



Solutions and Case Studies

for Mechanical Designers

SEMI
CONDUCTOR
MANUFACTURING EQUIPMENT SOLUTION



Thank you for picking up this booklet.
In this booklet, we introduce a variety of challenges shared by our customers
in the semiconductor manufacturing field, their solutions, and valuable
Technical Information.

About NBK

We are a manufacturer specializing in problem-solving

- ▶ Extensive track record of manufacturer adoption into **pre and post processes**
- ▶ Compatible with **vacuum** environments
- ▶ A wide range of products with excellent **chemical resistance**
- ▶ Offers **Cleanroom Washing/Packing**
- ▶ Proven track record of handling approximately **80,000** custom items



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01

Industry Trends

Introducing the latest trend information surrounding the semiconductor industry!

Semiconductors, the so-called "bread of industry," are essential for a data-based society

Along with the dramatic worldwide growth of semiconductors, similar development has taken place for semiconductor manufacturing equipment. For many years, NBK has developed and sold products for semiconductor manufacturing equipment.

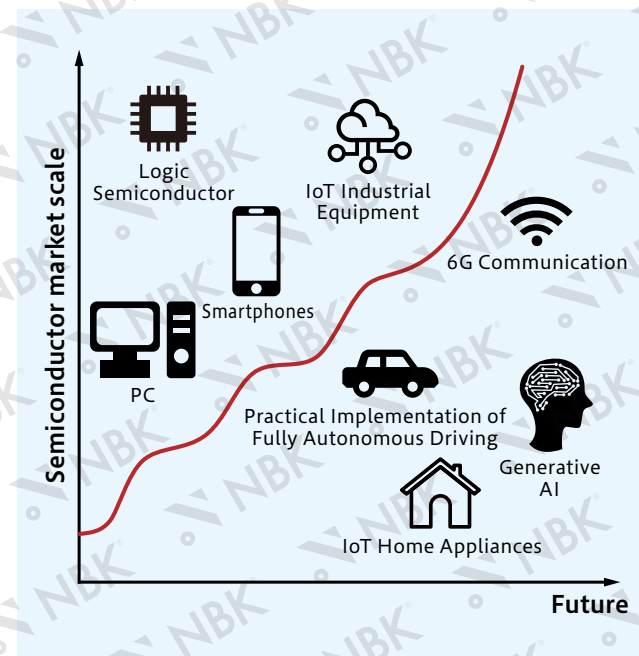
NBK intends to continue its growth along with the technological innovation of the semiconductor industry.



01

About the Semiconductor Industry in 2024

The 'Spring 2024 Semiconductor Market Forecast' released by WSTS (World Semiconductor Trade Statistics) on June 4, 2024, highlights a sharp increase in demand for memory and certain logic products driven by AI-related investments. In the future, continuous growth is expected in areas such as environmental sustainability and automation, in addition to AI-related demand. Significant market expansion is anticipated in sectors such as 'communication,' 'generative AI,' and 'automotive'.



02

Towards Achieving Carbon Neutrality

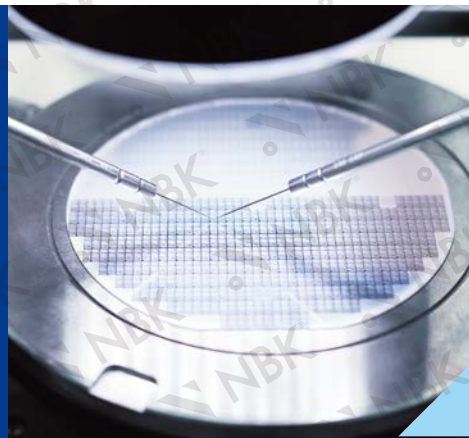
Semiconductors are expected to evolve further in the pursuit of carbon neutrality. Achieving a decarbonized society requires energy efficiency in all devices using semiconductors. This necessitates the advancement of high-performance semiconductors and the accelerated mass production of semiconductors.

Therefore, semiconductor manufacturing equipment is surely also called on for higher precision, higher quality, and greater throughput.

