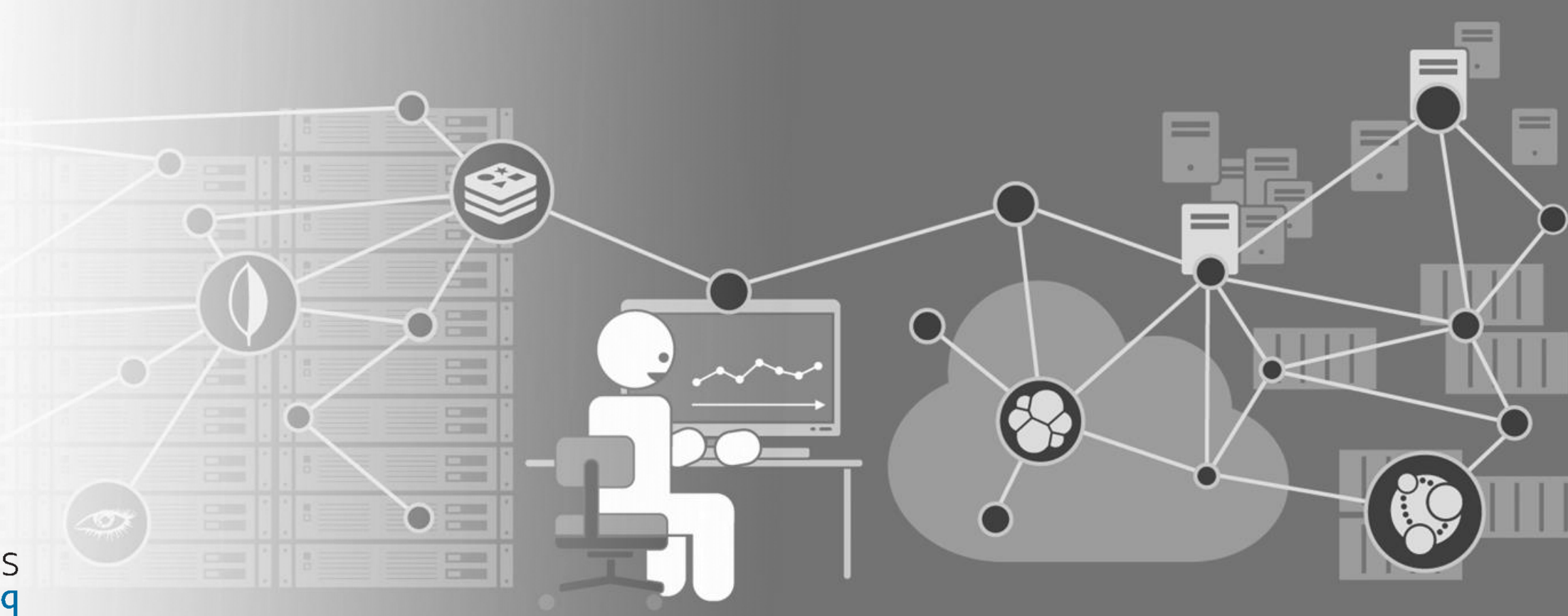


Workshop on Embedded Systems & IoT Technology

3D Printing Technology

From Scratch to the Final Objects

Baseem H. Al-Sabbagh



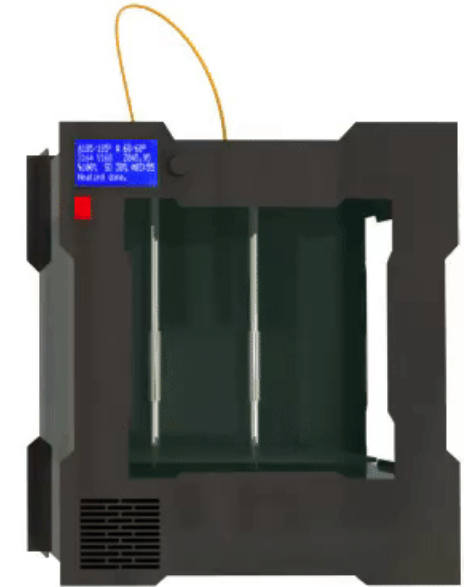
What is 3D Printing?

