Design Prize 1983

The 11 winners in this year's Schools Design Prize competition have produced a range of imaginative products designed, amongst other things, to help the disabled, deter thieves and improve sporting performances. The young designers received their cheques and certificates from HRH Princess Alexandra at a ceremony at the Institution of Civil Engineers in London.

As always Studies in Design Education Craft & Technology reports this event fully with accounts of the successful entries from some of the students and their teachers.

The prizes are £150 in the under 14 age group, £200 in the 14 to 16 age group and £250 in the 16 to 18 age group. In addition every school with a winning student is given the choice of £200 or a THORN EMI FERGUSON video recorder.

This is the first year of THORN EMI's three year sponsorship of the Schools Design Prize. The competition was launched seven years ago as a means of encouraging the development of design talent in schools, and of providing a direct link between education and industry. It is organised by The Design Council.

The judges were drawn from education, industry and the media. Under the chairmanship of Dr. David Bethel, director of Leicester Polytechnic, they examined a large number of projects by school students from all over the UK, finding 11 outright winners; they also picked three projects for commendations.

The judges were looking for evidence of original thinking or a new application of an existing idea; the process by which the students had selected their projects, analysed problems, researched the solutions and evaluated the final designs; they considered the presentation of the projects too. It is a precondition of the competition that the designs should be capable of manufacture by industry, and the students in the oldest age group are expected to show an awareness of manufacturing processes and market potential.

The 1983 winners are:

GROUP ONE (under 14 years)

Gideon Tearle of Bayswater Middle School, Oxford – Bike-a-Lite, a combined dynamo/battery lighting system for a bike.

Jason Osborne, David Rowe and John Russell of Saxmundham Middle School, Suffolk – a versatile nest-box for poultry.

Richard Marsh of Durham Johnston Comprehensive School, Durham – a prototype turbine to convert wave power to electricity.

GROUP TWO (14 to 16 years)

Lorna Griffiths and Jonathan Powell of Cynffig Comprehensive School, Bridgend, Mid Glamorgan – an anti-theft milk bottle holder.

Graham Light of Philip Morant School, Colchester, Essex – a one hand operated vice.

GROUP THREE (16 to 18 years)

Jackie Garrett of the Sandon School, Chelmsford, Essex – a transfer aid from wheelchair to car seat.

Julian Gitsham of Knutsford County High School, Knutsford, Cheshire – a boat maintenance support.

Jonathan Groves of Trent College, Long Eaton, Nottingham – a portable dentistry unit.

Andrew Chinn of Wootton Upper School, Bedford – an automatic window lock.

Simon Eames of Shrewsbury Sixth Form College, Shropshire – a useful bag for fell runners.

Suzanne Robinson of Heber County High School, Malpas, Cheshire – an adjustable footrest for a canoe.

Commendations

Graham Wood, age 16, of Helena Romanes School, Great Dunmow, Essex – a device for converting waste straw into fuel.

John Anderson, age 16, of the Ecclesbourne School, Duffield, Derbyshire – an illuminated clock.

Katharine Ruddock, aged 18, of South Park Sixth Form College, Normanby, Cleveland – a walking aid for children with cerebral palsy.

Brief biographical details of the candidates are given; the number who are now working in or studying some aspect of design is impressive.

Automatic Window Lock
Andrew Chinn (18 years)
Wootton Upper School

Preparations for a forthcoming family holiday gave Andrew the idea for his A level design and technology project – an automatic window lock. Although the lock was to be for one specific window, Andrew's aim was to make it sufficiently adaptable to be used, with slight modification, on any size of wooden frame, aluminium or even sliding windows.

Andrew researched the different types of lock available and their mechanisms. He wanted his lock to be as simple as possible, not only in the way it worked, but for fitting, so that it could be sold in a kit form.

