

# Science and Engineering in Plastics Manufacturing



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South Houston High School



Lamar University College of Engineering  
Research Experience for Teachers Summer Program  
Sponsored by the National Science Foundation

# Mini-Grant

- Pasadena ISD Education Foundation
  - \$1,000 - \$5,000 grants for district teachers
  - Easy application process
  - Featured grant application auctioned at Taste of the Town



# Mini-Grant

- Education in Plastics Manufacturing
  - \$30,000 raised



# Lamar Research Experience for Teachers in Advanced Manufacturing.

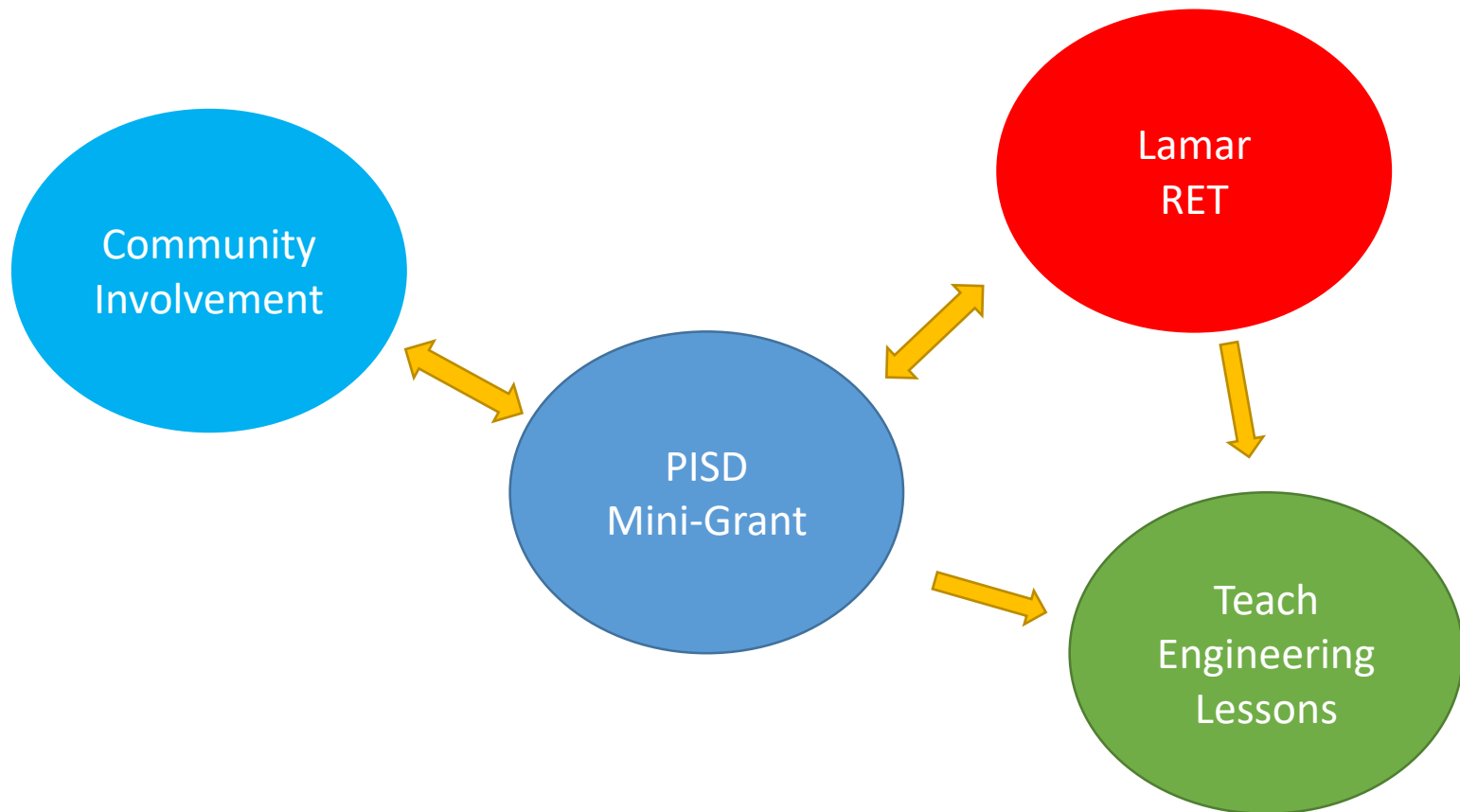
- Small group training with Lamar Engineering Professors
- Field trips! Field Trips! Field Trips!
- Hands on research
- Curriculum Development



