



Background

A. Finkl & Sons Co. was founded in 1879. Finkl is the world's leading supplier of forging die steels, plastic mold steels, die casting tool steels and custom open-die forgings, processing 100,000 tons of steel each year. Since the 1800s, Finkl has maintained a commitment to manufacture 100 percent of its products in Chicago. These products are distributed domestically and to more than 18 countries worldwide. They sell their products to other manufacturers, like plastic processors, die casting companies and closed-die forging plants. With more than 100 patents to its credit, Finkl's steel formulations and steelmaking technologies set worldwide standards. Finkl's facilities are on the leading edge of technology, using the most automated processes in the world. In recognition of Finkl's product quality, Finkl was the first integrated steel manufacturer in America to receive ISO 9000 certification.



Problem

•A. Finkl and Sons rely heavily on the performance of their milling machines and are unable to detect fast enough, through human observation, when inserts, or teeth, have broken.

•Reasons For Concern:

Broken insert results in much higher stress on the adjacent tooth, which is likely to break if the machine is not shut off soon. Thus, a chain reaction of teeth breaking easily starts when the first break is not detected sufficiently fast.

Damages finish of the steel resulting in possible re-milling and time loss

Multi-Million dollar problem

•This project focused on automating the detection of a broken insert, by way of accelerometer readings, so that unnoticed breakages could be detected almost immediately.

While work was done on all aspects of the automation process, there was a primary focus on developing and testing various analysis methods, for it was debatable whether or not such detection was even possible.



Goal

- Automate the notification process when a cutting insert is broken.
- The main challenge of this task was to come up with a programmable method for detecting if any inserts are broken at a given time, while the machine continues to cut.



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