



## NACHI-BUSINESS Galaxy

### A BRIEF LOOK AT NACHI

#### Family Brands

##### Machining

**Symbio** Fruitful, Sustaining

**Anchor** Precise, Enduring

**Tornado** Keen, Prolific

##### Components

**Quest** Fundamental, Reliable

**Legato** Bold, Lithe

##### Robots

**Presto** Quick, Rigorous

**Forte** Dignified, Strong

**Artis** Exquisite, Masterful

**Machining**

**Cutting Tools**



**Symbio**  
Round Tools  
Drills  
End Mills  
Taps  
**Tornado**  
Metal Band Saws



**Anchor**  
Precision Cutting Tools  
Broaches  
Hobs  
Shaving Cutters  
Forming Racks  
Precision Dies

**Machine Tools**



Broaching Machines  
Micro Finisher  
Precision Roll Forming Machines  
Special Purpose Machines



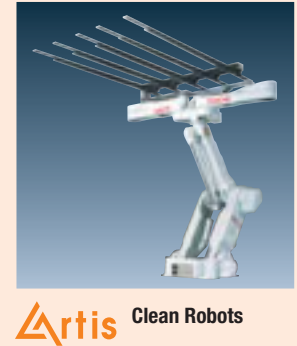
Aspheric Generators  
Precision Slicing Machines  
CNC Grinding Machines

**Robots**



**Presto**  
Welding and General Handling Robots

**Forte**  
Heavy Duty/Payload Handling Robots



**Artis** Clean Robots



High Speed Steels  
Hardened Rods  
Micron Hard  
Fine Multi Alloy

**Special Steels**



Vacuum Carburizing Furnace  
Vacuum Degreasing Washer  
Coating Equipment  
Coating Process

**Industrial Furnaces**

**Materials**



**Quest**  
High-Function Bearings for Industrial Machines  
High-Function Bearings for Automobiles

Ball Bearings  
Roller Bearings  
Various Other Bearings

**Bearings**

**Components**



**Legato**  
High-Function Hydraulic Equipment for Industrial Machines  
High-Function Hydraulic Equipment for Construction Machines

Hydraulic Pumps  
Hydraulic Valves  
Hydraulic Motors  
Hydraulic Units

**Hydraulic Equipment**



Solenoid Valves for Automobiles  
3way Solenoid Valves  
Linear Solenoid Valves  
Automotive Hydraulic Units

**Automotive Hydraulics**



Regrinding/Recoating for Cutting Tools

Tool Engineering Services



Robot Maintenance, Overhaul  
Remodeling, Retrofit for Machine Tools  
Maintenance of Industrial Furnaces  
Technical Consulting  
Robot School

**Engineering**

**Business Partners**

Sumitomo Electric Industries, Ltd.  
Sumitomo Electric Hardmetal Corp.  
ALLIED MATERIAL CORP.  
Kashifuji Works, Ltd.  
Kanzaki Kokyukoki Manufacturing Co.,Ltd.  
Industrial Metal Products Corp.

Sodick Plustech Co., Ltd.  
Fujikoshi Machinery Corp.

DAIHEN Corporation  
DENSO CORPORATION  
Aichi Sangyo Co., Ltd.

JTEKT Corporation  
Asahi Seiko Co., Ltd.  
The Tata Iron and Steel Co., Ltd.

Chien Hsin Trading Co., Ltd.  
Shanghai Automotive Industry Corp.  
Daesung Industrial Co., Ltd.

Daido Steel Co., Ltd.  
Riken Seiko Co.,Ltd.  
Eramet Group

**Responding to the Market Needs**

Automobiles and Automotive Parts

3-4

Electronics, Electrical Appliances, Information and Telecommunications

5

Aircraft, Railroads and Construction Machinery

6

Machine Tools and Industrial Machinery

7

Marketing and Lifestyle

8

**Expanding Latent Technology**

Cutting Tools  
Machine Tools  
Precision Dies  
Precision Tools

11-14

Robots

15-16

Bearings  
Hydraulic Equipment  
Automotive Hydraulics

17-20

Special Steels  
Industrial Furnaces  
Coating

21-22

## Safe and Comfortable Driving

### Engines

Contributing to Higher Energy Efficiency and Green Processes



### Automotive Air Conditioner Bearings



Double-row Angular Contact Ball Bearings for Automotive Air Conditioners



Compressors for Automotive Air Conditioners



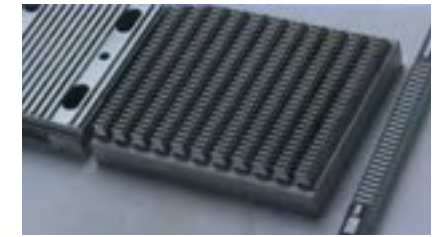
Handling Robots



Spot Welding Robots  
Ultra-Heavy-Load Handling Robots

### Steering

Safe and Stable Steering



Broaching of Steering Racks



Self-aligning Clutch Release Bearings



4-point Contact Ball Bearings  
BX Series



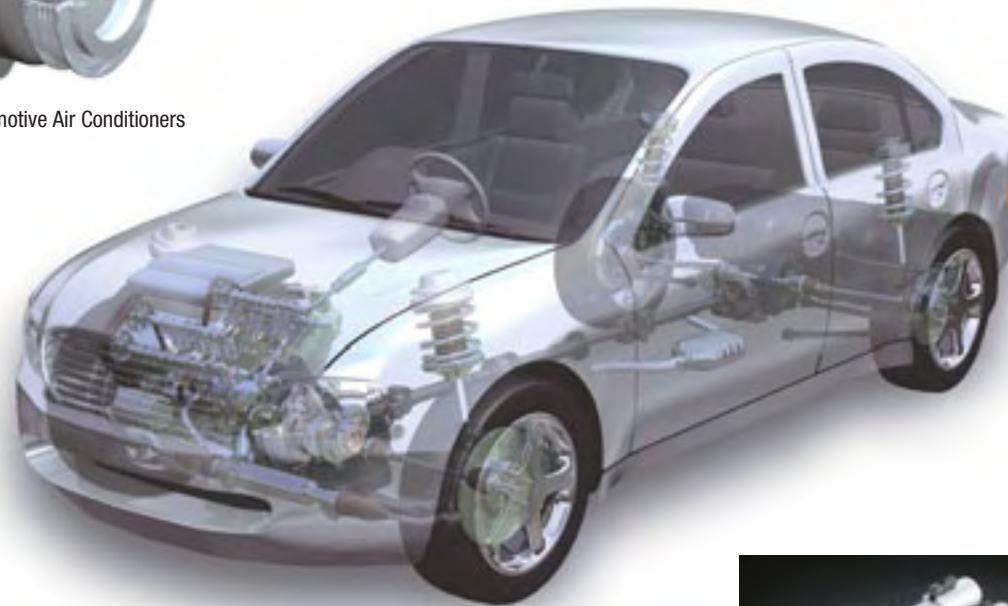
Vane Material in Power Steering  
Pumps Made from HSS

