

Screw Machine Condition Monitoring

Sponsor: Great Lakes Controls and Engineering

Overview

The purpose of the project is to provide condition monitoring of a standard automatic lathe machine to provide quality improvement of machined parts.

Faulty parts are produced when the cutting tools begin to dull or spindle bearings wear beyond nominal limits. Condition monitoring would provide a way to identify dull tooling and worn out spindle bearings and proactively replace each specific component prior to production of faulty parts and lengthy down time of machine.

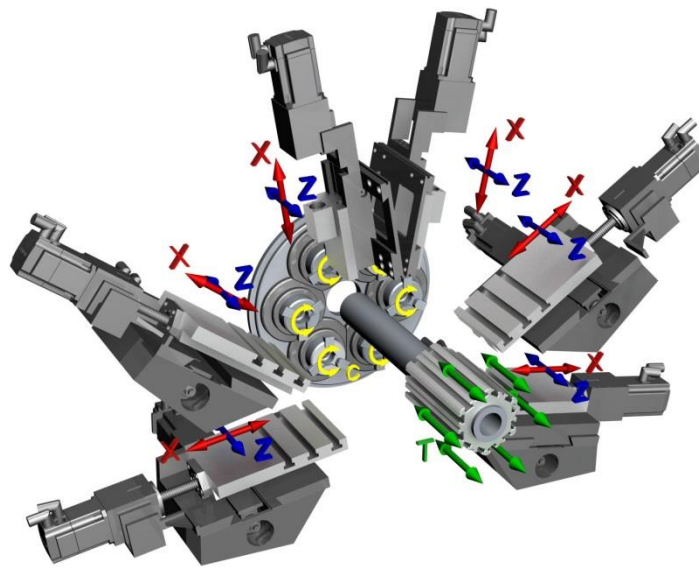


Figure 1: Automated Lathe Tool Cross Slides

Tasks

1. Use a sensor(s) to identify sharpness of tool life as operation of the machine is ran.
 - a. Sensor must only read one tool operation.
2. Wire cutting operation not in progress, system will have ability to monitor spindle bearings of machine
3. Output a 0 to 10 volt analog signal of the tool life to the Programmable Logic Controller (PLC) of the machine.
 - a. Map signal to 0-100% of tool life remaining.
4. Ability to eliminate background noise and focus on one tool inside the automatic screw machine.
5. Run off supplied 24VDC.
 - a. 4-pin control cable connector ran from main control panel to device for power and analog signal.
6. Sensing device must be compact to fit inside machine without interrupting process and withstand harsh environment.

- a. Size should be less than 2" x 2" x 2".
- 7. \$250 budget for multiple units made.

Deliverables

- 1. A sensing device to place inside the machine.
 - a. An auto calibration routine for new tools or location of sensor change.
 - b. User-friendly operator interface for set up.
 - c. Accurate 0-10 VDC output signal to main PLC for tool life of specific tool.
 - d. Device must have ability to auto-reset itself to continuously monitor tool life.
 - e. Device must be able to survive in harsh conditions that are inside machine (coolant, metal shavings, etc.)
- 2. Documentation to place and run the system by operator with high school diploma.