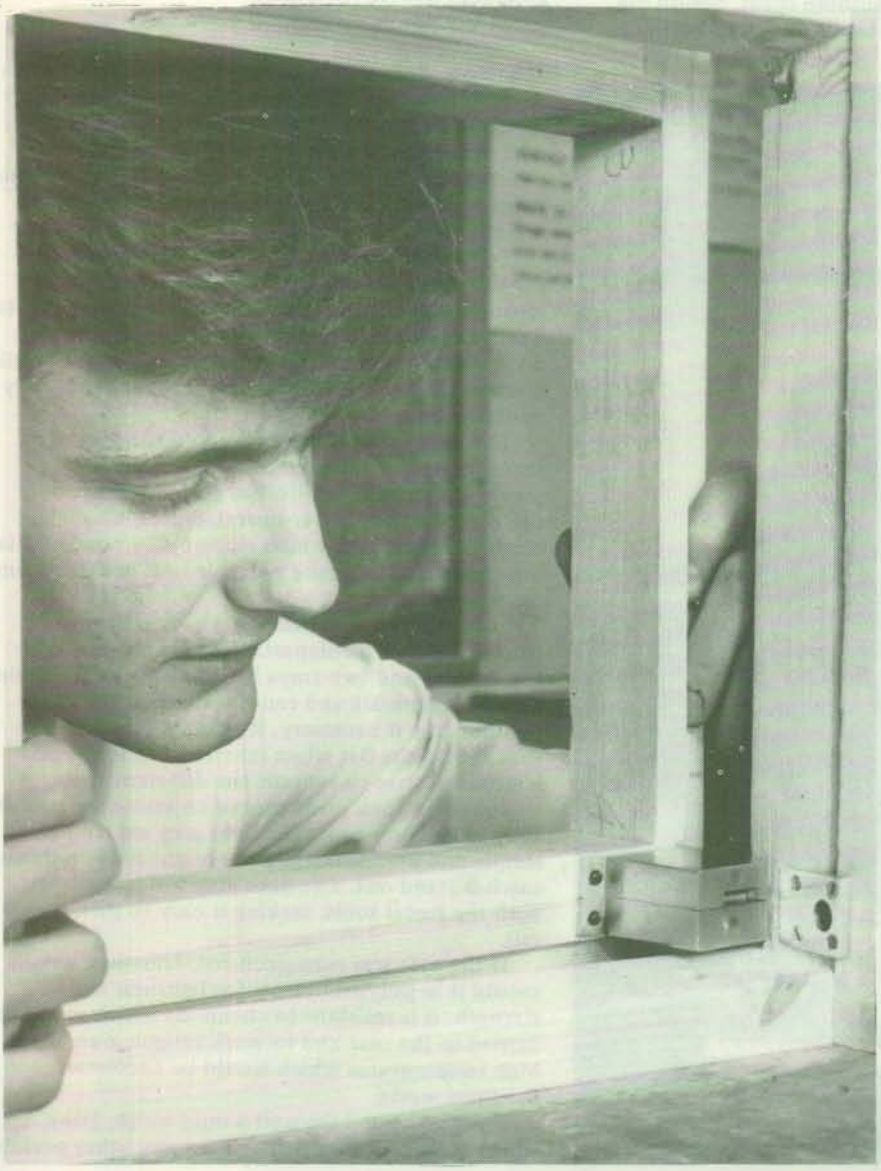
He based his design on a spring-loaded bolt mechanism housed in an aluminium casing. The casing is screwed securely onto the frame of the window, so that the bolt slides against a striking plate and into a housing on the outer frame.

The most unusual feature of Andrew's design is that it does not need a separate key to lock or unlock it. The simple action of closing the window will automatically trigger the locking mechanism. As the inner frame closes against the striking plate, a small nylon pin is pushed into the casing, releasing

a spring mechanism which pushes the bolt into the frame. To re-open the window, anything from a pencil to the end of a door key can be slotted into a groove on the front of the casing to slide the bolt back.

The judges were particularly impressed with the thorough way in which Andrew tackled the project, considering not only the design of the project, but also the style of the packaging and the literature. They felt his research, graphics and presentation were above average.

Having completed his A levels, Andrew hopes that he will have the opportunity to make modifications to his design and approach some manufacturers. He has just started a four year course in engineering science and technology at Loughborough University.