### MQL Machining System



MQL Power Cell

High-efficiency,  
Non Step Deep Hole Drilling



### Transmissions

For Responsive and Comfortable Driving



Solenoid Valves for Automobiles

### Micro Finisher



Crankshaft and Camshaft Lapping

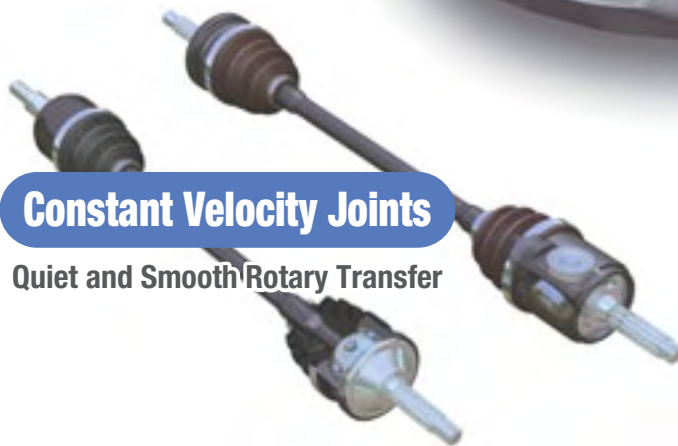
Vacuum Heat Treatment and Parts Washer  
for Environmental Conservation



Automated Vacuum Carburizing System

### Constant Velocity Joints

Quiet and Smooth Rotary Transfer



Example of Transmission Gear



Roller Bearings for Constant Velocity Joints



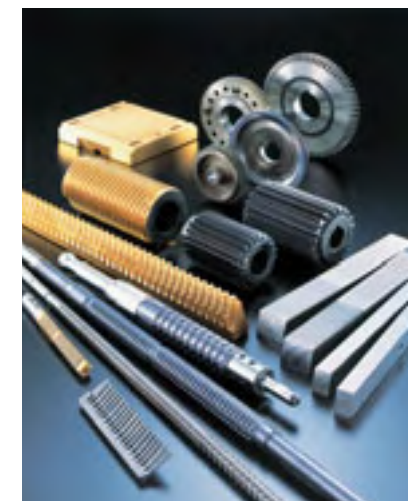
Precision Rolling



MQL Broaching



High Speed Hob Cutting



Broaches & Gear Cutting Tools

**From IT to Home Appliances**

**Ultra-precision Machining for HDD Magnetic Heads and Optical Communication Systems**



Precision Slicing Machine



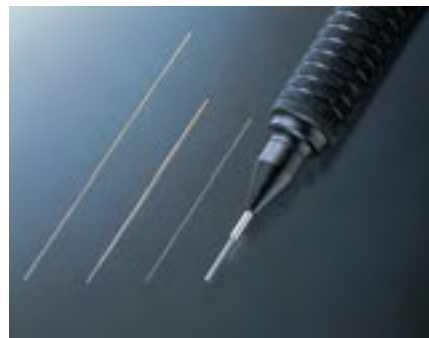
Electro-Discharge Truing Device



Connector

V-groove Block

**For Punching Semiconductor Packaging and IC Checker Probe Pins**



Ultra-fine Wire "Micron Hard"

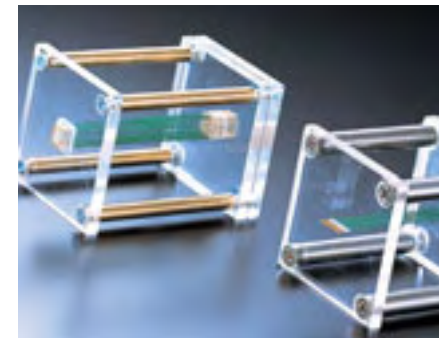
**Producing Parts for Liquid Crystal Panels and Molds for Digital Cameras and DVD Pick Up Lenses in Nanometer**



Ultra-precision Aspheric Generator "NANO ASPHER"



Ultra-precision Groove Cutting Machine "NANO GROOVER"



Example of Micron Hard Applications  
(Probe Unit for Semiconductor Testing)



Example of Machining by Ultra-precise Aspheric Generator  
(Molds for Lenses)



Liquid Crystal TV Screen

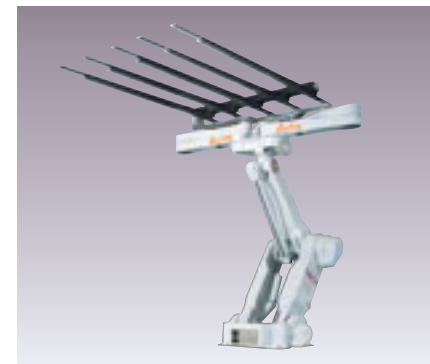
**Ideal Tool for Producing Compressors for Air Conditioners**



Air Conditioner



Broaches for Machining Compressor Vane Slots



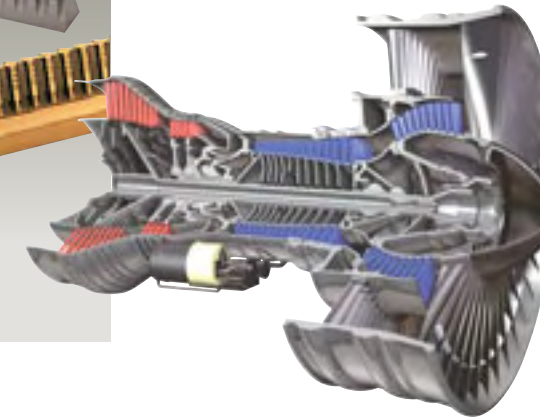
Large-sized Glass Substrate Transfer Robot

**Supporting Reliability with High Functionality**



X-mas Tree Form Broaches  
Turbine Disks and Blades

**Achieving High Productivity with High Precision**  
World-leading high-precision broaches and end mills facilitate the machining of blades for gas turbines and jet engines.



