KENDAT

DTU

Animal Cart Programme

TECHNICAL
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RELEASE

Wooden Flexwheel for Donkey Carts

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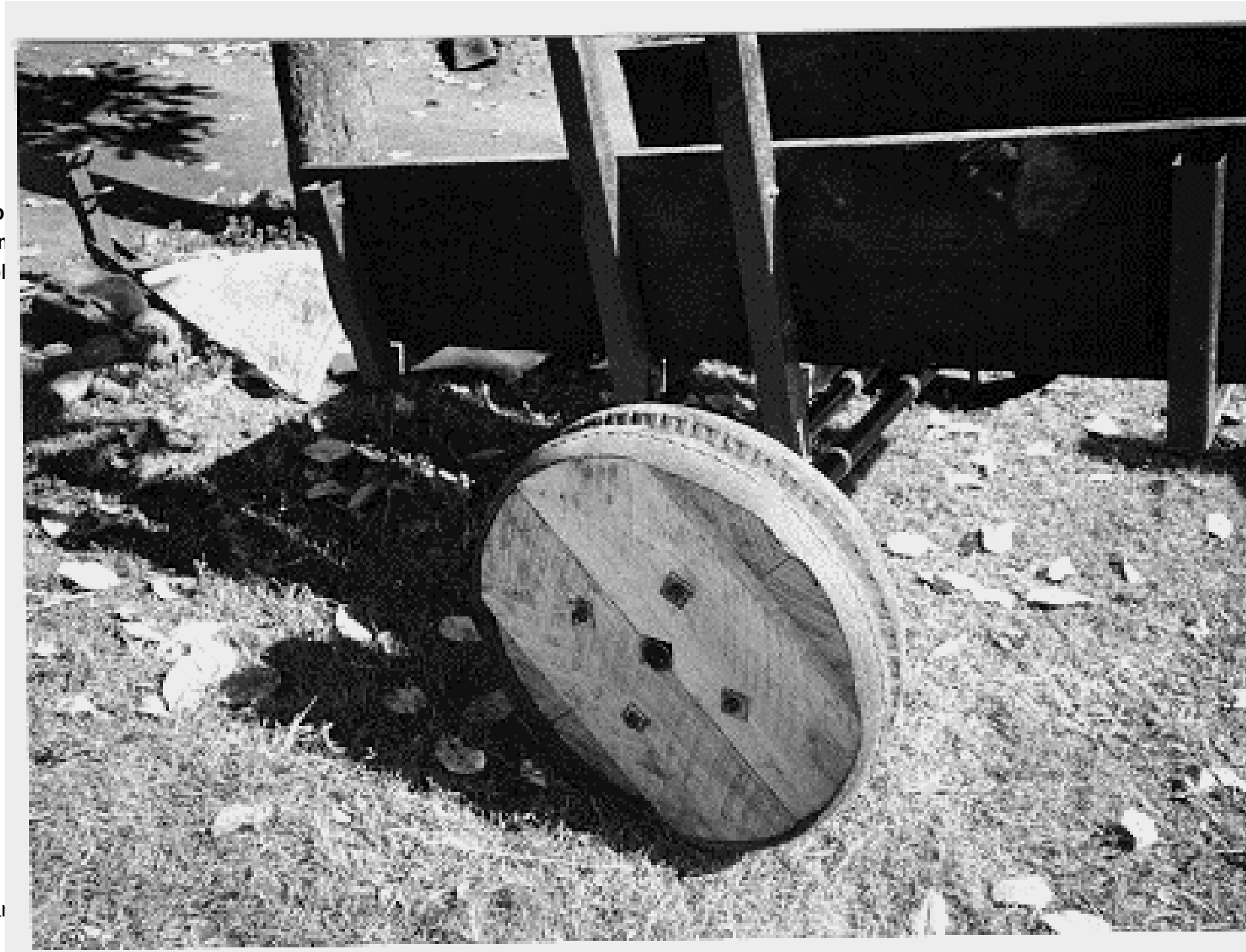

**Figure 1: woo
wheel for anir
using old rubl
and timber.**

Wooden Flexwheel for Donkey Carts.

Introduction

In this booklet we tell you how to make wooden wheels with scrap rubber tyre rims for donkey carts. The idea for these wheels comes from TDAU and Kasisi Mission in Zambia. This type of wheel cannot be punctured and it is quite easy to make. Unfortunately although the wheel itself is made without steel, the fixing to the axle does need welding.

