

IPRO 304



INNOVATING PROCESS IMPROVEMENTS IN MANUFACTURING OPERATIONS

PROBLEM

- ~ A. Finkl & Sons Co. needs a way to detect broken teeth on their milling machines
- ~ Currently they are losing 125 minutes a day in replacing broken teeth
- ~ \$200- \$250 is being spent towards this problem per day

ACCELEROMETER

- ~ A device that measures vibrations
- ~ Idea is to attach to head of milling machine to measure the vibrations.
- ~ When a tooth breaks it will cause vibrations & this activity will be recorded



PROJECT GOAL/OBJECTIVES

- ~ To develop a robust, working prototype
- ~ Automatic monitoring
- ~ Detection of broken teeth in milling machine



LASER APPROACH

- ~ Researched different approaches
- ~ Laser used to detect broken teeth
- ~ After looking into several companies, found that it would cost Finkl more money than they would want to spend
- ~ Finkl machines are outdated
- ~ Retrofitting milling machines with laser controls would be too much work
- ~ Better to buy brand new machines instead of laser detection

RESEARCH

- ~ Different accelerometers were compared
- ~ Techkor was found to be best
- ~ Accelerometer collects and transmits vibration data securely via a wireless link
- ~ Data collection parameters are configured from a networked Windows PC
- ~ Data memory
- ~ Internal battery



- ~ Bigger bandwidth
- ~ Faster frequency response
- ~ Temperature sensor
- ~ Internal antenna
- ~ Transmits secure data

EXPERIMENTAL DESIGN

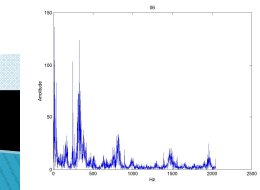
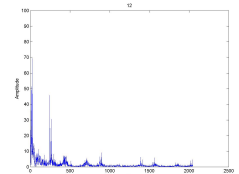
- ~ First attached two accelerometers on the head/spindle of the milling machine
- ~ One perpendicular to head; one parallel to head
- ~ Attached with a metal "arm"
- ~ Attached with magnets
- ~ Different orientations



- ~ To account for any mistakes

DATA GATHERING

- ~ Data was gathered using different situations to compare
- ~ Data taken with no broken teeth
- ~ Data taken with 8 broken teeth



CONCLUSION

- ~ At this time we need more time to analyze the data properly
- ~ So far the accelerometer is best option