X's-mill Geo Series

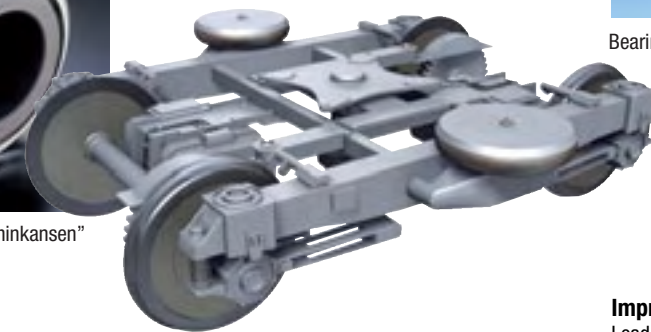


Bearings for Jet Engines



Journal Bearings for the Bullet Train "Shinkansen"

**Ensuring High Speed, Safety and Comfort**  
Journal Bearings for the Bullet Train "Shinkansen"  
Bearings for Jet Engines



**Improving Operability**  
Load Sensing System



Wheel-drive Motor/Swing Motor

**Energy-efficient, Compact and Powerful**  
Highest ranked hydraulic equipment for construction machinery in the world  
Wheel-drive and Swing Motors,  
Variable Volume Piston Pumps



**Robot Systems for Arc Welding, Spray Painting and Handling**



Variable Volume Piston Pump

Arc Welding Robots

## Achieving High Precision and High Efficiency

**Bearings and Hydraulic Equipment for Various Applications in Machine Tools, Printing Presses and Paper Manufacturing Machines**

**Cutting Tools (End Mills) for High-speed Machining of Parts**

**Profiled Materials that are Near-net Shape**



Machining Centers



Super Precise Bearings for Machine Tools



Sealed Ball Screw Support Bearings



Printing Presses



Compact Energy-saving Hydraulic Units



Bearing for Paper Manufacturing Machines



"Power Meister", Compact Hydraulic System of high energy-efficiency and high precision



End Mill Doing High Speed Cutting



Handling Robots



Profiled Bars [Pre-shape]

## Widely-used in Many Areas of Our Lives



Tools for DIY – Drills



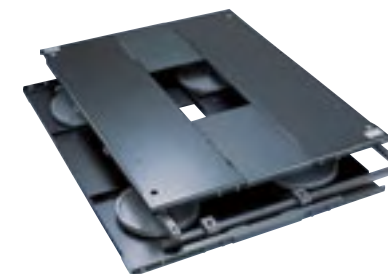
Tools for DIY – Hand Hacksaw Blades and Jigsaw Blades



New brand for bearings QUEST



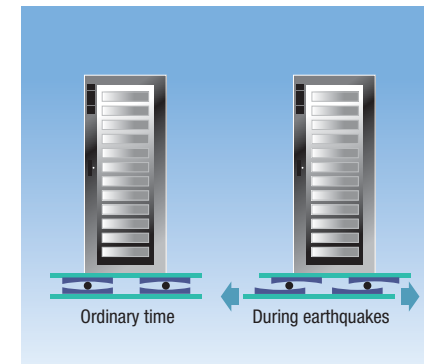
Recycling Materials transfer Robots



An earthquake-proof equipment "Magni Cradle", which will protect your important assets and information from earthquakes



Excel Series Spherical Roller Bearing



Controls the shock of earthquakes with rolling technology of bearings

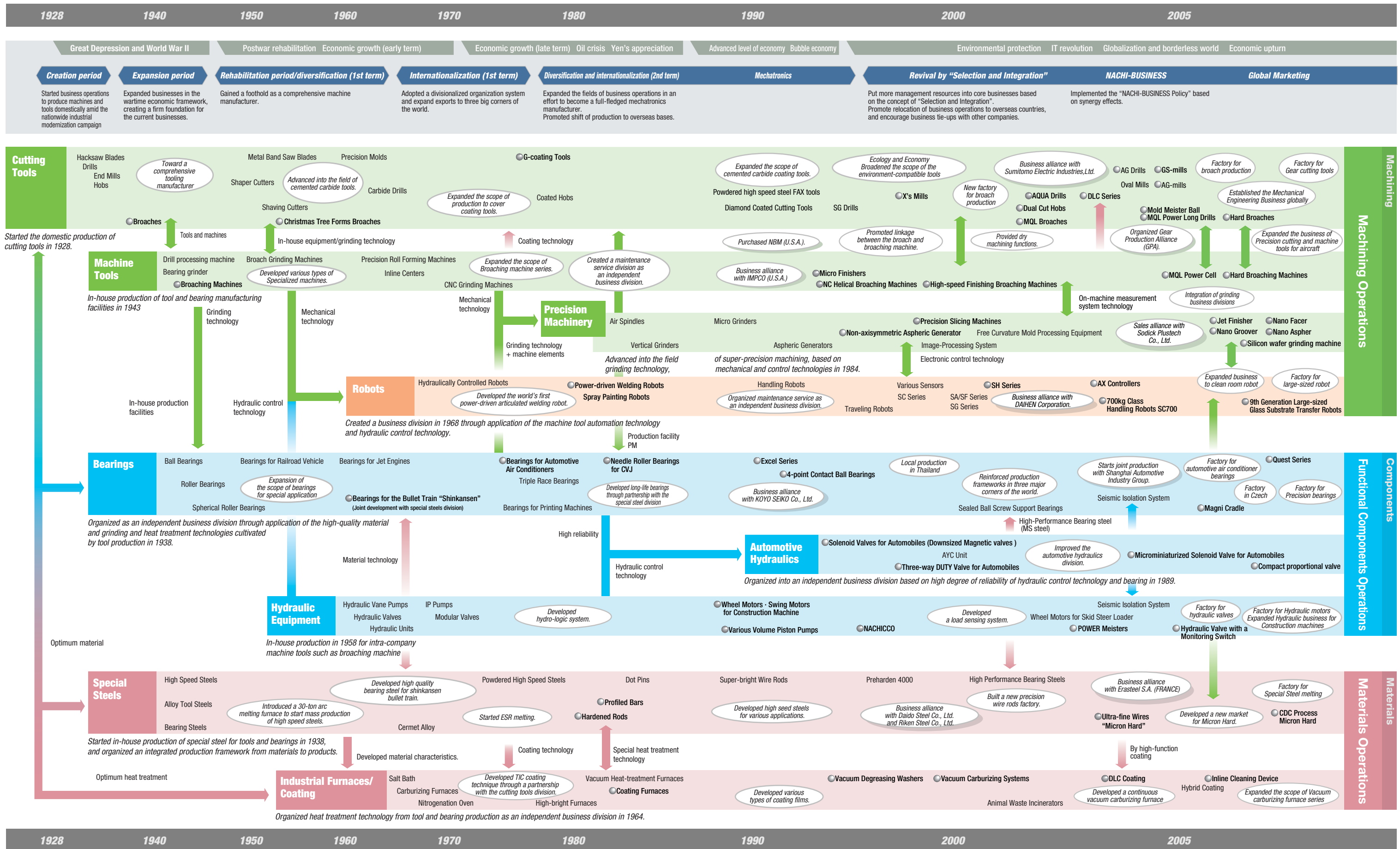


Bearings for opening/closing Stadium Domes



Metal Band Saw Blades for cutting frozen tuna

Genealogy of Synergies based on Engineering & Product Development



**Contributing to the Development of Machining through Machinery and Tools**  
**Supporting Machine Tools and Cutting Tools Completely with High Performance and High Precision Required for Machining Processes**

## Drilling

From standard drills to high precision and high performance drills a full line up to meet any applications.

Jointly with Sumitomo Electric Industries, Ltd.

Aqua Drill Series



Proprietary Aqua Coating makes super-hard drills highly efficient for dry, wet and mist applications.

