

Public Abstract**First Name:**Brian**Middle Name:**Christopher**Last Name:**Mooney**Adviser's First Name:**Roger**Adviser's Last Name:**Fales**Co-Adviser's First Name:****Co-Adviser's Last Name:****Graduation Term:**FS 2012**Department:**Mechanical & Aerospace Engineering**Degree:**MS**Title:**NEW TOOL DESIGN FOR MEASURING TOOL DISPLACEMENT IN MILLING

Monitoring tool displacement during a milling process allows the operator to identify when there is relative movement between the cutting tool and the workpiece. When the relative movement between the cutting tool and the workpiece becomes large enough, the displacements of the cutting tool become known as chatter. Chatter produces a dimensionally inaccurate cut, poor surface finish, tool breakage, and is the main obstacle in high speed milling. If the milling machine or operator were able to detect the smaller tool displacements leading up to chatter, then the milling operation can be altered to eliminate the onset of chatter.

A new tool design to measure tool displacement during milling operations is presented and validated in this research. The concept behind this new tool design is to indirectly measure the tool's displacement in the x and y direction by attaching a thin disc perpendicular to the neck of the cutting tool. The disc will allow sensors to measure the angle of deflection in the neck of the cutting tool by measuring the resulting tilt in the disc. Measuring the disc's displacement rather than the actual tool's displacement allows for the sensors to be placed above the cutting tool and away from milling operations.