The instructions here do not cover how to make the cart or the axle - you will need to read other Technical Releases from us to find out how to make these.

You should find that you can make a pair of wheels including the bare steel axle pipe for about £30. This cost will depend on the cost of the materials and labour. Once you get organised, two men can probably make a pair of wheels in two days.

Easy to make design.

This wheel is designed to be constructed without any special tools and jigs, and without any hard-to-get materials. The only tools which you must have are a simple welder, a woodsaw, a hacksaw, and a hammer.

Unfortunately we have only tested one of these wheels in Kenya and Uganda but we had no problems.

Cutting list and costs

Table 1 shows a cutting list for a wheel - recent prices of materials in Kenya are shown converted into £UK.

Construction step by step

1) The first job, is to get all the material together and clear a space to work. Ideally you will be able to work on a flat area of concrete.
2) Start by cutting the tyre into two pieces around the centre of the tread. You will not be able to cut a tyre with a steel cord in the tread so avoid the steel type.
3) Measure the diameter of the tyre rim hole accurately. This is likely to be about 325 mm for a 13" tyre, 350 mm for a 14" tyre or 400 mm for a 16" tyre. Measure the diameter five or ten times in several different positions and take an average.
4) Measure the outside diameter of the tyre. This will be about 600 mm for the smaller tyres and 650 to 700 mm for the larger tyres.

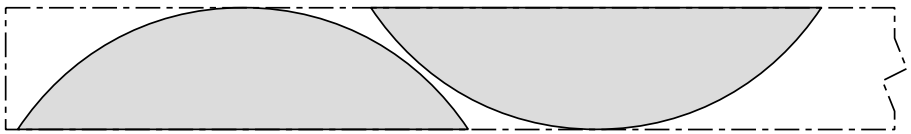

Figure 2: marking out segments to reduce waste.

5) Draw a circle of diameter 30 mm less than the outside diameter of the tyre on a piece of paper or cardboard using a piece of wire to make a compass. On the same centre draw a second circle of diameter equal to the hole diameter. This is to help you mark out the timber, so you should take some trouble over getting it accurate.

6) Now use the cardboard template to mark the timber planks. You can prick through the template into the wood and then join the marks with a pen. Figure 2 shows how to mark out the segments to waste the minimum timber.

7) Cut out the segments. For each wheel you will need to make two of the discs shown in Figure 3. Each disc is three planks thick as you can see. Make sure that the tyre is a snug fit on the single thickness small disc.

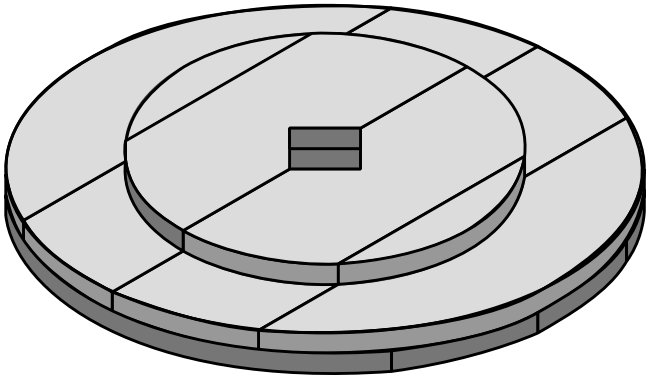

Figure 3: half of one wheel.

8) Nail the segments together with 60 mm nails clenched over. Make sure that the cutouts for the axle all line up - you can put a short piece of pipe into the notch to help align the segments.

9 Carefully mark the position of the bolt holes through the discs and drill the four holes in each disc. It is probably worth making these holes 15 or 16 mm diameter if you are using M12 bolts because it is hard to get all the holes to line up accurately.

10) Cut pieces of 40 × 6 mm steel bar 150 mm long to make the wheel stud struts shown in Figure 4. You will need four for each wheel. To make the long bolts cut the heads off 40 mm bolts and weld on pieces of 12 mm round bar 180 mm long. Check how thick your timber is and change the length here to suit if you need to.

