For
IT Industries
Automobiles
Air Craft
Industrial Machinery

NACHIBUSINESS Galaxy
A BRIEF LOOK AT NACHI

NACHI-FUJIKOSHI CORP.
Automobiles and Automotive Parts

**Safe and Comfortable Driving**

**Engines**
Contributing to Higher Energy Efficiency and Green Processes

- Compressors for Automotive Air Conditioners
- Double-row Angular Contact Ball Bearings for Automotive Air Conditioners

**MQL Machining System**
High-efficiency, Non Stop Deep Hole Drilling

**Micro Finisher**
Crankshaft and Camshaft Lapping
Vacuum Heat Treatment and Parts Washer for Environmental Conservation

**Constant Velocity Joints**
Quiet and Smooth Rotary Transfer

**Transmissions**
For Responsive and Comfortable Driving

- 4-point Contact Ball Bearings
- BX Series
- Self-aligning Clutch Release Bearings
- Vane Material in Power Steering Pumps Made from HSS

**Spot Welding in Car Production**

**Handling Robots**

**Solenoid Valves for Automobiles**

**Steering**
Safe and Stable Steering

- Broaching of Steering Racks

**Automobiles and Automotive Parts**

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From IT to Home Appliances

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

For Punching Semiconductor Packaging and IC Checker Probe Pins

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

Ultra-fine Wire "Micron Hard"

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

Ideal Tool for Producing Compressors for Air Conditioners

Air Conditioner

Broaches for Machining Compressor Vane Slots

Large-sized Glass Substrate Transfer Robot

Electronics, Electrical Appliances, Information and Telecommunications

Supporting Reliability with High Functionality

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.

Energy-efficient, Compact and Powerful

Highest ranked hydraulic equipment for construction machinery in the world

Wheel-drive and Swing Motors, Variable Volume Piston Pumps

Improving Operability

Load Sensing System

Robot Systems for Arc Welding, Spray Painting and Handling

Aircraft, Railroads and Construction Machinery

Ensuring High Speed, Safety and Comfort

Journal Bearings for the Bullet Train "Shinkansen"

Bearings for Jet Engines

Journal Bearings for the Bullet Train "Shinkansen"

X-max Tree Form Broaches
Turbine Disks and Blades

Bearings for Jet Engines

Wheel-drive Motor/Swing Motor

Variable Volume Piston Pump

X's-mill Geo Series

Arc Welding Robots

Ultra-precision Aspheric Generator "NANO ASPHER"

Ultra-precision Groove Cutting Machine "NANO GROOVER"

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Machine Tools and Industrial Machinery

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

Ordinary time
During earthquakes

Super Precise Bearings for Machine Tools
Sealed Ball Screw Support Bearings

Machining Centers
Printing Presses

Compact Energy-saving Hydraulic Units

Bearings 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)

Marketing and Lifestyle

Widely-used in Many Areas of Our Lives

Tools for DIY – Drills
Tools for DIY – Hand Hacksaw Blades and Jigsaw Blades

Excel Series of Deep-groove Ball Bearings

Excel Series Spherical Roller Bearing

Recycling Materials transfer Robots

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

Bearing for Opening/Closing Stadium Domes

Metal Band Saw Blades for cutting frozen tuna

Achieving High Precision and High Efficiency

Controls the shock of earthquakes with rolling technology of bearings

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End Mill Doing High Speed Cutting
Handling Robots

Profiled Bars (Pre-shape)
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

**Cutting Tools and Machine Tools**

**Drilling**
- **Aqua Drill Series**
  - From standard drills to high precision and high performance drills a full line up to meet any applications.
  - Jointly with Sumitomo Electric Industries, Ltd.
  - Proprietary Aqua Coating makes super-hard drills highly efficient for dry, wet and melt applications.

- **SG-ES (ESS) Drills**
  - HSS drills with end mill shanks perform accurate positioning and stable drilling of bore diameters.
  - 3-axis column moving type, compact and highly flexible.

