**How to design a toothpaste squeezer**

**Teacher notes**

**Resources:**

* Teacher powerpoint
* Example STL file
* Fusion 360
* Some toothpaste tubes of different brands
* Rulers
* Cups for toothpaste

**Pre-preparation**

* Print out the student worksheets
* Ensure you have access to Fusion 360
* Print out the example STL file, make a few copies for the class to look at.
* Give each table a tube of toothpaste.
* The aim of this lesson is to build upon the learning from the mini iphone keyring task.

**Learning Objectives**

* To design a toothpaste squeezer using Fusion 360.

**Starter task 5 minutes**

* Students are to measure the width of the toothpaste and the ‘thickness of the tube’. To be able to do this, students will need to squeeze out around 10% of the toothpaste so they can measure the thickness of the tube when partially empty. They need to record down their measurement and then compare with different brands. Are all sizes the same?

**Objective 1**

**Task 1 – 5 minutes**

**Review of current options out there for solving the problem.**

* Review the different images on toothpaste squeezers. Are some too complex? Would they do the job? Why don’t toothpaste companies sell squeezers with their product? Would they fit inside a toothpaste packaging box?
* This could lead to discussions such as;

Companies would lose money if customers could squeeze every last bit of toothpaste out of the tube as they wouldn’t need to replace them as much.

Is the design of a toothpaste tube flawed as you can’t actually get all of the product out?

Would another product too manufacture be more expensive for the company?

Would they be sold in every box or as a special edition product?

**Objective 2 - To design a toothpaste squeezer.**

* Students are to look at the example 3D printed toothpaste squeezer as a basis for their design. They need to create four different designs that can fit inside a toothpaste box that can be sold with the product. They are to use the worksheet to draw their designs. Students should annotate the designs with measurements.
* Once they have completed a range of designs, they need to use fusion 360 to create a 3D design of their idea.
* Run through the slides on how to design the example shown so students understand what to do (they are not to copy, they are to create their own shapes. You could set a theme to the design).
* Remind students of the trim feature from last lesson along with the spine feature.

**5 minute Plenary**

* Recap the initial objectives with the class.
* Ask the students to reflect on their learning and explain ‘What is a revolve and how is it different to an extrude?’.