TABLE 1: materials for wooden flexwheels.

component	material	# lengths reqd [#*mm]	total material for two wheels [mm]	cost [UK£]
wheel studs	50×M12 nuts and bolts	8	8	2.08
wheel stud struts	6 × 40 flat bar	8 ×150	1200.00	0.90
axles	1-½" BSP malleable iron pipe	2 × 1500	3000.00	8.23
small timber discs	150×25mm timber	8 × 360 + 8 × 200	4480.00	1.47
large timber discs	150×25mm timber	8 × 580 + 8 × 400	7840.00	2.57
scrap rubber car tyre	size 185×14	2 reqd	2 reqd	4.00
	TOTAL			19.26

11) Next cut the axles from 1-½" black pipe. These will probably need to be about 1600 mm long - it depends on the axle design you are using.

12) Position the axle in a pair of discs without the tyre and fit four stud/ struts. Arrange them to lie around the axle as in drawing 1/3 at the end of this document.

13) Using a trysquare get the axle square to the wheels and get someone to hold it there while you weld the struts to the axle. Make sure that you weld the struts to the axle strongly.

14) Remove the nuts from the studs and the outer wooden disc and fit the two halves of the tyre as shown in drawing 1/3. Replace the nuts and washers and tighten.

15) Repeat for the other wheel. You've finished it!

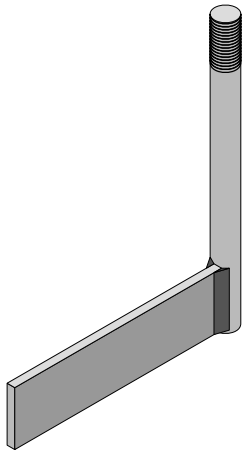

Figure 4: strut and stud fabrications.

Other DTU cart developments

The DTU has been working on new designs of carts and all their components to bring down their costs and make things more locally manufacturable. It has designs for bodies, wheels, hubs, bearings and animal harness all available from DTU as Technical Releases.

Drawing

You will find a drawing of the wheel on the next page.

