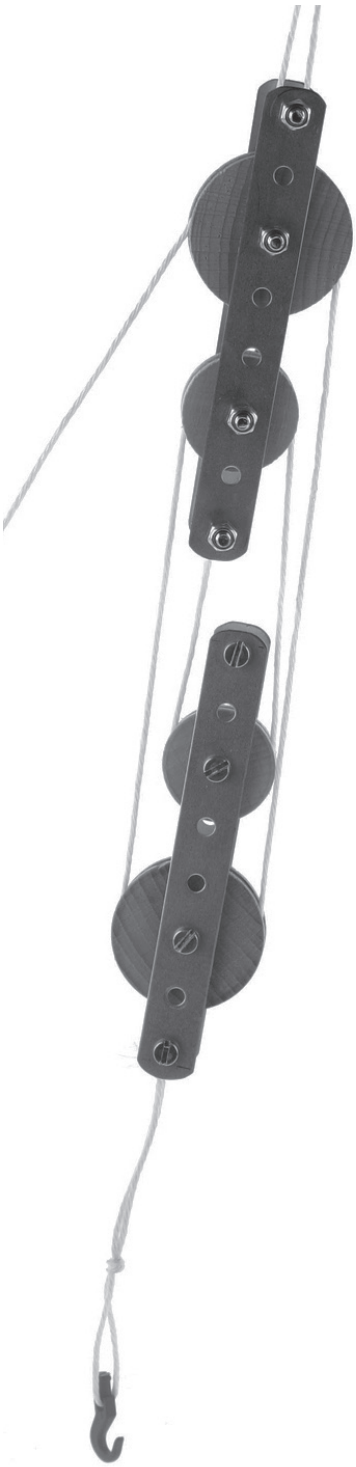
OPITEC

Hobbyfix

108.580

Pulley system



Parts list		
	Quanity	**Size(mm)**
Holed metal strip	2	250x15x1
Pulley with 4mm hole	2	ø 40,
Pulley with 4mm hole	2	ø 30,
Brass tube	8	ø 5x0,5, 15 mm
Crane hook	1	
Machine screws	8	4x25
Lock nuts	8	M4
Washers	8	ø4,3/9
PP Cord	1	12 Meter

Necessary tools:

Metal hacksaw

Compact metal shears or hacksaw

File, spanner

Scissors, Felt tip pen

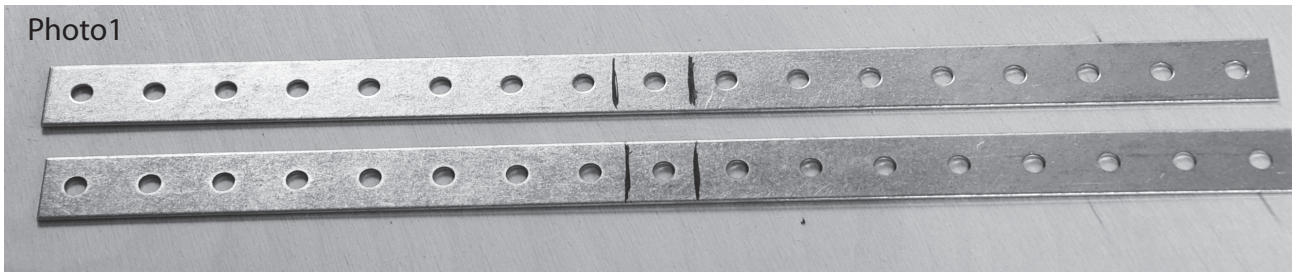
Hand or Pillar drill

Please Note

The OPITEC range of projects is not intended as play toys for young children.They are teaching aids for young people learning the skills of Craft, Design and Technolo- gy.These projects should only be undertaken and tested with the guidance of a fully qualified adult. The finished projects are not suitable to give to children under 3 years old. Some parts can be swallowed. Dan- ger of suffocation!

Instructions

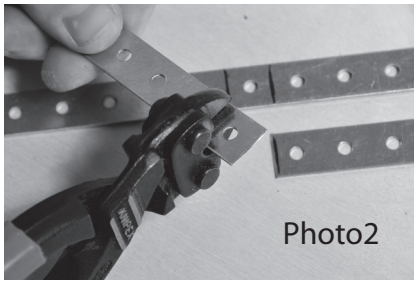
1. Mark out the flat holed metal strips 250 x 15 x 1mm as shown. Draw lines after the eighth hole with a felt tip pen

