
3D MODELING AND PRINTING

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CLASS DESCRIPTION

The course introduces learners to computer 3D Design with 123D Design using the 123D Design software to create animation, text, and structures in 123 dimensions. This course is modeled to project-based where learners will complete tasks and construct 3D objects.

TOTAL CLASS TIME: 120 minutes

CLASS OUTCOME

By the end of this class, students will learn how to use to 3D design/ modeling using the 123D design software, understand the basic operations in 123D design, Movement and manipulation of objects in virtual 3D space, develop series of projects such as Modelling of Text and Objects (for example cup, flower vase, wine glass, containers, interior designs, etc.) and understand the basic operating principle of the 3D printers.

INTRODUCTION

Drawing is a form of visual art in which a person uses various drawing instruments to mark paper or another two-dimensional medium.

Animation is making drawings and pictures to move. Is the process of making the illusion of motion and change by means of the rapid display of a sequence of static images that is minimally different from each other.

Design is a plan or drawing produced to show the look and function or workings of a building, garment, or other objects before it is built or made.

123D Design is a powerful, yet simple 3D creation and editing tool that supports many new of the latest 3D printers. It is the simplest way to get their ideas and conceptions into 3D. Produced by the same creators of AutoCAD, this will give your children/wards the canvas with which they will unleash their creativity by drawing 3D Design of simple objects like a table to more complex designs like a castle.

3D modeling is the process of developing a mathematical representation of any three-dimensional surface of an object via specialized software. A 3D model also lets you see the end result before it's built, allowing you to correct issues before it's too late.

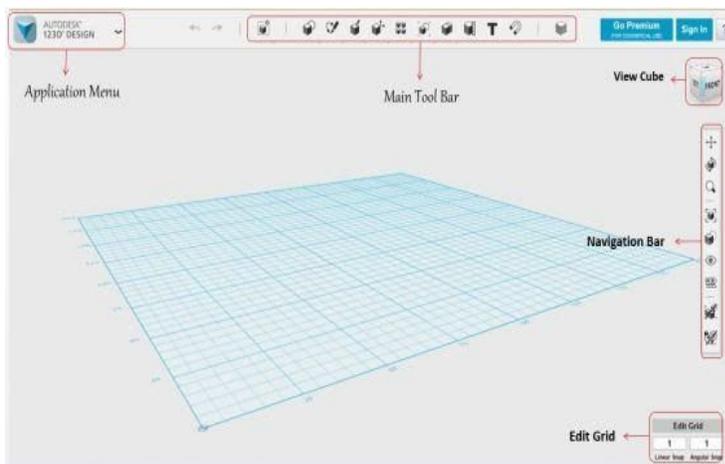
MATERIALS NEEDED

1. 123D software
2. Computer

123D DESIGN USER INTERFACE

123D Design is a powerful, easy and user-friendly 3D application that can create amazing and complex objects starting from basic shapes or sketches. These objects can then be 3D printed or manufactured with CNC, laser cutters, water jet cutters, etc.

This is the screen you will see when you open the 123D Design software.

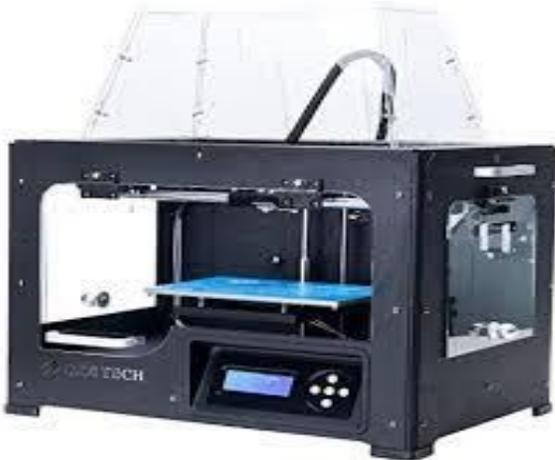


1. **Application Menu** : Create new, open, save, import and export files from here. Directly send the files to different applications.
2. **Main Toolbar** : Start creating 2D shapes or 3D models using the tools in this toolbar. Transform, construct and modify objects using tools.
3. **Navigation Toolbar** : Is shown as;



4. **Viewcube** : Is the easy way to navigate on the screen. Just by clicking on different angles, view the model in different angles.
5. **Edit Grid** : Change the grid size to the preset sizes or specify your own custom grid size. *Now that you know the user interface of the software, let's begin to create objects.*

3D PRINTER



extruder)

Qidi Tech 3D Printer (with Dual

3D printing also referred to as additive manufacturing is a process of making three-dimensional solid objects from a digital file. This process is the direct opposite of the regular ‘subtractive manufacturing’ where cutting out a piece of metal or plastic material with a milling machine or any other device. 3D printing unlike subtractive manufacturing is economical. It enables the production of complex shapes using less material than the traditional manufacturing methods through the addition of precise quantity of

material. A 3D printer can make pretty much anything from ceramic cups to plastic toys, metal machine parts, stoneware vases, fancy chocolate cakes or even (one day soon) human body parts.