3D Printing is a process of making 3-dimensional solid object from a virtual digital model from one layer at a time.

Modelling

Printing

Final Object



Historical background...

In 1984, Charles Deckard Hull of 3D Systems Corporation, developed a prototype system that can print 3D objects. He named the technique as **Stereolithography**; patent later in 1986.

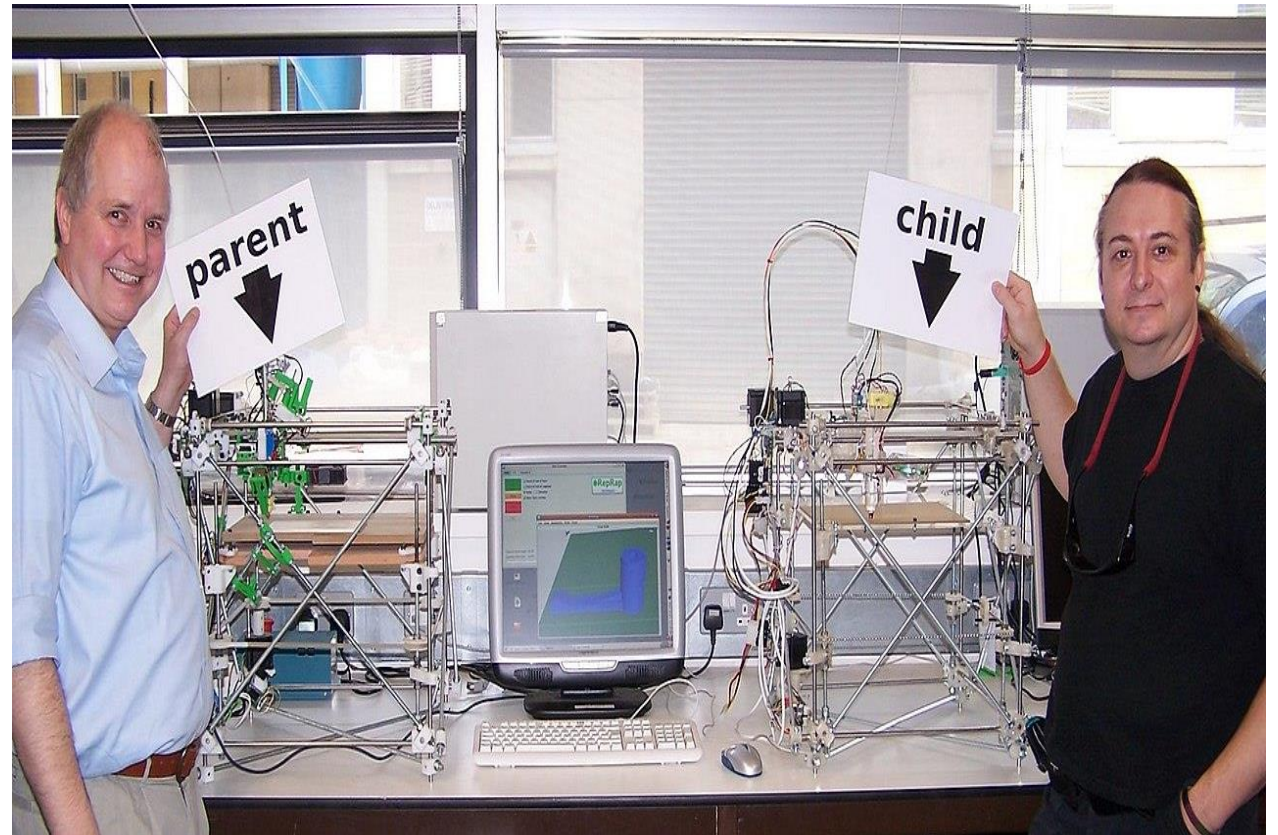
His creation currently is the name of common file format used in most 3D printers, ***.STL**