Bag for Fell Runners
Simon Eames (18 years)
Shrewsbury 6th Form College

Simon, a keen scout, wanted to make something for his A level design project that was linked with his outward bound interests. In his initial research, Simon considered the rucksacks available for mountain rescue teams, as he wanted to develop a lightweight belt that would carry all the essential equipment but would not hamper fast movement. Following from this idea he looked at what was on the market for fell runners and found that equipment for walkers was all that was available.

Simon compiled a questionnaire to gain an idea of runners' requirements and compared this with what was on the market. He found that comfort

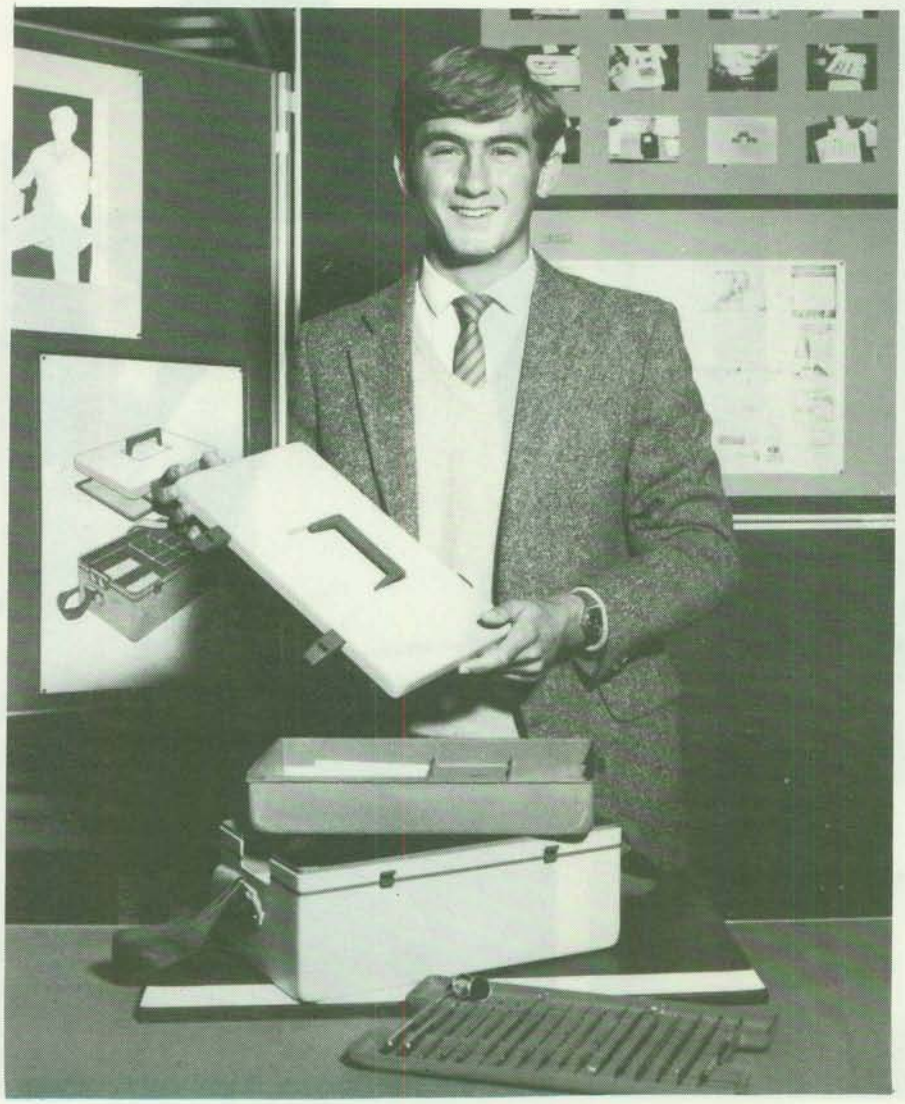
and easy access were considered most important features by runners themselves, so he concentrated on these. He designed his bag around the bare essentials that runners would need, such as a map, compass, kagoul and food, to make it compact and well-fitting.