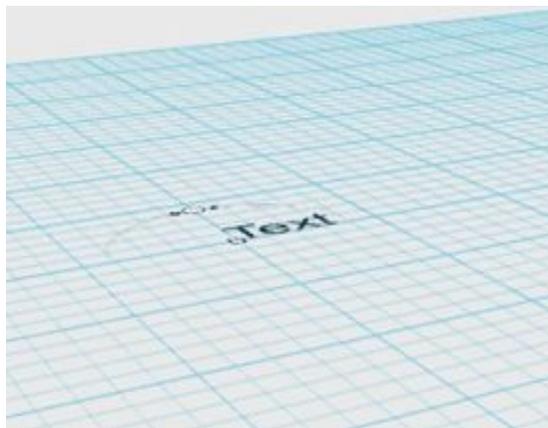
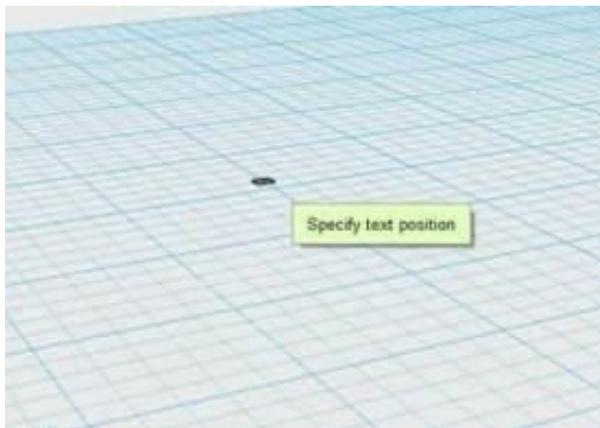
A 3D printed object is achieved by laying down successive layers of material until the object is created. In the course of the printing, each layer of the 3D printed object comes as a thinly sliced horizontal cross-section of the eventual object. It can also be seen as that idea of building a physical form out of tiny layers.

123D DESIGN APPLICATION

PART 1: HOW TO MODEL A NAME TAG/ 3D TEXT:

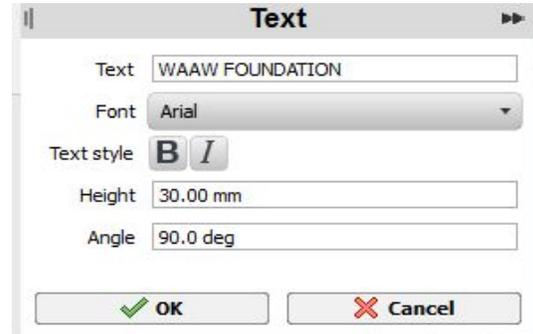
Step 1: Start 123D Design Application from the Desktop Icon on your computer.

Step 2: Click on Text icon  and select anywhere on the drawing environment to place your text.

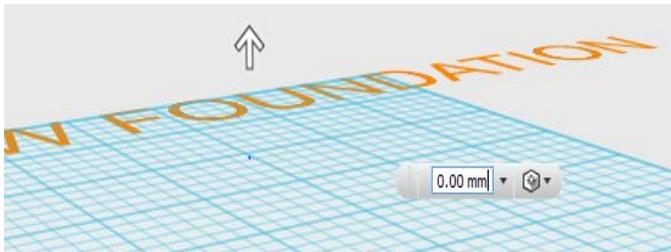


Step 3: Change the text and write your name

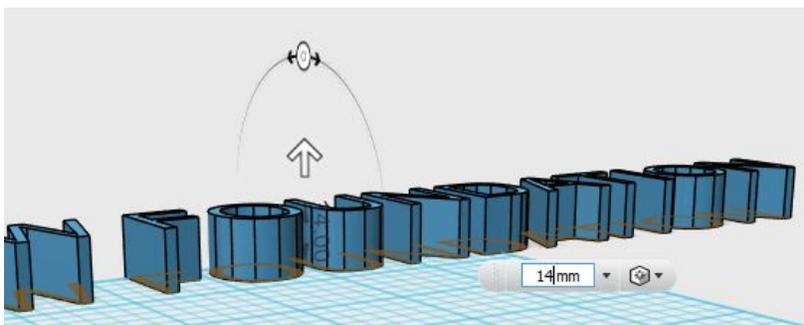
Step 4: Increase the Height to 30mm then click **OK**



Step 5: Go to **construct** on Tool bar  select **Extrude** 



Step 6: Select the text (WAAW Foundation) type the height of the text to give it thickness, type 14mm press **Enter** on the Keyboard.