02

Search Issue Solutions and Case Studies by equipment

Explanations of how to handle special environments such as vacuum, high temperatures, and chemical adherence, sorted by equipment.



1 Equipment interior overall

01 Tools that can be used even in narrow working spaces are required

[Learn More → P.6](#)


NEW

02 Fastening Sheet Metal such as Magnetically Shielded (Permalloy Shield)

[Learn More → P.6](#)


03 Tools that can be used even in locations where magnetization must be avoided are required

[Learn More → P.7](#)


04 Devices must be firmly connected

[Learn More → P.7](#)


05 Screws that will not affect communication are required

[Learn More → P.8](#)


06 Improved coupling insulation properties are required

[Learn More → P.8](#)


UPDATED

07 Screws that can be used in limited spaces are required

[Learn More → P.9](#)


08 High-speed control of raising/ lowering shafts, suppressing hunting, is required

[Learn More → P.9](#)


Prevent wafer transport robot screws from corroding

[Learn More → P.44 Q:06](#)

Washers Falling Off During Maintenance in Chemical Environments

[Learn More → P.45 Q:07](#)

NEW

Looking for Non-Magnetic Washer Integrated Screws

[Learn More → P.52 Request example 04](#)

NEW

Seeking Cleanroom-Washed Screws with Short Lead Times

[Learn More → P.53 Request example 06](#)

NEW

Looking for High Chemical-Resistant M2 Low-Profile Screws

[Learn More → P.52 Request example 05](#)

NEW

Looking for Non-Magnetic Micro Screws

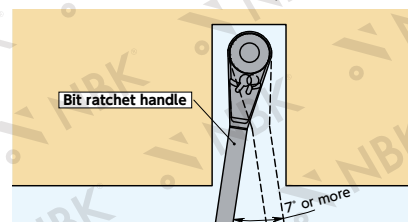
[Learn More → P.53 Request example 07](#)

Q:01

Tools that can be used even in **narrow working spaces** are required

A: Tools optimized for working in narrow spaces are available

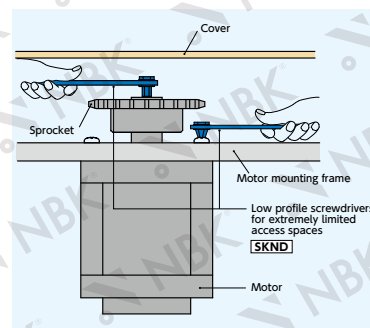
Tools with reduced height dimensions are available. Required working space is decreased, so device/equipment structure can also be made more compact.



If there is space for the bit ratchet handle to rotate 7" or more, screw turning can be done.

► For Extremely Limited Access Spaces

Bit Ratchet Handle Set
SKNBR-6.35-8SET



► For Extremely Limited Access Spaces

Low Profile Screwdriver
SKND



Q:02

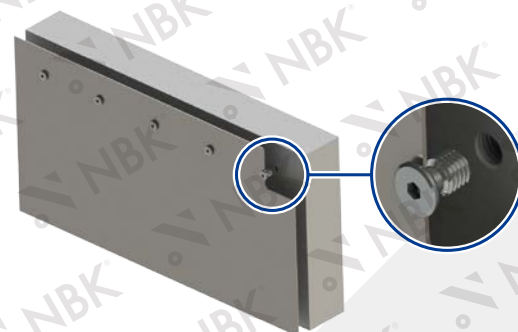
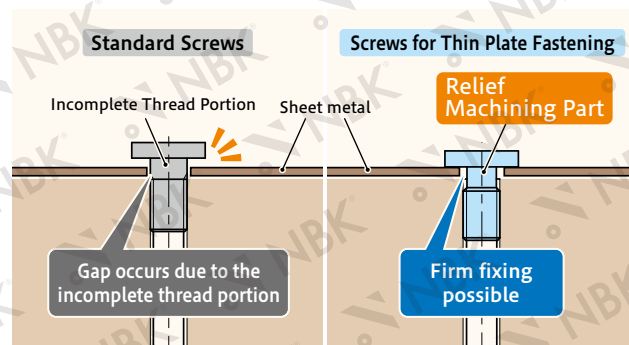
Fastening Sheet Metal such as **Magnetically Shielded (Permalloy Shield)**

A: Screws Available for Fastening Sheet Metal

Screws with large incomplete thread sections may not fully tighten sheet metal, such as magnetic shields (Permalloy shields). Using sheet metal fastening screws with relief processing at the neck allows for secure fixation of sheet metal.