He got the best general shape for the bag by wrapping the equipment in film and experimenting with several different ways of carrying it. Simon settled on a belt shape that would sit comfortably over the hips and in the small of the back, and was fastened around the waist by one simple quick-release buckle.

Simon got tremendous support from Karrimor Ltd., a well-known manufacturer, which supplied waterproof material for the bag and lining, and made up the prototype to Simon's design at the factory in Accrington.

As fell running is an autumn sport, Simon did not have time to get his bag fully tested before he left school However, an appraisal carried out by the chairman of the Fell Runners Association has given Simon some useful hints for the future development of the bag. Simon's planned modifications are to change the shape of the compass pocket and possibly increase the size of the bag. With changes, the bag could be used by hikers as well as runners. Simon is confident that, if manufactured in sufficient numbers, the price could be competitive for what is a small, discerning market.

Simon has left school and is studying town and country planning at the University of Wales, Cardiff.



Emergency Dentistry Unit
Jonathan Groves (18 years)
Trent College

Jonathan chose a project based on dentistry for his A level in design. He thought that there was planty of scope to develop an original idea in this field, while other areas were saturated with products which he could, at best, only redesign. His portable dentistry unit is for use in emergency work in this country and in the third world.

To keep himself updated with developments in the dentistry world, Jonathan read appropriate journals on a regular basis and visited three dentists. From this research he saw a gap in the market for a kit which could be carried easily, but which would contain all the necessary equipment for emergency dental work.

The early designs were based on the idea of incorporating a compressor or transformer to power the dentist's drills. But then Jonathan discovered a new batter-operated drill, which was small and light, and which made bulky power units unnecessary. The entire portable unit design became much simpler.

In prototype it consists of a vacuum formed plastics case with compartments for chemicals in the bottom and two trays for tools which fit inside. The lid is separate and can be detached for use as another tray if necessary; its handle is recessed so that the lid sits flat when inverted. Each tray has a moulded strip to support the different tools.

Jonathan took great care of choosing the colours for his dentistry unit. The light grey exterior is simple and practical while the bright red handle and catches stand out. The dark grey inside contrasts with the metal tools, making it easy to pick them out.

If the case was manufactured, Jonathan would mould it in polypropylene, for lightness and strength; it is resistant to chemicals which might be carried in the case and to work fatigue even at the high temperatures which would be encountered in the third world.

Fully equipped the unit would weigh 2½kg, which is significantly lighter than any other portable

dentistry unit on the market. Four companies have shown interest in manufacturing Jonathan's design which could be adapted for other uses such as veterinary work and chiropody.

Jonathan is currently studying industrial design at Leicester Polytechnic.

Transfer Aid from Wheelchair
Jackie Garrett (18 years)
Sandon School

After a holiday with a disabled friend, Jackie experimented with ways of moving a person from wheelchair to car seat without the physical effort of lifting. She developed the aid for her A level technology project, making it neat, inconspicuous and easy to use.

The device consists of a carefully designed three-three-way joint, and a transfer board which replaces either arm of a wheelchair. The joint fits into the tubular frame at the front corner of a standard wheelchair, holding the board in place. A pin at the back corner of the chair secures the other end of the board.

When in use the joint allows the transfer board to be moved through three planes into the correct position. The board is lifted vertically away from the rear locating pin, twisted through 90° so that it is perpendicular to the chair, then dropped to the horizontal. When the chair is positioned next to the car seat the transfer board bridges the gap between the two and the disabled person can slide across it.

Jackie made three prototypes before deciding on the most suitable design. She rejected a padded board after discovering that is was easier for a person to slide across a metal surface. She also tried making the board from aluminium but decided that steel was cheaper and not significantly heavier.