SG-ES (ESS) Drills



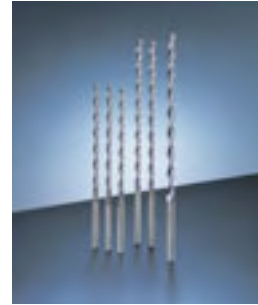
HSS drills with end mill shanks perform accurate positioning and stable drilling of bore diameters

MQL Power Cell



3-axis column moving type, compact and highly flexible

MQL Power Long Drills



MQL, Non step drilling deeply more than 20 times of drill diameter

## Broaching

World-leading broaches and broaching machines

A wide range of broaching products, broaches from keyway to large-diameter helical and X-mas tree forms, and broaching machines from 30KN to 500KN.

X-mas Tree Form Broach



Helical Broach



NC Helical Broaching machine  
 Excellent for high precision broaching of internal helical gears. Highly flexible with no lead bar and no pit



Hard Broach

High-speed Hard Broaching machine  
 Achieving high-precision, high-performance semi-dry broaching of the high-hardness materials

## Milling

End Mill Series that satisfies the high-performance machining requirements for tooling and machine parts

Jointly with Sumitomo Electric Industries, Ltd.

GS Mill Series



GS, world standard carbide end mill that is developed together with Sumitomo Electric Industries, Ltd.

AG Mill Series



Achieving high-performance through special high-speed coating

DLC Cutting Tools



The world's first dry cutting for aluminum alloys

High Speed Inline Center



High reliability column traverse type machining center

## Gear Cutting

Formed Gear Production Alliance (GPA) jointly with Kashifuji Works, Ltd. And Kanzaki Kokyukoki Manufacturing Co., Ltd. to provide turnkey service for gear production of automotive and other industries

Hyper Dual Hobs



High-performance, wet and dry machining of gear wheels

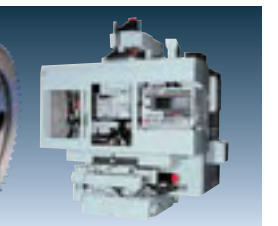


CNC Gear Hobbing Machine  
 Kashifuji Works, Ltd. (GPA)

Shaving Cutters



For finishing gears with high precision



CNC Shaving Machine  
 Kanzaki Kokyukoki Manufacturing Co., Ltd. (GPA)

## Roll Forming

Short forming time with high precision with use of a forming rack  
 Contributing to energy and material savings with no cutting chips



NC Precision Rolling Machine  
 High-speed rolling of 30 m/min. doubles machining efficiency.  
 Energy saving of clean machining with semi-dry roll forming



Forming Racks  
 High precision maintained with highly efficient machining

## Tap and Die

Providing highly efficient cutting to threading

Jointly with tap manufacturers

G Tap Series



Superior wear resistance, high efficiency and long life.

Tufflets



Stable and precise thread with chip-free process

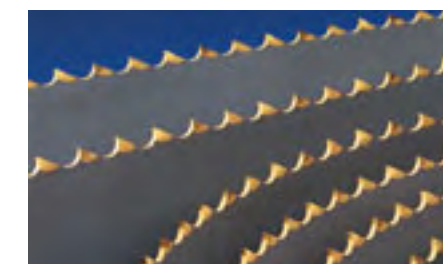
Thread Rolling Racks



Wide array of applications in mass production through high precision and high efficiency

## Cutting-off

Efficient cutting-off of materials such as regular steel and special steel as well as nonferrous metals and frozen foods



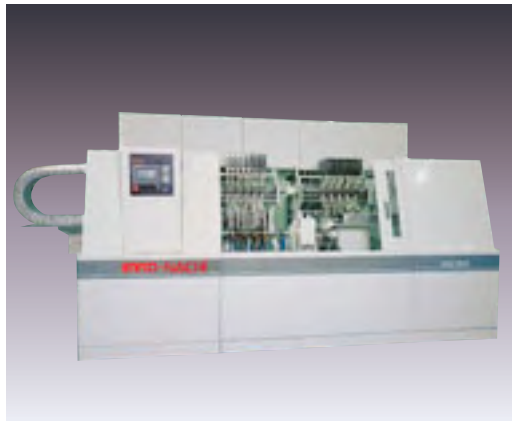
Metal Band Saw Blades  
 Saw blades with superior cost performance for cutting of various materials

**Providing Nano-technology in High-tech Fields in Pursuit of Precise Machining**  
**Responding to Demands in Leading Edge Technology Fields with Ultra-fine Machining at the Nanometer Level**

## Film Lapping Process

Improving surface roughness and roundness with lapping that uses film coated with polishing powder.

Jointly with IMPCO (US Company)



Micro Finisher



Improving surface roughness and roundness of crankshaft bearing surfaces.

## Ultra-fine Processing

Grooving and cutting of hard, brittle materials for electronics and optical parts to precise dimensions of the 0.1 micrometer level

### Ultra-precision Plane Surface Grinding

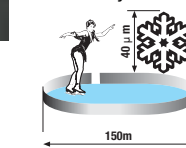
Electrolytic In-process Dress Grinding

20 nm or less surface roughness per 300 mm diameter



Surface of silicon wafer finished to have a mirror finish

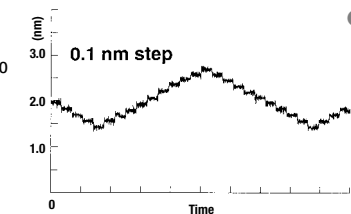
“20 nm or less surface roughness per 300 mm diameter” is equivalent to the roughness of the skating rink of a 150 m diameter, meaning no rough spot of the size of a snow crystal.



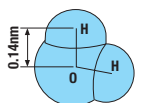
### Ultra-precision Feed Mechanism

Hydrostatic Pressure Screw and Slide

0.1 nm step feed



World-class step feed in 0.1 nm increments achieves backlash-free feed.



Size of water molecule

## Precision Molding

Offering precision dies that support a wide range of fields, from automotive parts to electric and electronic equipment, to aerospace, aircraft, and precision equipment, as well as supporting transfer configurations.

### Stamping Dies

Progressive Dies



Single Dies



### Precision-machining Technology for Die Production



End Milling



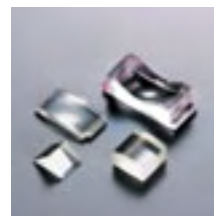
Jig Grinding

## Ultra-precision Molds Process

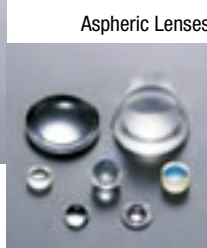
Processing machine for lens molds that require precision forming in nanometer tolerances.



Ultra-precision Groove Cutting Machine “NANO GROOVER”



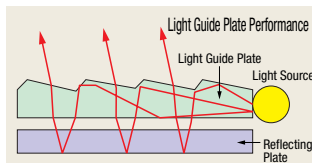
Non-axisymmetric lenses



Aspheric Lenses



Aspheric Generator for next-generation DVDs lens molds “NANO ASPHER”



Mounted with hydrostatic pressure feed mechanism and trace shape measuring unit, this unit finishes lens molds for laser printers and digital video cameras and light guide plate molds for liquid crystal panels to nanoscale shape precision.

