



Precision Monitoring. Maximized Tool Life. >>

Tools are often replaced too soon—or too late—driving up cost and risk. Real-time tool monitoring and control eliminates guesswork, extends tool life, prevents failures, and delivers a more stable, profitable machining process.



Up to 40%
scrap reduction



Up to 50% reduction
in tooling costs



Up to 60% reduction
in cycle times

TMAC Measures True Tool Wear and Takes Direct Action

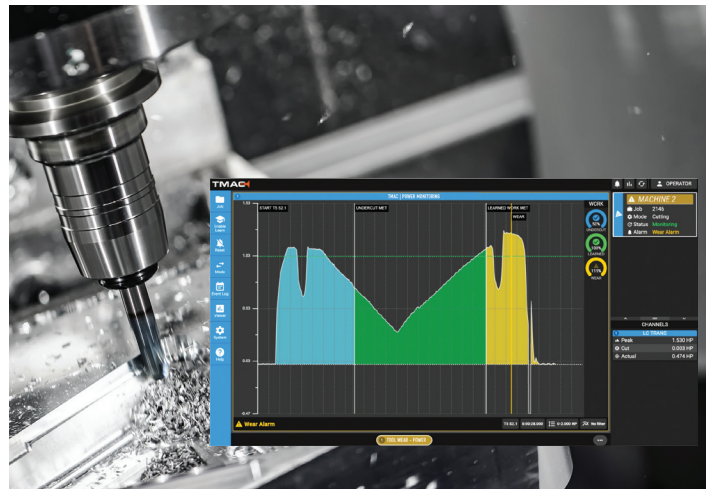
TMAC (Tool Monitoring Adaptive Control) measures wear in real-time, initiating active control and optimization of the cutting process to protect tools, parts and machinery.

“*TMAC changed our projections for tool usage from \$500k to \$140k per year.*”

— Aerospace Parts Manufacturer

By detecting tool wear and breakage as it happens, TMAC reduces scrap, maximizes tool life, minimizes damage and ensures consistent, reliable machining. It learns the optimum spindle power load for each tool and cutting section, comparing it to user-defined limits and automatically expires the tool only when true wear is detected—preventing premature replacement or unsafe overuse.

In the event of breakage, TMAC reacts within **<5 milliseconds**, to automatically stop the machine and retract tooling before damage occurs, preventing unplanned downtime and catastrophic events.





TMAC Capabilities >>


- > Measures precise tool wear in real time to maximize tool life.
- > Responds at millisecond speed to prevent crashes, machine damage and unplanned downtime.
- > Safely optimizes feed rates to adapt to variations in material, tooling and depth of cut.
- > Integrates high-precision, multi-range sensors with auto-scaling display sensitivity for accurate monitoring across applications.
- > Provides real-time data graphing and records all cutting data for in-depth analysis—with pan, zoom, overlay and data export tools.
- > Detects misloaded parts, missing features, undercuts, or tools not engaged in material.
- > Optimizes cutting programs and delivers essential in-process protection for stable, repeatable autonomous operation.
- > Sends remote notifications for alarms and machine events.
- > Integrates seamlessly with nearly any CNC machine or control type—regardless of builder—making it ideal for mixed-machine environments.
- > Supports machine-condition intelligence, including vibration-based spindle bearing health monitoring.

By the Numbers >>

 **More than 1,000 Data Points Analyzed Every Second**

 **24/7 Autonomous Operation**

 **Up to 40% Scrap Reduction**

 **Up to 50% Reduction in Tooling Costs**

 **Up to 60% Reduction in Cycle Times**

 **Reliable Process Protection Across Automated Environments**

 **Over 95% Useful Life for Each Tool**



OPTIMIZING PRODUCTION ACROSS MANUFACTURING INDUSTRIES

Adaptive Feed Rate Control for Optimal Cutting Performance >>

TMAC dynamically adjusts real-time feed rates based on continuous spindle power load monitoring—optimizing performance as cutting conditions change.

TMAC automatically takes action:

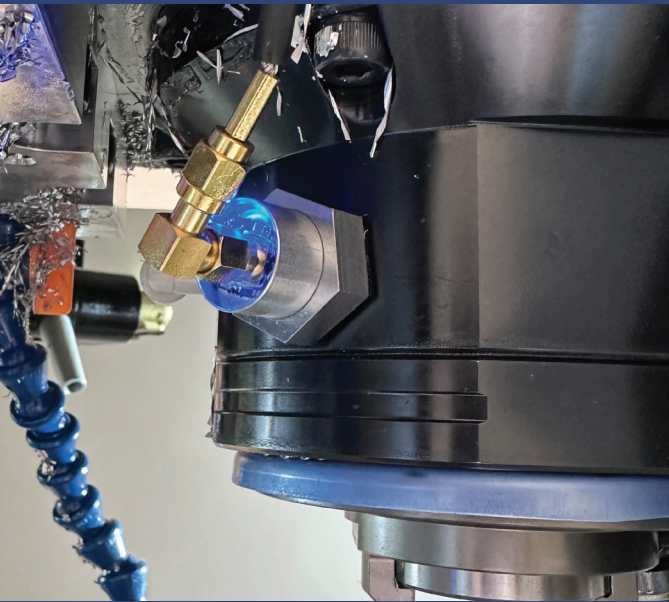
- > Increasing feed rates during lighter cuts or air-cutting to eliminate wasted cycle time.
- > Decreasing feed rates during heavy engagement or as tool wear increases to maintain stable load.
- > Ensuring consistent, optimal tool load from start to finish.

Feed rates are no longer a compromise, as they are intelligently optimized every millisecond of the cut, leading to **faster cycle times, longer tool life, and precise, stable machining.** (Most significant savings are achieved when machining hard and difficult-to-machine materials.)



The Guardian of Automated Machining

TMAC continuously monitors and controls tool and cutting conditions, protecting the process and enabling reliable lights-out operation. In automated environments, TMAC ensures every cut is executed as programmed, verifies correct robot loading, and detects missing features, undercuts, or tools that fail to engage material.



Total Machine Condition Monitoring

TMAC supports multiple sensor options to measure tool wear on any machine or application while simultaneously monitoring any additional peripheral sensors such as vibration, strain, coolant flow and pressure. If any parameter deviates from predefined safe limits—low coolant flow, rising vibration, or abnormal load—TMAC responds instantly to prevent damage and avoid downtime. Integrated vibration-based spindle bearing health monitoring protects even further with deeper machine-condition insight.

Independent Control

TMAC's standalone high-speed processor delivers fast, accurate monitoring without drawing on CNC control resources, ensuring uninterrupted performance in demanding or fully automated machining environments.

TMAC + AI — Predictive Intelligence for the Modern Machine Shop

AI module with TMAC delivers a new standard of predictive tool management and process consistency by using historical process data and machine learning to automatically set and refine monitoring limits, improve tool life insights, and detect suspect parts before they affect downstream operations.

With TMAC keeping constant watch—and taking immediate action when necessary—you gain the operational confidence your manufacturing environment deserves.

For a live demonstration:

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