Versatile Nesting Box for Poultry
Jason Osborne, David Rowe, John Russell
Saxmundham Middle School

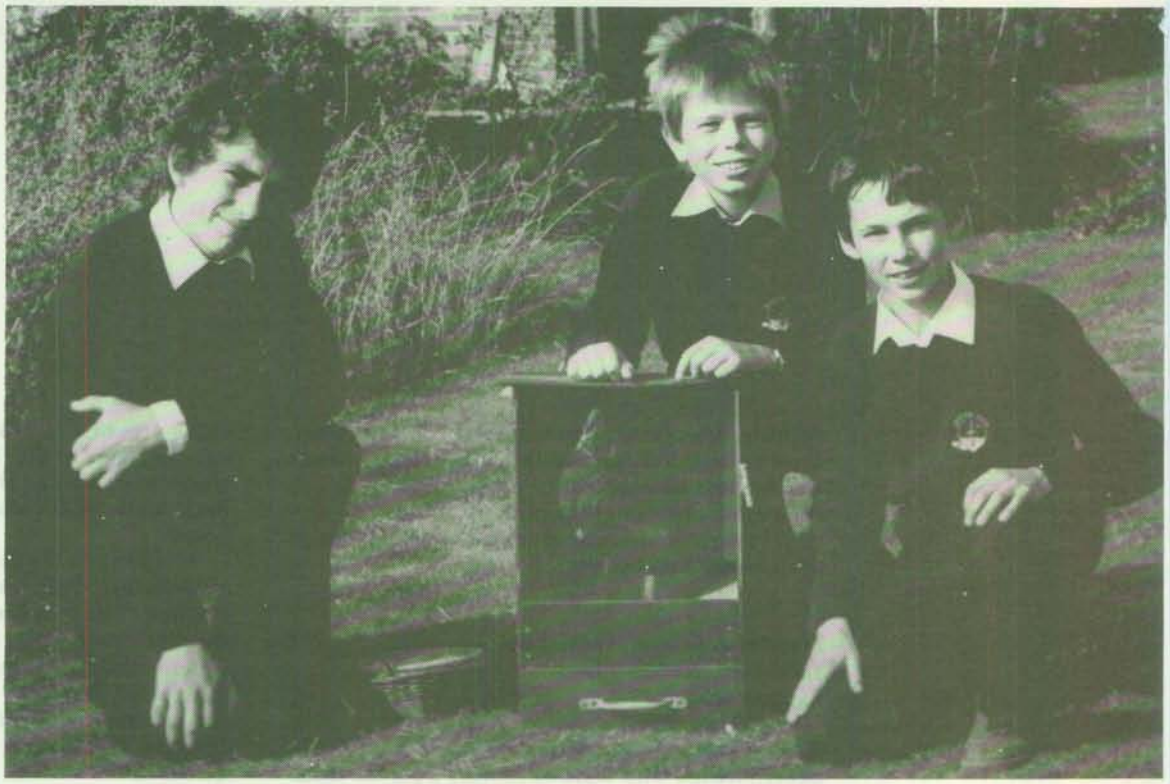
All three winners keep hens and have often found that the eggs are broken when they go to collect them. If an egg is brittle shelled and breaks, the hen will eat the yolk, a common problem to poultry keepers. Once a hen has got the taste for yolk, she may start pecking all the eggs. the boys decided to design and make a nest-box that would solve the problem.

The boys researched what was already available and began work at school on a prototype. The result is a standard looking nest box, but with some clever modifications.

With the help of cardboard models, the boys designed a sloping nest tray out of wood with a hole in the centre. The tray slots into the nest-box and the new-laid eggs roll down the slope, drop through the hole and into a padded drawer under the tray – well out of the hen's reach, but easy to collect.

The boys found that they had to test the angle of the sloping sides of the tray very carefully, to make sure that the eggs did not roll too fast and break. They used foam to line the drawer and covered it with sticky-backed plastic.

Once the prototype had been made, the boys realised that it could be more versatile. With a few modifications, such as the addition of a slatted wooden door and floor, the box can be used as a coop to cure broody hens, as they do not like the light, draughty environment. A change of tray and added slats to complete the door, makes the coop into a cosy, dark, nesting box, perfect for sitting hens to hatch their chicks.



There has been a lot of interest already from local farmers and poultry keepers and the boys have a list of potential customers for the nesting box if it is manufactured. They are confident that their market would include people owning small-holdings, as well as larger scale poultry keepers.