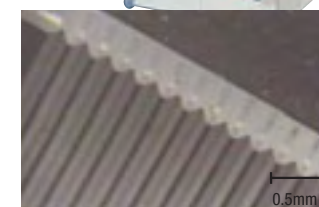
## Precision Slicing Machine

Accuracy and quality



### SPG Series

Machining of V-groove for an optical fiber cable to an accuracy of 0.1 μm.

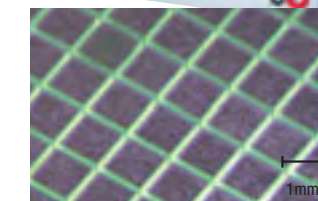


Machining V-grooves of Optical Fiber Array

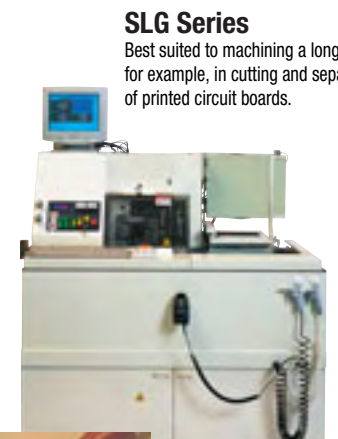


### SHG Series

High-precision cutting and grooving of crystals and ceramics

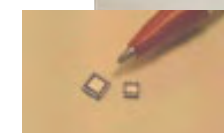


Cutting of Glass with Multi-blade



### SLG Series

Best suited to machining a long stroke, for example, in cutting and separation of printed circuit boards.



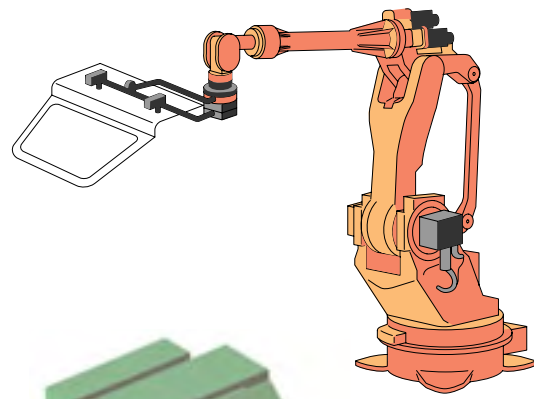
Cutting of IC Chips — Separation into Pieces

Productivity



**Flexibly Responding to Requests for Advanced Production Lines**  
**Contributing to Automation of Production Lines Based on the World's Number 1 Spot Welders**

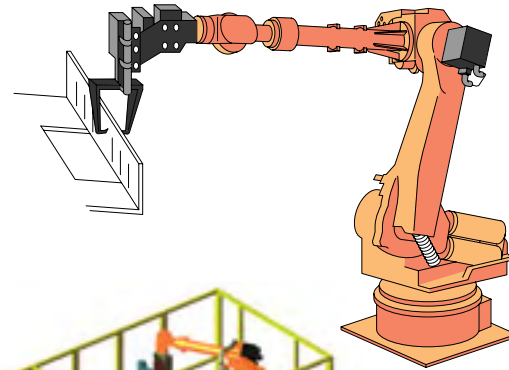
## Handling



Providing the high speed, wide-ranging movements and the highly accurate repetition of positioning for the large and small parts

Standard Handling Cell

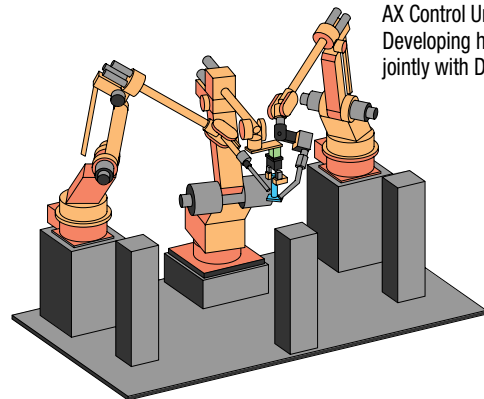
## Spot Welding



Achieving the optimal track and high-speed movement of servo gun that is synchronized with the robot movement