► For Fastening Sheet Metal

Hexagon Socket Ultra-Low-Profile Bolts
SSHS-UC



NEW

Q:03

Tools that can be used even in locations where **magnetization must be avoided** are required

A: Non-magnetic tools are available

Suitable for assembly and maintenance of equipment and devices in environments with strong magnetic fields. They can also be used on devices for which magnetization must be avoided.



► Non-magnetic

Titanium Hexagon Key
SKHTG



► Non-magnetic

CFRTF Adjustable Wrench
SKMWCP-200

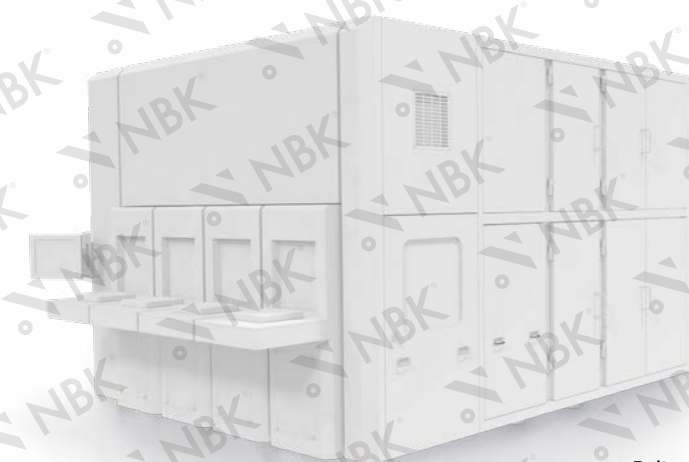


Q:04

Devices must be **firmly connected**

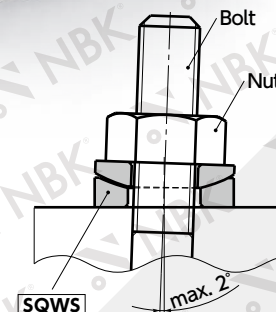
A: Washers which can correct an alignment mismatch between the bolt and seating surface, occurring frequently when connecting equipment, are available

When connecting two pieces of equipment, the use of spherical washers absorbs any bolt tilting, enabling reliable fastening.



► Spherical Washers

SQWS



Selection
NavigatorCAD Data
Download
<https://www.nbk1560.com/>

03

Search Issue Solutions and Case Studies by manufacturing process

Because equipment interior environments vary widely by process in semiconductor manufacturing, the performance required of machinery and parts also differs by equipment and process. Here we present case studies of issue solutions by process and equipment.