The boys are considering improvements, such as the use of easy-clean plastics and improving the padding in the drawer. The box could be used singly, either out of a run or inside a standard hen-house, but the boys also are thinking of designs for multiple boxes of five or six in a row.

A report of the entry by the boys follows in this issue.

Bike-A-Lite
Gideon Tearle (13 years)
Bayswater Middle School

Gideon wanted to develop a safety product for the cyclist to enter in the Science Fair at Oxford. In his experience of cycling, Gideon found that dynamo-powered lights tend to dim as the bicycle slows down or stops, so that the cyclist may be least visible to motorists at a time when he is most vulnerable – while waiting to turn right.

Gideon discovered that one major battery manufacturer is working on the design of a rechargeable dual-powered battery and dynamo system. Although not on sale yet, the design seemed

complex, so Gideon decided to develop a cheaper alternative.

He designed and built a circuit that would switch across to battery-power whenever the dynamo was not being used. As soon as the bike is moving and the dynamo can produce the power, the batteries switch off. To test his circuit Gideon made a model, using part of an old bike.

His tests proved that the idea works, and now Gideon wants to design a pack that can be fitted easily onto any working bike. He is confident the 'Bike-a-Lite' could be made as a fairly cheap kit for cyclists to fit for themselves; as a safer alternative to dynamo lights and cheaper than using batteries all the time.

Gideon has moved to the Cheyne Upper School where he can develop his interest in electronics and computers in the school club.

Anti-Theft Milk Bottle Holder
Lorna Griffiths, Jonathan Powell (15 years)
Cynffig Comprehensive School

Lorna and Jonathan first researched whether the theft of milk was a common problem in their area. They found that most people had one pint a day delivered; but where front doors were near the road, frequent thefts eventually stopped some people having milk delivered at all.

'We began by designing a box but found it was too easy to break into, so instead we used a piece of PVC drainpipe, with a locking cap at the top and a floor at the bottom', Lorna explained. Demonstrating how it works, Jonathan said, 'The milkman pushes the bottle of milk through the cap which contains a one-way flap so that the bottle cannot be taken out until the cap's padlock is unlocked'.

The holder, which can be fixed to a wall, has holes incorporated in the bottom to let rain water drain away, and for air to circulate. After visiting local dairies, Lorna and Jonathan found that there were six different sizes of milk bottle used in the area, so the holder has been designed to accommodate the largest.

There are some refinements to be made: 'At the moment it looks a bit like a bomb', Lorna admitted. 'But it is a prototype. If people want to attach the holder to the wall by their front door it could be painted to go with the door'.

An article by Mr Edwards, teacher at Cynffig school follows in this issue.

