ImechE Design Challenge - External Pipe Crawler

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Chassis

The construction of the device was designed to be robust enough to survive many trips up and down the course, aswell as not buckle under impact in case of failure of the drive system.
The design is cost effective, using recycled aluminium and the TIG welding process, Allowing it to be easily modified with various hanger positions to mount the associated electronics. This tough construction means high loads can be added to the wheels to increase friction to the climbing pole.

Power generation and storage

Three Motors Used;
- 24,000RPM
-1.5- 3.0 Volts
-Wheels attached directly to motor
-Electric motors were found to be weak during testing.
-More options must be explored to provide the required torque, E.g Gearbox.
-Cost of motors and batteries - £14.99
12 Batteries used;
-AA Size
-Each battery provides 1.5V to motors
-18v of power supplied to motors in total
-6 battery packs mounted using adhesive
-Low price of £5.99

Weight : <1.3Kg
Height: 200mm
Width: < 150mm

The Spec:
No. Motors: 6
Supply Voltage:18V
Matierial: Aluminium

Mechanical drive and propulsion

Mechanical Drive and propulsion for the pipe crawler was tricky but the design of direct drive for he motors was deemed the best idea the wheels had plenty of grip on the pipe but unfortunately the torque output from the motors was not enough even with the plethora of batteries fitted to the crawler. To improve upon this a gear train could be implemented to allow the engines to spin at their preferred rpms and allow them to get torque to the wheels. In adding a gear train, we hope of that we can get the crawler up the pipe despite its massive weight

Control, Robustness and Reliability and payload

The pipe crawler is controlled by a switch on the top that is wired up to all three motors that is then turned on at the start of the heat so that the crawler can go up the pipe. It is then triggered by the top to turn off so that the mass of the crawler can then help it free fall faster as it's a larger pipe crawler. The pipe crawler can take the impact due to it's a main body being made from aluminium. If over time, there is wear and tear on the wheels they can be easily adjusted as they can be pivoted to suit the pipe. It is also easy to change parts if needed as they are fastened in a way which is easy to remove and the parts, we used to be relatively low cost and readily available from most hobby stores and online. The pay load is attached by a key chain clip put through a hole that was drilled into the bottom of the device. The attachment is slightly off centred yet this helps us out as it pulls the driving wheels towards the pipe which can help add some more traction to the crawler.