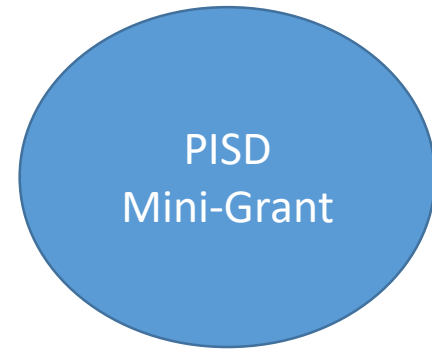
# Lamar Research Experience for Teachers in Advanced Manufacturing.



# Education in Plastics Manufacturing



# Education in Plastics Manufacturing



## Goals:

Teach students about plastics and plastics manufacturing.

Use equipment and techniques relevant to real world manufacturing

Create lessons that are aligned to TEKS

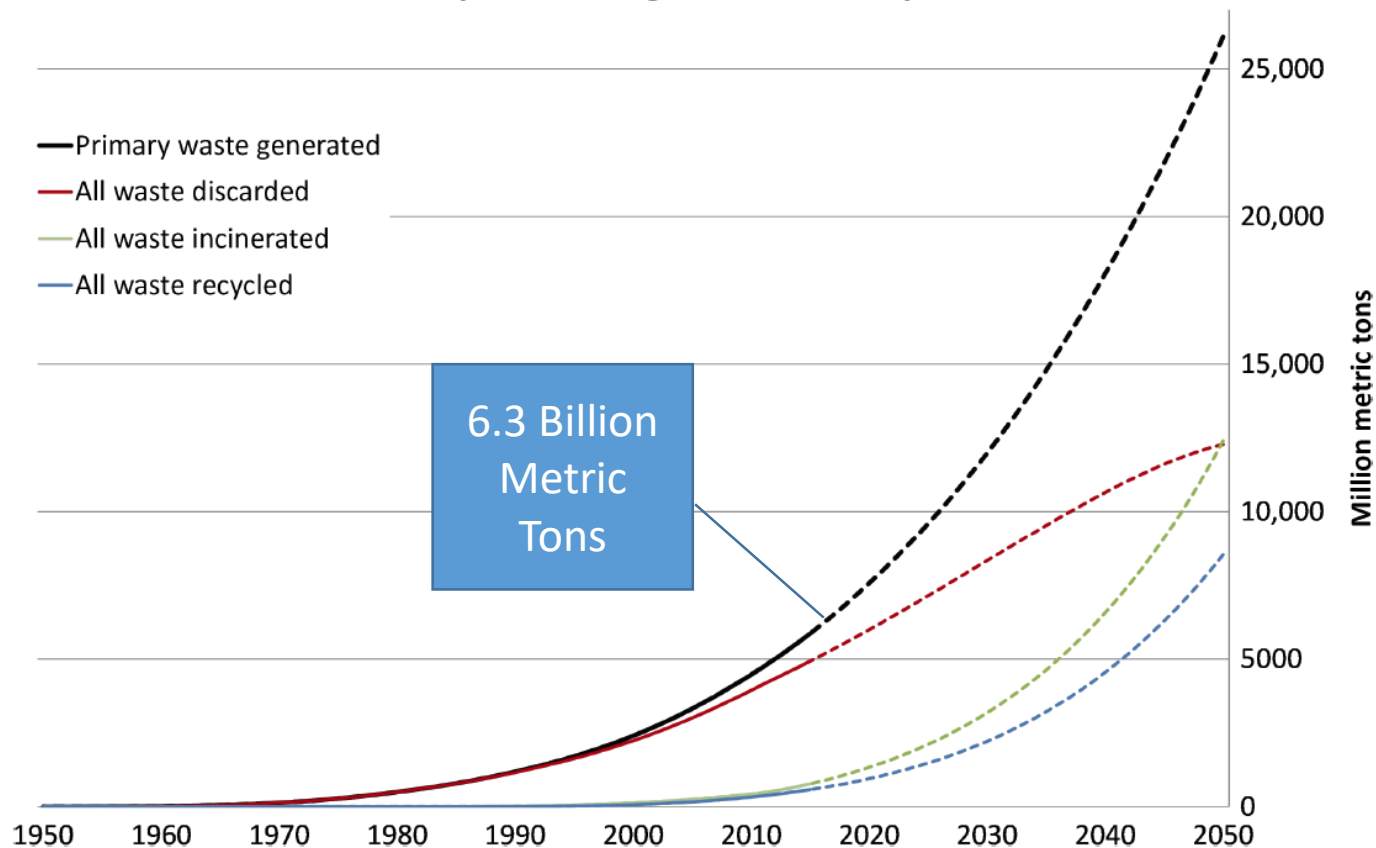


# Education in Plastics Manufacturing

PISD  
Mini-Grant

## Why it's important:

Cumulative plastic waste generation and disposal



Geyer, Jambeck, et al. Science Advances 19 Jul 2017:Vol. 3, no. 7



# Education in Plastics Manufacturing

PISD  
Mini-Grant

Why it's important:

## STUFF WE NEED AND WANT



# Education in Plastics Manufacturing

PISD  
Mini-Grant

Why it's important:

# STUFF WE DON'T WANT



# Education in Plastics Manufacturing

PISD  
Mini-Grant

## Injection Molding Machine:



### Advantages:

- Fast
- Easy
- Very Important Manufacturing Technique

### Disadvantages:

- You need molds

\$1,800 LNS Tech Model 150 A

# Education in Plastics Manufacturing

PISD  
Mini-Grant

## CNC Milling Machine:



### Advantages:

- You can make your own molds

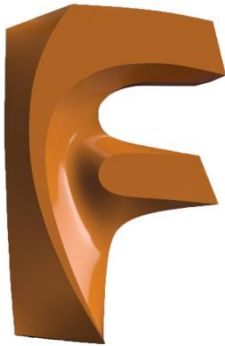
### Disadvantages:

