



# Mechanisms – A Practical Approach

## Teacher Guidance Document

### About

The “Mechanisms – A Practical Approach” unit has been developed to support the recently reformed National curriculum in England, in particular the Design and Technology programmes of study. This unit is designed to allow learners the opportunity to gain a hands-on experience of mechanisms alongside developing an understanding of key principles, terminology and mathematical applications.

This unit supports the following areas of the *Design and technology programmes of study: key stage 3 National curriculum in England [Reference: DFE-00192-2013]*:

- *Develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world*
- *build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users*
- *identify and solve their own design problems and understand how to reformulate problems given to them*
- *select from and use a wider, more complex range of materials, components and ingredients, taking into account their properties*
- *understand and use the properties of materials and the performance of structural elements to achieve functioning solutions*
- *understand how more advanced mechanical systems used in their products enable changes in movement and force*

### Resources

Three distinct components have been developed to facilitate the delivery of this unit:

- The VEX IQ Mechanisms Kit
  - *This contains the entire component parts required to complete the work-book.*
- A work-book: Mechanisms – A Practical Approach
  - *There are two versions; one for pupil use with answer sections and one for teacher use which contains sample answers and supporting information.*
- A supporting PowerPoint: Mechanisms & Types of Motion
  - *This supports the delivery of the unit by introducing types of motion and key principles. Example applications of the mechanisms featured are also provided.*

## Teacher Guidance



### Suggested method of delivery

This unit is designed to be malleable and the following guidance is only a suggested method of delivery. Time scales will certainly vary between groups of learners with different abilities.

#### Lesson 01

Introduce the unit using the supporting PowerPoint “Mechanisms & Types of Motion”. Slides 2-7 introduce the four types of motion, discussions regarding the application of and examples of each type can be discussed. It is suggested that learners take notes on these in an exercise book for example.

Once you are happy that your group is able to identify and explain the four types of motion progress on to the “Drive Systems” slide 8 onwards. The following slides will introduce the concept of gears, how they can be configured, what a gear ratio is and how it can be calculated. Continue through the PowerPoint to slide 11 with learners taking notes at appropriate stages.

#### Lesson 02-03

Introduce the VEX IQ Mechanisms kit along with the work-books. Based on their knowledge of the previous lesson, learners should be able to complete pages 3 & 4. Discuss and explain answers, using the teacher copy of the work-book if required.

From page 5 onwards, the work-book is supported by the PowerPoint. Each type of component is introduced on one slide with the following slide showing at least two applications. It is suggested that the slide containing the component information is displayed as the learners attempt the questions. The applications slide can be displayed whilst discussing the answers.

Aim to complete up to page 10 of the work-book (slide 21) by the end of lesson 03.

#### Lesson 04-05

Continue to progress through the work-book and supporting PowerPoint from page 11 (slide 22) as the final 3 mechanisms are introduced.

Once the final investigation on page 13 of the work-book has been completed learners are then introduced to a series of design challenges. Learners will be required to apply their knowledge learnt over the previous lessons to develop and produce a solution for each task. The three tasks increase in complexity as they progress and are useful extension activities for the higher attaining learners in your groups.