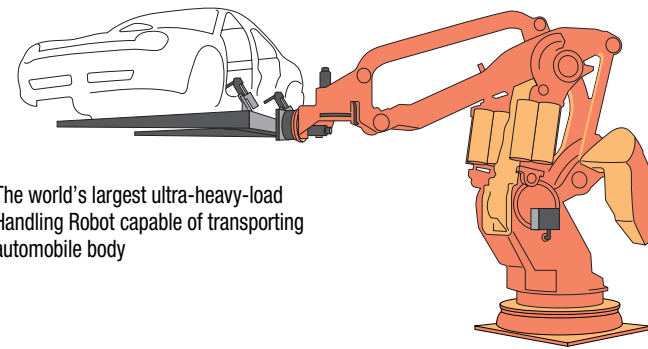
Standard Spot Welding Cell

## Arc Welding



AX Control Unit  
 Developing high-precision paths jointly with Daihen Corp

## Ultra-Heavy-Load Handling

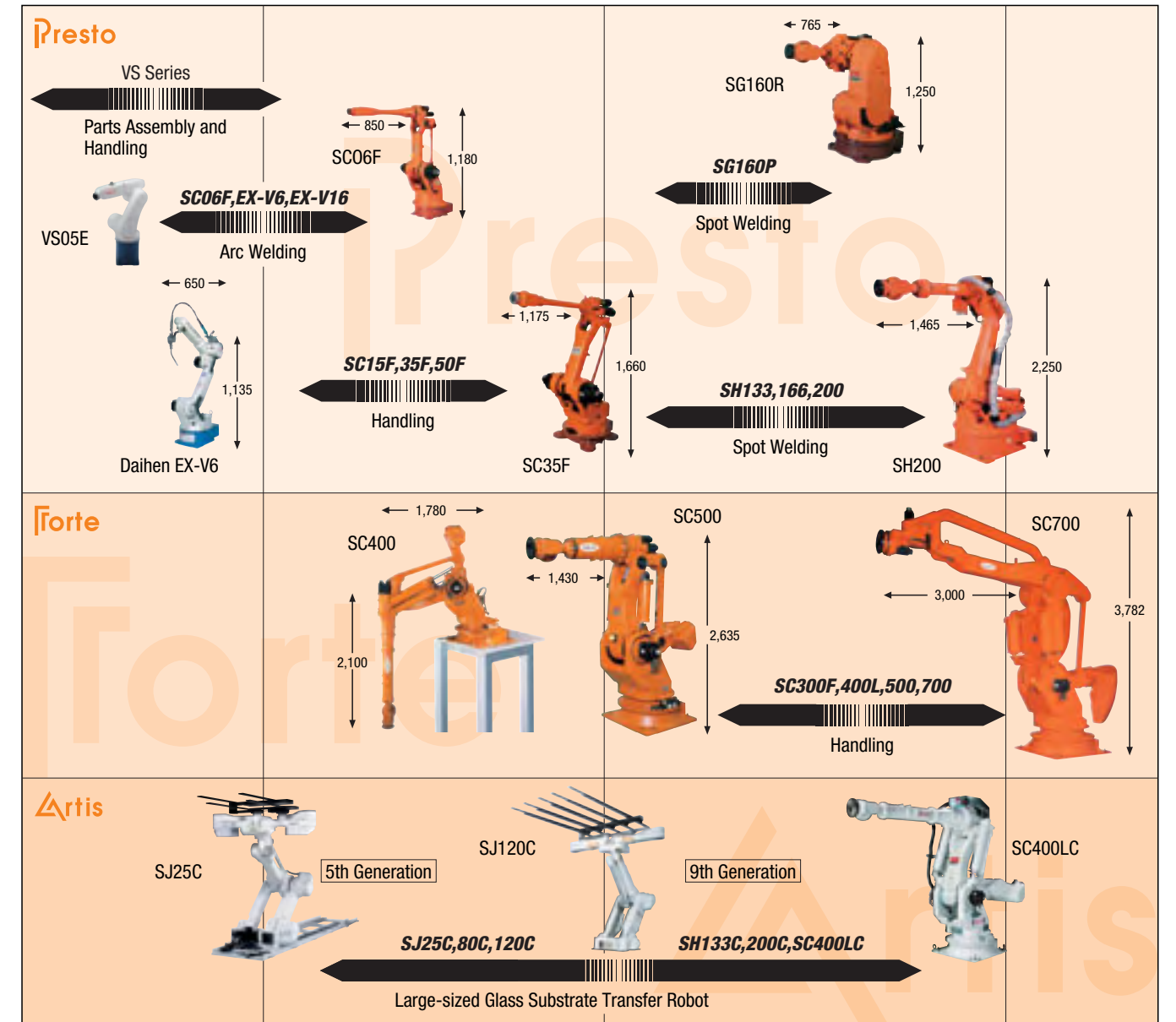


The world's largest ultra-heavy-load Handling Robot capable of transporting automobile body

## Nachi Robot Series Payload up to 700 kg

A broad lineup to meet a wide selection of applications and spaces.

In cooperation with Daihen Corporation



10 100 700 Robot Payload: kg



**Spot Welding for Automobile Parts SH166**  
 Making a factory clean and quiet with high-quality welding of no sputter



**Arc Welding for Housing Materials SC15F**  
 Effective use of space with overhead suspension specification



**Loading Work for Machine Tools SC15F**  
 Layout that allows a robot to supply work for multiple machines  
 Long hours of unmanned operation with Work Stocker



**Material Handling with Vision Sensor ST166**  
 Parts position detected by 3D Vision Sensing

## Longer Life



Excel Series  
 Deep-groove Ball Bearings  
 Low Torque and Sealing Capability



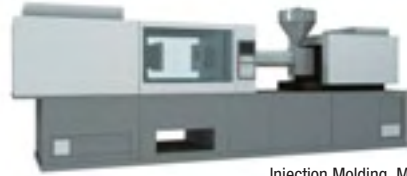
Motors



Paper Manufacturing Machines



Excel Series  
 Spherical Roller Thrust Bearings  
 With the world largest load capacity, these bearings can be used in the high-temperature environment



Injection Molding Machine



Excel Series  
 Spherical Roller Bearings  
 With the world largest load capacity, these bearings can be used in the high-temperature environment

## Advanced Functions

Constant Velocity Joints



Roller Bearings for Constant Velocity Joints

High-performance bearings for superb operability, comfort and safety in automobile driving

Automotives Air Condition Compressor



Bearings for Automotive Air Conditioners

Thin-walled compound ball bearings that have the top market share in the world have high performance and are lightweight and compact plus they stand up to high speed, high temperatures and vibrations

Transmission



Keystone Type Cylindrical Roller Bearings

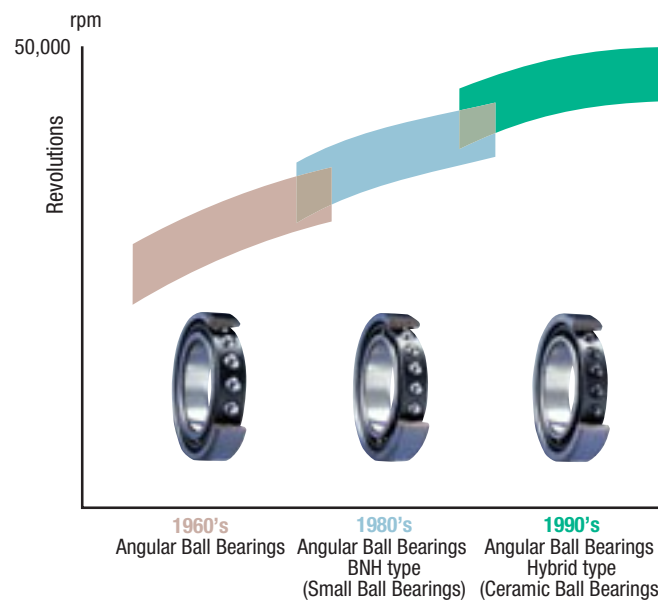
These cageless, full complement roller bearings have a long operating life. The special heat treatment, even in poor lubrication applications, allows them to last a long time

Pull-type Auto-centering Clutch Release Bearings

For high power and high performance transmission

## Higher Speed and Higher Precision

Precision Bearings Evolve with Advances in High-speed Machining



Using angular contact ball bearings for high-speed spindle operations (MQL Power Cell)



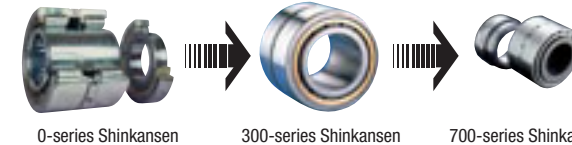
Sealed Ball Screw Support Bearings  
 Supporting maintenance-free machinery with Sealed Ball Screw Support Bearings in high-precision application

## High Speed and High Reliability

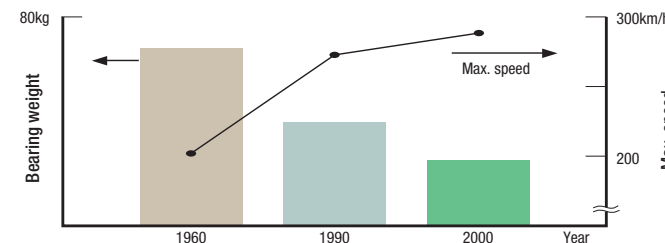
Lightweight and Compact Bearings for Axles capable of withstanding the high speed of the bullet train "Shinkansen"



