MINI ROBOT WARS at RAF Cosford

From time to time TEP colleagues get an opportunity to try out ideas outside of the classroom. Just to prove we could do it we set off to RAF Cosford for the Annual Air-show in mid June and commandeered one part of an aircraft hangar for a spot of robot building and robot wars TEP style.

The basic design we used was developed by Kieron McGeever, using just two cut and folded pieces of aluminium sheet and two 'clunk-click' gearbox motors and a double pole double throw pair of switches. Mark Harmsworth designed and built two desktop 'battle zones' complete with flippers to flip unwary competitors upside down.

The TEP 'HQ' was set up with resources, tools, TEP's manufacturing centre and zones for assembling chassis and soldering switches.

Young visitors from age 3 up to 13 arrived all day with and without parents and kept the whole team busy. By late afternoon precisely 100 two wheel battling robots had been constructed and most had been tested in the battle zone. What was really good was to see them being 'driven off' across the tarmac and back towards the air-show by delighted youngsters (and some parents!).

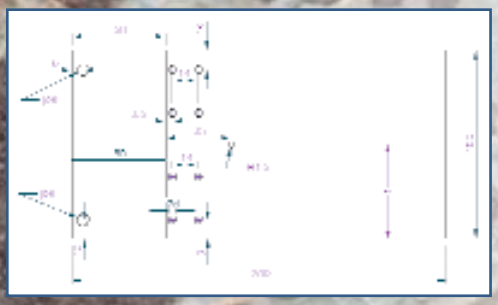
By using vast amounts of strong double sided tape, construction was sped up over conventional nut and bolt assembly and added to the fun when robots tackled each other and started to fall apart realistically.

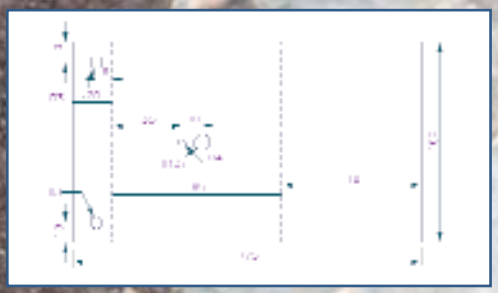
Due to the wedge style front end it is easy to catch and flip opponents over and the skid steer rear wheels are easily understood and steering is mastered quickly.

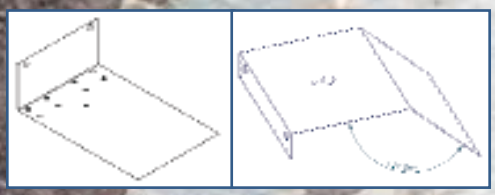
Young visitor walking his built robot home

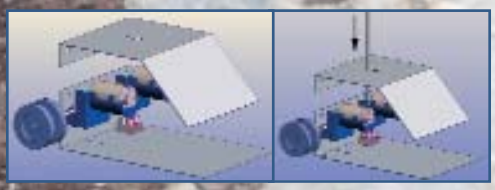
Two young roboteers battle it out in the 'Battle Zone'

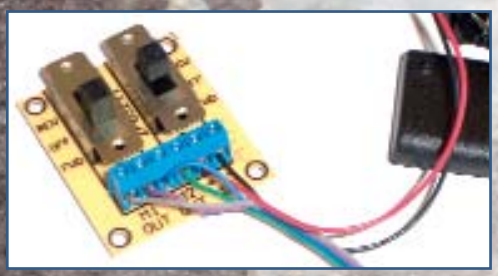
Building a Mini-Robot









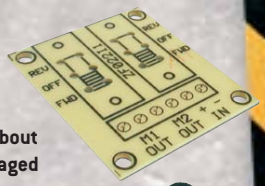


Images showing the wiring and motor assembly

To make this robot you will need two pieces of aluminium sheet, one 200mm long by 100mm wide and a second 175mm long by 100mm wide. They need to be carefully marked out as per the diagrams shown. The holes need to be drilled and punched before bending the metal sheet.

Each gearbox is held in place by four 12mm long nuts and bolts. Gear boxes will need to have one side of the axle longer than the other to allow them to be mounted side by side.

1. Start by marking out the aluminium sheet to the sizes shown on the drawings. Lines show where the metal will be folded; only mark the centres of the holes.
2. Punch all holes before you bend the sheet. Bend the sheets to the angles shown.
3. Bolt the motor gear box cases to the base plate (or use double sided tape)
4. Cut the gear box axles to the required lengths.
5. Re-assemble the gear boxes with the long side of the axles to the outside.
6. Carefully fit the wheels to the axles (two wheels to each axle - we used 39mm wheels and in some cases knobbly tyres. Rubber bands give great grip as a low cost substitute for tyres.)
7. Fit the top in place with two nuts and bolts (or double sided tape)
8. Pass the wiring harness through the large hole in the centre of the Top Plate and fit the aerial rod through the small hole then attach the wiring harness to the pole with tape.
9. A simple DPDT control panel must now be assembled and fitted to the other end of the wiring harness. Each motor has two wires (we used sleeving to rapidly assemble wires to the solder tags on the motors without soldering) which means four wires lead out up the aerial rod to the switchgear. We decided about 1 metre of wire was quite enough to get tangled and we encouraged the children to tape up or twist the wires together so they did not tangle too much.



Bending the aluminium sheet

Attaching the wheels to the motor axle

TEP's motor control switchgear is used with either 3 volts (for the feint-hearted) or 4.5 volts for real speed! Pupils and children will no doubt decorate and customise their own designs with spikes, horns, blades, eyes, fur!

Thanks in particular to Sue McGeever and William Baldwin for helping younger constructors during the day.

Main Parts List

EW2 030	Motor Control Switchboard
TG1 010	MM28 Clunk Click Motor Gearbox
CW3 027A	39mm Polythene Wheels
EC1 035	2AA Switchable Battery Box
TS6 002	Low cost A4 Aluminium sheet

teaching resources

You can download the full detailed instructions for the two wheel robots from the TEP website at www.tep.org.uk