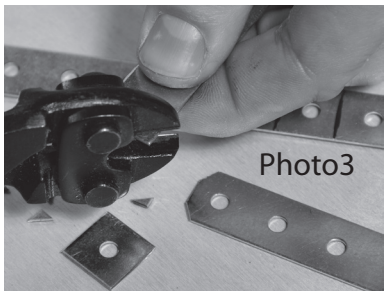


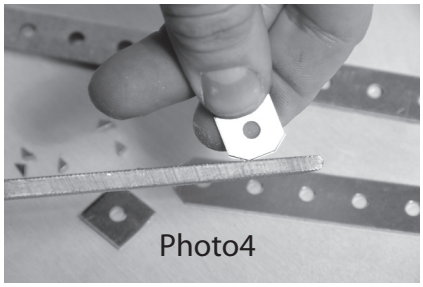
2. Cut the metal strip into 4 equal lengths as shown . (See Photo 2)

3. Trim the ends of the on the 4 metal lengths (Photo 3)

4. File all the ends round and remove any burr to make them safe (Photo 4)



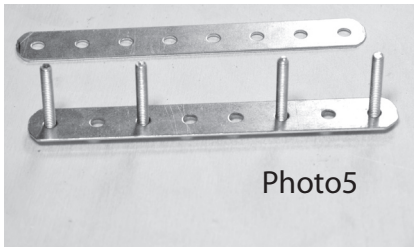


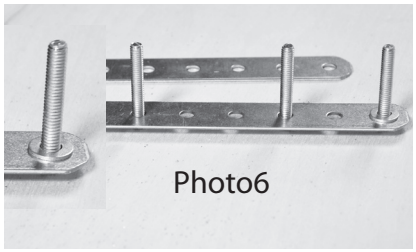


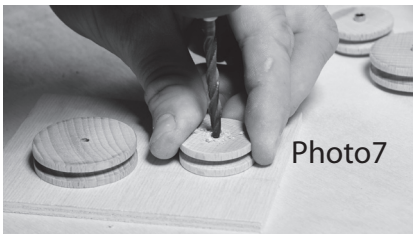
5. Insert the machine screws through the holes in one of the metal strips (Photo 5)

6. Add a washer and nut to each machine screw.

7. Enlarge the holes in the pulleys with a drill to 5mm diameter)



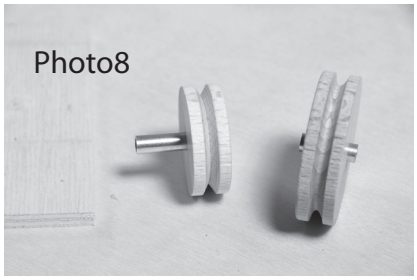


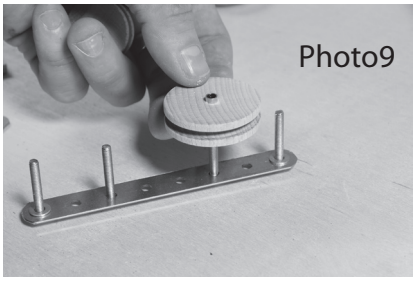


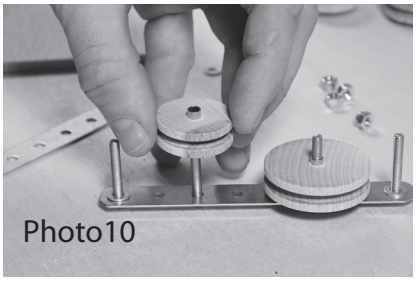
8. Insert the brass tube bearings into the pulley so that they are centralised

9. Place the large pulley as shown in the photograph (9)

10. Then place the small pulley alongside (See photo 10).

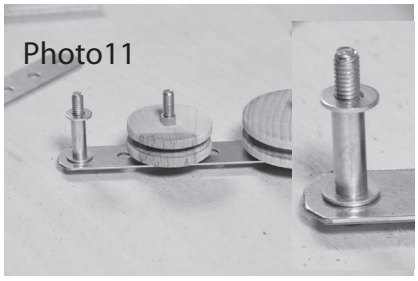




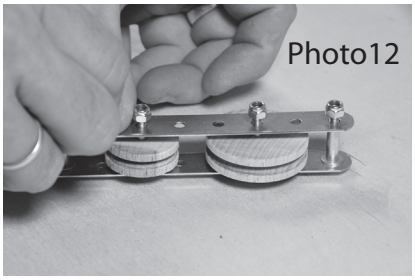


Instructions

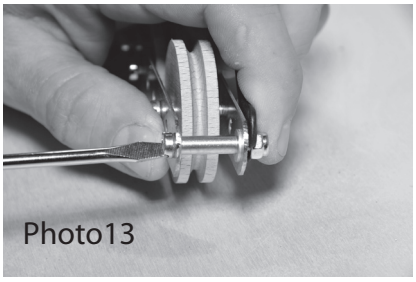
11. On the outer screws add a washer brass tube and a further washer (Photo 11)



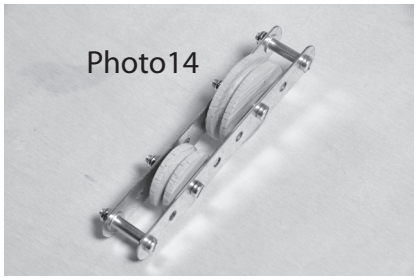
12. Now carry out the same steps on the opposite end (Photo 12)