- Big Learning curve
- Will take a lot of time if you want students to use it

About \$2300 Taig Tools CNC Mill

# Education in Plastics Manufacturing

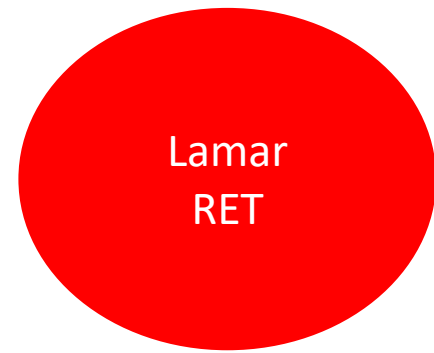
Lamar  
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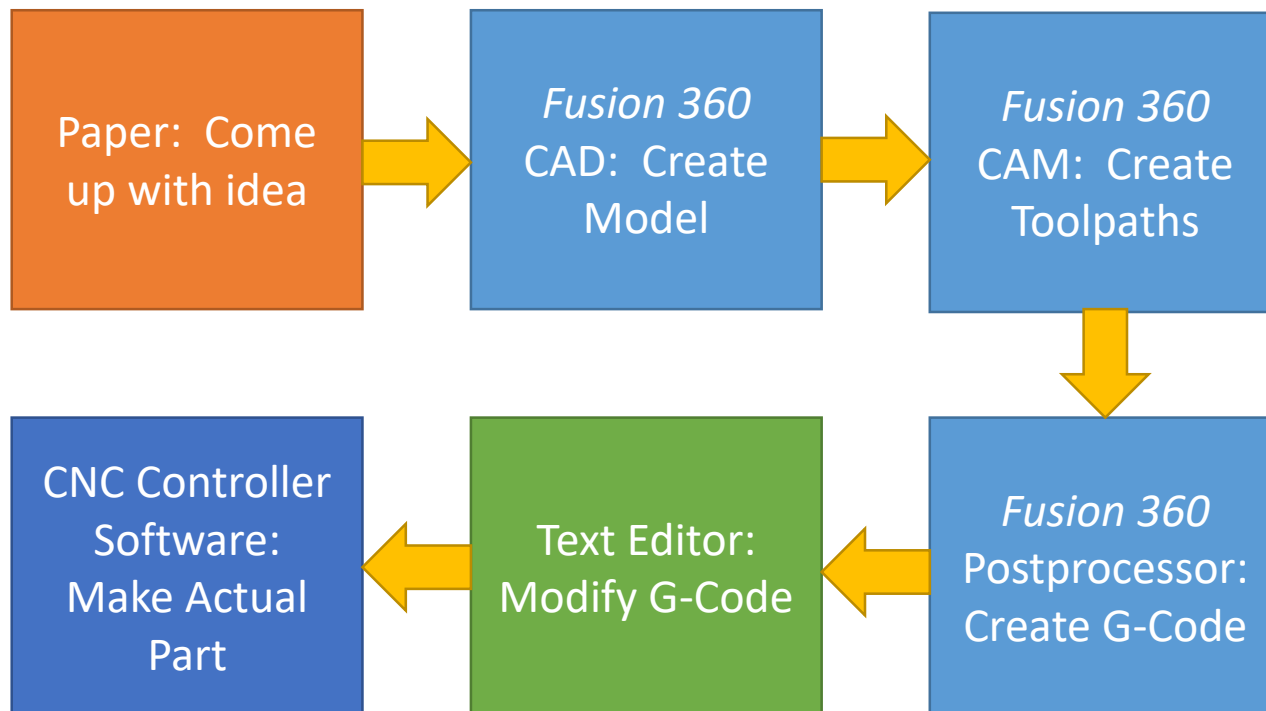
AUTODESK®  
**FUSION 360™**

