MSD LAB POTFOLIO

Course ID: ME - 4314
Department: Mechatronics Department – College of Engineering

Objectives:
The course is aimed at developing the student's understanding about the synergistic interaction of electronic Engineering, mechanical engineering, control systems and digital systems in system design and product Manufacturing. The objective is to develop skills to find innovative solutions, manage multidisciplinary teams And work at all levels of an integrated engineering system.

Contents:
The course comprises of experiments and demonstrations related to calculation of Motor parameters, H-Bridge Designing, Arduino programming, CAD/CAM modeling of Encoder and Gears, CNC Milling Machine part Programming and cutting of Gears on CNC.

Text Books:

1. Mechatronics: Electronic control systems in mechanical and electrical engineering, 4th

Edition, by **W. Bolton.**

2. Mechatronics System Design, 2nd Edition, by **Devdas Shetty.**

3 Axis CNC Milling Machine

CNC stands for *computer numeric controlled*. It refers to any machine tool (i.e. mill, lathe, drill press, etc.) which uses a computer to electronically control the motion of one or more axes on the machine. As computer technology evolved, computers replaced the more inflexible controllers found on the NC machines; hence the dawn of the CNC era.

• CNC machine tools use software programs to provide the instructions necessary to control the axis motions, spindle speeds, tool changes and so on.

• CNC machine tools allow multiple axes of motion simultaneously, resulting in 2D and 3D contouring ability.

• CNC technology also increases productivity and quality control by allowing multiple parts to be produced using the same program and tooling.

400mm
15.75inch

390mm
15.36inch

530mm
20.87inch

Power Supply 30V

A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters. Some power supplies are separate standalone pieces of equipment, while others are built into the load appliances that they power. Examples of the latter include power supplies found in desktop computers and consumer electronics devices. Other functions that power supplies may perform include limiting the current drawn by the load to safe levels, shutting off the current in the event of an electrical fault, power conditioning to prevent electronic noise or voltage surges on the input from reaching the load, power-factor correction, and storing energy so it can continue to power the load in the event of a temporary interruption in the source power.
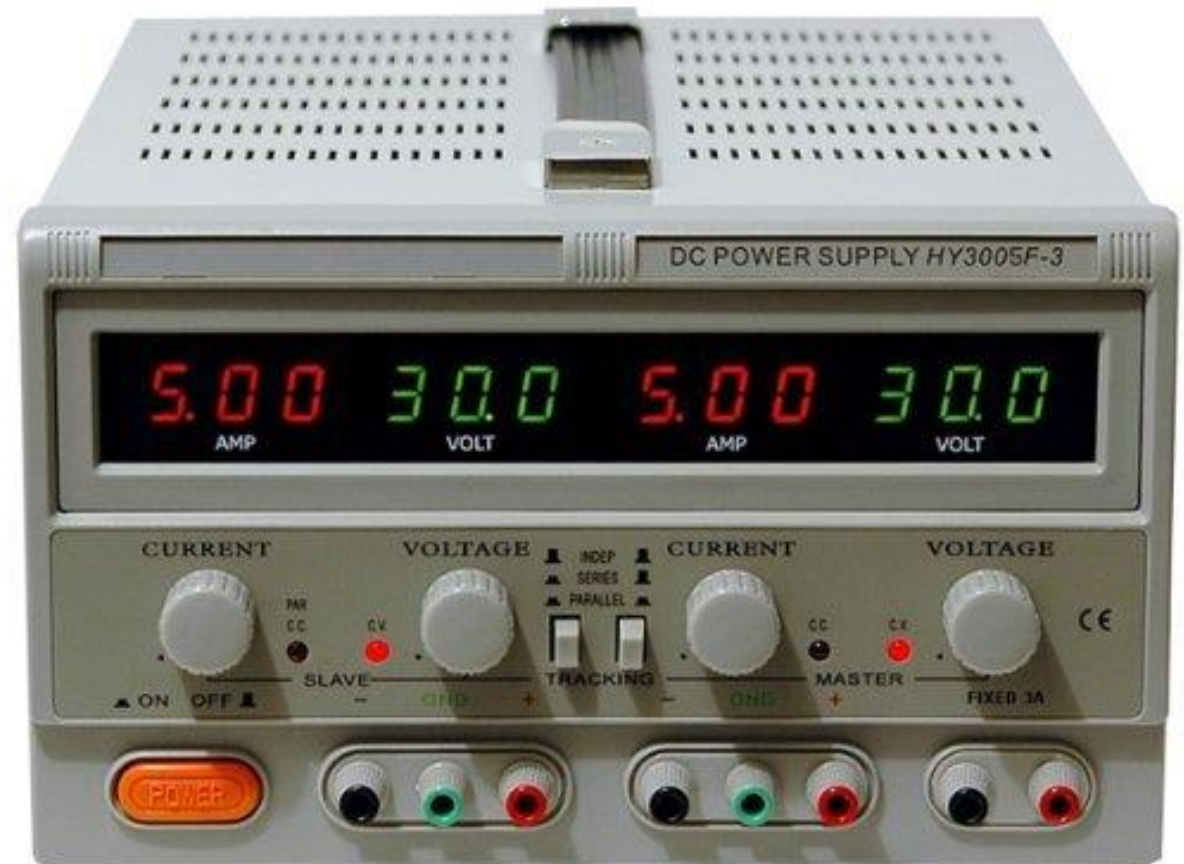
Digital Oscilloscope