- **MQL Power Cell**
  - MQL, One step drilling deeply more than 22 times of drill diameter.

- **MQL Power Long Drills**

**Broaching**
- **World-leading broaches and broaching machines**
  - A wide range of broaching products, broaches from keyway to large-diameter helical and X-mass tree forms, and broaching machines from 300KN to 500KN.

- **NC Helical Broaching machine**
  - Excellent for high-precision broaching of internal helical gears, highly flexible with no dead bar and no pull.

- **X-mass Tree Form Broach**

**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**
  - Kanzaki Kokyukoki Manufacturing Co., Ltd. (GPA) for finished gears with high precision.

**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., double machining efficiency.

- **Forming Racks**
  - High precision maintained with highly efficient machining.

**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 cold performance for cutting of various materials.

- **Saw blades and hand hacksaw blades for DIH**

**Milling**
- **GS Mill Series**
  - Milling tools that satisfy the high-performance machining requirements for tooling and machine parts.
  - Jointly with Sumitomo Electric Industries, Ltd.
  - World standard cutters and end mills 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.

- **e-Center**
  - Compact special-purpose aluminum dry machining center (900 mm wide).
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.

**Ultra-fine Processing**
Grooving and cutting of hard, brittle materials for electronics and optical parts to precise dimensions of the 0.1 micrometer level.

**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.

**Ultra-precision Molds Process**
Processing machine for lens molds that require precision forming in nanometer tolerances.

**Precision Slicing Machine**
Machining V-grooves of Optical Fiber Array

**Ultra-precision Plane Surface Grinding**
20 nm or less surface roughness per 300 mm diameter
Surface of silicon wafer finished to have a mirror finish

**Ultra-precision Feed Mechanism**
Hydrostatic Pressure Screw and Slide
0.1 mm step feed

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Film Lapping Process

- Micro Finisher

Ultra-fine Processing

- Ultra-precision Plane Surface Grinding
- Surface of silicon wafer finished to have a mirror finish

Precision Molding

- Stamping Dies
- Precision-machining Technology for Die Production
- End Milling, Jig Grinding

Ultra-precision Molds Process

- Ultra-precision Groove Cutting Machine "NANO GROOVER"
- Aspheric Generator for next-generation DVDs lens molds "NANO ASPHER"

Precision Slicing Machine

- SPG Series
- Machining V-grooves of Optical Fiber Array
- Cutting of Glass with Multi-blade

Ultra-precision Feed Mechanism

- Hydrostatic Pressure Screw and Slide
- 0.1 mm step feed

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**Jointly with IMPCO (US Company)**
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.

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

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

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Robots

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

**Forward-looking Handling**

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

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

**Arc Welding for Housing Materials**

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

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

**Spot Welding for Automobile Parts**

- Making a factory clean and quiet with high-quality welding of no sputter

- **Neutralizing Space**
  - Effective use of space with overhead suspension specification

**Loading Work for Machine Tools**

- Layout that allows a robot to supply work for multiple machines
- Long hours of unmanned operation with Work Stocker

**Palletizing Chemical Products**

- Loading bags and boxes of parts on pallets

**Nachi Robot Series Payload up to 700 kg**

<table>
<thead>
<tr>
<th>Small Size</th>
<th>Medium Size</th>
<th>Large Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS15E</td>
<td>SC06F</td>
<td>PW20</td>
</tr>
<tr>
<td>VS05E</td>
<td>SC06F</td>
<td>Spray Painting</td>
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<tr>
<td></td>
<td>SG160P</td>
<td>SJ80C</td>
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<tr>
<td></td>
<td>SG160P/R</td>
<td>SJ80C</td>
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<tr>
<td></td>
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**10 100 700 Robot Payload: kg**

- 850
- 1,180
- 2,250

In cooperation with Daihen Corporation
**Bearings**

*Functional Parts that Support Safety, Reliability and Comfort*

*Long Life at High Speed and High Accuracy, Plus Compactness*

### Longer Life

- **Excel Series**
  - **Deep-groove Ball Bearings**
    - Low Torque and Sealing Capability
  - **Motors**
  - **Injection Molding Machine**
  - **Paper Manufacturing Machines**

