

TECHNICAL  
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RELEASE

**DTU**   **KENDAT**

# Animal Cart Programme

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## Steel Wire Rim Wheel for Donkey Carts

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Figure 1: wire rim wheel for animal carts.



# Steel Wire Rim Wheel for Donkey Carts.

## Introduction

In this booklet we tell you how to make steel wire or bar rim wheels for donkey carts. The instructions 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.

The advantages of this type of wheel are that it cannot be punctured and that it is quite easy to make.

You should find that you can make a wheel for about £12. 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 half a day.

## 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 hacksaw, and a hammer.

Unfortunately we have only tested one of these wheels in Kenya and Uganda but we had no problems. A good modification is to cut the tread from an old tyre and bolt it to the outside of the wheel. Then it is quiet on tarmac roads.

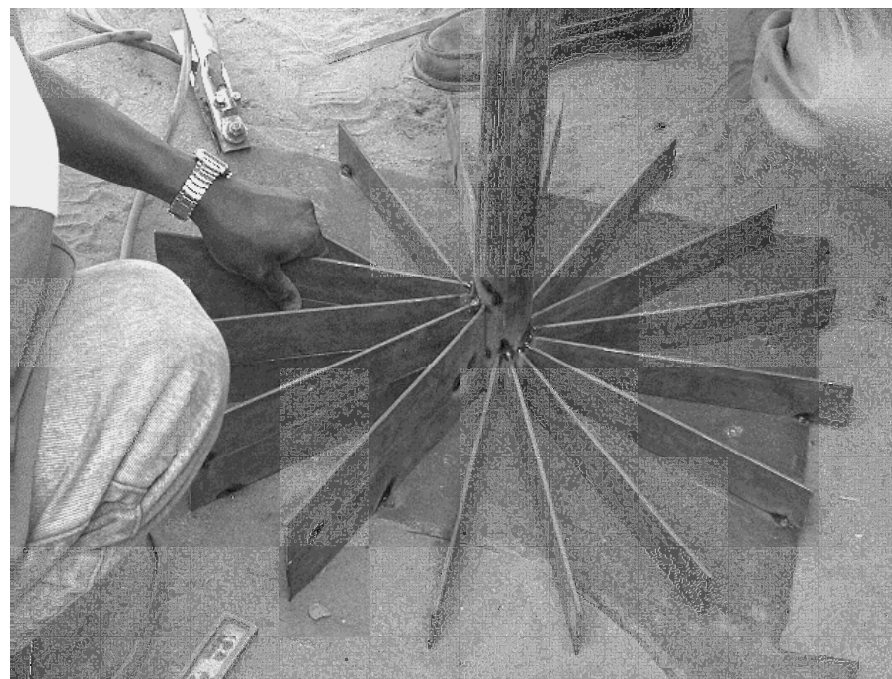
TR39: 4th April 1999

## Cutting list and costs

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

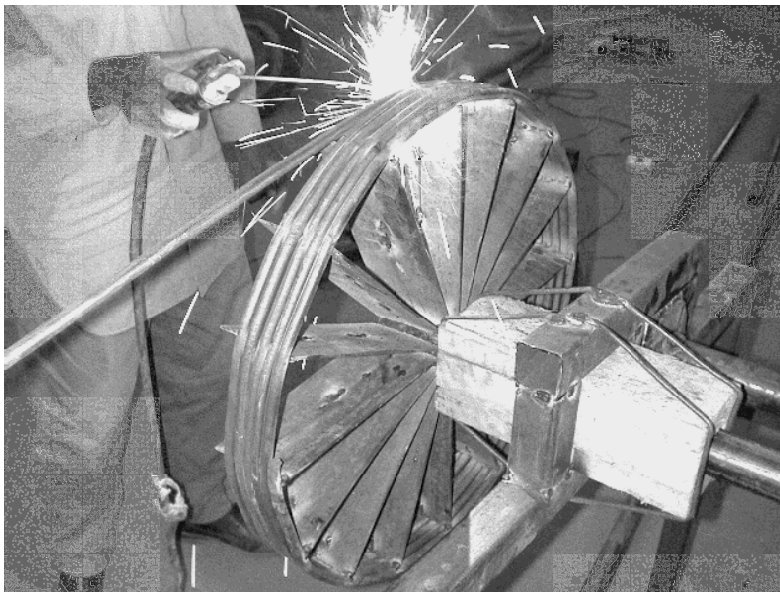
## Construction step by step

- 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.



**Figure 2: welding spokes to axle.**

- 2) Start by cutting the 16 spokes each of which needs two pieces of flat bar. If you want to make the wheel an exact size subtract the axle radius and the wire diameter from the required radius for example if you want the diameter to be 600 mm ie a radius of 300 mm and the axle is 50 mm diameter and the wire is 10 mm diameter then the spokes should be  $300 - 25 - 10 = 265$  mm.
- 3) Next cut the axles from 1-½" black pipe. These will probably need to be about 1500 mm long.



**Figure 3: welding steel wire rim wheel for donkey carts. Also shown is wooden bearing.**

- 4) Using a try-square or a piece of wood or metal to check that the spokes are square to the axle weld the spokes evenly around one end of the axle as shown in Figure 5. Weld one on, then the opposite one, then one at right angles to the others, then the one opposite it and so on.
- 5) Then mount the axle horizontally as shown in Figure 3 so that it can rotate. Straighten the round bar out and then bend about 500 mm of one end so that it fits around the wheel spokes neatly. Weld the end of the wire to the end of a spoke so that it is flush with the outside of the spokes. Weld the wire to the next spoke keeping it flush with the outside of the wheel.

