Yarmouk University

Hijjawi Faculty for Engineering Technology

MiniFab Lab

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Lab Overview

The MiniFab Lab is located in the manufacturing materials and processes lab in the Industrial Engineering Department at the Hijjawi Faculty for Engineering Technology. The MiniFab is found by a generous funding by the Erasmus+ program under the BITTCOIN-JO project.

The lab provides a venue at which the students are encountered with state-of-the-art technology that might be hard to have access to in normal conditions. The lab is used for both teaching and research and is available for all university students interested in prototyping and innovative ideas that support their entrepreneurship skills. Many experiments have been held in the MiniFab lab and it has been also used for research projects at which it supported having a collaborative learning environment and supported students and researchers' projects. Moreover, the lab reduces the need for large investments as it can be used for building and testing small-scale products.

Devices Available in the Lab

The lab provides state of the art technology for manufacturing processes when compared to the conventional machining techniques at which it includes CNC laser cutting machine, CNC plasma cutting machine, CNC lathe machine, 3D printers among others.

1) CNC Laser Cutting Machine

The CNC laser cutting machine provides clean cuts that require no post processing operations at which the machine is capable to create intricate designs and precise holes, this makes the machine capable of producing work with high accuracy and precision. Cutting tools or custom tools are not required in CNC laser cutting machines. The machine is a computer numerical control machine which uses a high-powered laser beam that cuts the workpiece as a result of the melting and vaporization at the point at which the laser beam is focused. The laser head controls the movement sequence to control the desired shapes of interest. The machine outperforms the conventional milling machines. A compressed gas is used in the machine to cool down the focusing lens and eject metal from the work surface. The machine is used in the medical industry among other industries as it reduces material distortion.

CNC Laser Cutting Machine

2) CNC Plasma Cutting Machine

The CNC plasma cutting machine uses plasma for cutting electrically conductive materials. The machine is a computer numerical controlled machine. The path the plasma moves can be controlled by the computer to produce high precision cuts which finds a wide range of applications such as industrial construction, fabrication techniques, automotive maintenance and repair among others. Materials that could be used in the machine include but are not limited to aluminum, steel, copper and others. The machine is widely used as a result of its low-cost precise cuts.

CNC Plasma Cutting Machine

3) CNC Lathe Machine

The CNC lathe machine includes a fixed cutting tool and a central spindle at which the material spins. The machine is a computer numerical controlled machine at which the movement of the material is controlled by a set of instructions. Complex parts with multiple angles can be made using the machine. The machine is suitable for many different applications including but are not limited to creating and drilling holes, creating screw heads, performing round shapes with inner or outer diameters, sanding, turning, cutting of any shape. Materials that could be used in the machine include metal or wood. The machine is used for small and large scale versatile applications in machine shops and factories among others.

CNC Lathe Machine

4) FDM 3D Printers

The FDM 3D printer is a fused deposition molding machine used for 3D printing at which it is used for prototyping and short run manufacturing. The printer creates 3D objects and relies on additive manufacturing by extruding the materials through a nozzle. Thermoplastic Filaments are used in the printer as the feedstock material. As the filling is forced through the nozzle, the heat melts the material, and it will be deposited in 2D layers in the platform at which the layers will defuse and form the 3D shapes. The FDM 3D printers are very versatile, providing scalable flexible prints which will affect the cost to size ratio. FDM filaments are cheap compared to other 3D printing methods. A wide range of thermoplastic materials could be used in the printers. Post processing operations are highly dependent on the applications. Applications include but are not limited to engineering models and concepts, tools, low volume production of complex parts, product development among others.

FDM 3D Printers