OKUMA

50 years in pursuit of the ideal of Single Source for Machine & Control

The miracle of OSP evolution

Okuma Sampling Path control

Why has Okuma continued to create OSP for a full half-century?

Over the half century from the development of OSPⅢ in 1963, Okuma has continued creating to provide the assurance of Single Source for Machine & Control and "Only One" functions that exceed customers' expectations. Our development concept has always been "total responsibility" from design to maintenance and repair, conceived from shop floor situations.

How will OSP continue to evolve from now into the future?

Integration of technologies for machine, electric, information, and knowledge has promoted knowledge creation on the shop floor, and continues to create a tide of technology.

Fusion of "machine and control"
CNC (microprocessor)

OSP5000
1981

OSP7000
1993

OSP-E100
1999

CNC (soft-wired)

OSP3000
1979

Birth of "electronic control"
NC (hard-wired)

OSP2000
1972

OSPⅢ
1963

2012 5-Axis Auto Tuning System **World's first**

2010 Machining Navi **World's first**

2004 Collision Avoidance System **World's first**

2001 Thermo-Friendly Concept **World's first**

1994 CNC control ATC **World's first**

1991 CNC for turret rotation control

1989 Completely automatic process decision programming function
One-Touch IGF

1987 Development of high-speed NC control technology that became the foundation of Super-NURBS

1982 Brushless servo motor (digital servo control)

1981 IGF (Interactive Graphic Function)-L

1971 Lathe auto programming (LAP)

Fusion of "machine & control & Information"

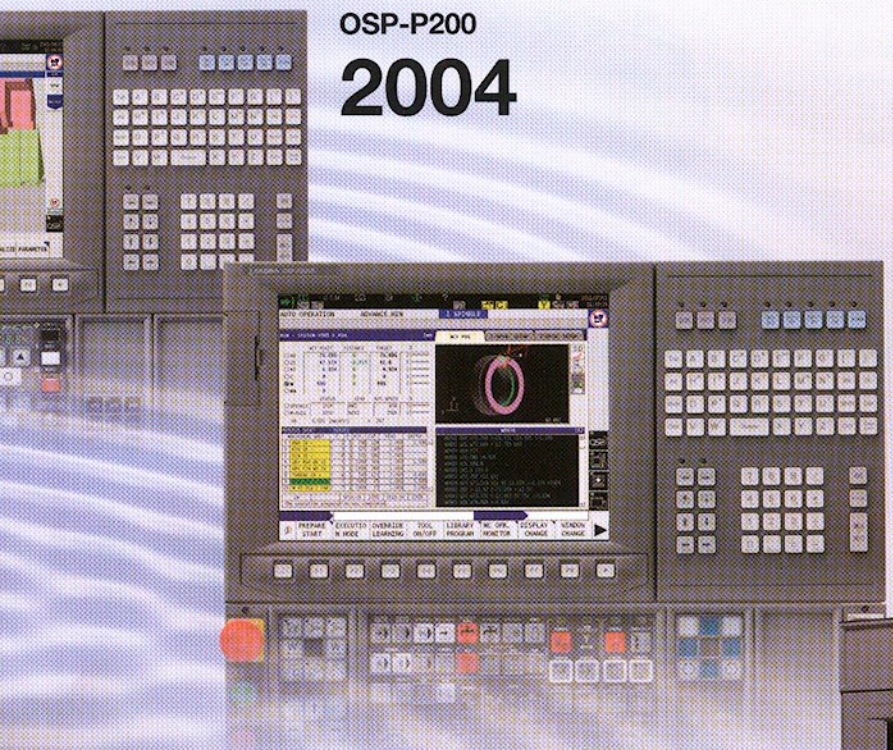
OSP-P200

2004

Fusion of "machine & control & Information & Knowledge creation"

OSP-P300

2012



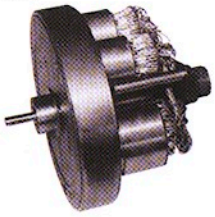
Pioneering a new era with Single Source for Machine and Control, an Okuma "Only One" Technology

Easy-to-use 19" touchscreen

2013

Okuma—Your Single Source for Machine & Control

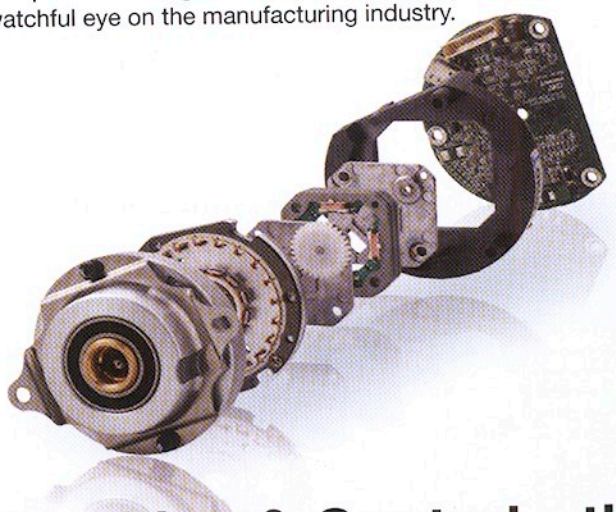
An NC machine (OSPⅢ) utilizing an absolute position feedback system was developed in 1963, marking Okuma's debut as Japan's only mechanical-electronic manufacturer producing both machine tools and NC devices.