Acknowledgements

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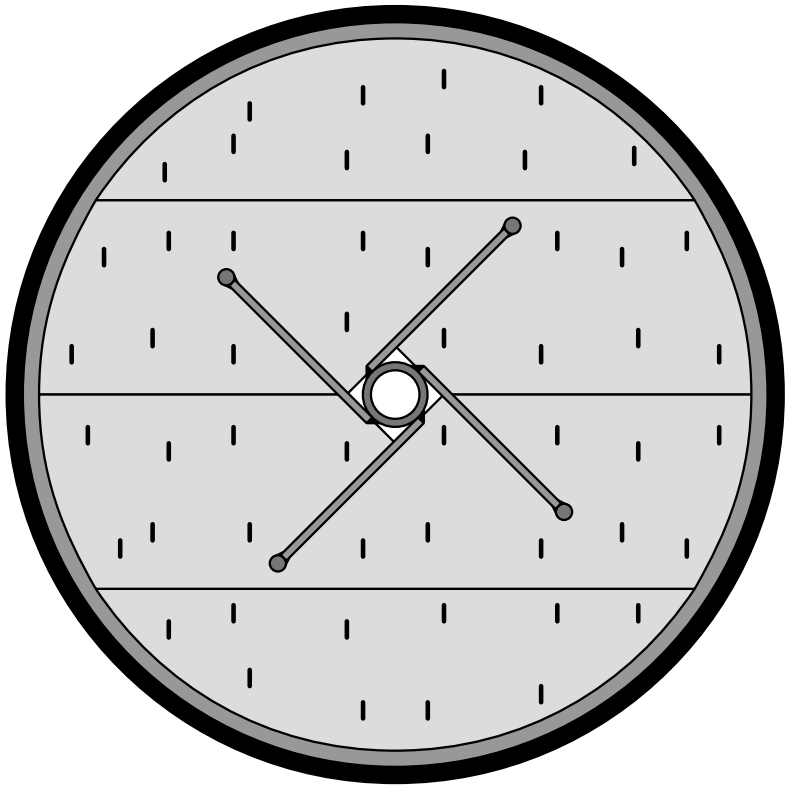
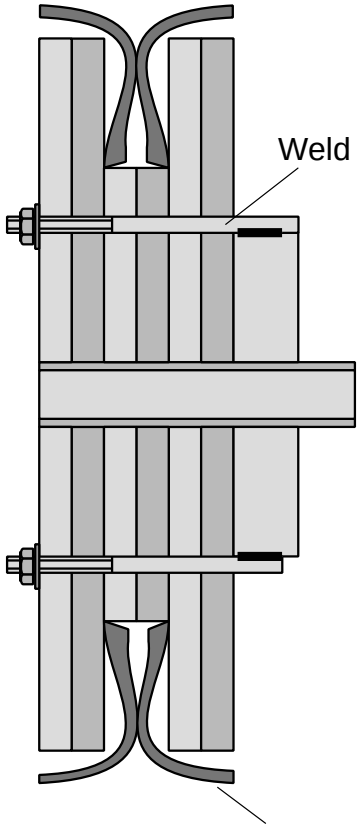
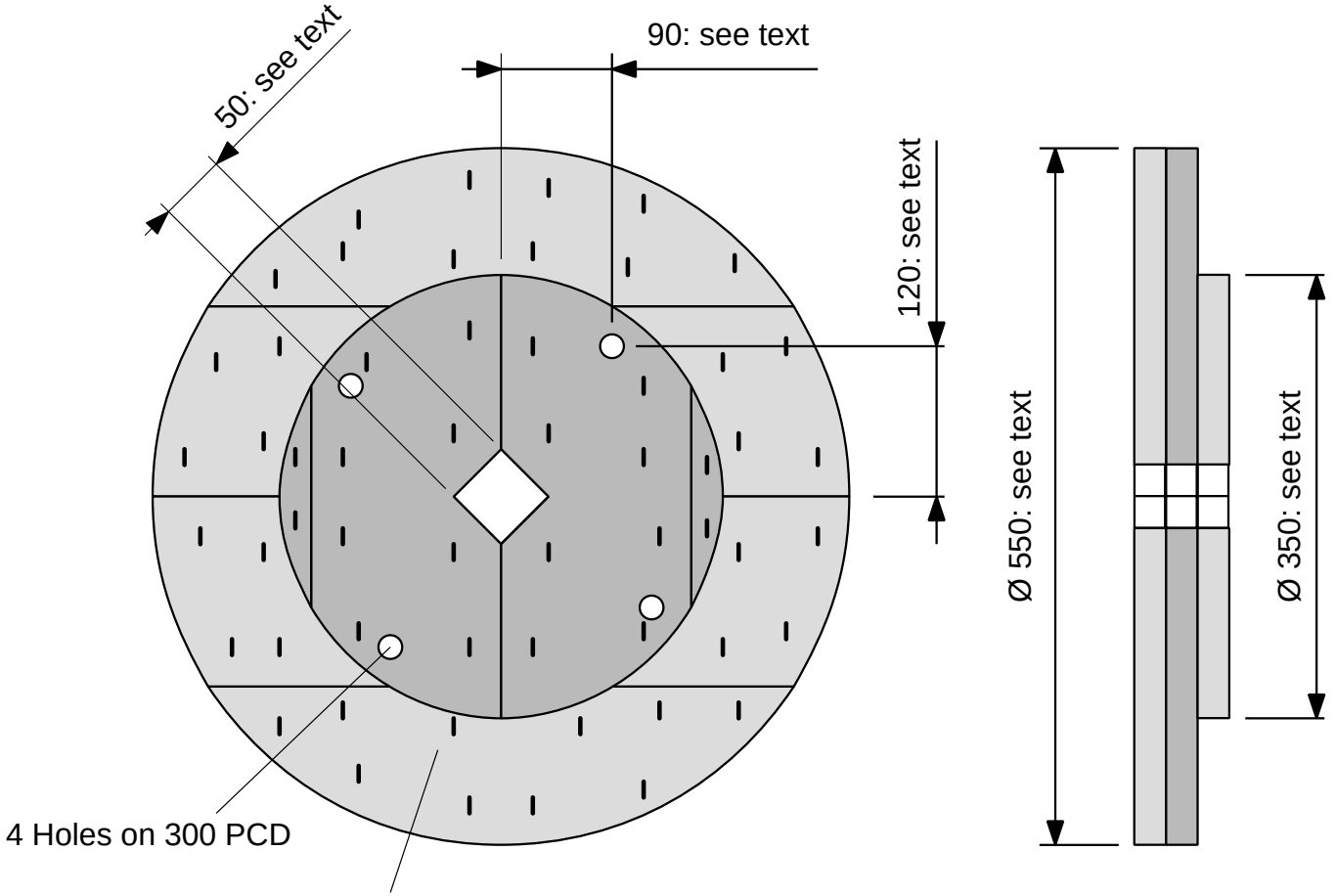




