



# Limitless Optimization of Machine Tool Performance

Open architecture THINC<sup>®</sup> system provides upgradable tools to increase productivity without costly CNC overhaul

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## Executive Summary

Capital investments on machine tools often come with some heavy baggage. While short term gains are measurable and impactful, the use of a proprietary control system may close the door for future system improvements.

The challenges of today's aerospace industry create a need for smarter, more flexible solutions. Open architecture control systems provide a platform for customization and ongoing upgrades that provide users with the kind of controls they need to maximize lean performance. This keeps the door open for continuous process improvement, greatly increasing the lifetime return on investment.

Any machine tool can cut metal, but one of the keys to improving the process is to capture and analyze the data associated with the processing and cutting. The machine control plays a critical role in being able to capture that data. A Windows<sup>®</sup>-based, open-architecture system provides connectivity, traceability and adaptability. This enables end users to continuously improve processes, impart management control, reduce costs and improve quality.

All machine controls allow you to operate the machine - turning, cutting, drilling or milling - whatever the machine capabilities might be. However, machine functionality provides only one part of the production picture. To truly improve machine tool performance, it is essential to have the ability to control and upgrade the various inputs in order to impact the overall manufacturing or cutting capabilities of the machine.

## CONTROL

### True Optimization Can Only Be Achieved When the End User Has Control of Their Controls

THINC (THE Intelligent Numerical Control) is the aerospace industry's first limitless control platform that grows with emerging technology **even after a machine is on the factory floor**. Its true PC compatible motherboard runs all aspects of the machine, including real-time motion as well as all Windows applications. Because of its single processor design,

## The THINC Fluid Platform

- True PC compatible motherboard
- Upgradable single processor
- Independent memory upgrade capability
- Standard PC Ethernet
- Multiple USB ports streamline integration

*Anything that runs on a Windows® operating system can run on a THINC® platform.*

## CONNECTIVITY

it can easily be swapped to remain technically current over time. Memory can be upgraded independently by the end user, eliminating expensive memory options and providing the ability to use any preferred off-the-shelf technology. The standard PC-compatible Ethernet and multiple USB ports at the motherboard allow easy integration between the factory floor and corporate communications channels, allowing for a paperless environment and data acquisition, plus easy integration of computer and industrial peripherals.



### How is THINC different from other controls?

Conventional CNC capability is frozen in time and obsolete the day the customer takes delivery. **The THINC open architecture platform will grow with technology**, allowing it to adapt to changing customer requirements. Anything that runs on a Windows® system can run on a THINC platform.

Traditional CNC design is a static reflection of the customer's needs, as perceived by a corporate development organization. This limits growth over time. Now, an open and fluid platform can allow the end user to take advantage of new capabilities as they become available from various sources, without a costly CNC control overhaul. Expansion of capabilities over time can be made using off-the-shelf, or even custom, solutions.

The result is a dynamic control platform that provides optimization efficiencies resulting in a distinct competitive advantage.

### True Manufacturing Solutions Require Connectivity

By connecting various programs, equipment and information, layers of intelligence can be added, allowing for collection and analysis of data. This provides the tools needed to make informed decisions about process improvements.

Open architecture controls, such as THINC provide a link between the machine, the human and the information components of manufacturing. THINC enhances the ability of the machine to cut parts by interfacing, via Ethernet cable or USB connection, with peripheral equipment, accessories and information sources.

The ease of connectivity and the ability to read and process information reduces the need for redundant inputs, minimizes human intervention and provides security controls.

