

# Mechanical Engineering Department Seminar

3:35pm September 24, 2014  
1130 Mechanical Engineering  
111 Church Street SE, Minneapolis, MN 55455

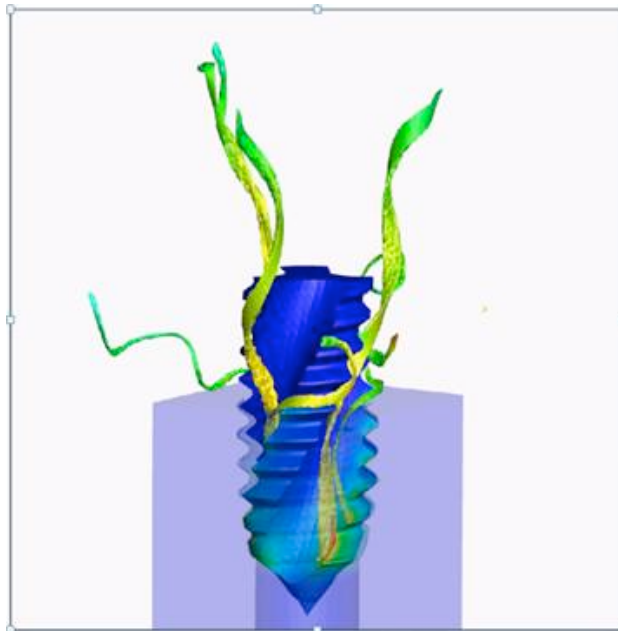


## Validated Physics-Based Models for Machining Process Improvement

Troy Marusich

Chief Technical Officer; Third Wave Systems

This presentation will describe the technology building blocks for modeling machining processes such as turning, milling and drilling. Thermo-mechanically coupled, dynamic finite element techniques will be outlined that provide the basis for the detail-level numerical representations in two and three dimensions for cutting tool and workpiece interactions. Constitutive modeling appropriate for machining will be discussed. Macro-level modeling for full part machining analysis will be described, and the subtle but intimate connection between the length scales. A high degree of emphasis during the presentation will be placed on model validation as an integral part of the model development process; experiments which identify the requisite physical responses as opposed to simple numerical tuning. Examples of machining process improvement will be provided that will emphasize the culmination of models development, validation and the technical know-how needed to interpret model output and make engineering decisions. Finally, some comments on future directions.



**Bio:** Dr. Troy Marusich is the Chief Technical Officer of TWS, specializing in applying computational techniques to manufacturing and R&D for improved product and process performance. He is known internationally for his work in the simulation of metalworking processes for improved design and process performance and part quality. As the primary architect behind the TWS software, Dr. Marusich is responsible for the development of many proprietary technologies that TWS now holds. Before joining TWS in 1995, Dr. Marusich was a Design Engineer at John Deere. He holds a B.S. in Mechanical Engineering from the University of Minnesota, and M.S. and Ph.D. degrees in Engineering from Brown University in solids and structures, and an Masters in Business Administration from the University of Minnesota. Dr. Marusich has also authored numerous papers on machining and machining simulation and currently has two patents pending in relation to simulation technology and machining process development.