A digital oscilloscope is a complex electronic device composed of various software and electronic hardware modules that work together to capture, process, display and store data that represents the signals of interest of an operator. Digital oscilloscopes are often referred to as digital storage oscilloscope (DSO) or digital sampling oscilloscopes (DSO) a digital oscilloscope features six elements — the analog vertical input amplifiers, analog-to-digital converter and a digital waveform memory, a time base which features a triggering and clock drive, the circuits for waveform display and reconstruction, the LED or LCD display, and the power supply.

Digital oscilloscopes periodically samples a time varying analog signal and stores in the waveform memory the signal's values in correlation with time.

Function Generator

A function generator is usually a piece of electronic test equipment or software used to generate different types of electrical waveforms over a wide range of frequencies. Some of the most common waveforms produced by the function generator are the sine wave , square wave, triangular wave and sawtooth shapes. These waveforms can be either repetitive or single-shot (which requires an internal or external trigger source).[1] Integrated circuits used to generate waveforms may also be described as function generator ICs.

In addition to producing sine waves, function generators may typically produce other repetitive waveforms including sawtooth and triangular waveforms, square waves, and pulses. Another feature included on many function generators is the ability to add a DC offset.

Although function generators cover both audio and RF frequencies, they are usually not suitable for applications that need low distortion or stable frequency signals. When those traits are required, other signal generators would be more appropriate.

Gear Train

Gears are toothed members which transmit power / motion between two shafts by meshing without any slip. Hence, gear drives are also called positive drives. In any pair of gears, the smaller one is called pinion and the larger one is called gear immaterial of which is driving the other. When pinion is the driver, it results in step down drive in which the output speed decreases and the torque increases. On the other hand, when the gear is the driver, it results in step up drive in which the output speed increases and the torque decreases.

A gear train is a mechanical system formed by mounting gears on a frame so the teeth of the gears engage. Gear teeth are designed to ensure the pitch circles of engaging gears roll on each other without slipping, providing a smooth transmission of rotation from one gear to the next.
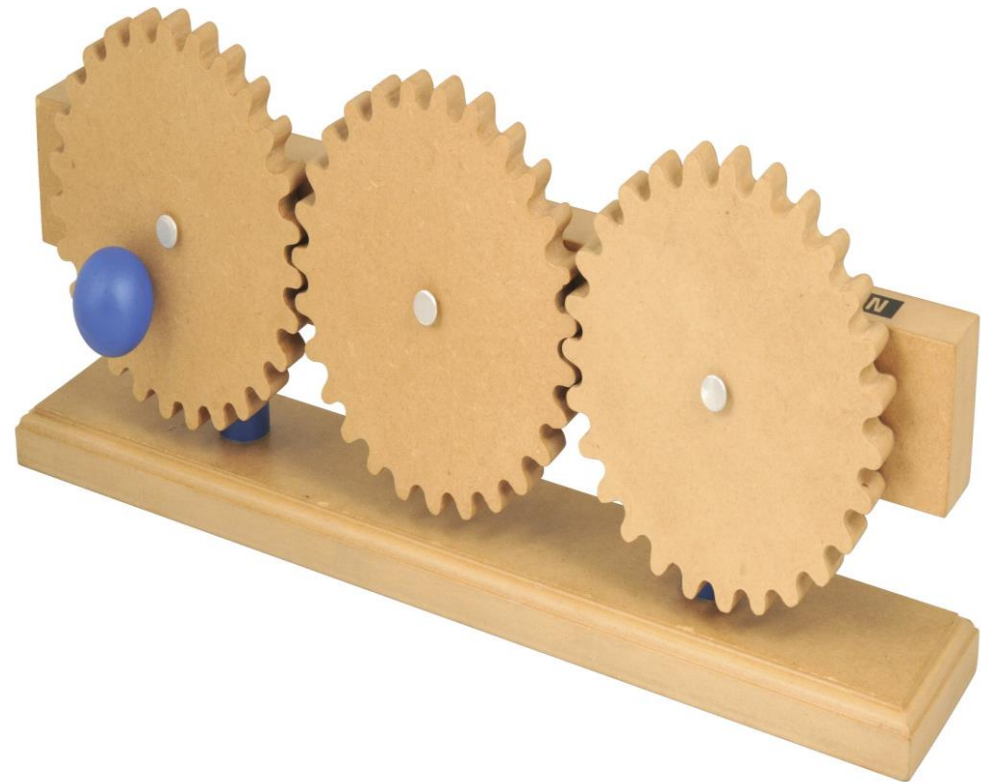
Encoder