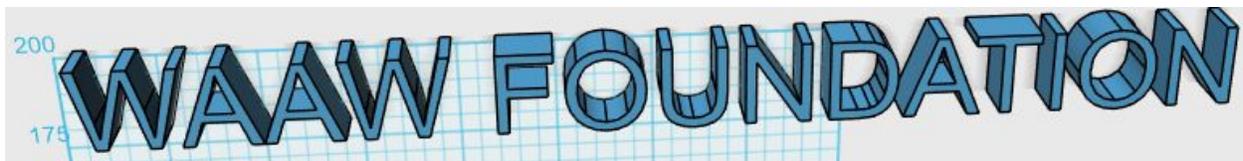


Step 7: Right Click and hold the mouse button to rotate and view your 3D Text.

Step 8: Click on this icon  to **hide your sketch**.

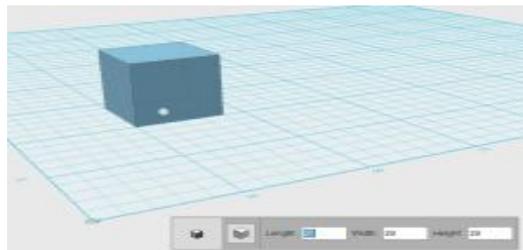


Step 9: Select Hide Sketches. Click **file** and **save** your Model



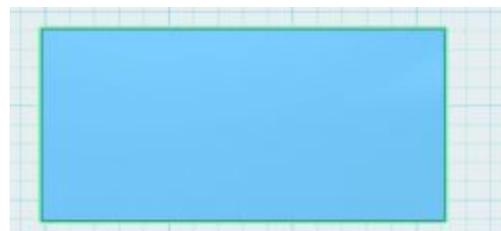
PART 2: NAME TAG ON A SURFACE

Step 1: Click on Primitive icon,  Select Box  and drag to the drawing environment.



Step 2: Type these values for **Length =50mm**, **Width = 80mm** and **Height = 3mm**. Press **Enter** and

click **Top**  to have a good view.



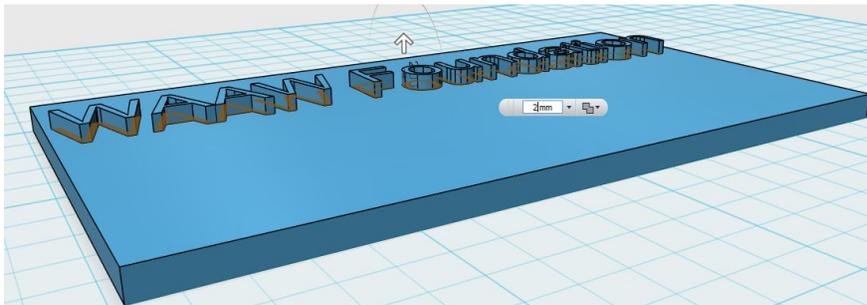
Step 3: Click on Text  place the text on box and write your name. Change the Height to 20mm, then click OK.



Step 4: Click on the **Home** icon  to view in Isometric.

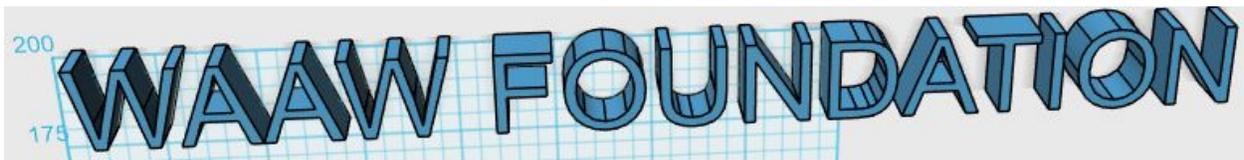
Step 5: Select **Construct** icon  click on **Extrude** icon 

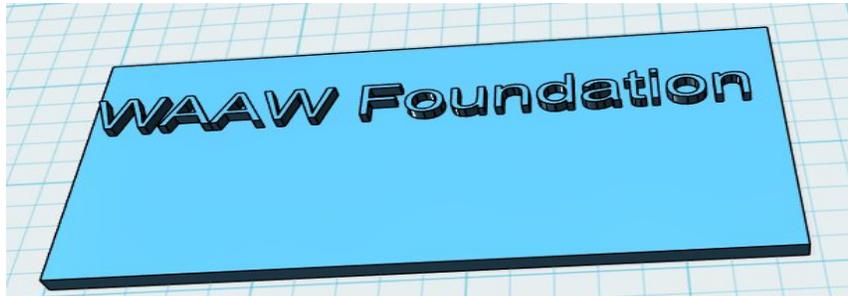
Step 6: Select the Text created, type the **Height =2mm** to add thickness to the text and press **Enter**



Step 7: **Hide Sketch** and rotate to view your final design.