- CAD/CAM Software
- Free
- Powerful

# Education in Plastics Manufacturing



## Workflow for Making Molds

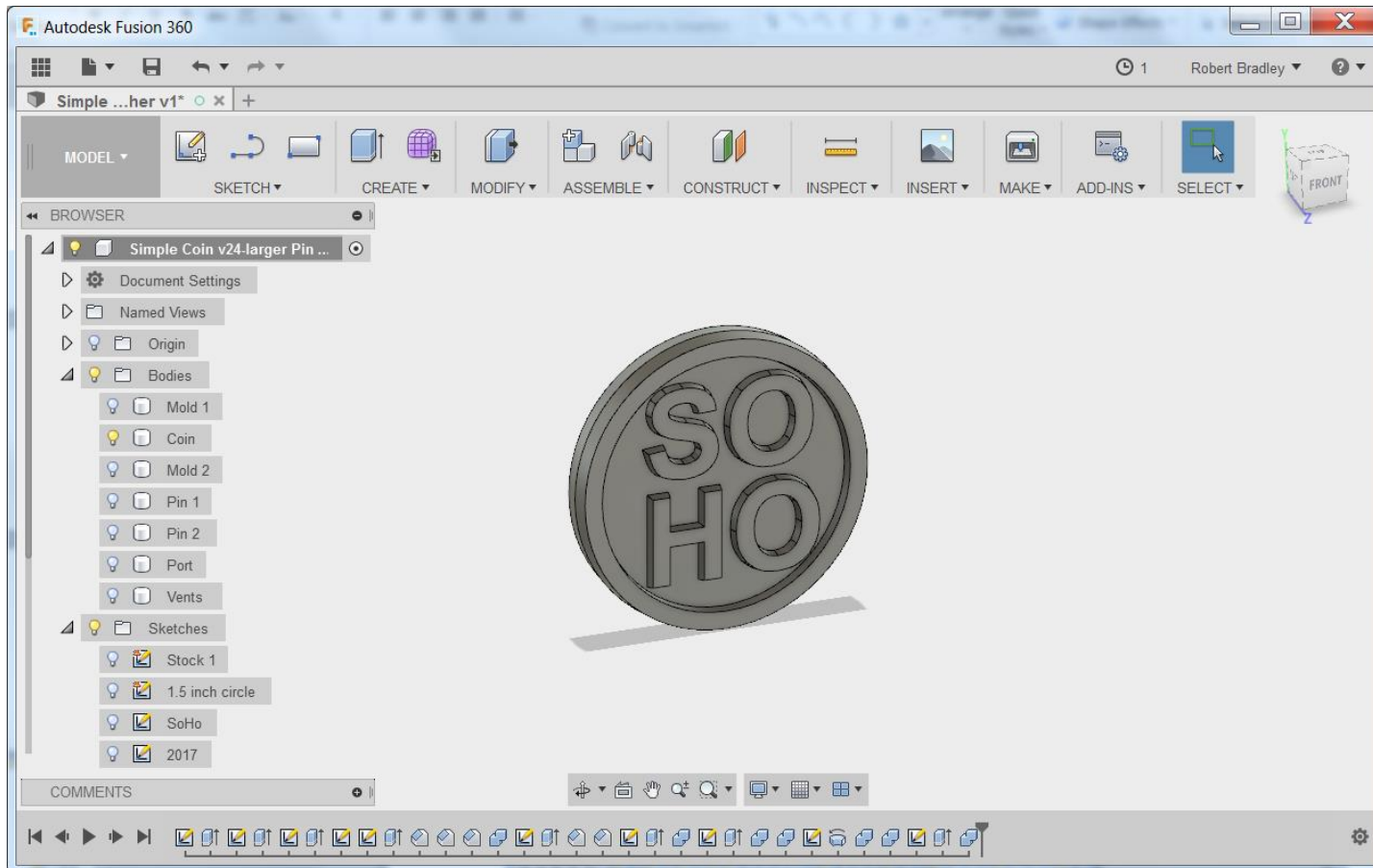