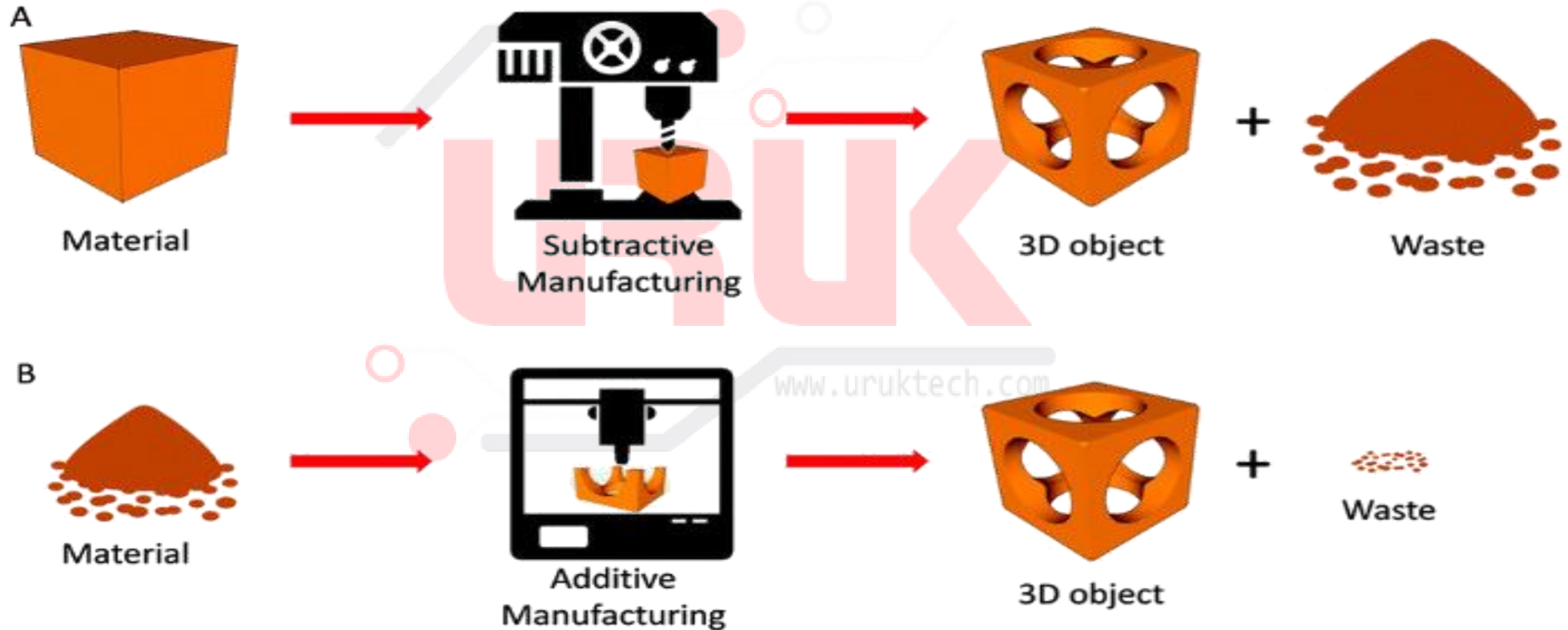
20 years later...

- > In 2005, Adrian Bowyer (left), launched the **RepRap** project. A project initiated to develop a low cost 3D printer that can print most of its parts.
- > First part was successfully printed by Vick Oliver (right) on 13/9/2006.
- > In April 2008, the first end user machine was released. By September, 100 copies was registered around the world!

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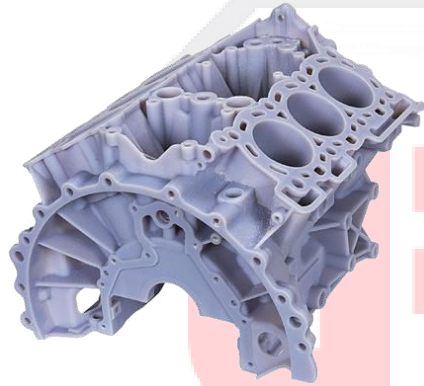