The absolute position feedback system

The absolute position feedback system, which is capable of sequence return (upon restart of machining that has been stopped partway through) so zero return setting is not required, was an essential and fundamental feature from the customer's point of view.

However, commercial-use semiconductor memory products were not available at that time, so absolute position feedback with current position memory even if the power was cut off was still a mere dream. Okuma, a company constantly in pursuit of the highest ideals in machine tools, achieved this dream thanks to its willpower and pride as an organization that had been keeping a watchful eye on the manufacturing industry.



Single Source for Machine & Control—the and knowledge creation. This has been

History of OSP development

Birth of "electronic control"

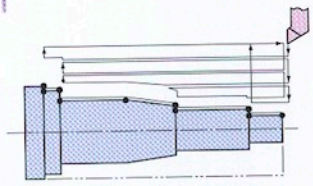
NC (hard-wired)

1963
OSPⅢ

OSPⅢ Numerical Control (Okuma's 1st)

Okuma began researching NC machine tools in 1960, and successfully developed an absolute position detector during the development of the OSP III. Use of an absolute detection system that does not lose the "current position" even when the power is shut off is a basic concept for the reliability of Okuma CNCs that has been continued to today.

1971



LAP (lathe auto programming for roughing)

With final shape inputs; rough copying, round bar turning, and grooving could be done automatically. It drew considerable attention for being easy to use and effectively shortening time requirements. Nicknamed the "Okuma cycle," LAP was soon adapted in other major NC systems throughout the world.

Birth of "electronic control"

CNC (soft-wired)

1972
OSP2000

OSP2000 CNC

The OSP2000 series was the world's first practical computerized NC (CNC), equipped with a dedicated NC minicomputer. Complex, high-level machine control with software was achieved using the concept of advanced flexible software. This was an NC that could respond flexibly to changing needs.

Fusion of "machine and control"

CNC (microprocessor)

1981
OSP5000

OSP5000

The OSP5000 series were high performance CNCs equipped with multiprocessor system. A multitask function was standard, and tape operation was stopped with the standard specifications of tape storage operation and manual data input (MDI).

Flexible software

In 1972 we developed the OSP2000 series of NCs with built-in minicomputers—the world's first commercial computerized NCs (CNCs).

In 1970 NCs were "hard-wired NCs" with circuits designed, wired, and assembled specifically for the machine to be controlled. This meant that changing specifications or adding options took a huge amount of time. Replacing these circuits with software made it easy to change specifications or add optional functions.

Flexible software was planned with the expectation that customers' operating methods and machining techniques would change over the years they used a machine tool. This was a very forward-looking way of thinking in the days when these CNCs were developed.

Okuma-Built Controls, Motors, Drives and Encoders

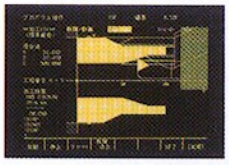
The technical combination of these Okuma-built components, creates the foundation of accuracy that all computer numerical control (CNC) machines require. The harmonious communication between these units not only allows Okuma machine tools to have some of the highest metal removal rates, but also gives positioning repeatability in the single digit micrometer range. Day in and day out, even in the most unpredictable environments, Okuma's complete drive system package delivers perpetual strength and accuracy.

foundation for machine, control, information, Okuma's unchanging philosophy towards OSP

Fusion of "machine & control & Information"

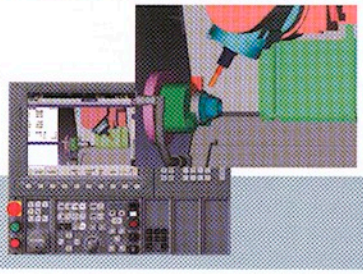
Fusion of "machine & control & Information & Knowledge creation"

1981



1989

2004
OSP-P200
Collision Avoidance System



2012
OSP-P300

IGF (Interactive Graphic Function)-L

An interactive graphic function (IGF) was developed that automatically created NC programs when the operator pushed keys according to instructions on the screen. NCs entered a new era with revolutionary software that enabled data input with human and NC "interaction."

