

edgeSV
NTEK SYSTEM

USE CASE

CNC Machine Tools

SV500 by NTEK SYSTEM | ESA-based Motor & VFD Predictive Maintenance

OVERVIEW

In CNC machine tools, the condition of spindle and feed-axis drives affects machining quality and uptime. SV500 uses Electrical Signature Analysis (ESA) to screen drive motors and variable frequency drives (VFDs) for early load changes.

PROBLEM

Gradual drive changes are hard to notice while machining.

Key challenges:

- **Unplanned stops** — A spindle or feed-axis drive fault can interrupt machining and cause rework.
- **Tool and drive condition** — Tool wear or collision symptoms are hard to follow continuously with periodic checks alone.

EXPECTED OUTCOMES

Spot drive changes early and plan inspections in advance.

Expected benefits:

- **Early warning signs** — Screens load changes in drive motors and VFDs early.
- **Planned maintenance** — Inspections can be scheduled in idle machining time.
- **Inspection priority** — Per-machine trends narrow down what to check first.

TARGET EQUIPMENT

CNC machine tool | Spindle motor | Feed-axis motor | VFD

SOLUTION

01 VFD Status Diagnostics

Analyzes the VFD's voltage output and current waveforms to diagnose faults in rectifier diodes, DC-link capacitors, and switching semiconductors (SCRs or IGBTs). Also analyzes the condition of power supply and power quality of the VFD.

02 Motor Status Diagnostics

Without installing additional sensors on the equipment, analyzes the voltage and current waveforms supplied to the motor to diagnose mechanical faults (Cavitation, Soft Foot, Bearing, Vibration, etc.), electrical faults (Stator, Cable connection, Heat, Noise, etc.) and Load fluctuation fault.

03 Power Quality Status Diagnostics

For power quality diagnosis, saves power quality indicators such as voltage, current, interruptions, sags, harmonics, etc. in trend data.

04 Edge AI Server

Performs all diagnostic analysis directly on the edge device. Built-in memory and storage—2GB DDR, 8GB eMMC, and SD card support up to 256GB—enable long-term storage of diagnostic data and waveforms without transmitting them to a server. The built-in web-based UI/UX provides access to real-time data, diagnostic result of the equipment, diagnostic data of the power quality, alarm events, reports and etc. without a separate server.

Operational Impact of edgeSV

Continuous monitoring and early detection support availability, maintenance and energy efficiency.

20~40%	10~25%	5~15%	10~20%
Reduction in unplanned downtime	**Maintenance cost savings**	**Energy savings**	**Longer equipment life**

Illustrative ranges, not verified SV500 results. Actual outcomes depend on site conditions and corrective actions; PoC validation is required.

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