Additive versus subtractive manufacturing



Forms of additive manufacturing

> Photopolymers



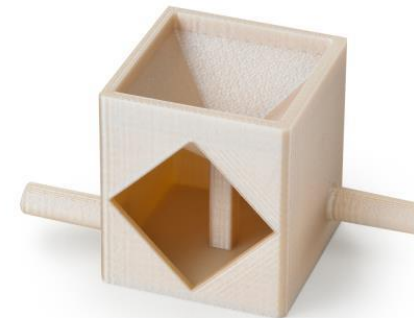
> Granular



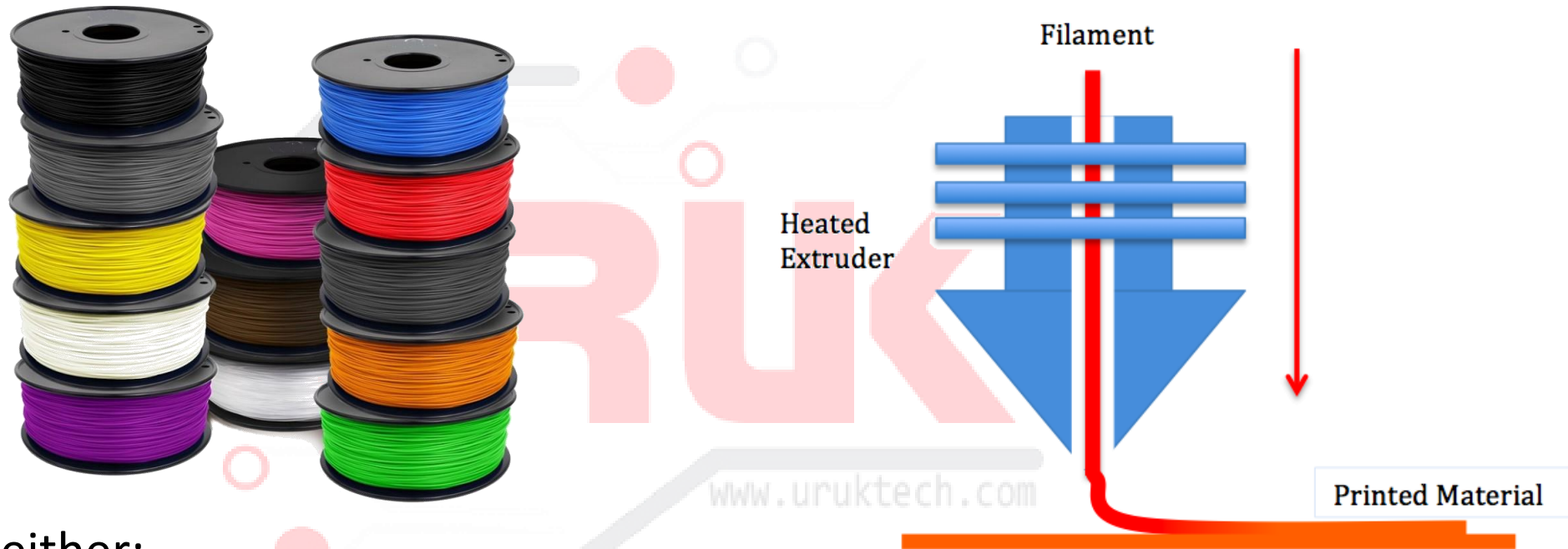
> Lamination



> Fused Deposition Modelling



Fused Deposition Modelling (FDM)

