

# TEACHER NOTES

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## ABOUT TEP

The Technology Enhancement Programme, funded by the Gatsby Charitable Foundation and managed by the Gatsby Technical Education Project, has the broad aim of enhancing and enriching technology education throughout the UK. It has a particular interest in supporting designing and making in a rapidly changing modern world and strongly believes in the principle of “learning through doing”.

TEP is a rapidly growing organisation that offers:

- *expert subject advice through its central team of advisers,*
- *INSET and a national Summer School,*
- *regular updates on developments in technology education,*
- *rapid access to wide range of unique physical, printed and multimedia resources.*

## ABOUT TEP PUBLICATIONS

All TEP publications are photocopyable and do not prescribe what should be taught or how it should be taught. TEP has absolute confidence in the professional judgement of teachers to selectively copy or edit the material as they believe appropriate.

Each book contains project outlines or narratives which follow a similar structure:

- Overall subject context
- Design brief
- Specification
- Design constraints
- Guide to design and manufacturing
- Evaluation

These project elements are in the hands of the teacher who might, for example, want to set a very specific context, an alternative design brief, or limit (or widen) the resources available.

The *bookmarks* in the right hand margin are placed there for teachers. They highlight the structure of each project, provide a commentary where appropriate, give references to Study Files - and flag up maths and science opportunities. The bookmarks can easily be taken out when the material is photocopied.

### ABOUT STRUCTURES

In "Structures" each unit is presented as a focused design and make task designed to occupy a nominal 5 hours of curriculum time. Each unit provides basic information, calls for some investigation but also demands that pupils make some fundamental *design decisions*.

Project 1 provides the opportunity to design and make a very simple and potentially inexpensive *full-size* structure at relatively low cost - assuming, for example, that melamine-faced chipboard is used for the shelving element. The basic suspension idea is by no means a new one but it is nevertheless a good vehicle for looking at important principles and taking reasoned design decisions. There are also plenty of opportunities for good innovative design work - including the design of smaller component fastenings.

Project 2 offers pupils the opportunity to work with two relatively new and exciting materials: ripstop nylon and pultruded composites. Some of the design principles introduced are highly significant in other contexts - not least, for example, in some high technology buildings which use large scale flexible envelopes or skins. It is worth noting that kite making and flying is a rapidly expanding leisure growth industry and attracts both boys and girls in the proportion of about 60:40.

Project 3 is particularly significant in offering schools an original system of fabricating structures based on possibly the cheapest and most easily available resource: paper. A 'standard' roll-tube made from A4 size plain paper and having eyelet reinforcement at both ends costs approximately (1994) 0.5 pence. Roll tubes offer the intriguing possibility of combining paper and metal as construction materials - using nuts and bolts for joining. The system has yet to be explored for its full potential, but it promises the possibility of endless realistic scale modelling and full size prototyping of some structures.

Project 5 provides an opportunity for pupils to get involved in an interesting industrial design project which can also involve simple quantitative work. A commercial lamp of this type would probably use a standard miniature halogen lamp with low voltage transformer, but for the sake of both safety and simplicity, battery operation is suggested. Using structural components as conductors presents many interesting design opportunities.

**During trialling of this project it has become clear that roll-tubes are an excellent alternative to aluminium rod for the structural parts. Aluminium or copper tape can be rolled in as an integral part of the tubes - or conventional conductors can be run inside.**

### TEP CRITERIA

The contents of the Structures textbook have been designed according to the key criteria for TEP.

1. To raise the quality of manufacturing within pupils' work in the 14-16 age range. The material is presented so that a TEP pupil can follow structured approach to making things but at the same time make significant design decisions. Such an approach ensures that every TEP pupil achieves a high quality manufactured item and a better understanding of manufacturing principles and procedures.
2. To encourage pupils to apply industrial standards and procedures wherever possible within the constraints of school technology. The core units will be supported by industrial examples from the industry links of TEP schools. In this way, construction work in the classroom will be referenced to the reality of industrial procedures through TEP case studies.
3. To give a deeper understanding at the various stages of construction through mathematical and scientific activities. Some of these activities are essential to the manufacturing tasks while others are possible extensions to units within a particular textbook.

# STRUCTURES TEACHERS' NOTES

## COMPONENTS SUPPLIERS

### **EMA**

EMA Ltd.,  
58-60, The Centre,  
FELTHAM,  
Middlesex,  
TW13 4BH  
Tel. 0181-890 5270

Butaine tubing, pen components etc.  
“Universal press tool”, handpunch, plastic bearings etc.

Mould case, glue gun, glue sticks

(Nb. this firm currently offers starter kits for the manufacturing units)

### **Teaching Resources**

Teaching Resources  
Technology Education Centre,  
Middlesex University,  
Trent Park,  
Bramley Road,  
London,  
N14 4YZ  
Tel. 0181-447 0342

“Universal press tool”, handpunch, plastic bearings,  
electroplating kit, pre-coloured metal, mould case, glue gun, glue sticks, etc.