TEACHERS NOTES

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 a wide range of unique physical, printed and multimedia resources.*

ABOUT TEP PUBLICATIONS

All TEP publications are photocopiable 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.

The book contains five 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 as a brief guide to each project. They highlight the structure of each project, provide references to Study Files and, where appropriate, flag up maths and science opportunities. The bookmarks can easily be taken out when the material is photocopied.

ABOUT MECHANISMS

In *Mechanisms* each of the 5 projects has been carefully considered in terms of technical support for pupils. It is anticipated that some use will be made of pre-formed components - e.g. motor mounts, to avoid presenting pupils with too many manufacturing tasks or tasks which are too difficult.

The projects can be presented as tightly structured tasks (e.g. "focused task", "minor project"), or as support for a more open ended activity ("capability task", "major project", etc.). Each task anticipates the specific problems pupils are likely to encounter in designing and making mechanical systems and provides a "menu" of technical options. These have been carefully thought out so that they are within the range both of pupils' capability and the physical resources that might be offered. All the tasks have been trialled and success in making something work is virtually guaranteed. Ultimately, it is up to pupils to consider the "menu" elements and combine (and add to) them through intelligent decision making.

As well as offering opportunities for designing and making mechanical systems, each task involves potential for additional control. The Paper Feeder, for example, can be made to deliver a measured amount of paper using a timer; the automaton can be controlled using a Bit by Bit controller to perform different routines. In fact, all the tasks offer possibilities for combining mechanisms with electronic control systems. One might therefore think in terms of mechatronics - a developing discipline or design approach which integrates mechanical and electronic systems from the point of conception of a product. The use of Field Effect Transistors (FETs) offers cheap and simple control opportunities since a single FET plus one or two additional passive components can constitute a useful system.

In Mechanisms, each project is presented as a structured design and make task designed to occupy a nominal 5-10 hours of curriculum time. Each project provides basic information, calls for some investigation but also demands that pupils make some fundamental design decisions.

TEP CRITERIA

A Investigate mechanical systems

1. Analyse basic mechanical systems in terms of the functions they perform.

2. Calculate:

   - Transmission ratios for movement.
   - Transmission ratios for force.

B Apply knowledge of mechanisms to the product

1. Calculate, where appropriate, one or more of the following:

   - The input force.
   - The input movement, distance, speed, revolutions, rpm.
   - The output.
   - The friction needed.
   - The transmission ratio.

2. Identify an appropriate mechanism using the selection tables.

C Construct or make the product

1. Produce a design specification reflecting the necessary limitations of the design brief.

2. Generate a range of design proposals reflecting the design specification.

3. Use modelling or prototyping techniques (visual and/or product) to explore, modify and confirm design proposals.

4. Based upon the chosen design, generate a production specification to include:

   - Working drawings to BS308.
   - A phased time plan, outlining the main stages of manufacture.
   - Identification of appropriate tools (hand and machine) and equipment.
   - Identification and selection of appropriate materials.

5. Manufacture the product to the specified level of quality and within the identified time scale.

D Test and evaluate the product

1. Apply quality checks to the product during manufacture as identified in the production specification.

2. Test the product and evaluate whether the mechanism can carry out the activity required.

Components Suppliers
Inclusion of suppliers in this list does not imply a recommendation in terms of quality or value for money. Most of the components are common electronic components and may be purchased from a wide range of other suppliers.

EMA Model Supplies Ltd.

Unit 2
Shepperton Business Park
Govett Avenue
Shepperton
TW17 8BA

Tel. 01932 228 228
Fax 01932 253 766

Middlesex Teaching Resources

Middlesex University
Technology Education Centre
Trent Park
Bramley Road
London N14 4YZ

Tel: 0181-447 0342
Fax: 0181-447 0340