The Bullet Train 700-series "Shinkansen Nozomi"



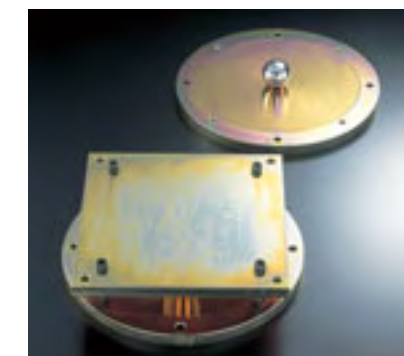
0-series Shinkansen    300-series Shinkansen    700-series Shinkansen



## Developing New Technologies

Seismic Isolation System

Highly reliable in protecting houses from earthquakes by preventing the transmission of seismic motion to the structure with rotational movement

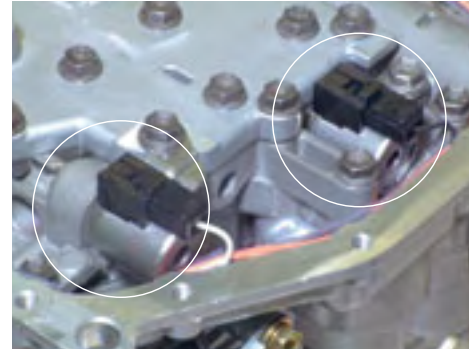
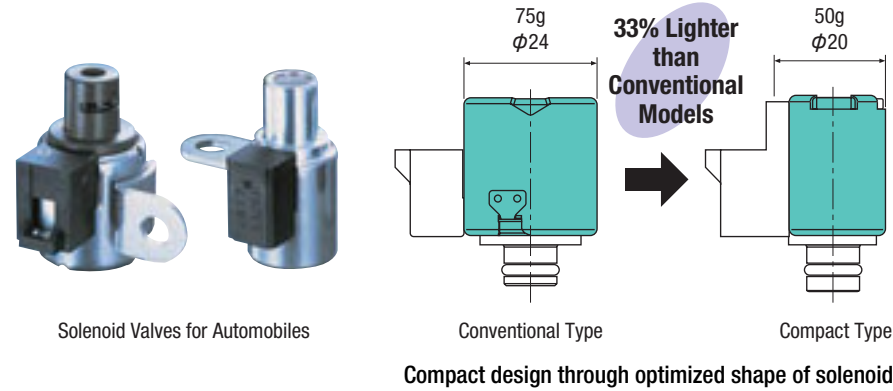


This system uses highly reliable rolling bearings that support the weight of the structure to prevent direct transmission of seismic motion to the structure



## Compact

### Optimum Control of Automotive AT and CVT



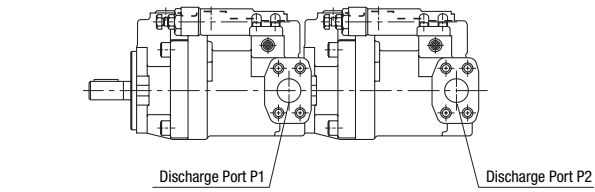
## Composite and Multi-functional

### Two-pump Functions Integrated into a Single Pump

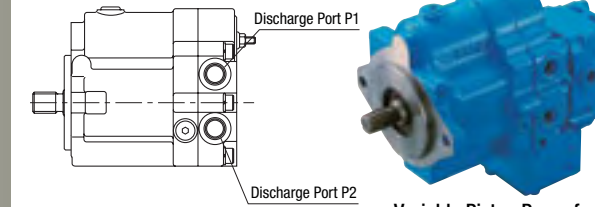
Necessary functions are compactly integrated



Strengthening small excavator wheel drive motors and swing motors



Tandem Type (conventional type)



Split-flow Type



Variable Piston Pump for Small Excavators

### Load Sensing System



Improving operability with a unique control system and realizing the single pump load sensing by eliminating the pump for a swing motor