One-Touch IGF (Complete process auto-decision programming)

The 10-year dream of having the NC make completely automated decisions for all machining processes, cutting conditions, and tools after input of the material and machined shapes was realized. Since then versions have been repeatedly upgraded, earning a reputation among inexperienced users as "an NC that is simple to operate" and among veterans as "an NC that reflects user know-how."

OSP-P200

This was the world's first practical open CNC to combine machine control and PC technology. User-friendly functions were added with a large color liquid crystal display and touch panel operation. Machine Control and Windows® Collaboration: Innovative new functions (Collision Avoidance System, etc.) provided only by Okuma with Single Source for Machine & Control using Okuma's own NC software.

OSP-P300

As a "machine & control" builder, Okuma makes further strides in machine tool manufacturing with this superb control featuring "Easy Operation." Okuma took a close look at the way machinists actually operate machine tools, to help them create smoother and more effective ways of producing parts. Novice operators as well as professional machinists get complete control—and satisfaction.

OSP—bringing further improvements to accuracy, reliability, and operability based on a "user first" philosophy

For OSP, the "zero point" is to improve ease of use

When Okuma developed its own CNC as a machine tool manufacturer in the 1960s, we were told that this was both reckless and went against industry conventions. Incremental systems were the mainstream at the time, but Okuma engineers confronted this challenge head on and developed OSP with **"absolute position feedback,"** which could accurately reproduce the tool position when a machine was restarted. Customers were freed from bothersome "zero return" operations, dramatically improving the user-friendliness and reliability of CNCs.

This "user-first" philosophy and spirit of unflinchingly taking on the challenges of an unknown technology have been passed on to successive generations of Okuma engineers, and the company has developed it own hardware and software as well as core units such as encoders and servo motors. In our pursuit of CNCs that let customers enjoy the performance of Okuma machines to the fullest, we have left a trail of innovation that has rewritten the history of control technology.

Machining technology developed with methods that cannot be imitated by other companies

High-level machining and simple operation with NC control—. This was the ideal we were pursuing when the **"Okuma cycle"** (lathe auto-programming; LAP) was developed in 1971. Since that time, we have continued to produce pioneering support technologies, such as practical application of "interactivity" in which NC programs are automatically created by pressing keys following screen instructions.

More than anything else, it was the birth of **"One-Touch IGF"** in 1989 that marked a major new epoch. This was a revolutionary technology by which the NC determined the machining process, cutting conditions, and tools completely automatically based solely on input of the blank shape and machined shape. Achieving this, however, required analysis of procedures, tools, and cutting conditions for each type of machining, design of algorithms, and creation of programs. It was going to be an enormous investment of time and work. Okuma therefore brought veteran machining employees and the software development team together in the same room to lay down a system in which refined techniques would be visualized with drawings and numerical values. Trial programs were tested one at a time amid heated debate, and the nearly overwhelming tasks of assessment and revision were gone through repeatedly.

The One-Touch IGF that came into being in this way greatly reduced the number of inputs and time. This completely changed the image of CNCs that had prevailed to that time, such as by enabling confirmation of tools up to the cutting of blanks with the use of animation. The completely automatic operation decision function that was born from the development system of literal "Single Source for Machine & Control" became a core Okuma technology, and as it was expanded to other series and machine models, and evolved to become **"Advanced One-Touch IGF."** Today OSP has a firmly established position as a control that not only automatically creates NC programs but also easily carries out machining preparations including zero setting and tool compensation.

User's Voice

Looking at the evolution of successive OSPs, you can see Okuma's approach of uncovering users' hidden needs and reflecting them in improved performance and operability, as well as their pride in their products.

Keiso Kogyo Co., Ltd.

Our employees' high regard for OSP comes from its user-centered design concept and operability. This is exemplified by the ease of use in program editing and macro creation and the ease with which parameter changes can be understood.

Unicraft Nagura Corporation

In-house development of core technologies that "make it possible to do what could not be done"

Okuma has a tradition of in-house development of whatever is necessary if it does not already exist. Examples are development of an **optical AbsoScale**, considered to be essential for highly accurate position detection, invention of a **brushless motor** that is maintenance-free, development of a high-speed calculation board for dies/molds, being the first to make **NC turrets and ATCs**—the list goes on and on.

High-speed, high-accuracy machining of dies and molds is based on technology that symbolizes the balance between mechanics and control. High-speed, high-quality machining of free-form surfaces requires that program commands be faithfully reproduced, and that collaboration with the machine be pursued to the utmost. Prime examples are feed axis drive system bending compensation, circular quadrant projection compensation, high-speed contouring typified by **Super-NURBS**, and CAD/CAM systems, all of which have reached the level of practical application since the late 1980s. These technologies have allowed us to provide customers the joy doing what could not be done, and have received great support in areas such as press die machining.

