Feedback Control:

Stepper Motors provide very accurate angle of rotation as codded. This will in turn move the lead screws precisely to the required position. But if the motor goes haywire then the tool can move much deeper into the work piece. This will cause severe damage to the Extension and some fragile parts may break.

To avoid this feedback control becomes mandatory. Two IR distance sensors are used to keep a track on the two axes of motion. They work on the principle of transmitting and receiving IR light and measuring the time required to do so. The sensors are placed such that they can track the motion of the flat surface in front of them.

The error of the stepper motor can be observed by the IR sensors and if necessary be rectified by commanding the stepper motor accordingly.

Safety Precautions:

There are two major forces acting on the tool tip namely Ft - Thrust Force and Fc - Cutting Force. If they exceed a certain critical limit, then tool edge may get blunt rapidly. The forces exceed the limit if the feed rate or the depth of cut is more than the specifications. For measurement of these perpendicular force two strain gauges are used.

While cutting operations friction is always present. Friction between the tool and the workpiece leads to high heat release. This may increase the temperature of the workpiece above the fusing point. It causes a small amount of molten metal to accumulate on the tool tip making it blunt. Thus, a check on rise in temperature is also necessary in cutting operations. For this a temperature sensor is attached and the temperature of the tool is checked continuously.

The main motor on the lathe which rotates the spindle is heavy duty, high torque motor. During its operation high amount of vibration is created. These vibrations travel through the gear box the whole machine. Vibration cause the surface of the machined workpiece to be uneven. The finish of the surface is also compromised. We can’t remove the vibration but surely can stop the operation if the amplitude becomes too large. Then if the problem is analyzed and solved the operation may resume. For this a vibrometer is mounted on a location where the maximum amplitude of vibration will be recorded. This location must be as far as possible from any supporting structure.