# Education in Plastics Manufacturing

Creating the mold in Fusion 360

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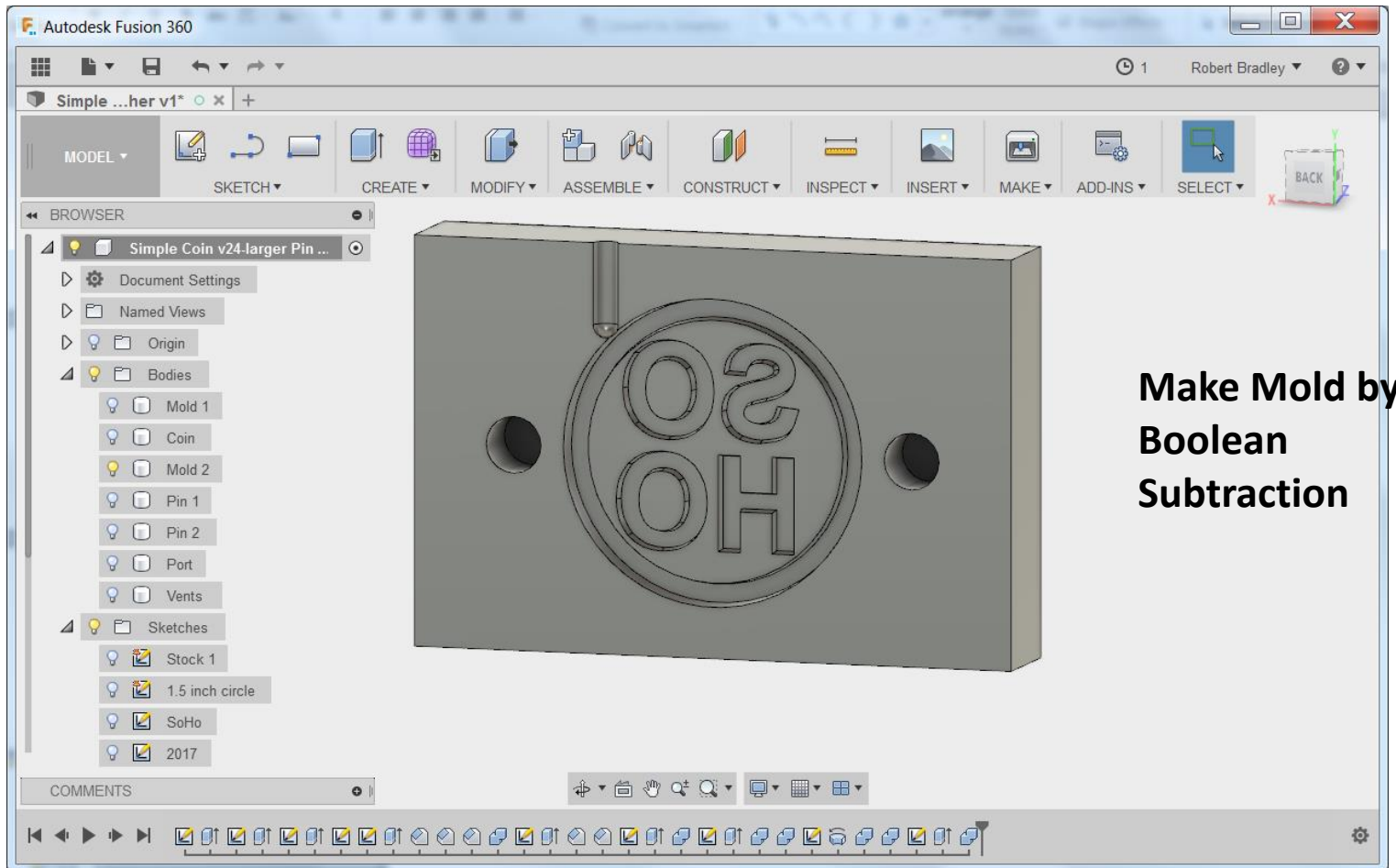