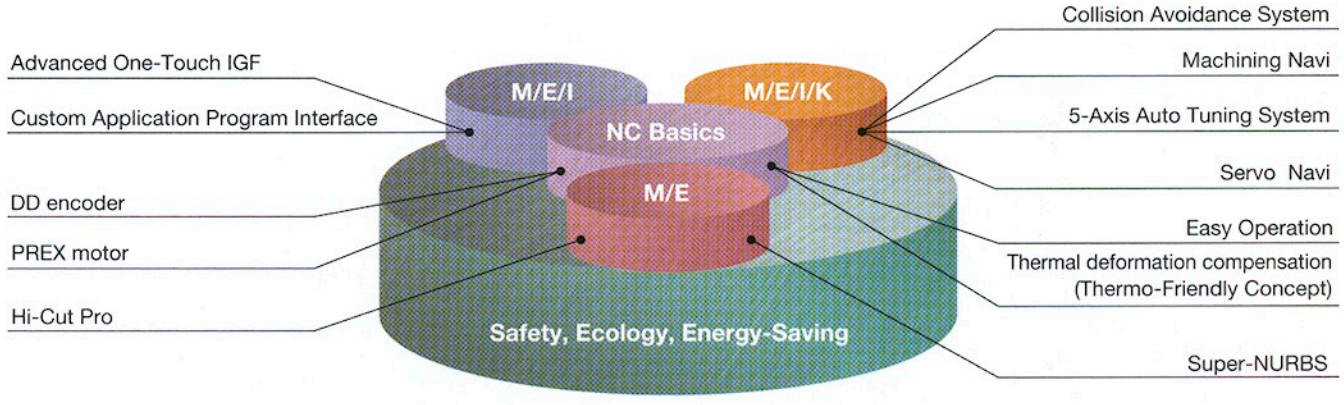
Improving machining infrastructure so customers can make maximum use of machine capacity

The daily life of Okuma developers differs from the image of quietly carrying out research in an experimental laboratory. New development themes are discovered not only from handling technical inquiries that come from sales personnel, but also from the "three actuals" (actual place, actual thing, actual facts) in going to customer sites to see and hear directly how they use their machines and what their problems are.

Issues that needed to be addressed included thermal deformation of machines due to changing temperatures, the occurrence of machining chatter, interference and collisions due to operation errors, and tuning to obtain machining accuracy. These things can cause production efficiency to drop especially at sites where 5-axis machining with high machining quality and complex machine movements is done. It used to be that thermal deformation was viewed as a "machine characteristic" and the search for cutting conditions and collision prevention checks as "operator skill." These things were understood to be one part of the technical proficiency and machining know-how of the machine shop. At Okuma, however, we consider these matters to belong to the technical field of machining infrastructure (foundation) that we should provide to customers, and it was our challenge to achieve ways to deal with them as Only-One technologies.

Following the **Thermo-Friendly Concept** to control thermal deformation developed in 2001, we introduced the **Collision Avoidance System** to prevent interference and collisions even when operation error occurs and **Machining Navi** to visualize machining status and identify the optimum cutting conditions without chatter. The **5-Axis Auto Tuning System** to automatically tune for geometric error in 5-axis machining, in which achieving accuracy is difficult, and dramatically raise the reliability of slope machining and free-form machining was introduced in 2012.

These technologies have become synonymous with Okuma as **Intelligent Technology**. When commanded to do what people want to do, the NC makes decisions as if it had intelligence of its own and carries out the optimum machining together with the machine. This has been made possible by the trinity of machine technology built up over more than a century, electronic and electrical technology refined over half a century, and control and information technology that is finely meshed with the other two to the highest degree. This is Okuma's key technology to help customers bring out the highest levels of accuracy and productivity intrinsic to machine tools on their shop floors.



- Safety, eco, energy-saving
  As required for NC controls
- NC basics
  As required for NC controls

- M/E
  Innovations from Mechanics/Electronics
- M/E/I
  Innovations from Mechanics/Electronics/Information tech

- M/E/I/K
  Innovations from Mechanics/Electronics/IT/Knowledge creation

Control with OSP enables program editing and compensation tasks to be done during machining, facilitating work. We find the user task function to be particularly useful, as it helps to prevent repeat machining and reduce unforeseen defects in axial grinding.

Chushin, Inc.

You can feel the user-oriented design concept of OSP in the ease of program editing and search and implementation of the fixed cycle from an early point. That user-oriented approach is also seen in the speed with which Okuma handles repairs and troubles.

Koretsune Seiko, Ltd.

Machine, control, information, and knowledge creation

Total solutions that respond to a wide range of customer needs

OKUMA

This product is subject to the Japanese government Foreign Exchange and Foreign Trade Control Act with regard to security controlled items; whereby Okuma Corporation should be notified prior to its shipment to another country.

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