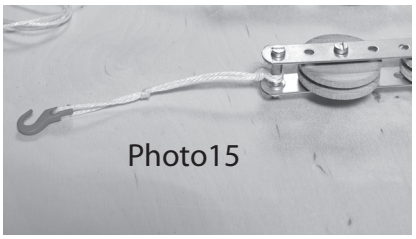
13. Tighten the end machine screws with a screwdriver and spanner. (Do not overtighten !) (Photo 13)



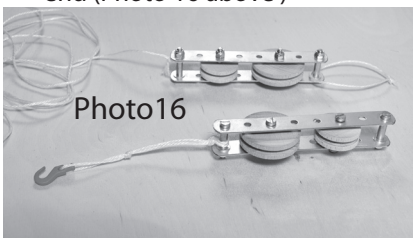
14. To make the second pulley repeating the steps 5-13.



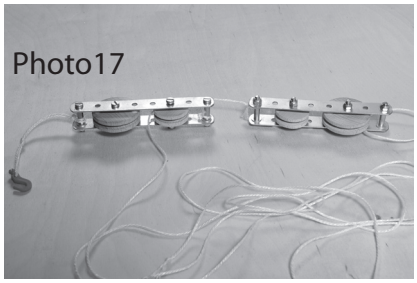
15. Once complete add to one pulley system the 10cm cord and the crane hook (Photo 15)



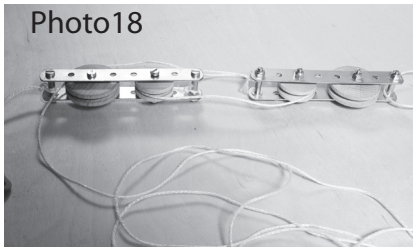
16. On the second pulley tie a 10cm loop on the end above the large pulley then tie the long remainder of the cord around the machine screw at the opposite end (Photo 16 above)



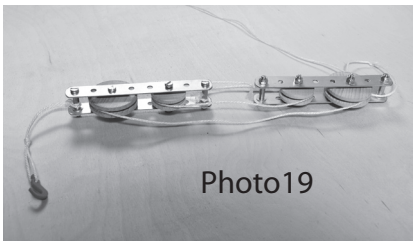
17. Arrange the pulley system as shown in photo 17 and guide the long length of cord around the small pulley of the first system



18. Then guide the cord back around the small pulley on to the adjoining pulley system and around the large pulley (Photo 18)



19. Now thread the cord back to the first system and around the large pulley (Photo 19)



20. The pulley system can now be carefully hung up. As soon as a weight is added to the hook the cord will become taut. By pulling on the long cord a weight can be lifted up and down (Photo 19)

The history of the pulley

The pulley system has been known since antique times. Archimedes 287 -212 BC (son of the astromomer Pheidas) studied in Alexandia . As the Romans attacked Acrhimedes was he most well known mathematician and designed war machines to protect the town. Among his discoveries were the pulley system for lifting weights, the water screw and a water driven planetarium. His first use of the pulley as a simple roller can be seen in carvings of the time . Cranes needed to move the large blocks making up the coliseum in Rome. By developing pulley systems they were able to shift stone blocks weighing tonnes. Leoardo da Vinci
carried on with this idea on in many of his discoveries.

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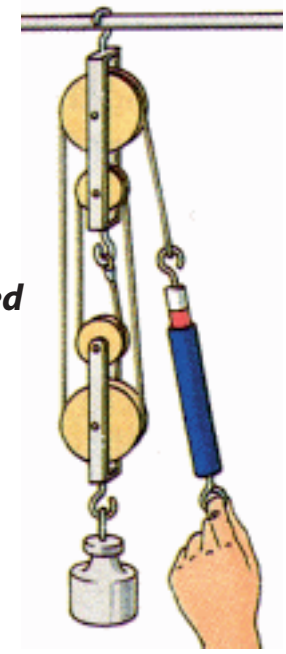
During the Renaissance 1586 a pulley system was used to transport and erect the large pillars in St marks square Rome by the enginner Domenico Fortuna
The first differential pulley system was used in London reaching an efficiency of 1 :10000
this means (about 10 N) pulling power was able to lift 1 ton in weight (about 10,0000N).

The pulley:

The cord runs over **2 free pulley rollers**
These are the 2 lower ones –a large and a small roller.

- The top 2 pulley system is attached to a beam
- So the load is divided amongst the four pulleys
- Each pulley carriers a quarter of the load
- To lift the load **0,5metre** the cord must be pulled four times as much this means **2metres**
- The weight on the lower roller must also be taken into account

--- ***So a pulley system with 4 rollers means that you only need one quarter of the effort***



The golden rule is:
What you save in power by using a mechanical system, must be compensated for in other ways.