	General Arrangement	Scale	10mm	Title	Drawn by	CEO
		Date	13-4-99	WOOD FLEXWHEEL FOR DONKEY CARTS	Dwg No.	1/3



	Wood components	Scale	10mm	Title	WOOD FLEXWHEEL FOR DONKEY CARTS	Drawn by	CEO
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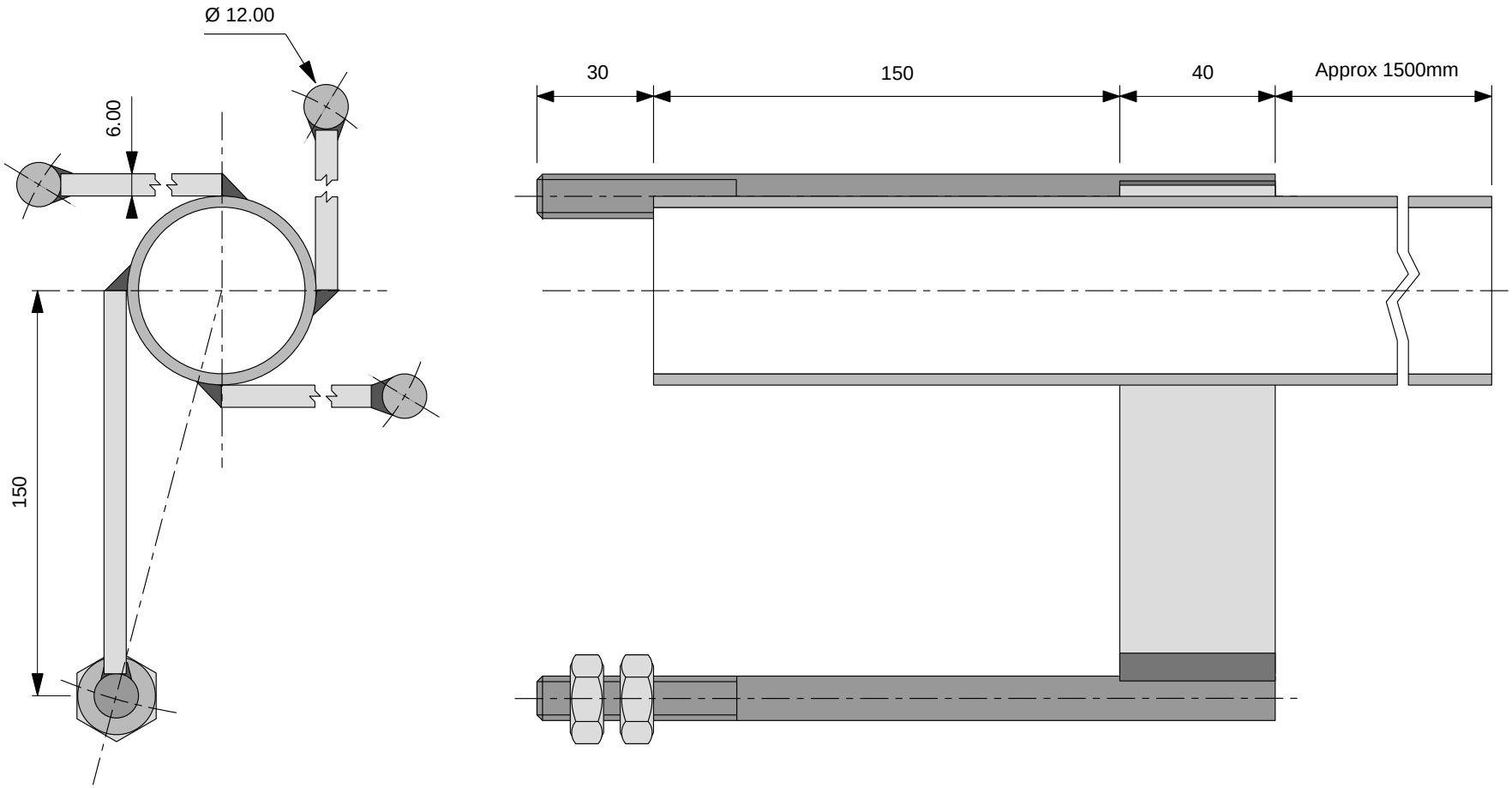

	AXLE COMPONENTS	Scale	10mm	Title	WOOD FLEXWHEEL FOR DONKEY CARTS	Drawn by	CEO
		Date	15-4-99			Dwg No.	3/3