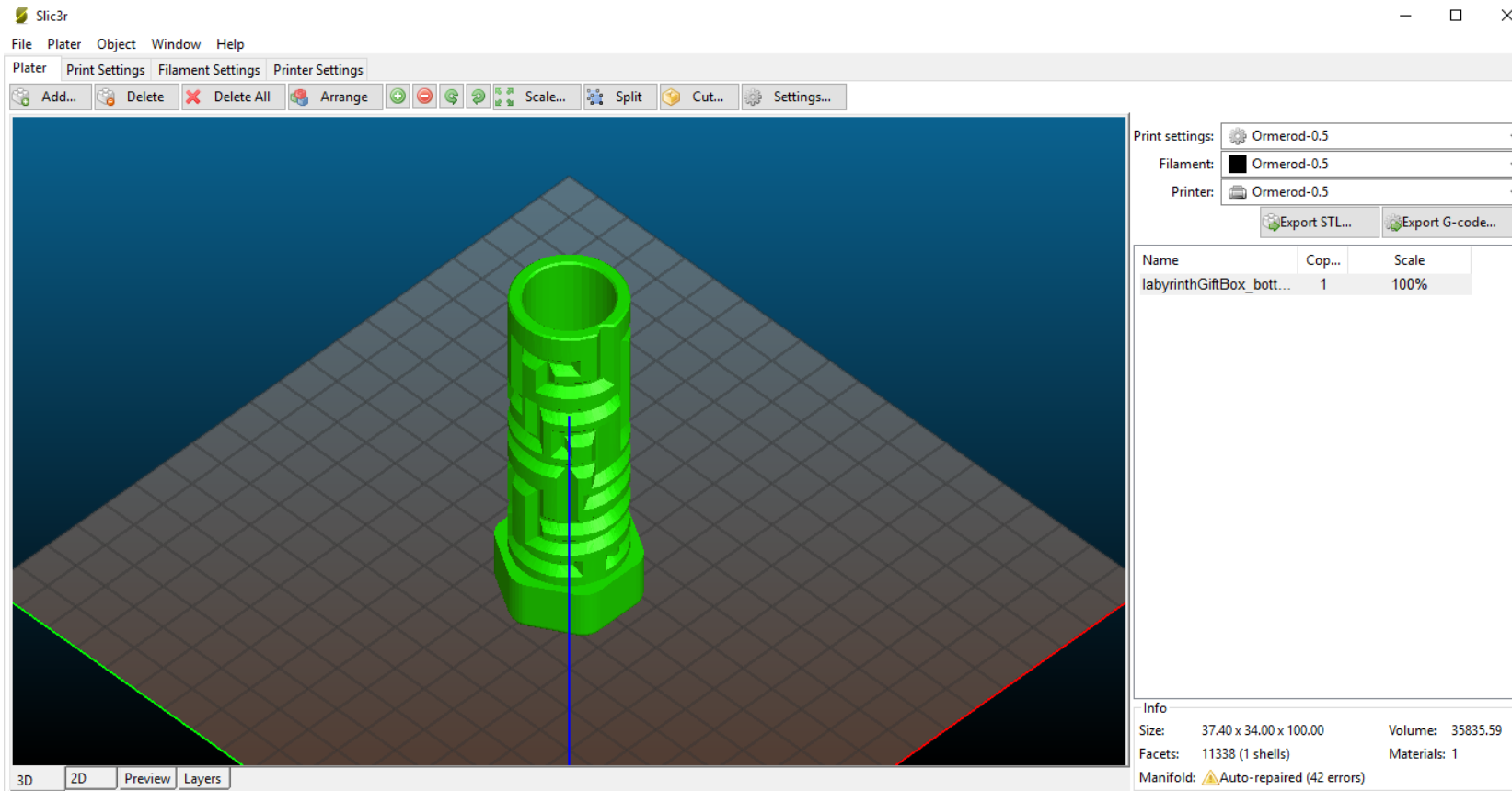


Mainly either:

- > PLA (Polylactic acid)
- > ABS (Acrylonitrile Butadiene Styrene)

