Hello, this a video for Engineering Measurement & System Monitoring unit, learning outcome one where we must measure mechanical quantities.

Here we have a rig called LJ Create, Transducer and Instrumentation Trainer which we are going to use to measure various mechanical quantities. I will give an overview of the rig in this video.

If we look down the left hand side of the rig we have some sensors, for example we have temperature sensors where we have a choice and a heater element is connected so each of them pick up the change in temperature when the heater is turned on. So, a comparison can be made. Then down here we have variable resistors, slider type and rotary types, so they can measure the change in position. Starting with these two sensors types for temperature and position, they have a physical input, which must be changed or signal conditioned to give an output such as voltage or current. Something must change to give a common output. There are other position sensors called a variable capacitor and a LVDT (Linear Variable Differential Transformer) so these are more precise methods of measuring small changes in displacement and then we get an output from it. Here we have a strain gauge, which is for measuring load so small weights are added and they can be detected by the strain gauge output. Strain gauges are found in load cells. The deflection can not be seen by our eyes but the strain gauge can detect this small change which has to be converted to a common unit such as voltage. The output is obviously not going to be kilogram but we are going to condition the signal to give the desired output. Therefore the mechanical quantities are getting converted into electrical quantities. Then up at the top we have an electric motor rotating the shaft. There are various ways of measuring speed such as a light gate, magnet type and at the end there is a tachogenerator, so the faster it goes it the greater the voltage. The others produce pulses as every rotation a pulse is produced so a time per rotation which is converted to revolutions per minute. There is also position of rotation on a potentiometer.

So the general idea with this rig. We might have a signal that is very small, it might need amplified or it might be give a voltage measurement and convert it to current. Also we can use a Wheatstone bridge which converts a small change in resistance into a voltage.

Thank you for listening. Further videos will follow on specific experiments.