One Hand Operated Vice
Graham Light (16 years)
Philip Morant School

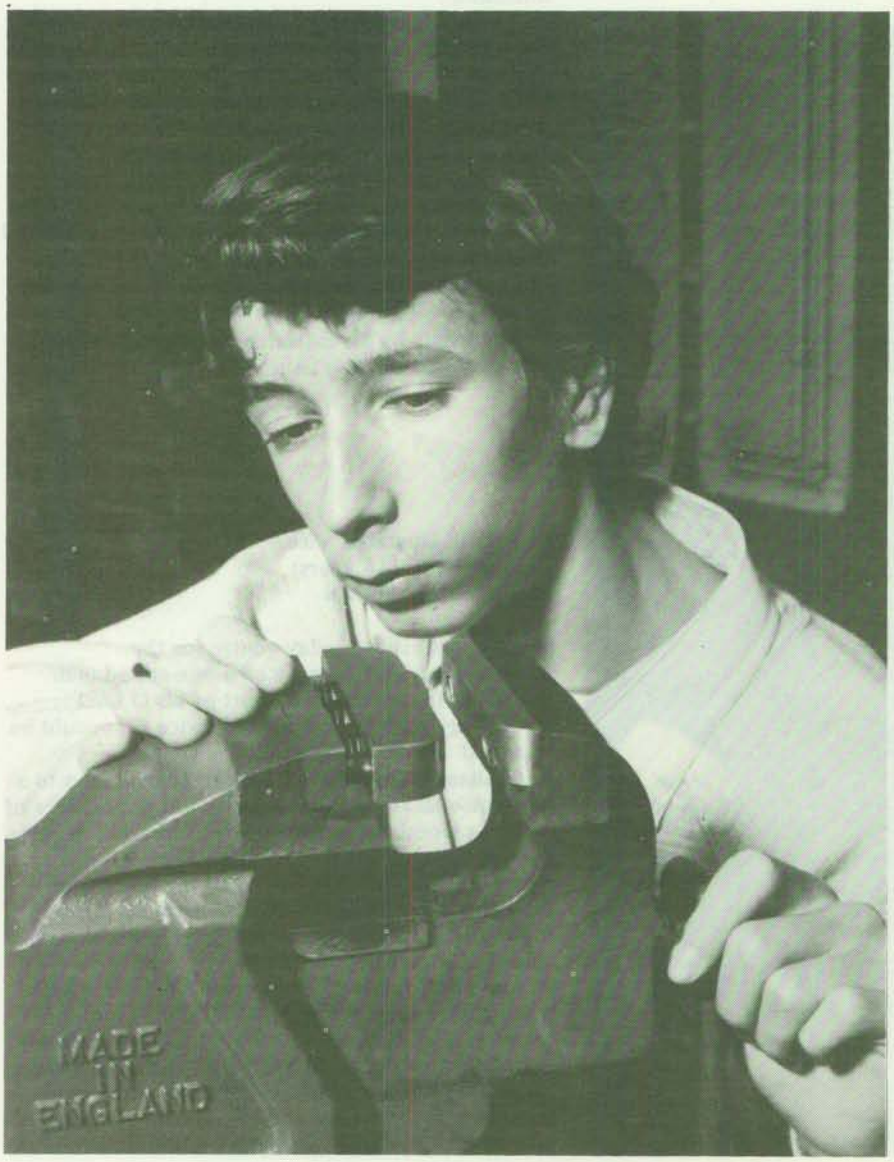
On a school visit to a day centre for the handicapped Graham noticed a one-armed man struggling to use a vice. As part of his O level technology project he designed a vice that could be operated with just one hand.

Graham's idea was to fit spring loaded jaws to a conventional vice so that they would grip a piece of metal or wood the moment it was inserted, leaving the operator's hand free to tighten the vice. Although Graham first envisaged the jaws being a permanent modification of the vice they can be removed easily and the normal jaws replaced, giving complete versatility.

The Mark I model used two spring loaded bolts which fitted right through the steel jaws and into the vice head. Graham discovered, however, that a strong downward force on the object in the vice caused the bolts to sheer. His Mark II model, therefore, incorporates additional strengthening pins to take the load off the main bolts.

The edges of the jaws are rounded as a precaution against scratching the work as it is inserted into the vice, and with wooden buffers clamped to these, the vice can be used for woodworking as well as metal working. Whatever the material, Graham's device is not only a very useful aid for people with one hand, it can also act as an invaluable third hand for those without any disability.

The judges considered that Graham had found a simple, cheap and effective solution to the problem he had identified. The estimated cost of manufacture is £2, which would be reduced with bulk orders. Graham has written to several manufacturers to see if they would be interested in producing his design commercially; he is now at the Colchester Institute doing a course in printing.



Boat Maintenance Support
Julian Gitsham (18 years)
Knutsford County High School

Julian comes from a sailing family and is well acquainted with the problems of boat maintenance. Knowing that he could make boat maintenance much easier by designing a means of holding the boat in specific positions, he developed a boat support for his A level design project.

Having sent out questionnaires to sailing clubs, schools and individuals to find out what sort of device was needed, Julian concentrated on the three criteria highlighted by his research. The support should allow the boat to rotate through 360°; it should be possible for just one person to operate the support; and, the end product should cost no more than £50.