Final 3D Models



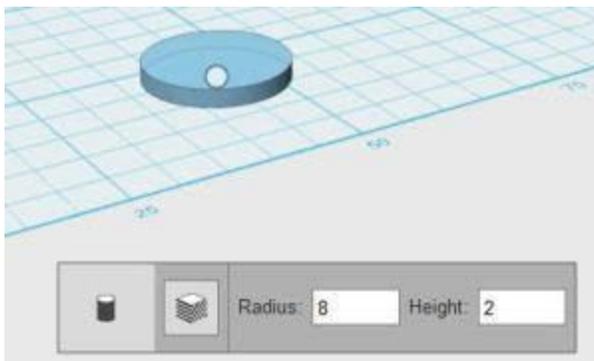


PART 3: HOW MODEL A CUP

Step 1: Go to the **Main Toolbar** —> **Primitive shapes** —> **Cylinder**



Drag it to the Grid Area, and then specify the radius and height.



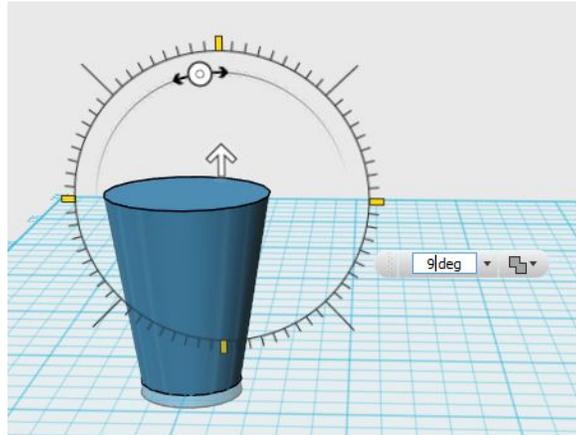
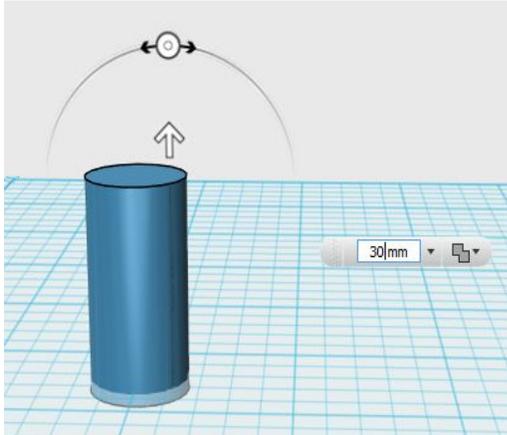
Step 2: Using “Extrude” Tool

Now extrude the object by clicking the **Main Tool Bar** —> Go to **Construct** —> Click on **Extrude**.



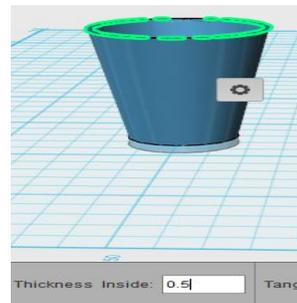
Select the **Top Surface** of the Sketch and **Extrude** it “**30 mm**” High.

Click  to set the degree to “9 deg.”.



Step 3: Using “Shell” Tool

In this step we are going to make the object hollow. Click on the **Main Tool Bar** —> **Modify** —> **Shell**



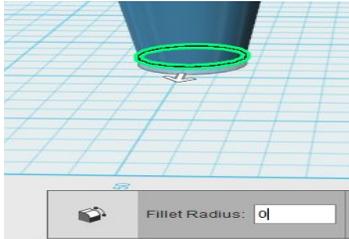
Let the thickness inside be 0.5 mm

Step 4: Using “Fillet” Tool

In the **Main Toolbar** —> **Modify**—> Click on **Fillet**.



Select the bottom circle and in the “**Fillet Radius**” dialog box write **2mm**.



Step 5: Adding Material or Colour

Select the object first. Then click on the **Material**  icon shown below.