# Education in Plastics Manufacturing

Creating the mold in Fusion 360

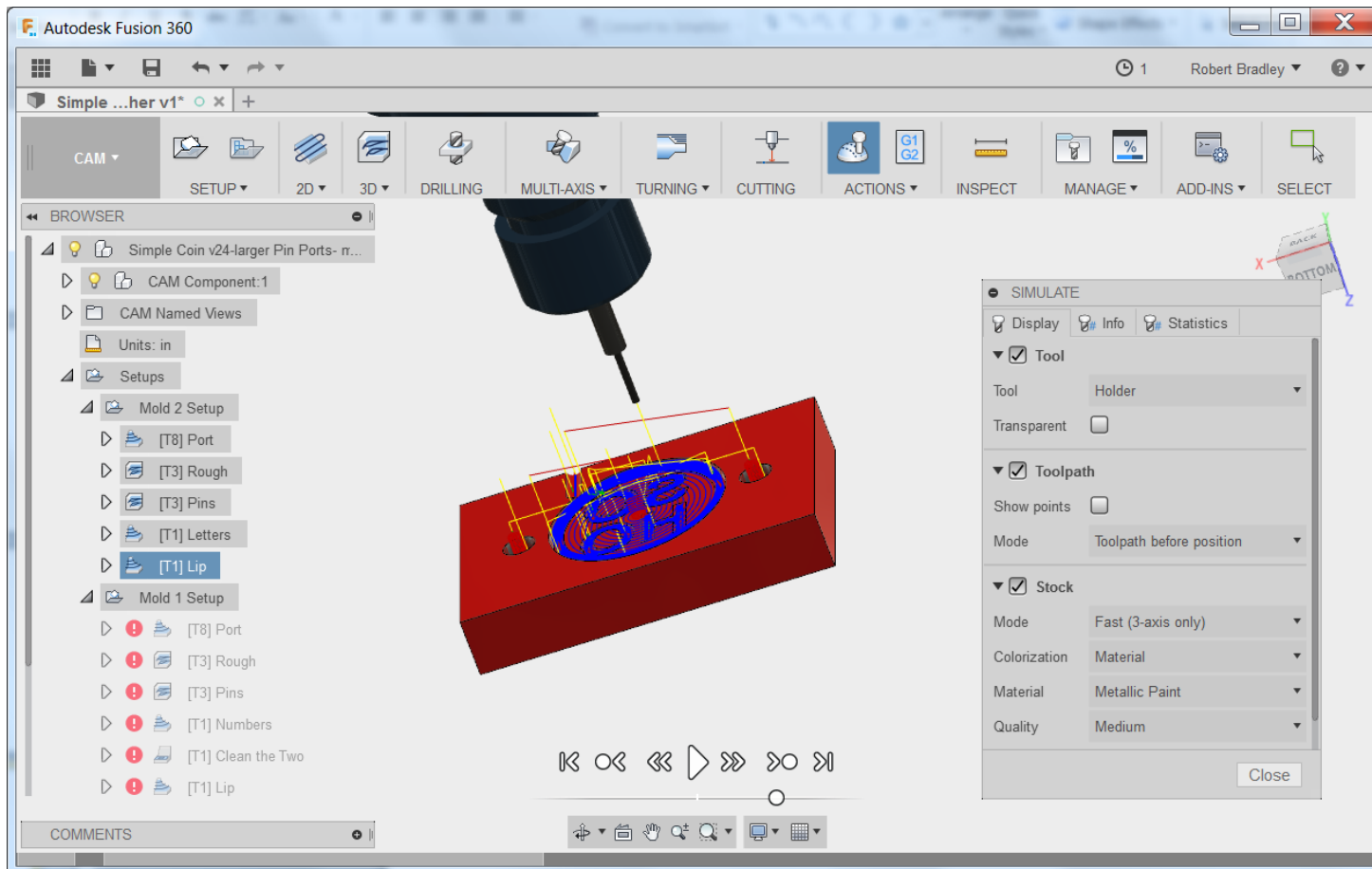
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# Education in Plastics Manufacturing

