Injection Molding

Lesson Plan for Grade 8, STEM Class

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OVERVIEW & PURPOSE

The purpose of this lesson is to extend knowledge of 3D design and printing by exposing students to manufacturing of everyday objects using an injection molding process.

EDUCATION STANDARDS

This lesson aligns with the following Connecticut Technology Standard for grades 6-8:

1. Nature of Technology
2. Design and Development (Engineering)

OBJECTIVES

1. Students will describe Injection Molding as a process for transforming raw materials into useful goods.
2. Students will explain that technology used in injection molding is a powerful force that improves human productivity.
3. Students will apply science concepts and math processes through the use of technology with the design process.
4. Students will use the engineering design process.

MATERIALS NEEDED

1. Access to internet and 3D design software (Tinkercad)
2. 3D Printer and Filament
3. Resin (not sure what to use yet) for molded

4. Injection Molding Demo (will be done with Technology teacher who has one in his room)

ACTIVITY

This activity will take place after students have been working and designing with Tinkercad. Students will have already designed and 3D printed an object that they will be creating a mold for in this activity.

I will show students various molds that they may be familiar with: play dough molds, sand castle molds, jello, cake, and candy molds. We will then talk about how many objects that they use or see everyday are molded on a variety of machines. We are going to learn about injection molding. I will show students various objects that have been manufactured using the injection molding process. Students will be able to hold and pass these objects around the class. I will ask questions that will get them to start thinking about why these items may be manufactured using the injection molding process. I also have pictures from my externship of objects that will be familiar to them and videos of the molding process.

Students will observe a demonstration of a molding machine that my colleague has in his room. This will help them to see and hold the small molds and discuss topics like pressure needed to hold the mold together as the resin is injected.

We will then go back to tinkercad and make a mold of the object that they will be manufacturing through this process. (I am going to try to make a step by step tutorial of myself doing this and then the students can use it as a reference).

While waiting for molds to print: Students will spend some time learning about the molding process. I am thinking of assigning a topic to small groups and they can then report their research back via google slides.

Once our molds are made, we will use clamps or strong elastic bands to hold them together with enough pressure so we can inject them with resin.

Students can now create multiple objects by reusing the molds, If there is time we can even try different types of resin.

An extension of this would be to create and sell our items to the student body as a way to fundraise for more materials or equipment.