

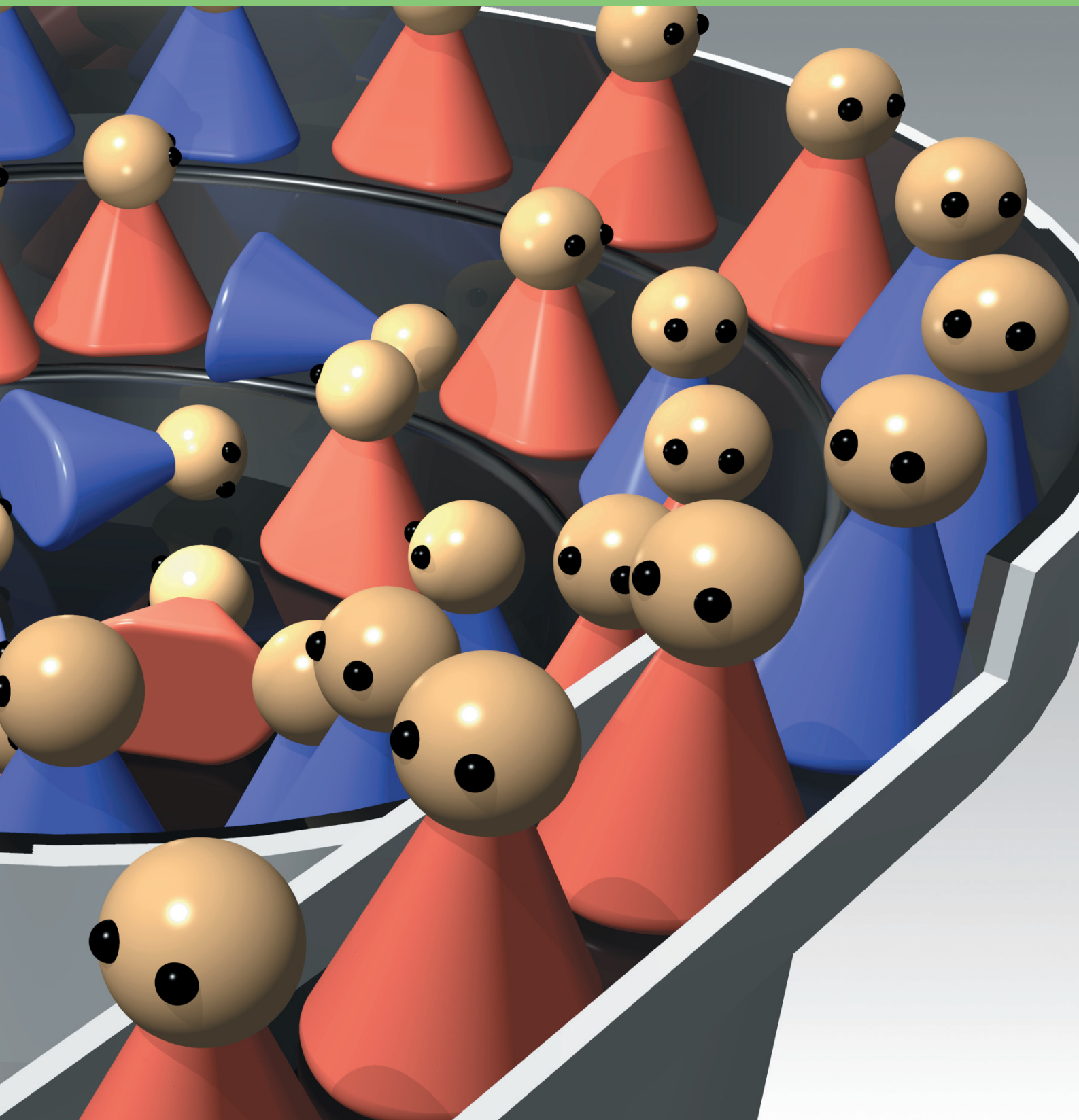
For New Technology Network

# NTN<sup>®</sup>

NTN corporation

# Parts Feeder Guide Book

CAT. No. 7019 / E



# *Parts Feeders Support Factory Automation.*

*Parts feeders are important for automating the production line and assembly system, and are used by an overwhelming majority of manufacturers in automated industries.*

*NTN Parts Feeders are excellent at high speed feeding and, due to a unique horizontal vibration system and isolated bottom, are vibration resistant.*

*NTN has extensively developed a series of products, and not just Parts Feeders, but also the related peripheral equipment necessary to contribute to an energy-conserving, high-speed production line and assembly system.*







# **NTN Parts Feeder Guide Book**

**Operation of Parts Feeder**

**Introduction of Applications**

**Selection of Bowl and Unit**

**Introduction of Series**

**Assembly Layout**

**Escapement and Peripheral Equipment**

**Consultation inquiries:**

# Operation of Parts Feeder

A parts feeder has three major functions: **storing**, **aligning** and **feeding**.