## Real-World Applications

### *66% Reduction in Cycle Time*

*Accurate Grinding & Manufacturing Corporation in Corona, California supplies shafts, carrier assemblies and housings to the aerospace industry. Okuma, along with distributor partner Gosiger, helped them analyze their processes and develop a fully automated production line that reduced cycle time by nearly 66%, eliminated waiting time between operations and reduced loading and unloading time. The THINC control allowed them*

*to connect an Okuma Captain L370MW lathe with live tooling, a FANUC robot and a conveyor. This transformed a process that formerly involved five steps to a continuous process that can run unattended.*

## TRACEABILITY

### Demands for Traceability Create a Need for Smarter Controls

Traceability of product and processes is important in many industries for a variety of reasons: compliance with regulatory directives, product recall risk aversion, quality intelligence, or to build customer trust. Especially with government regulations in the aerospace industry (whether it be commercial aircraft or military), there is a high demand for traceability. With the THINC control, it is possible to trace things such as the origin of raw materials, what tool was used, which operator was running the machine, at what time the parts were made, on which machine the parts were made, etc.

### Real-World Applications

#### *Traceability Minimizes Error*

*Traceability was a key issue for a customer that needed to perform post-process testing on raw material they were making. Utilizing the power of the THINC control, an application interface was customized to allow the operator to utilize the machine control to pull data from the company's network into the machining program. The interface calculates all the tool offsets and calibrations required to perform the cutting operation. Raw material data (from the network) automatically populates specified fields and prints the data onto labels via a label printer connected to the control. The machining program includes an operation that engraves an identification number on to the part - the same number that prints onto the label that is applied to the bag in which the finished cut part is placed. The THINC control and the associated interface minimized human inputs and thus human error, providing unprecedented traceability and powerful control data.*

## ADAPTABILITY

### Adaptability Allows for Robust Monitoring and Measurement in a Variety of Manufacturing Environments

Storing and processing data on the control (using API) provides the capability to adapt to various manufacturing environments, formats, and philosophies. Each part program may require a different level or routine of measurement, and the THINC control can flexibly adapt to these requirements. Even if you have an FMS with multiple pallets and multiple part programs, each can be custom handled. From statistical process control (SPC) to 100% inspection, the control will adapt.

Touch-sensitive probing is used to gauge, measure and verify key features on a part. If a part is found to be out of spec, a variety of actions can occur:

- A flag or alarm can be triggered
- In pre-process situations, geometry can be identified and adjustments made to avoid damage to the tool, workholding or machine
- Part rejection

- Reworking of the part
- Other human intervention to determine cause and resolution

Adaptive Control Software monitors software and sensors within the machine to make automated, real-time decisions regarding feed rate and depth of cut. Applying predetermined parameters, the control makes adjustments such as decreasing the depth of cut when an increase in horsepower is detected, or increasing the feed rate with a decrease in horsepower.

Monitoring and measurement through the control provide end users with robust, adaptable tools to reduce waste and downtime.

## The Open Architecture Approach: An Open Door to Profitability

Given the challenges and demands faced by today's aerospace industry, incremental process modifications are inadequate to produce the scale of efficiencies needed to remain viable. A seed change that shatters the traditional silo model of doing business is not only needed, it is inevitable.

Open architecture is based on a philosophy of removing the barriers, limitations and planned obsolescence imposed by proprietary control systems. It places focus on continuous improvement of control systems by allowing ongoing incorporation of best-in-class upgrades. This involves opening the door to connectivity, which has traditionally been viewed as risky. The truth is, it allows all parties to focus resources on expanding performance continuously.

### Increase Productivity

THINC's open, integrated control system maximizes machining efficiency via a real time adaptive control.

### Improve Quality

With the ability to monitor and make adjustments based on data collected and processed by the control, quality can be maintained and tracked to support the highest requirements of the aerospace and other industries. By reducing opportunities for human error and using the machine control to aid in the decision making process, greater accuracy, repeatability, and quality can be achieved.

### Reduce Costs

By increasing productivity and improving quality, overall cost per part is reduced.

### Increase Profitability

Combine the THINC control with the power, stability and accuracy of the Okuma machines, and manufacturers have the ability to cut nearly any part imaginable--opening up profitable new markets.

*Open architecture is based on a philosophy of removing the barriers, limitations and planned obsolescence imposed by proprietary systems.*

*To learn more about the open architecture approach or for further information on THINC specifications and options, contact Okuma at: [info@okuma.com](mailto:info@okuma.com) or call 704-588-7000.*