### Project background and goals
We seek to isolate and identify wear-related features in the auditory timbre spectrum of the sound of an end-mill.

### Methodology/Procedure
We use an auditory model of the mammalian inner ear and primary cortex to preprocess the data and extract timbre features. These features are in the form of vectors expressed in multiple resolutions (or scales). Then we classify these vectors into different classes using a Multi-Resolution Tree Structured Vector Quantizer (MRTSVQ).

### Significance
Such wear-related features can be used for online estimation of wear of the tool, which can be used by the machinist for a cut/resharpen decision. Furthermore, the class of the feature can give an indication about the kind of wear, and its potential to cause tool failure (breakage).

### Project Results
We have obtained extremely encouraging results which show that sounds of a particular class increase or decrease in frequency of occurrence as the tool wears. These results show that this procedure successfully extracts features that are wear-related.

These results have been obtained for various different configurations of tool diameters and job material, thus offering hope that this procedure is viable for a broad category of problems.

### Future Work
We are still in the analysis stage now. As yet, we don’t have any correlation between the class of the sound and the actual physical type of wear that causes it. Also, no models have been suggested for the wear dynamics in terms of the time-series of class labels. This, and some more understanding of the significance of the various features picked out by the auditory filters remain to be done.