|Brief

My dad and I would like to develop a stirling engine to work as an alternative power source. It must
- spin reasonably fast
- be well made
- run off both cold and hot temperatures
- must be able to have an attachment like a propeller
- must be able to generate power

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Evaluating materials for suitability and selecting them

Part	Material	Reason for Suitability
Piston	Steel	From the materials we had available in the workshop, I researched what kind of material had the least resistance and that was steel. Smooth on the outside so will reduce resistance between the piston and piston cylinder. Easy to machine and machining comes out really smooth and it looks quite good.
Cylinder for Work Piston	Brass	I chose brass because it really looks good with the decorative golden colour on the outside. It is a really easy material to machine. The outcome comes out smooth with a clean cut.
crankshaft	Brass and steel rod	As above for brass For the stirling engine to turn and do work successfully it must have a crankshaft which is strong and able to withstand a high revolution rate, and will not effect the entire engine as a whole.
Displacer cap	Aluminium	The material of choice because it is cheap and easy to manipulate unlike say brass which is very expensive and hard to get in a very large size. However if I was to met down brass I could have used it but brass melts at a high temperature and the forge at school is unable to do so. Aluminium is easy to source and can also transfer heat reasonably well but nowhere as good as a metal like copper. But copper has the same flaws as brass.
Displacer Cylinder	PVC	Can source scrap (eg from pipe gutterings) Can get it in a big enough size unlike petri dishes which are transparent but far too small.
Flywheel	Aluminium	Pretty much same reasons as for displacer cap ie size, cost, ease of working

Final Brief

The model stirling engine must drive a flywheel by using a source of either hot or cold temperatures
Specifications
- Height 165mm
- Base 110mm
- Flywheel 100mm
- Displacer 94mm with a 9mm centre
- Upper displacer flange 35mm with a 4mm centre
- Lower displacer flange 35mm 8mm M4x 0.7 depth = 3.5
- Connecting rod clevice 10

Trialling for suitability, selecting and applying practical techniques and processes
Selecting appropriate tools and equipment
Using results from testing to inform the making and trialling of the prototype

While machining the piston, I had to make sure that the tool bit was sharp, so I got a clean and smooth cut.

Casting process:

When making a prototype out of wood for the flywheel, I had to allow for any machining tolerance and a way of holding the finished cast in the lathe. I cut out spokes but when casting it with aluminium, it didn't work. So I decided I would machine it in the mill drill.

I had to test the moisture content in the green sand to make sure it was as perfect as possible. If it was too great the aluminium would explode and ruin the mould. If it was too dry the mould would just collapse and…

I had to melt the aluminium at the correct temperature. If it is too hot it will form bubbles.

I found that open casting was more time efficient than closed top casting where I may not have been able to finish on time. But it may have left more 'rubbish' in the material. For what I was doing, this was fine but not ideal.

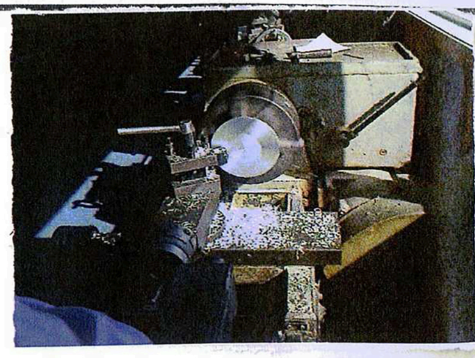
Milling process:

I faced all sides of the piece smooth then cut a groove into the flywheel with a tip tool. Then I drilled straight through the middle with a 3mm drill bit. This took about 2hours – I had to be exact to every millimetre.

When making the displacer cap, to mark out the holes I used the vernier height guage I did so using the ability to turn the work on its side and using 90degree angle to maximise accuracy

Using results from stakeholder feedback to inform the making and trialling of the prototype

I did not choose to put the gaps in the material to make the flywheel appear to have spokes because of time constraints.



This picture is showing the machining done on the displacer.

This damage was caused, becawse we only had like 5mm to grip onto the chuck.

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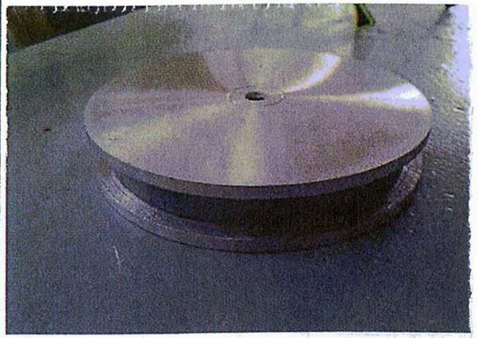
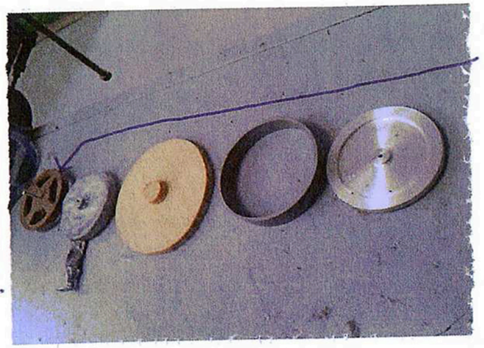
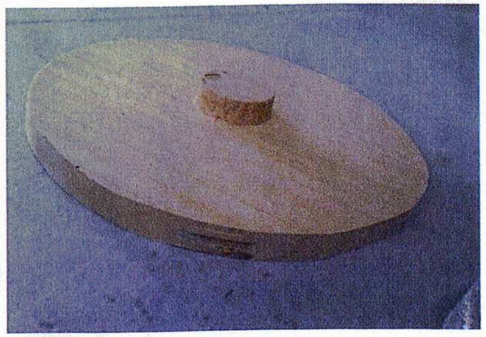


Opencast flywheel
All the unpurities are on the top layer of the cast, which you have to machine off.



This it the mold for the flywheel made out of real hard wood.



This a casting mold for the displacers which is made out of hard wood.

Closed caste flywheel
Using closed cast gives a good and clean ecast which you dont have to machine alot.

This is all the rubbish that has come up.

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