Creating Toolpaths in Fusion 360

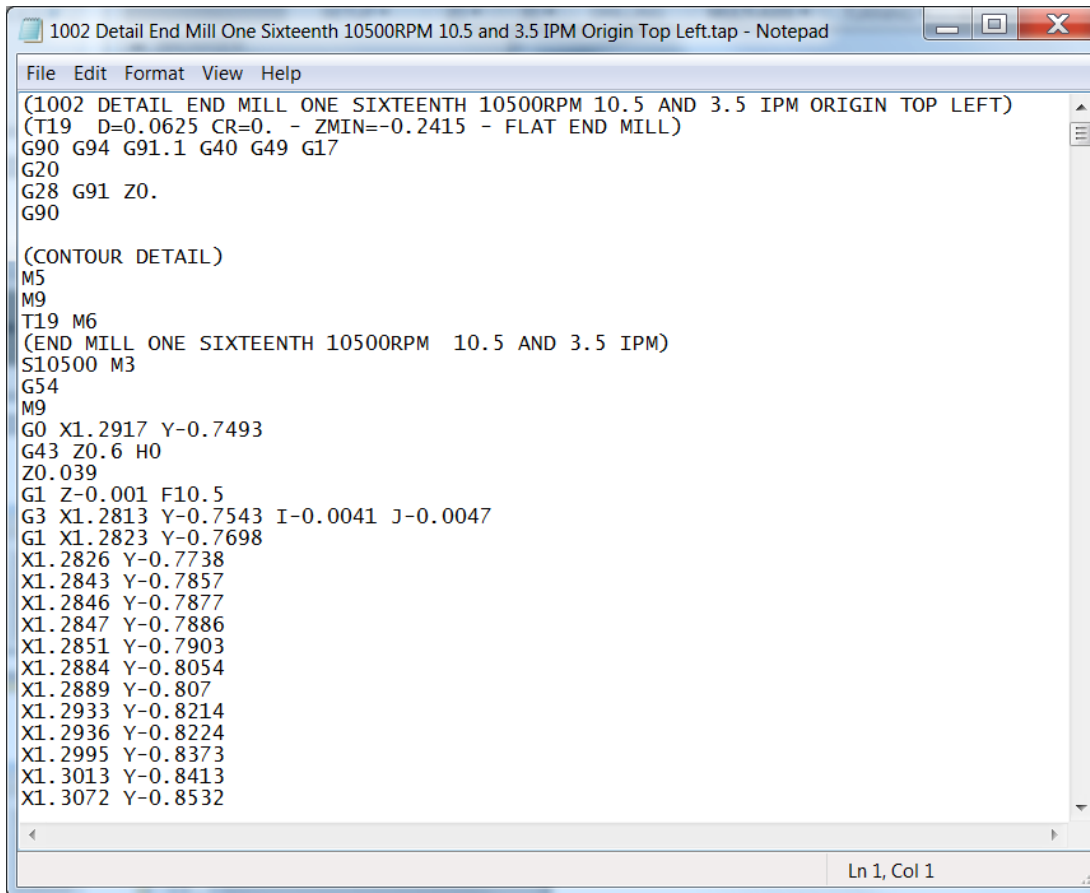
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# Education in Plastics Manufacturing