Julian's finished support fulfils all these needs. It consists of two tubular braized steel stands, with adjustable arms, which are positioned one at each end of a boat weighing up to 200 lbs. The arms, padded with polystyrene foam, hold any hull shape firmly. Each stand has a V shaped base, with one solid foot and two castors to ensure that the support is stable while in use and portable at all other times.

At the point where the arms join the stand, Julian has incorporated a rotating mechanism which allows one person to turn the boat through 360° and to lock it into any one of eight different positions. One person can load the boat onto the support by sliding the first stand into position and lifting the bow of the boat into it, and then repeating the manoeuvre at the stern.

The judges were impressed with the way Julian had researched and developed his project, trying a number of different designs and incorporating improvements wherever possible. They were pleased to see a fully tested prototype.

Julian has now moved to Oxford Polytechnic to study architecture; he intends to pursue his enthusiasm for sailing in the form of windsurfing.

Wavepower-to-Electricity Turbine
Richard Marsh (12 years)
Durham Johnstone Comprehensive School

Richard was convinced that there was a simple way of using wave power to generate electrictiy. He produced some drawings of an idea and made a model to demonstrate that it could work. He designed a simple cylindrical vessel containing a central spindle with four blades. As he was only in his first term at secondary school, Richard did not yet have the necessary skills to make this, so it was built to his specification at Durham University.

To test if his turbine design worked, Richard attached it to a chamber to channel water towards the turbine. All the metal brackets attaching the

turbine to the tin chamber were made by Richard in the lunch-hour at the school's technical studies club.

Wave movement causes a stream of air to turn the blades of the turbine. When the water level goes down in the chamber, air is drawn back through the vessel and over the blades, keeping them in motion. This movement drives a small dynamo attached to the vessel and the electricity generated registers on a voltmeter. Richard used ball bearings around the central spindle to ensure the blades move as freely as possible.

Richard is now considering developments and modifications that would be needed, such as altering the blade shape to improve turbine efficiency, and the use of non-corrosive materials. He thinks his idea could have a variety of marine applications, such as powering marker buoys and navigation lights.

Being interested in computers Richard has developed a program on his home computer to demonstrate the model. He is a keen scout and likes sailing and camping. As he is only in the second year at school, Richard has not decided which specialist subjects to study, but hopes to go on to University in the future.

Footrest for a Canoe
Suzanne Robinson (19 years)
Heber County High School

Suzanne became keen on canoeing while working for her Duke of Edinburgh's Award. She soon found a drawback with the design of most canoes – the footrest is very difficult to reach and adjust, if there is one. After contacting several manufacturers, she set out to design a footrest that was simple and quick to use, but was versatile enough to suit canoeists of different heights and weights.

Suzanne did a great deal of research, including ergonomics and the properties of materials. She made models of her ideas until she found one that was simple and effective, but easy to make. The final design is based on an aluminium T-bar that slides along the centre of the canoe in a lightweight polypropylene runner. Suzanne had to position the footrest carefully so that it didn't make access difficult or alter the buoyancy of the canoe. she found that fixing the bar and the runner with glass fibre actually strengthened the hull.

Suzanne plugged the shaft of the T-bar with polypropylene and drilled and threaded holes at intervals along it. To make adjustments to the length, the canoeist slides the bar along the runner and into a holder fixed just in front of the seat. Once the bar is at the right length, all the user has to do is screw two nylon bolts into holes in the bar. Washers under the bolts are clamped tightly against the top of the holder and firmly secure the bar.

Suzanne shaped the bolt heads so that they were easy to grip, even with cold, wet hands. The main

advantage is that adjustments can be made while the canoeist is in position, so that the most comfortable leg length can be fixed quickly and easily for each person.

The prototype is light and fits into any make of canoe. It has been put through rigorous safety trials by an experienced instructor, who was very impressed by its simplicity and versatitily. Suzanne, a keen canoe club member, says that the footrest would be particularly useful for clubs, where several different people have to use the same canoe.

Suzanne has now left school and is doing an art/design foundation course at Chester College of Further Education; she hopes to study three-dimensional design at college.

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