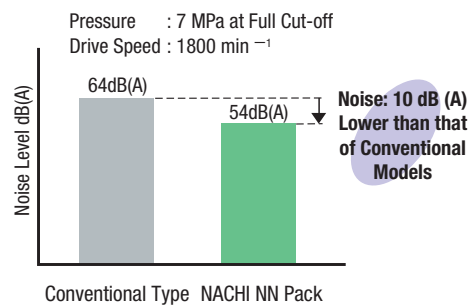
## Energy-saving

### Environmentally-friendly Hydraulic Units

Hydraulic Units with Low Noise and Low Heat Generation



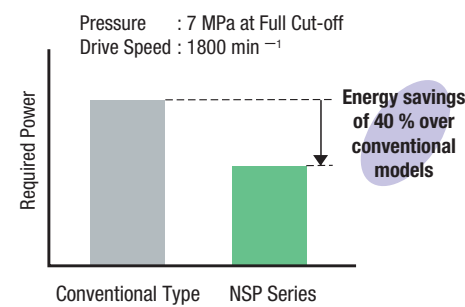
NACHI NN Pack



Energy-saving Hydraulic Units for Supply Power to Machine Tools



NSP Series



## High-pressure and High-precision

### Realizing Reliable Power Control

Providing greater compactness in hydraulic equipment



High-pressure Valve Series

Maximum Applicable Pressure 35MPa

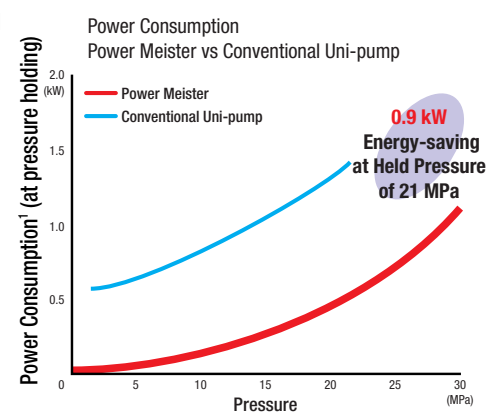


PZH Piston Pump

Compact hydraulic system with substantial energy saving and high precision

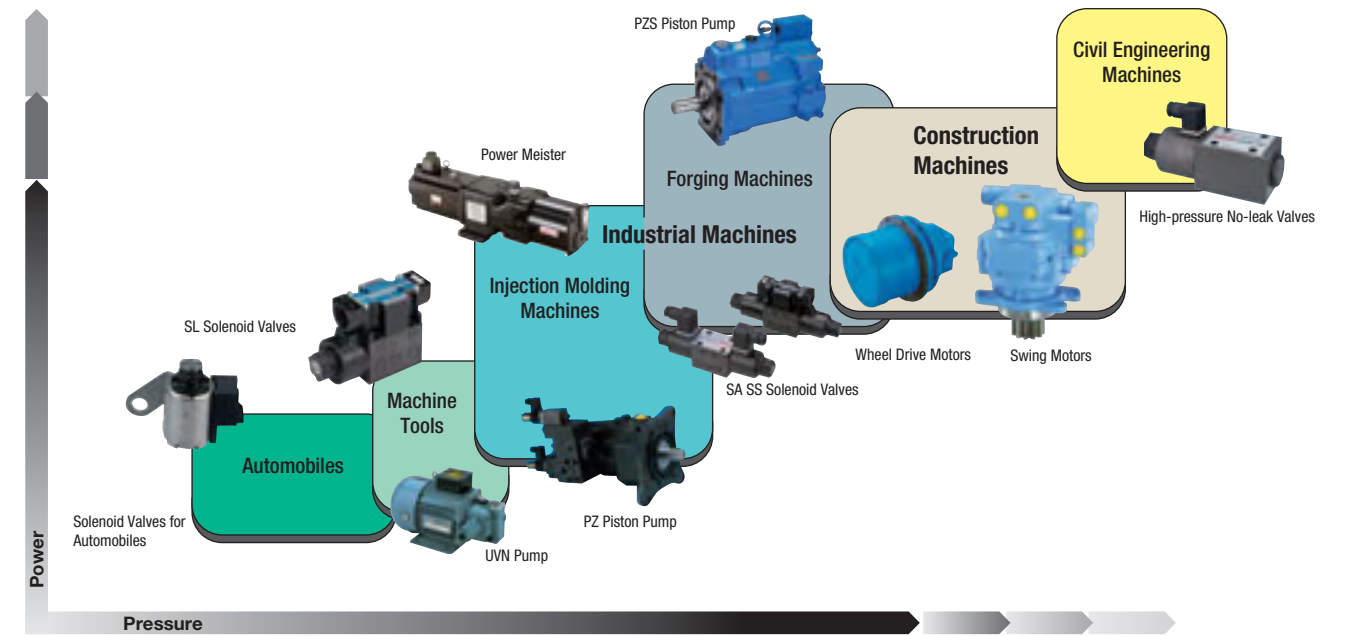


Power Meister



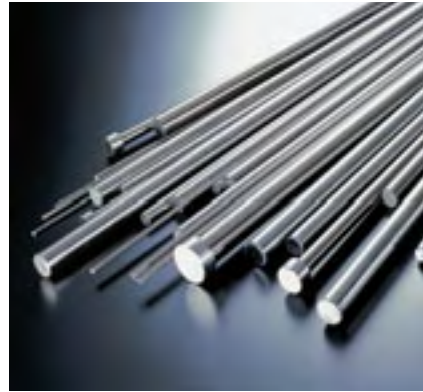
## Series of Power Control Products

Developing Safe, Stable Power Control Widely for Various Industries



Creating New Value by Combining Materials, Heat Treatment and Coating  
Adding High-performance Functions and Values to Materials

Improving Cost Performance by Matching Shape and Hardness to Applications



Heat-treated and ready for production  
Hardened Rods "Pre-harden"

Supporting a Wide Range of Applications Based on Materials Technology

Shaping Technology

Supplying materials that are as thin as a human hair (Micron Hard) and pre-shaped materials that are close to finished products



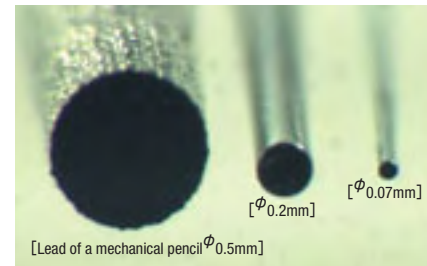
Challenging to the limits of small diameters  
Ultra-fine Wires "Micron Hard"

Heat Treatment and Surface Processing Technology

Maximizing material performance through coatings and special wire heat treatment (Pre-harden).



As close as can be to the final product shape  
Profiled Bars "Pre-shape"



Comparison of Micron Hard and the mechanical pencil lead

Creating New Value by Outstanding Treatment Processes



Vacuum Carburizing Furnace

The environmentally friendly EN-CARBO process enables low-cost, high-precision carburizing. Ideal for automobile parts, such as transmission gears.



Vacuum Degreasing Washer

Hydrocarbon-based solvents are used as a substitute for harmful chlorine organic solvents. It is ideal for washing before and after heat treatment and for washing parts.

Example of Washing (Gears)



Example of Washed Parts (Electric Parts)



Example of Automated Vacuum Carburizing (Transmission Gears)

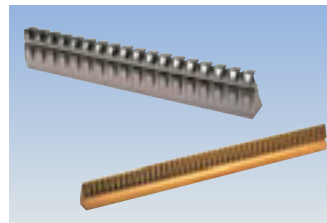


Automated Vacuum Carburizing System

Combining a vacuum carburizing furnace, vacuum degreasing washer, tempering furnace and transfer unit enables clean, flexible heat treatment and unmanned operation.

Metallurgical Technology for the World Top Level Tools and Essential Components

Application Examples



X-mas Tree Form Broaches for Jet Engines



Bearings for Jet Engines



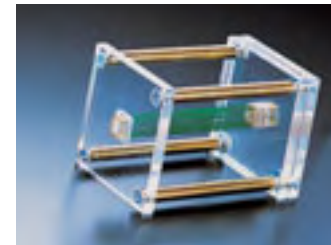
Vane for Hydraulic Pumps (Pre-shape)



Linear Bearings (Pre-shape)



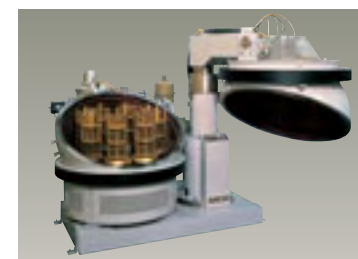
Print Head for Dot Matrix Printers (Micron Hard)



Probe Unit for Semiconductor Testing (Micron Hard)



High-grade ceramic coated films such as TiN, TiCN, TiAlN, CrN and DLC can be easily obtained. This machine is ideal for wear-resistant coating on dies, cutting tools and machine parts.



PVD Coating Equipment

**DLC (Diamond Like Carbon)**  
Excellent friction characteristics and diamond-like hardness, ideal for wear resistance on sliding parts.

Examples of Coating



Clutch Plates



Mold

*NACHI COMPLEX provides with Stages and Functions which are Keys for Companies*

## NACHI-BUSINESS Galaxy

### NACHI Current

Showroom



### Machinery & Robot Stage

Machining & Robot demonstration



### Tribology Stage

Components for automobiles and industrial machinery



### Quality Assurance Laboratory (QA Lab)



Three-dimensional measurement



Precision measurements

### Kohki Hall

General-purpose Hall



### Café Across

Dining Hall for the visitors



### Nachi-Fujikoshi Museum

Memorial Hall



*Engineering Services Throughout the World*



Robot Maintenance



Engineering Seminar



Showroom



Bearing Performance Test



Technical Consulting



Demonstration of Drilling



Robot Operation Training