Postprocess in Fusion 360

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File Edit Format View Help
(1002 DETAIL END MILL ONE SIXTEENTH 10500RPM 10.5 AND 3.5 IPM ORIGIN TOP LEFT)
(T19 D=0.0625 CR=0. - ZMIN=-0.2415 - FLAT END MILL)
G90 G94 G91.1 G40 G49 G17
G20
G28 G91 Z0.
G90

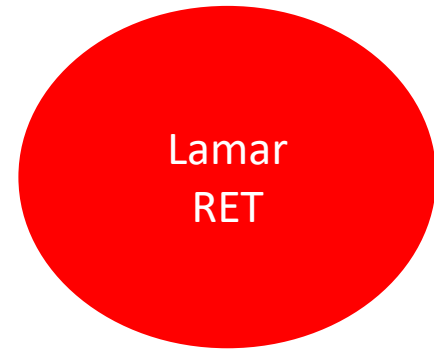
(CONTOUR DETAIL)
M5
M9
T19 M6
(END MILL ONE SIXTEENTH 10500RPM 10.5 AND 3.5 IPM)
S10500 M3
G54
M9
G0 X1.2917 Y-0.7493
G43 Z0.6 H0
Z0.039
G1 Z-0.001 F10.5
G3 X1.2813 Y-0.7543 I-0.0041 J-0.0047
G1 X1.2823 Y-0.7698
X1.2826 Y-0.7738
X1.2843 Y-0.7857
X1.2846 Y-0.7877
X1.2847 Y-0.7886
X1.2851 Y-0.7903
X1.2884 Y-0.8054
X1.2889 Y-0.807
X1.2933 Y-0.8214
X1.2936 Y-0.8224
X1.2995 Y-0.8373
X1.3013 Y-0.8413
X1.3072 Y-0.8532

Ln 1, Col 1
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Edit by hand to  
Remove unneeded  
Commands

# Education in Plastics Manufacturing

Mill Parts using Mach3 Software and CNC Mill



Video: 20171003\_155240.mp4

# Education in Plastics Manufacturing

Community  
Involvement

## Donations:

- Plastic Pellets
- O-Rings for Balloon Cars
- Silicone for Cut-out molds

## Field Trip

## Trunk-or-Treat



# Education in Plastics Manufacturing



Teach  
Engineering  
Lessons



Free online repository for Science and Engineering Lessons

Education in Plastics Manufacturing  
<https://youtu.be/FUsMfQol-4s>

