Stretham Old Engine

Here at Stretham Old Engine we are very proud of our beam engine and we want everyone to see it! We thought the next best thing to seeing it in person is to make your own version, so here we have a cut-out project for you so you can make your own version until you can visit us in person.

There are two ways to use our beam engine cut-out. You can either make a colourful collage, or, if you fancy doing a little bit of engineering, you can make your very own 2D model of our beam engine!

To make the collage you will need:

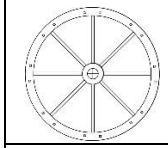
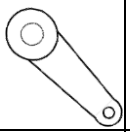
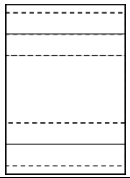
- A printed copy of our cut-out sheet
- A pair of paper cutting scissors
- Colouring pens or pencils
- Glue
- Paper or card to stick your creation to

If you plan to make the model you will also need:

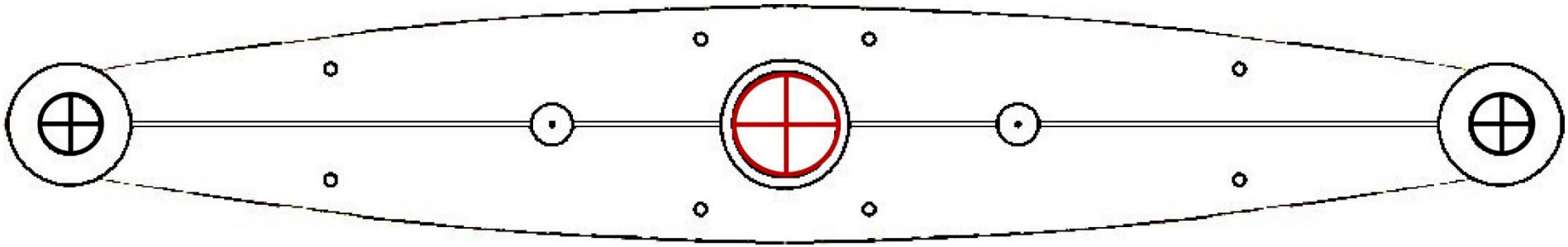
- Thin card to make the pieces
- Drawing pins and split pins or small pieces of wire to make the pivots.

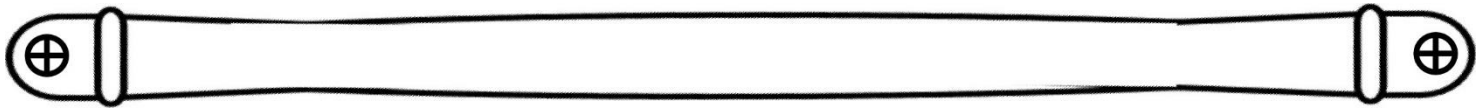
Parts

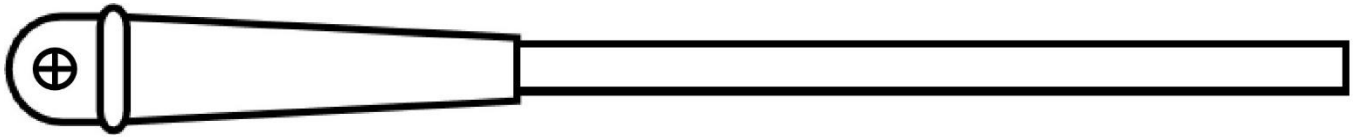
Every engineer needs to know the names of the parts they are working with. So, just in case you'd had forgotten them, we've listed the engine parts here for you:

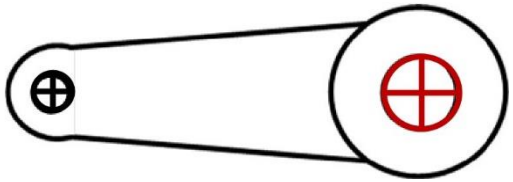
							
Flywheel	Crank	Cylinder	Piston rod	Column	Beam	Piston head	Connecting rod

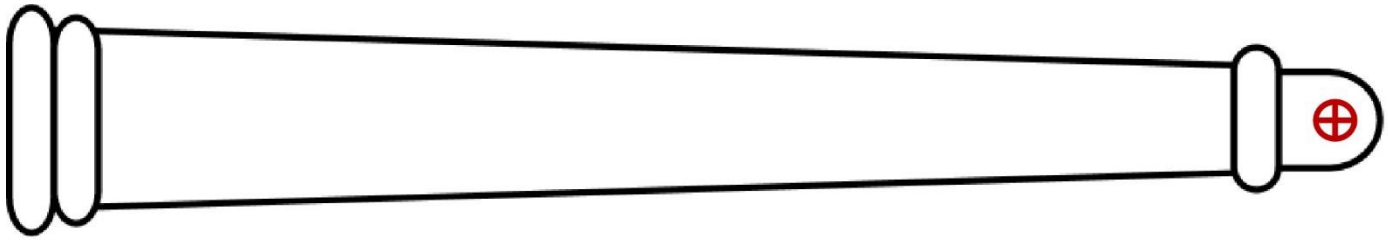
Stretham Old Engine











In association with
Seven Coloured Earths

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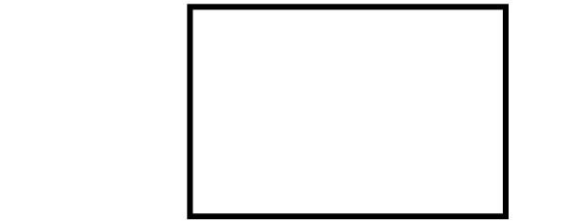
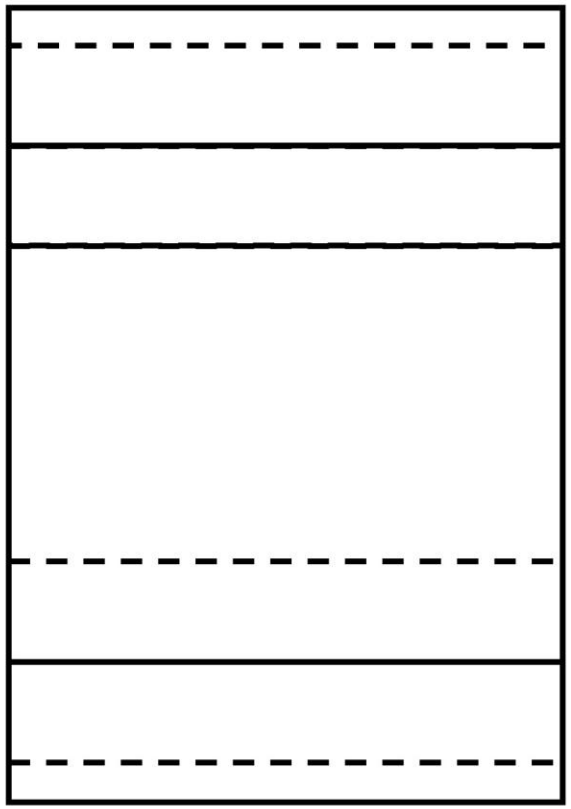
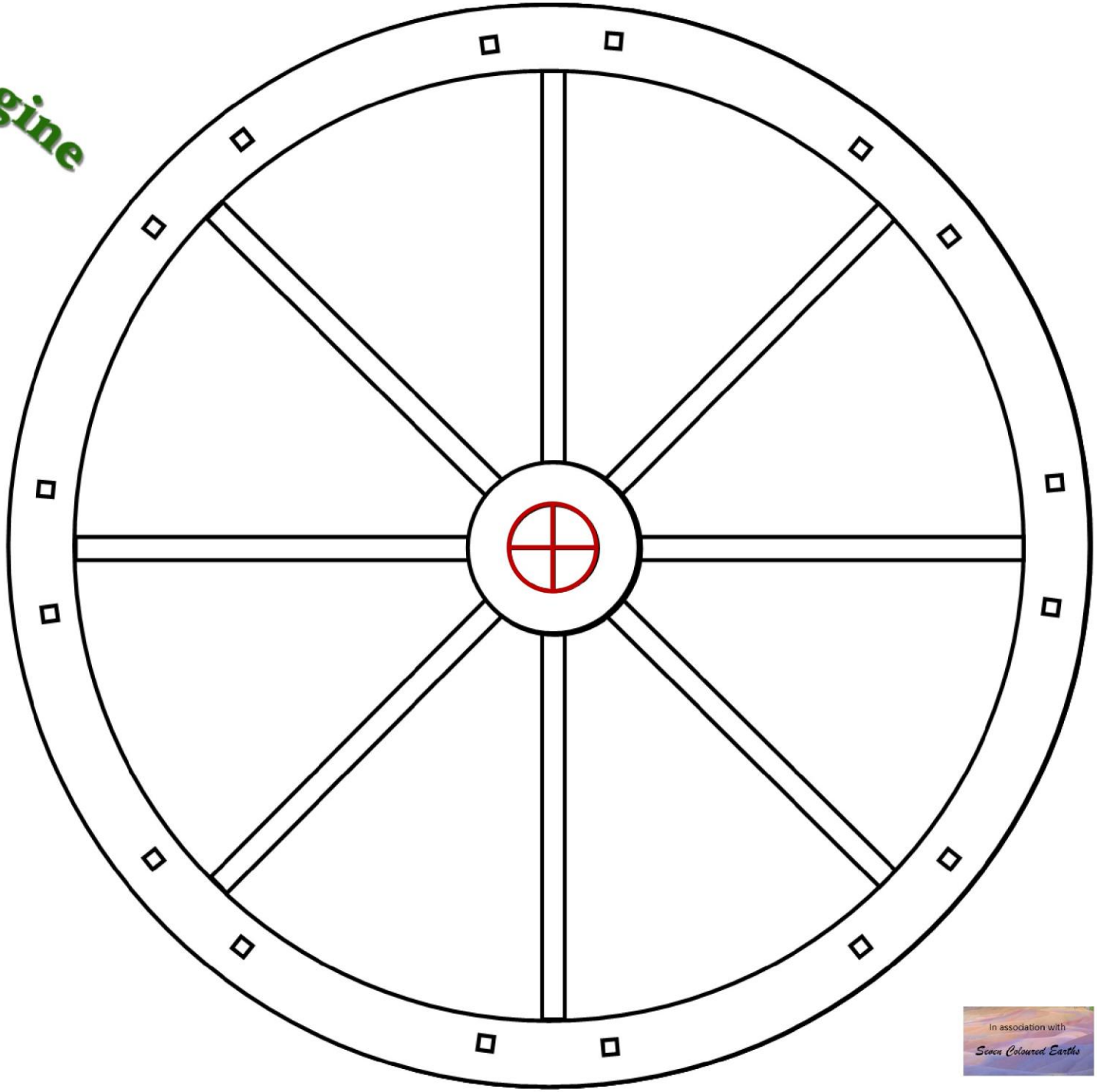