### Advanced Functions

- **Constant Velocity Joints**
  - **Automotives Air Condition Compressor**
  - **Transmission**

- **Roller Bearings for Constant Velocity Joints**
- **Bearings for Automotive Air Conditioners**
- **Keystone Type Cylindrical Roller Bearings**
- **Pull-type Auto-centering Clutch Release Bearings**

### Higher Speed and Higher Precision

- **Precision Bearings Evolve with Advances in High-speed Machining**
  - 50,000 rpm
  - 1960's: Angular Ball Bearings
  - 1980's: Angular Ball Bearings
  - 1990's: Angular Ball Bearings
  - BNH type (Small Ball Bearings)
  - **Using angular contact ball bearings for high-speed spindle operations (MQL Power Cell)**

### High Speed and High Reliability

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

### 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

- **The Bullet Train 700-series “Shinkansen Nozomi”**
  - 8-series Shinkansen
  - 300-series Shinkansen
  - 700-series Shinkansen

- **Sealed Ball Screw Support Bearings**
  - Support high-speed machinery with sealed ball screw support bearings in high-precision application

- **Using angular contact ball bearings for high-speed spindle operations (MQL Power Cell)**
Hydraulic Equipment and Automotive Hydraulics

Functional Parts that Support Safety, Reliability and Comfort
Powerful and Reliable with Compact Power Control

Compact

Optimum Control of Automotive AT and CVT

Solenoid Valves for Automobiles
Conventional Type
Compact Type
33% Lighter than Conventional Models

Energy-saving

Environmentally-friendly Hydraulic Units
Hydraulic Units with Low Noise and Low Heat Generation

Conventional Type
NACHI NN Pack
NACHI NN Pack

Energy-saving Hydraulic Units for Supply Power to Machine Tools

Pressure : 7 MPa at Full Cut-off
Drive Speed : 1800 min⁻¹

Noise : 64dB(A)
Lower than that of Conventional Models

Conventional Type
NACHI NN Pack
NACHI NN Pack

Compact design through optimized shape of solenoid

Composite and Multi-functional

Two-pump Functions Integrated into a Single Pump

Necessary functions are compactly integrated

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

Series of Power Control Products

Developing Safe, Stable Power Control Widely for Various Industries

Realizing Reliable Power Control
Providing greater compactness in hydraulic equipment

High-pressure and High-precision

Compact hydraulic system with substantial energy saving and high precision

Power Consumption
Power Master vs Conventional Uni-pump

Pressure Consumption (at pressure holding)

0.85kW
Energy savings at Held Pressure of 32 MPa

Series of Power Control Products

High-pressure Valve Series
FZH Piston Pump
Power Master

Maximum Applicable Pressure 35MPa

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

Variable Piston Pump for Small Excavators

Strengthening small excavator wheel drive motors and swing motors

Load Sensing System

Optimum Control of Automotive AT and CVT

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Energy savings at Held Pressure of 32 MPa
Improving Cost Performance by Matching Shape and Hardness to Applications

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.

**Heat Treatment and Surface Processing Technology**
Maximizing material performance through coatings and special wire heat treatment (Pre-harden).

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.

**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
- Linear Bearings (Pre-shape)
- Vane for Hydraulic Pumps (Pre-shape)
- Print Head for Dot Matrix Printers (Micron Hard)

**Examples of Coating**
- Clutch Plates
- Mold

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

NACHI BUSINESS Galaxy

NACHI Current
Showroom

Machinery & Robot Stage
Machining & Robot demonstration

Robot Operation Training
Demonstration of Drilling

Robot Maintenance

Engineering Seminar

Bearing Performance Test

Technical Consulting

Service Engineering

Engineering Services Throughout the World

Showroom

Robot Maintenance

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Robot Maintenance

Robot Maintenance
For IT Industries

Automobiles

Air Craft

Industrial Machinery

NACHI-BUSINESS Galaxy

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