

# Design of An Open-Source Delta 3D Printer

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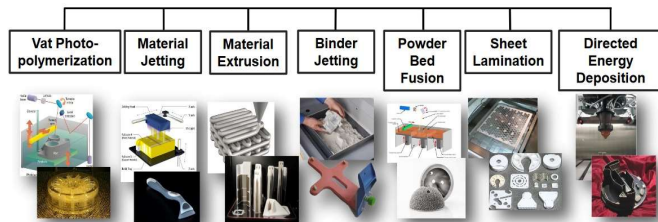
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## ABSTRACT

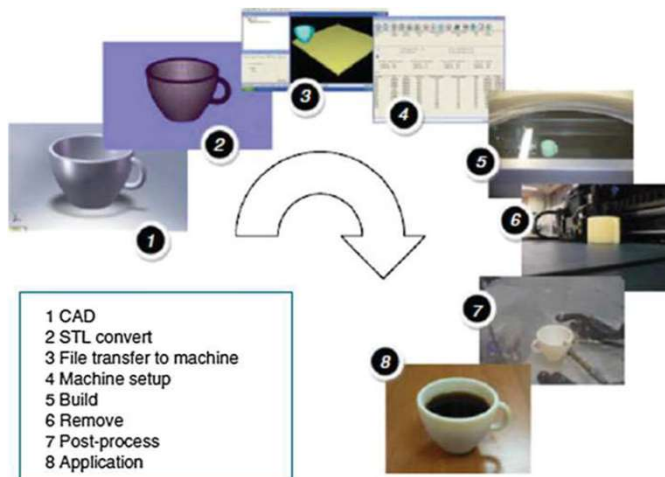
This end-of-study project consists of designing an **open-source 3D printer DELTA**, that is used to make plastic parts of complex shapes with the **Additive Manufacturing** procedure. The **mechanical design** part is done with **SOLIDWORKS** and to **optimize the geometry** of the system, a program under **MATLAB**, based on the trial-and-error method is developed. To achieve the 3D printer system, fundamental electrical parts are presented, motor sizing has been calculated and control system has been introduced, consisting of an **embedded electronic part**, which uses **ARDUINO** as a processor, as well as an **HMI interface and control firmware**.

## ADDITIVE MANUFACTURING

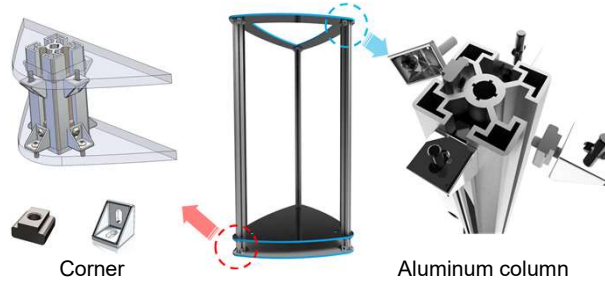
AM is a process that takes a virtual CAD description and turns it into a physical component. It can also be employed in a variety of ways and to variable degrees in various items. Depend to **ASTM F42**, there are: **7 Categories**.



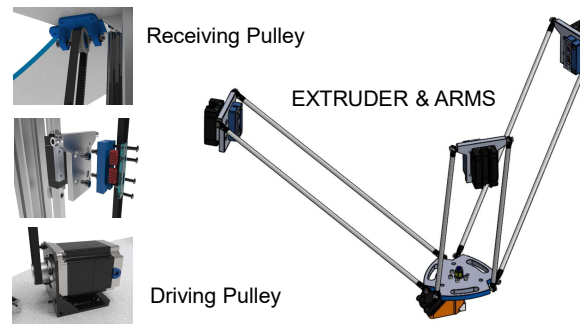
## 3D PRINTING/AM PROCESS



## DELTA 3D PRINTER - DESIGN



Corner  
Aluminum column  
Subassemblies of the plates with the column

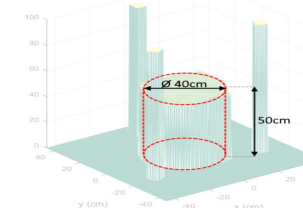
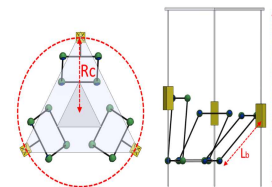
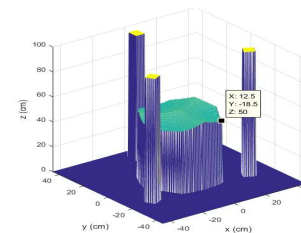


Receiving Pulley  
EXTRUDER & ARMS  
Driving Pulley

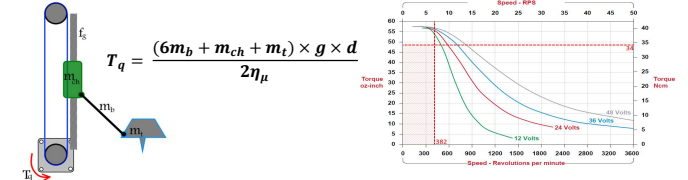
## GEOMETRY OPTIMIZATION

MATLAB script was developed that does a geometric scan for the volume that the extruder head can do by using try and error method we achieve to the optimization workspace on trial.

Variable	Value (mm)
$R_c$	350
$L_b$	350
$H_c$	850

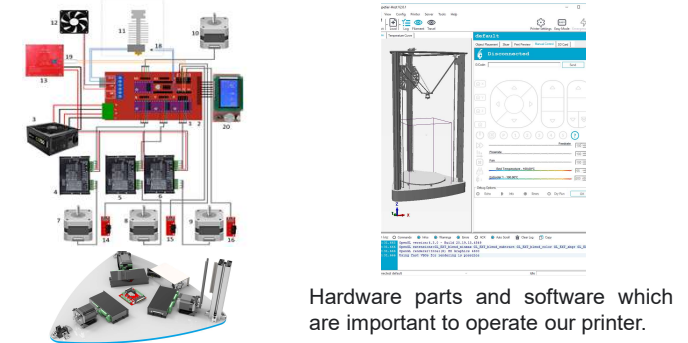


## MOTOR SIZING



Motor sizing of the system of which we determined Micro-stepping ( $P_{\mu}$ ), The torque  $T_q$ , and the speed N, which are necessary calculations to choose the engines.

## COMMAND AND CONTROL



Hardware parts and software which are important to operate our printer.

## CONCLUSIONS & PERSPECTIVES

- A virtual prototype of a delta 3D printer is presented, which is an **open-source 3D printer**. The project focused to introduce and develop the different parts to have a complete system of the 3D printer: design part, calculation and optimization, electrical, command and control.
- As perspectives is to use this document to fabricate a **Delta 3D Printer**.

