**Introduction**

A new technology is needed in aiding A. Finkl & Sons in the detection of cutting insert failure during the milling process. Currently, an operator must be present during the operation, which leads to much wasted time and decreased productivity.

**The Problem**

When a cutting insert breaks, it can lead to a catastrophic failure of the entire milling machine, resulting in tens of thousands of dollars of damage. An accelerometer is used to measure the vibration characteristics of the machine to detect failures. However, clear data could not be obtained from some of the machines.

**Possible reasons:**
- Excess vibrations drowning out signal due to lack of foundation
- Different depths of cut and feed rates
- Different machine natural frequencies

In a normal working signal (left), a distinctive rise in the intensity level at a certain frequency indicates a failure of a cutting insert. The non-working signal (right) displays many unclear peaks at a wide range of frequencies.

**The Objective**

The objective is to develop a method to automatically sense and report damages to the cutting inserts in real time from a remote location, allowing the operation of multiple machines at the same time. This system will involve measuring vibrations using an accelerometer.

**Past Methods**

Acoustic signs
Visual analysis
Power load

In a normal working signal (left), a distinctive rise in the intensity level at a certain frequency indicates a failure of a cutting insert. The non-working signal (right) displays many unclear peaks at a wide range of frequencies.

**The Solution**

A new wireless accelerometer is implemented. This will allow the sensor to be mounted directly onto the rotating spindle head and thereby closer to the cutting inserts, resulting in more accurate, uninhibited data. The wireless capability also allows the signals to travel further, providing the freedom of choosing the receiver location.