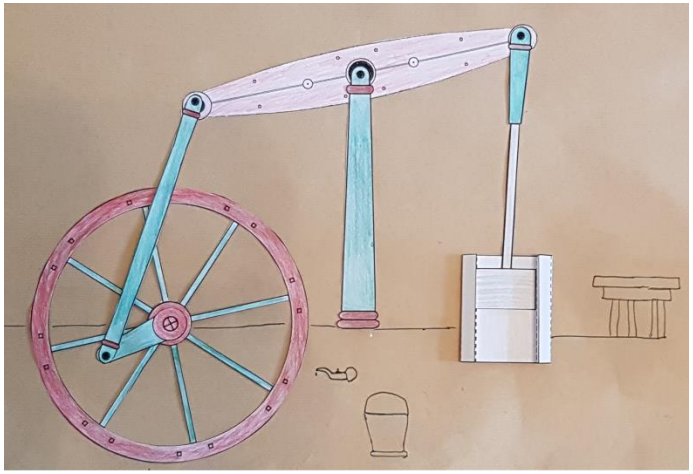




In association with
Seven Coloured Earths

It is easier to colour the engine parts in before cutting them out. If you are making the model it is best to stick both sheets onto thin card before colouring them in and cutting them. You don't need to stick the parts onto card if you are making a collage but if does give a nice 3D effect if you do. It is best to use thin card such as a cereal box. We have used a cardboard envelope. If you find cutting around the spokes too difficult, don't worry, you can colour the spaces in between the spokes the same colour as your background instead.

