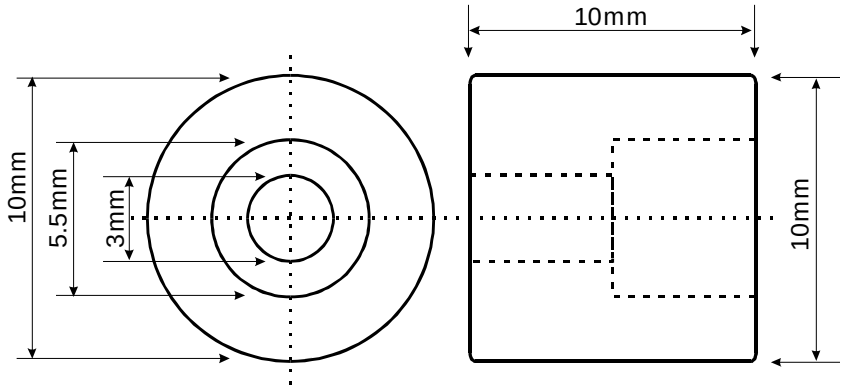


Figure 24: Front and side view drawing of a single cable stop.

Mounted at the bike it looks like what can be seen at the next figure.

Figure 25: Single cable stop mounted at the frame.

Admittedly it is not easy to weld the cable stop to the bike.

One addition to the cable stop would be a small slit in the cable stop. It will then be easier to mount the brake cable.

This improvement can be seen in the next figure, which has been found at (www.poweroncycling.com)

Figure 26: Single cable stops from www.poweroncycling.com)

Before you start drilling, mesure your cable, and adjust the dimensions of the single cable stop if necessary.

4.2 Chain tubes.

In order to protect the rider from getting greased by the chain some kind of protection is needed. This protection is done by a chain tube. For chain tubes a “plastic garden watering system tube” or similar can be used.

The one used so far is 12 mm PVC. It come in a roll and will not lie straight. In order to get the tube straightened out hot water is poured into the tube.

First cut the right length and position the tube so it can hang at full length without touching the ground. Put a plug in the low end and pour hot (appr 100^{o} C) water into the tube. **This has to be done very carefully** since the air in the tube will cause the hot water to splash while escaping the tube.

It is not easy to take a god picture of a chain tube, but the next figure shows how it can be done.

Figure 27: Chain tube made out of "plastic garden watering system tube"

More information about chain tubes can be found here:

http://www.ihpva.org/people/tstrike/building/plasticguide.htm