Continue welding the wire to each spoke in turn rotating the wheel as you go. Soon you will start bending the straight part of the wire, but you should find this ok. It is easiest if one person pushes the wire as another welds.

Continue pushing and winding and welding until the wire is the full width of the spokes. You will probably need to start a second length of wire to finish the wheel. Just weld it onto

**TABLE 1: materials for torsion tube brake.**

description	length m	#	total m	cost £UK
100 wide strip 600 dia single thickness	18.85	1	18.85	3.93
50x3 strip spokes 270 long	0.27	32	8.64	6.62
			TOTAL	10.55

the end of the first piece of wire and continue.

- 6) When you reach the other side of the wheel and you cannot get any more wire on you've finished it!

### **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.

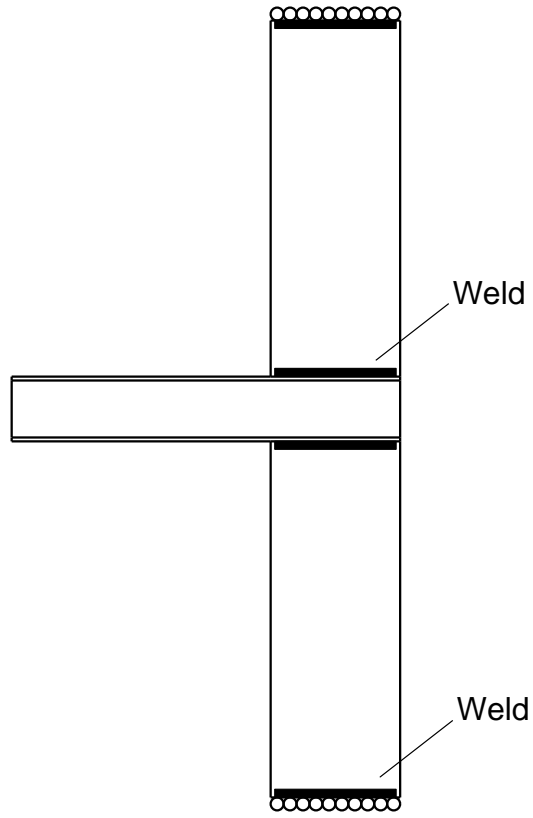
### **Drawing**

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

### **Acknowledgements**

The DTU is grateful to the DFID (British Government) for the financial support necessary to carry out the research and development project under which this product was developed.

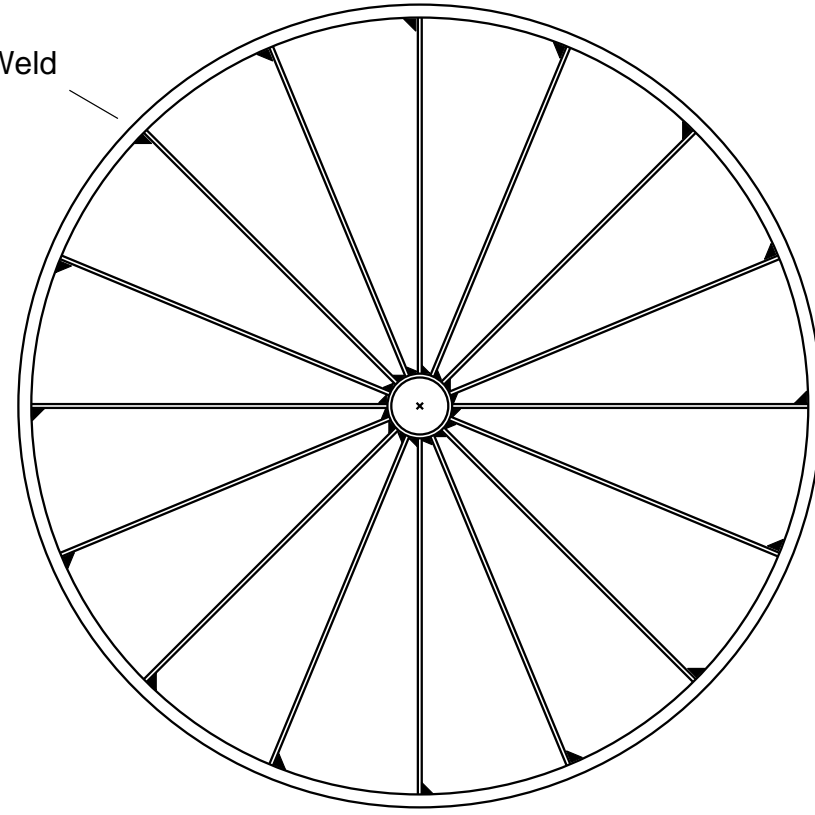
The DTU would also like to thank Dr Pascal Kaumbutho of KENDAT in Kenya and Mr Joseph Mugaga of TOCIDA in Tororo, Uganda for their very considerable help with this project. A large number of other people and organisations have contributed to the success of the project, most notably Mr Anthony Ndungu in Kajiado Kenya, Mr JD Kimani in Kikuyu Kenya and Mr Joseph Gitari in Wanguru Kenya in whose workshops most of the development work of this project was performed. Thanks are due also to Mr Stanley Lameria in Kajiado, Mr Patrick Gitari in Wanguru and Mr Mathew Masai in Machakos for their assistance.



Weld

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### General Arrangement

Scale	10mm <input type="checkbox"/>	Title WIRE RIM WHEEL FOR DONKEY CARTS	Drawn by	CEO
Date	4-4-99		Dwg No.	1/2