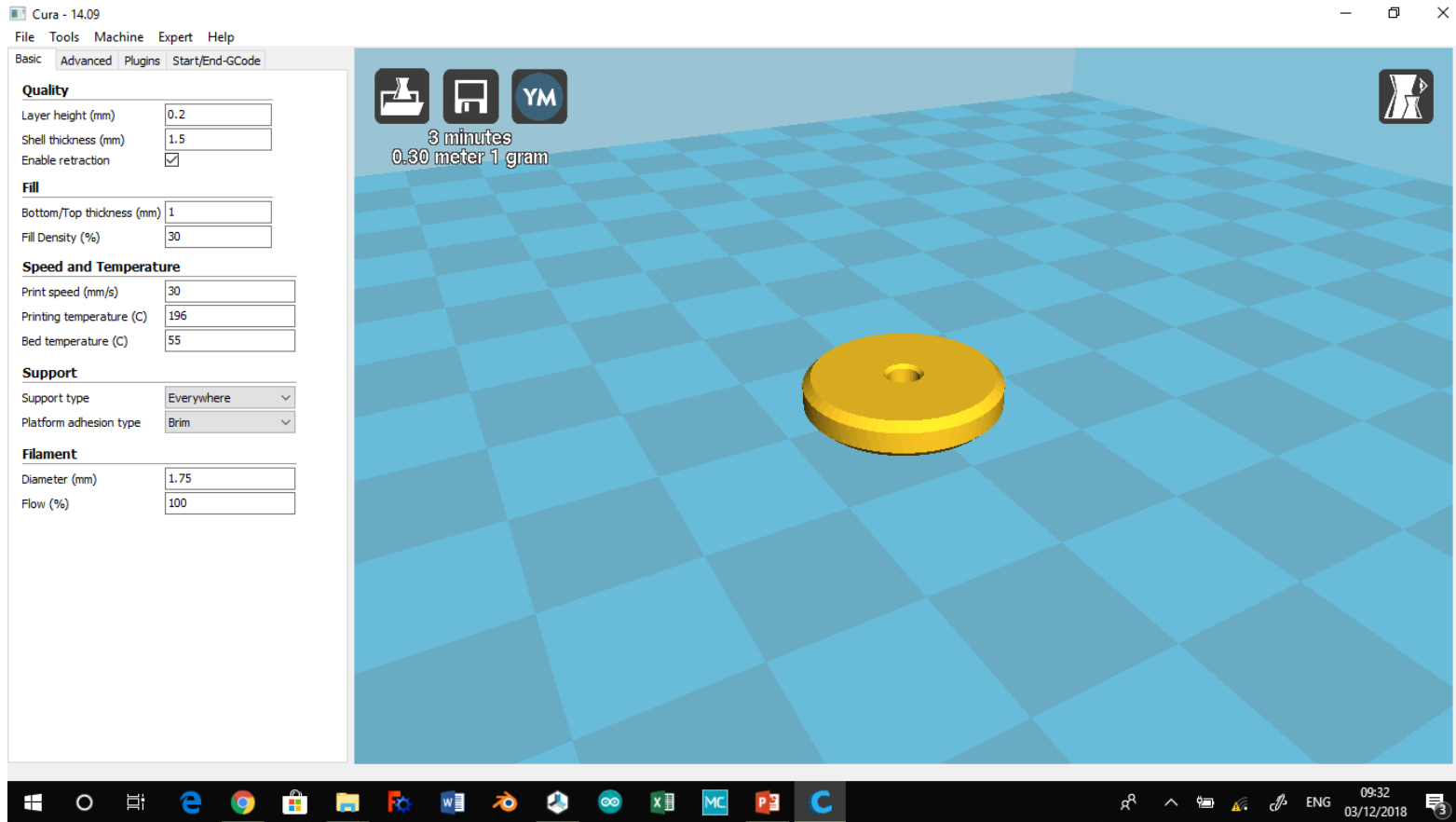
Slicers

Slice3r



Slicers

Cura



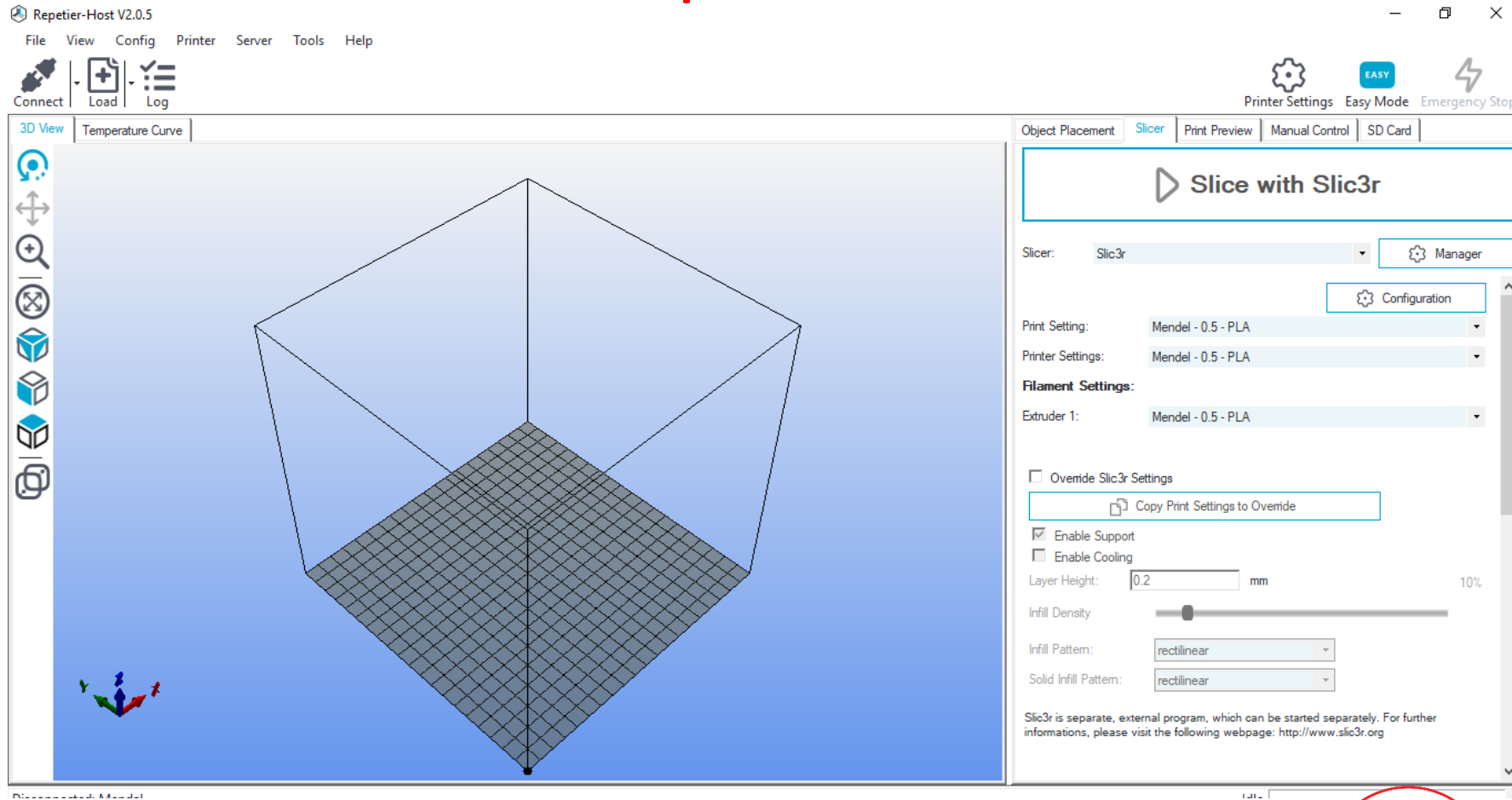
Control Software

Pronterface

The screenshot displays the Pronterface software interface. At the top left, the title bar reads "Pronterface" with standard window controls. Below it is a menu bar with "File", "Tools", "Advanced", "Settings", and "Help". The main control area includes a "Port" dropdown set to "COM11" and a baudrate of "115200", with "Connect" and "Reset" buttons. Below this, "Motors off" is checked, and "XY: 3000" and "mm/min Z: 100" are displayed. A central circular control panel features directional arrows for X, Y, and Z axes, along with concentric circles representing different feed rates (0.1, 1, 10, 100). To the right of this panel is a vertical Z-axis control with a scale from 0.1 to 10. Below the control panel are settings for "Heat" (Off, 185 (pla)) and "Bed" (Off, 55.0 (user)), each with a "Set" button. Further down are "Extrude" and "Reverse" buttons, and a "Print speed" slider set to 100%. The main workspace is a large yellow grid. On the right side, a console window shows the following error message: "Connecting... [ERROR] Could not connect to COM11 at baudrate 115200: Serial error: could not open port COM11: [Error 2] The system cannot find the file specified."

Control Software

Repetier



3D Printing Repositories

- > Thingiverse
- > GrabCAD
- > YouMagine

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Thank you ...

Q&A