Making the collage



1. Once you have cut your parts out arrange them on a large piece of paper or card and then stick them down. The easiest way to set your pieces out is to place your flywheel at the bottom of the page and the draw a line across the page where the middle of the wheel is placed. This line will represent the floor and the bottom of the column will sit on it.
2. Stick the wheel in place and then stick the bottom of the column on the line you have just drawn about 1 or 2cm away from the edge of the wheel.
3. Paste the cylinder about 6cm away from the base of the column. The cylinder does not have to sit on the line. We have stuck ours so one third of the cylinder is below the line. Usually you would not be able to see inside but we thought it would be nice to see the piston inside the cylinder. You can make the cylinder 3D by folding it along the lines before sticking it down. If you don't want to do this cut along the inside dotted lines to get a rectangle and stick that on your sheet instead.
4. Stick the piston head onto the thin end of the piston rod.
5. You now need to decide what angle you would like the beam to be. Move it around until you like how it looks and then stick it down. You can stick it under or on top of the column. Once you are happy with the position of your beam stick the column and beam in place.
6. Stick the top of the piston rod onto the beam.
7. You now need to put the connecting rod in place. This can be a bit tricky but take your time it'll be fine. First stick one end of the connecting rod onto the beam, then stick the crank on centre of the wheel. Move the other ends of the connecting rod and crank so they overlap and stick them in place.

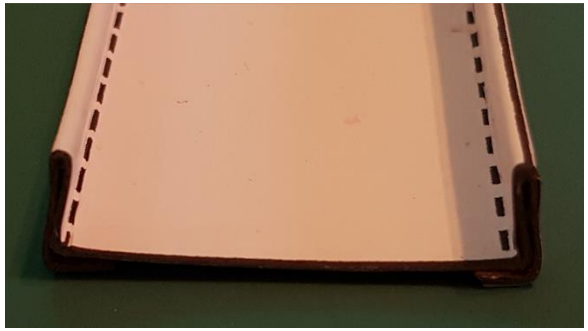
Congratulations! You've made your beam engine collage!

If you like you can draw people or other parts of machinery around the beam engine to make the picture even more interesting.

Making the 2D model

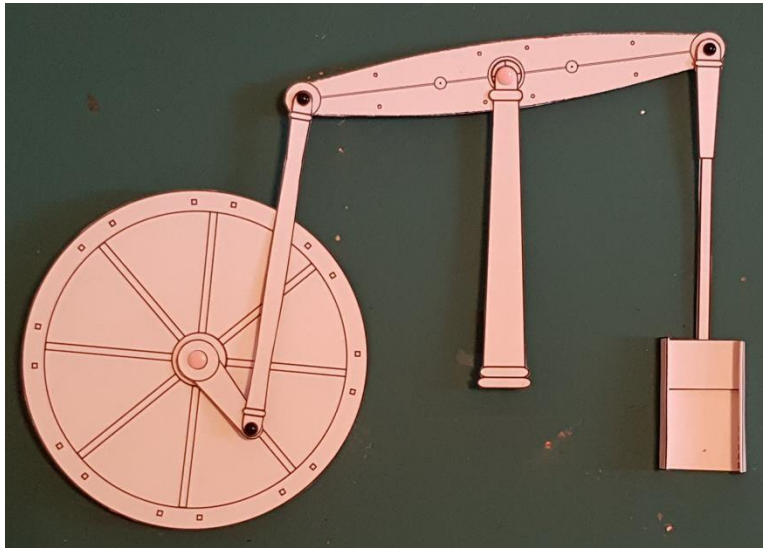
After you have cut the parts out you will need to make sure the piston fits into the cylinder and then join the rest of the parts together.

1. Glue the piston head onto the thin end of the piston rod. It is important that the rod is glued halfway along the longest side of the piston head. If the piston head is not centred properly the piston will not work.
2. Fold along the lines of the cylinder and glue the sides down to make a tray like in the picture below.



3. Check that the piston head fits into the cylinder and can slide up and down easily. If the piston head gets stuck, trim a little bit off of each side of the piston head.
4. Glue the large end of the crank on the centre of the flywheel.

You will now need to secure the pieces together. The joints secured with split pins are black in the diagram below and the drawing pins which are secured to the backing board are pink.



5. Using a split pin fasten the end of the piston rod to the end of the beam.
6. In the same way fasten one end of the connecting rod to the other end of the beam and the other end of the connecting rod to the small end of the crank. Check that all of the joints work and the parts can move freely.

Now you will need to pin the model to the board. Use the picture above as a guide.

7. Lay the top of the column over the centre of the beam and push a drawing pin through the centre of the red cross.
8. Straighten the column and glue or pin the base of the column to the backing card. It is important that the column is secure and doesn't move.
9. Pin the crank and flywheel through the centre of the red cross.
10. Glue/pin the cylinder to the board so the piston head sits comfortably inside.
11. Check your beam engine works by slowly turning the flywheel. The beam should move up and down pushing/pulling the piston as it goes.

Congratulations! You've made your 2D beam engine model!