Material.java

Overview

The Material class represents a printing material and provides functionality that support the switching between materials taking place in the GcodeWriter class. Current implementation assumes a maximum of 3 Material objects. Future implementation can create additional Material objects in the GcodeWriter class to accommodate for increasing number of materials used. This class contains a HashMap of slot coordinates, with each slot number and its corresponding G-code coordinates stored as an <Integer, double[]> key-value pair. Coordinates were determined manually through Repetier Host. Each Material object is initialized with a material number, E_curr, and extrusion multiplier.

Variables	Description
int materialNumber	Represents the slot number a material is loaded into on the printer. Material numbers are read left to right from 1 to 8 when facing the printer.
double E_curr	Represents current E-coordinate of a Material object; it corresponds to the current level of material contained in the syringe. Every Material object stores this E-coordinate so that the printer knows where to restore its plunger to. The E-coordinate is measured absolutely, not relatively, i.e. to move the extrusion rod down an additional 5mm from E_curr = 20, the G-code command is E25, not E5. Every Material object is initialized with E_curr = 0.0. Since the user can only calibrate the extruder once in Repetier Host before running the G-code file, this means that every syringe used **MUST** be loaded with printing material to the same level marked by the bottom edge of the tape on its associated syringe.
double extrusionMultiplier	Controls how fast a material is extruded, and is dependent of each material's viscosity. Its value must be determined by the user and inputted into the GUI. Currently implementation assumes extrusion multiplier of 1.0 for all materials used.
HashMap<Integer, double[]> coordinates	Every Material stores a map of every syringe's associated rack coordinates. These coordinates were manually configured RepetierHost

Methods	Descriptions
public Material(int materialNumber, double extrusionMultiplier)	Constructor creates material with extrusion multiplier and an associated rack-slot number.
public double[] getRackCoord()	Returns the x-y coordinates of Material's rack-slot
public void updateE_curr(double e)	Sets Material's E_curr to e. This method is called before the toolHead drops the material on the rack so that when picked up, the toolHead knows where to restore the plunger to.