Problem Solving: Electric Toothbrush Mechanism

Learning Objective

To develop students problem solving capability by guiding them through a mechanical systems problem.

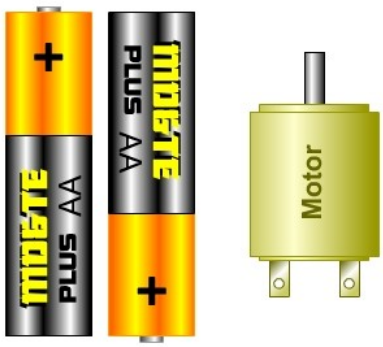
Situation

The diagram opposite illustrates a typical brush head that fits onto an electric toothbrush. This brush head oscillates through an angle of 16 degrees. (Click the start button to view the animation).

The toothbrush system

The known parts of the toothbrush system are:

- the toothbrush has a battery powered electric motor as the input device
- the toothbrush has a switch that switches the motor on and off
- the toothbrush has an oscillating toothbrush head as the output device.



Problem solving

- Devise a circuit for the electric motor that allows it to be switched on and off
- Devise a mechanism that connects the motor to the toothbrush head and converts the rotary motion of the motor into the oscillating motion of the toothbrush head.
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What you must do

- Analyse the problem so that you understand it fully.
- Devise a circuit for the electric motor that allows it to be switched on and off
- Make a list of mechanisms that convert rotary motion into an oscillating motion.
- Devise a mechanism that connects the motor to the toothbrush head and converts the rotary motion of the motor into an oscillating motion of the toothbrush head.
- Use notes and sketches to record your ideas and to evaluate them.
- Draw your best design.
- Evaluate your design and modify it if necessary.

You may use research methods to find information about suitable mechanisms, e.g.

- product analysis
- library search / computer software search
- internet search
- experiments - model your ideas
- interview - ask an expert.