***Chemistry of Plastic Mold Injection Research Notes***

1) Research plastic mold injection.

2) Research the emerging technology of “Carbon” 3-D printing.

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| Question | Answer |
| 1. How many types of injection molding are there? List a few that you found. |  |
| 2. What is the key difference between injection molding and “Carbon” 3-D printing? |  |
| 3. Which process is currently faster? |  |
| 4. Can both processes be used together to make an even better product? Why? |  |
| 5. What material(s) are you going to use for your machine? |  |
| 6. Are there any materials you can think of that could be used in the “Carbon” 3-D printing process that you might be able to do something like this process at home? Why or Why Not? |  |

***DIY Plastic Mold Injection Instructions***

Lab instructions below were all found at: <https://www.instructables.com/id/Cheapo-Injection-Molding-With-Gluegun/>

***Safety Instructions/Procedures to Follow:***

* Burn possibility from the hot glue gun
* Inhalation hazard of the releasing agent

***Materials needed for your DIY Plastic Mold Injection Machine:***

* Glue gun
* Scissors or knife
* Glue gun ammo (Glue Sticks)
* Cardboard (to form your outer mold)
* Cooking oil (or other release agent that glue won't stick to)
* Tape
* love (things are going to get sticky)

***Step-by-Step Procedure to Follow***

***A. Mold Release***

1. Dab cooking oil on the part you want to mold around.
2. This way the hot glue will harden around the object without adhering to it.
3. Generally, I put enough on the part, so the surface is well coated but not drippy.

***B. Outer Mold***

1. Form cardboard into the outer mold shape you desire.
2. You may want to keep your mold fairly open because you'll need to access every crack and crevice with the nozzle of your glue gun.
3. The top can be a separate piece that pops on after the glue is injected but before it hardens.

***C. Injection***

1. Using the glue gun, inject the mold full of hot glue. Start in the corners and under any protrusions. These were places I had to touch up later.
2. Fill the mold completely and put on the top if you have one.
3. Do any final adjustments to the outer mold shape if required. Then let it cool completely.

***D. Open & Adjust***

1. After cooling, peel off the cardboard.
2. Your newly born piece will be adhered to the cardboard. Mold release helps reduce this but there may still be stuck spots. Muscle and pry the piece off.
3. There may be voids. If so, re-oil your mold, pop some more glue on the void and put it back in the mold. This may or may not turn out well.
4. My pieces had lots of protruding metal pins that loved to trap air pockets, so I had to squirt glue right under them.

***New Skills***

With your new-found injection molding skills, you can make anything you want. And that's a good thing.

***Questions You Want Answered***

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| ***Questions*** | ***Answers*** |
| 1. What part did you chose to mold? Why? |  |
| 2. Why do you think that the mold stuck to the outer mold? |  |
| 3. What other materials can be molded? |  |
| 4. What other materials can be used as the molding liquid? |  |
| 5. What might an independent variable be in the project? |  |