Incremental rotary encoders generate an output signal each time the shaft rotates a certain angle. The number of signals (pulses) per turn defines the resolution of the device. The incremental encoder does not output an absolute position, which makes the internal components of the encoder much simpler and more economical. Besides position tracking, incremental encoders are often used to determine velocity. The position in relation to the starting point can be calculated by counting the number of pulses. The velocity can be retrieved by dividing the number of pulses by the measured time interval.

An incremental encoder has at least 1 output signal "A" or typically 2 output signals, called "A" and "B". These 2 signals are set up with a 90° offset, which is required for the detection of the encoder's rotation. By turning the encoder clockwise, the "A" pulse is rising 90° ahead
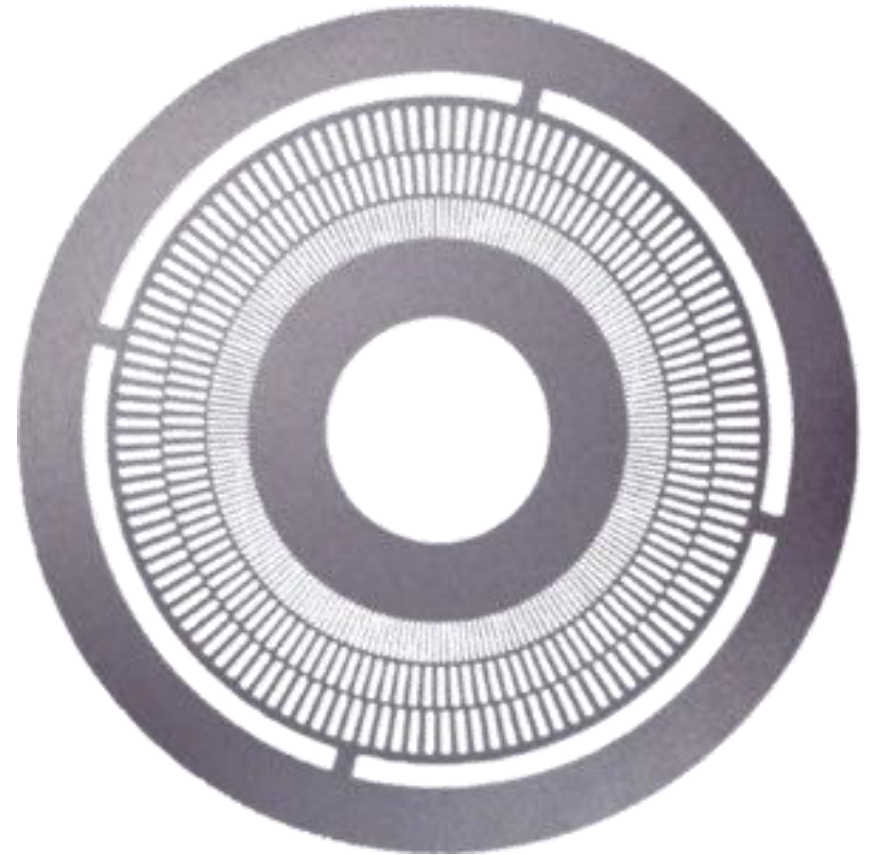
SMD Soldering station KADA

The hot air gun on this uses some kind of motor and impeller in the actual handle itself to create the airflow, The holster also has a magnet in it which activates a switch in the handle when you set it down, causing it to cut power to the heater and it continues to force air until it cools to 100degSpecification:

★. Power Voltage: 220V AC or 110V

★. Power Consumption: 270W (Max.)

★. Standard Iron Tip: AT-900M

★. Hot Air Temperature: 100 to 480C

★. Tip of Iron Temperature: 200 to 480C