01

**Wafer cleaning
equipment**

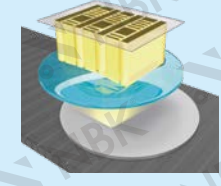

02

Oxidation/diffusion equipment


03

Coater/developer

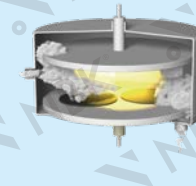

04

**Semiconductor
lithography equipment**


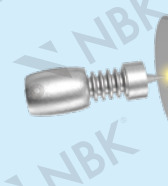
05

Physical inspection equipment

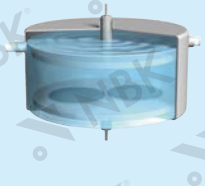

06

**Coating/sputtering
equipment**


07

**Ion implantation
equipment**


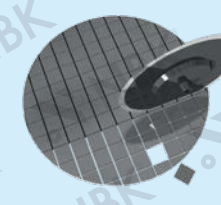
08

**Etching
equipment**


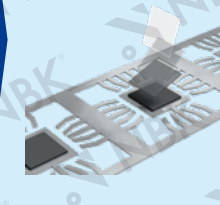
09

**Electrical inspection
equipment**

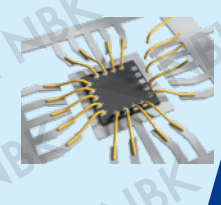

10

Dicing machinery


11

Die bonder


12

Wire bonder


Pre-Processes

|01. Wafer cleaning machinery

Cleaning process



► Component corrosion prevention is required

Screws with superior chemical resistance can be selected to withstand environments within equipment where chemicals are applied.

Characteristics required for special screws: **Chemical resistance**

► Tantalum

Special Material Screws
SNSTA



► PEEK

Plastic Screws
SPE



► Silicon Carbide

Special Material Screws
SICX-SX



► Ceramics (Alumina)

Special Material Screws
SCX



► VESPEL

Plastic Screws
SPDC



* Vespel is a registered trademark of DuPont.

► Screws Corroded by Hydrochloric Acid [Learn More → P.40 Q:02](#)► High-Corrosion-Resistance Ceramic Screws for Vacuum Environments [Learn More → P.43 Q:05](#)

|02. Oxidation/diffusion equipment

Heat treatment/oxidation/diffusion process

► Resistance to high temperatures and chemicals is required

For environments where various gases are used at high temperatures, screws with excellent heat resistance and chemical resistance are effective.

Characteristics required for special screws: **Heat resistance**

Chemical resistance

► Tantalum

Special Material Screws
SNSTA



► MAT21

Special Material Screws
SNSMT



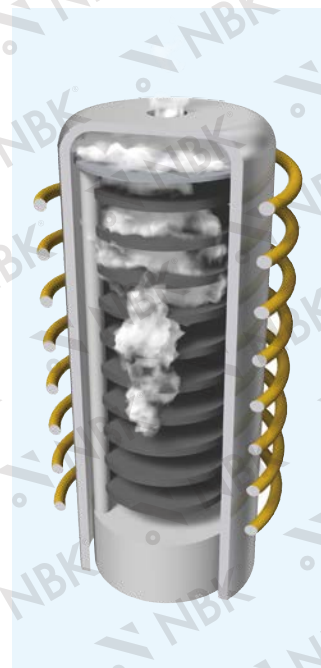
* MAT and MAT21 are registered trademarks of Proterial Corporation.

► Inconel 600 equivalent

Special Material Screws
SNSI



* INCONEL is a registered trademark of Special Metals Corporation.

► Screws Retaining Strength at 600°C [Learn More → P.39 Q:01](#)

|04. Semiconductor/lithography equipment

Photolithography process

Even the small screws used at joints enable exposure accuracy to be improved by suppressing the influence of reflection.

Characteristics required for special screws: **Anti-reflection**



► Low Temperature Black Chrome Treatment

Special Surface Treated Screws
SNSS-RY



► Stainless Steel Black

Special Surface Treated Screws
SNSS-BK

► Miniature Screws with high heat resistance [Learn More → P.42 Q:04](#)

|03. Coater/developer

Film formation process

► Improved production capacity is required

High-rigidity couplings are effective for the high-speed rotation required for photoresist film formation on the wafer.

Characteristics required for couplings: **High rigidity**



► High Rigidity

Disk Coupling
XHW-C



► Vibration-Absorption Capable Disk Type

Flexible Couplings
XGHW-C



► Component corrosion prevention is required

Screws with superior chemical resistance can be selected to withstand environments within equipment where chemicals are applied.

Characteristics required for special screws: **Chemical resistance**

► VESPEL

Plastic Screws
SPDC



* Vespel is a registered trademark of DuPont.



► Inconel 600 equivalent

Special Material Screws
SNSI



* INCONEL is a registered trademark of Special Metals Corporation.



► Low-Profile Bolts Galling in Clean Environments

[Learn More → P.41 Q:03](#)

