AdvantEdge is used to understand the “whys” of tool performance by providing a virtual testing environment for evaluating tool designs, machining process parameters and new materials. Users efficiently and affordably recognize promising prototypes and optimal cutting conditions while reducing design iterations and trial-and-error testing. AdvantEdge features a full suite for analysis including chip formation, tool life indicators (temperature, stress) and the effect of machining on the workpiece. The software has a large selection of standard, validated material models built into the program specifically for metal cutting, which allows for confident decision making without physical testing.

To make reporting results easier, post-processing includes a machining specific report generator that significantly reduces time spent documenting results, conclusions and standardizes work between users, making distributing results to management and customers much easier.

Machining Modeling
 Manufacturers across the globe find AdvantEdge to be a valuable tool in the design of milling, grooving, boring, sawing, broaching, drilling, turning and gear machining processes. These can be modeled as a simplified 2D model for high resolution cutting edge modeling or as a fully detailed 3D setup for complete machining processes.

Temperature & Stress Analysis
AdvantEdge users have the ability to analyze temperature and stress in order to predict tool wear behavior and performance. By comparing case-by-case scenarios, users can easily identify and implement optimum parameters and tool geometry changes.

HOW THIRD WAVE SYSTEMS GETS YOUR PRODUCTS TO MARKET FASTER

REDUCE TOOL DESIGN DEVELOPMENT CYCLES
- Identify promising designs quickly
- Analyze fundamental drivers for tool failure and chip formation
- Access virtual test results from a single source

REDUCE ENGINEERING EFFORT
- Designed for non-FEA experts
- Machining specific user interface
- Analysis tools for fast results comparison

HOW THIRD WAVE SYSTEMS IMPROVES YOUR PARTS & PROCESSES

IMPROVE PART QUALITY
- Avoid chip gouging on finished surfaces
- Reduce tool and workpiece deflection
- Identify changes in fundamental drivers for workpiece residual stress

INCREASE DEVELOPMENT ROI
- Reduce trial-and-error testing
- Enable communication with customers and internally through simulation results
- Eliminate blind prototype testing
HOW IT WORKS
» Define tool geometry parametrically or import from CAD program
» Select tool and workpiece materials
» Input cutting conditions
» Run simulations
» Compare simulation results in the results analysis wizard for optimizing cutting conditions or tool geometries
  » Analyze temperature and stress profiles to gage reductions in tool wear
  » Use chip formation to predict improved chip evacuation and chip breakage
  » Evaluate force plots to lower cutting forces and power consumption
» Generate report in HTML or PDF format

140+ VALIDATED MATERIALS DATABASE
AdvantEdge and Production Module have an expanding library of more than 140 standard materials that have been developed and validated by Third Wave Systems engineering staff. Through a proprietary material characterization process, our engineers continually update our material library with new models. During this process the materials are physically tested and resulting models are experimentally validated. Third Wave Systems’ expertise ensures the user can be confident of the results and analysis completed using Third Wave Systems modeling products.

PRODUCT SPECIFICATIONS
INPUTS
» Cutting tool material and geometry
» Workpiece material and geometry
» Process parameters (feed, speed, etc.)

OUTPUTS
» Plot force, torque, power, peak tool performance, stress and tool deflection over time
» Plot contours of temperature, heat rate, stress, strain, pressure and velocity for the tool, workpiece and chip
» Generate reports in both PDF and HTML formats for easily sharing data

FEATURES
» STEP/STL/VRML/DXF tool import capability
» Parametric and custom tool creation
» Library of 140+ standard workpiece materials
» User-defined material and constitutive models
» Residual stress modeling
» Results analysis wizard
» Report generation

PARALLEL COMPUTING
» Focus on large problem scalability has resulted in high performance parallel computing. Flexible licensing allows improved through-put and efficient use of licenses.
SAWING & BROACHING CAPABILITIES

The processes of broaching and sawing are available in AdvantEdge both as a simplified 2D cross-section and a detailed 3D model. This enables significant reductions in simulation setup time and costs for customers studying multi-tooth cutting tools. Using parametrically defined or imported workpiece geometry, process parameters, and an imported STEP tool, AdvantEdge is able to generate complex pre-cut Boolean workpieces, run simulations and deliver results.

These simulation results enable the study of chip-formation, tool breakage and the effect of machining on the workpiece. Users are able to see temperature, stress and force plots of the entire tool and per-cutting edge. This capability is a step forward for Third Wave Systems in terms of model complexity, allowing users to get to a machining solution faster.

CASE STUDY
IMPROVEMENTS IN Ti-6Al-4V TOOL LIFE THROUGH STUDY OF EDGE PREPARATION

Kennametal Inc. is global leader in the design and manufacturing of metalworking tooling. Kennametal engineers used the AdvantEdge software to predict and understand development of improvements in cutting edge geometry resulting in a significant increase in tool life for the machining of Ti-6Al-4V. Cutting edge simulations comparing the hone and T-Land cutting edge geometries show a reduction in maximum temperature and tool stresses for the T-Land geometry. These simulation results compare directly with experimental tool life testing with real reductions in cutting edge chipping on the tool.

To learn more about Third Wave Systems products and services, visit www.thirdwavesys.com. If you’d like to setup a live web demonstration for AdvantEdge, contact us at sales@thirdwavesys.com, or +1-952-832-5515.

ABOUT THIRD WAVE SYSTEMS, INC. > Third Wave Systems develops and sells premier materials based modeling software and services for machining solutions. Innovative manufacturing companies implement these solutions to dramatically reduce costs of machined components, accelerate design cycles, improve part quality and get to market faster.
Case Study:
Rheinische Fachhochschule Cologne, Institute of Manufacturing and Tooling Technology
“Simulation Assisted Design & Dimensioning of Chip Breaking Geometries on Profile Tools”

Rheinische Fachhochschule Köln (RFH) is working on a project with an industrial partner, Schwanog Siegfried Güntert GmbH, to design and develop custom profile tools with chip breakers. The project involves evaluating different types of chip breakers using both AdvantEdge 2D and AdvantEdge 3D. Simulation results including temperature, stress and strain were analyzed on the chip profile to make educated decisions for different types of chip breaker designs.

Objective: Transfer of chip breaker geometries to profile tools

Challenges: Profile grooving of ductile materials.

AdvantEdge 2D was used to verify the chip breaking process for each design of chip breaker. The force and stress output on the tool is also studied for selecting the best chip breaker design.

AdvantEdge 3D was used to import a CAD geometry of the tool to simulate the effect on the chip due to the chip breaker. The chip breaking effect was estimated using the maximum principal stress output from simulation contours. This process is repeated for new designs of chip breaker geometry on the cutting tool and compared against the experimental tests to verify the designs simulated in AdvantEdge 3D.