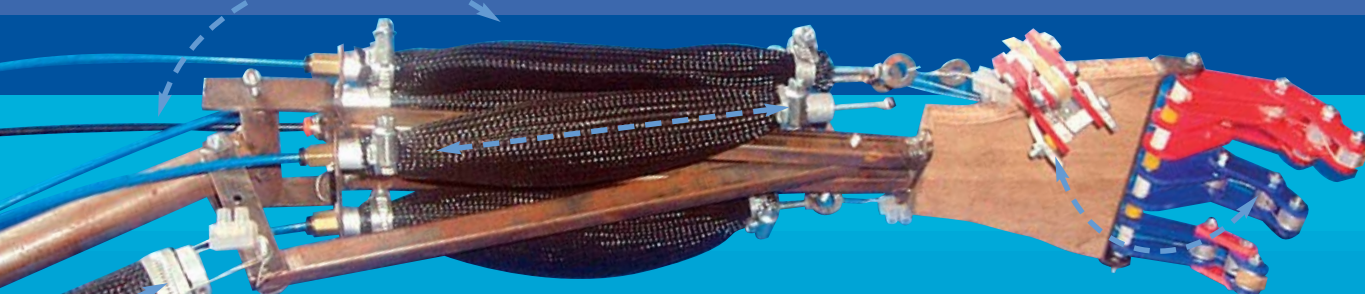


PNEUMATICS: A REVOLUTIONARY REVIVAL



A year and a half ago when I was digging around in a cupboard at school, I came across the pneumatics equipment, which had long been collecting dust. This started me thinking of how and why, had this system almost died away from the curriculum? At the same time I saw the work of Salford University robotics department and their use of air muscles. These two factors inspired me to combine the two ideas and develop a practical solution for schools, thus was born the robotic air muscle driven arm. It has taken time to develop and perfect the principles but the finished item performs consistently and smoothly and will be exhibited attached to **PX101 ('Pandora')** at the **D&T show** in Birmingham in November.

More information regarding PX101 and air muscle practical applications will be available in June 2004 courtesy of Gatsby Teacher Fellowships and through TEP.

I would appreciate anyone who has thoughts or comments on pneumatics and air muscle applications [TEP air muscles] to email me at rhylhightech@yahoo.co.uk.

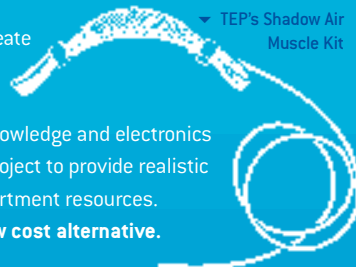
I hope to see you at the D&T show where Pandora will perform on the TEP stand, and I promise you that there will be a few new ideas that you may not have come across.

 **Mark Harmsworth**

Head of Design Technology, Rhyl High School

Mark's imaginative and creative use of air muscles to create stunning animatronic effects for Pandora, are available to us all. Very often the cost and size of conventional pneumatics is prohibitive. Furthermore the technical knowledge and electronics required to use linear motors and stepper motors in a project to provide realistic movement may be outside the scope of pupils and department resources.

TEP's Shadow air muscle kit provides an accessible low cost alternative.



▼ TEP's Shadow Air Muscle Kit

The air muscle works using a soft length of rubber tube overlaid with a braided sheath. The ends of the tube are sealed and as low pressure compressed air is fed into the tube it gets fatter as it inflates and shorter in length. Using low pressure air sourced from a footpump or tyre inflator and using a PET drinks bottle and a **3 way air valve** the muscle can be actuated to contract and then extend by filling the air muscle and then venting it using the valve. The drinks bottle provides the air reservoir to allow successive operation of the muscle. The holding force of the muscle is really surprising and movement and force can be amplified using simple levers.



▲ Polymorph has also been used here to replicate a ball joint



▲ Close up of the Air Muscle - as it inflates the air muscle gets fatter and becomes shorter in length pulling the two end components together

① If you have yet to try this resource we think you will be rather surprised. The scope for a range of robotic, animatronic and control applications at Key Stage 3 and Key Stage 4 is unlimited. Do send us a photo and a brief description of your work and we will feature it in News and Views and provide classroom resources as a thank you. Also don't forget to come and see **Pandora at the D&T with ICT show at the NEC 27th-29th November.**