Aligning is the most important feature of the three. The parts are aligned using physical sensors in addition to the basic attachment aligning method.

This method aligns the parts within a series of shaped tracks and conveyances running inside or outside the bowl.

NTN's optimum aligning method ensures consistent production quality throughout automated lines, irregardless of the part's shape or size.

## ★ Born in the U.S. raised in Europe, matured in Japan

"Why would NTN, a bearing manufacturer, produce parts feeders?"

It's an interesting story. Here's a little background on how NTN became involved with parts feeders.

About 50 years ago, the parts feeder was invented in the United States by the Syntron Company. It was a simple device, composed of small magnets and a few plate springs, but it could convey parts one at a time by vibrating them on an upward slant.

Could the inventor have known how important parts feeders would be to manufacturing around the world? Syntron's parts feeders were popular first in the U.S. and the technology gradually spread, arriving in Japan around 1955. Sales of parts feeders expanded gradually.

Some years later, a European bearing manufacturer not satisfied with the feeding speed and stability of the Syntron parts feeder developed their own highly efficient parts feeder. This company had recently sold several production facilities to NTN and was also providing us with needle bearings. The parts feeders achieved satisfactory results at our own facilities, so NTN arranged

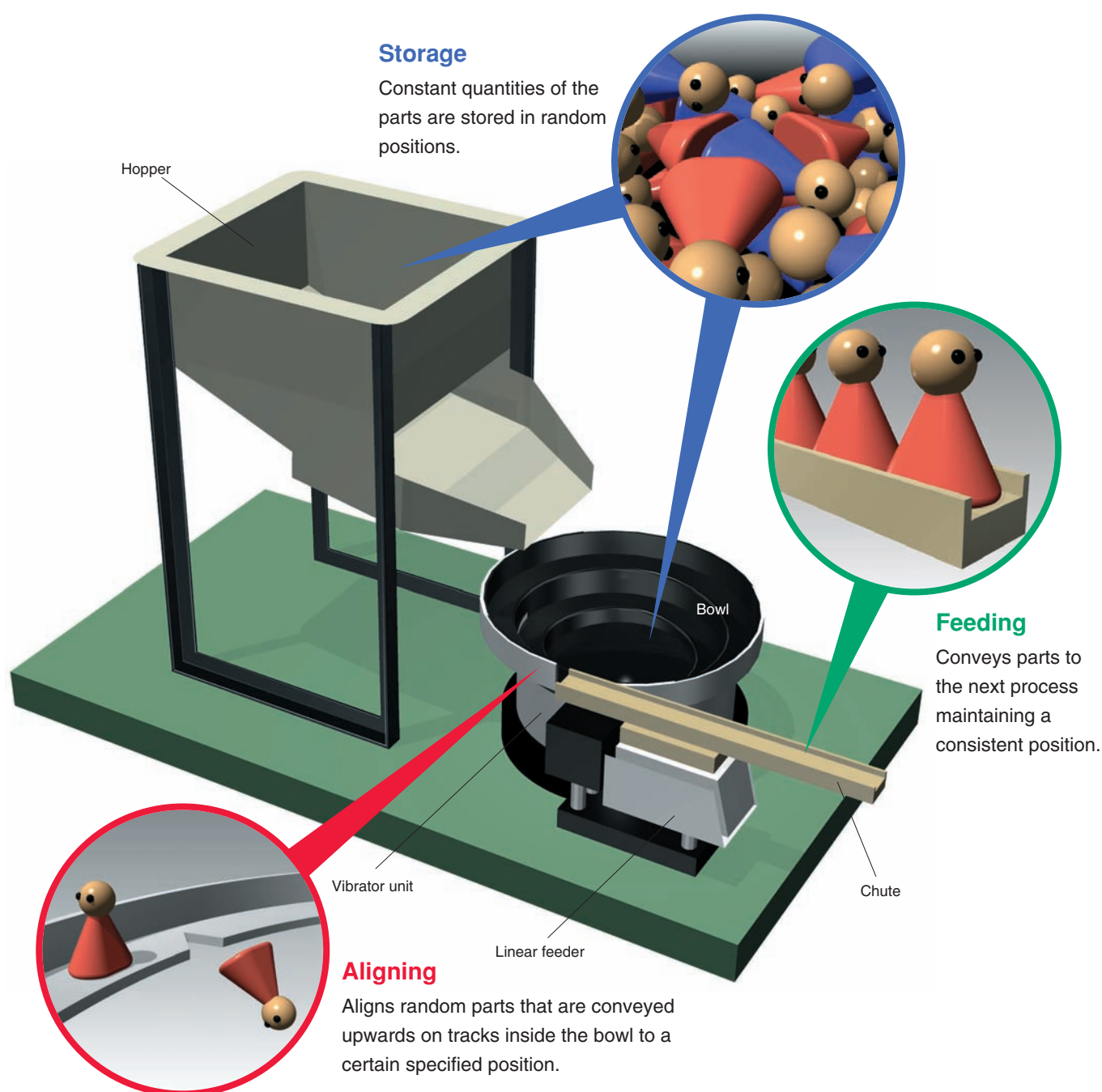


to begin production of this improved parts feeder—not only for use inside our own facilities, but also for general use in the Japanese market.

Since then, NTN Parts Feeders have become widely used in the Japanese market and we have introduced subsequent technological improvements, expanded the series' lines and expanded into servicing the peripheral equipment. NTN is now the leading manufacturer of parts feeders in Japan.

The Syntron method: born in the U.S., modified in Europe and brought to maturity in Japan by NTN.

*A parts feeder can align scattered parts in order and convey them in a consistent posture.  
The device seems to be just a magic box, but as a matter of fact, it incorporates precision mechanisms.*



**Standard composition of the parts feeder system**

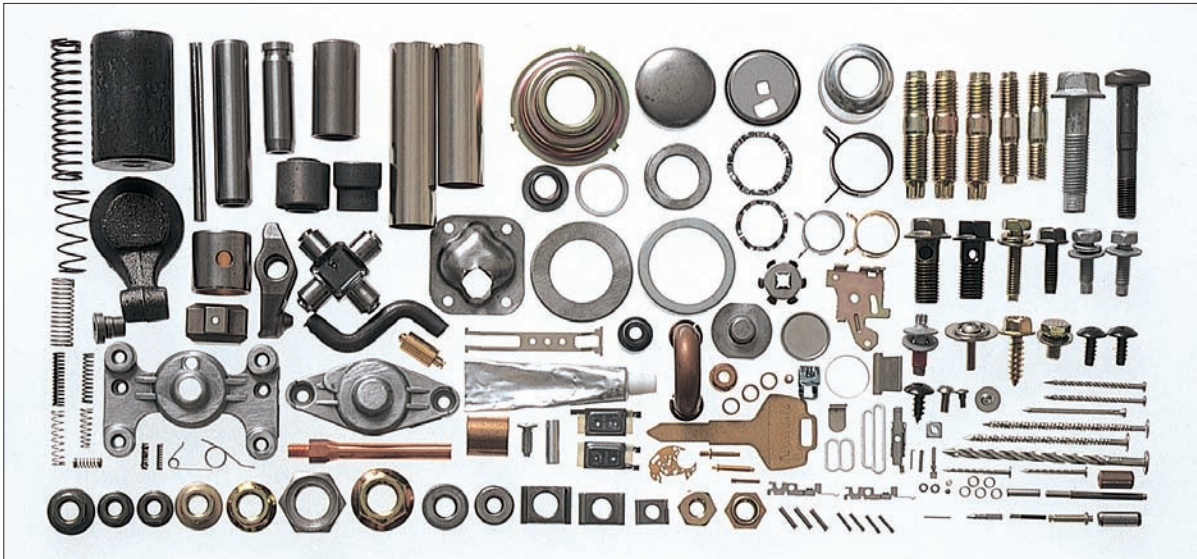


# Introduction of Applications

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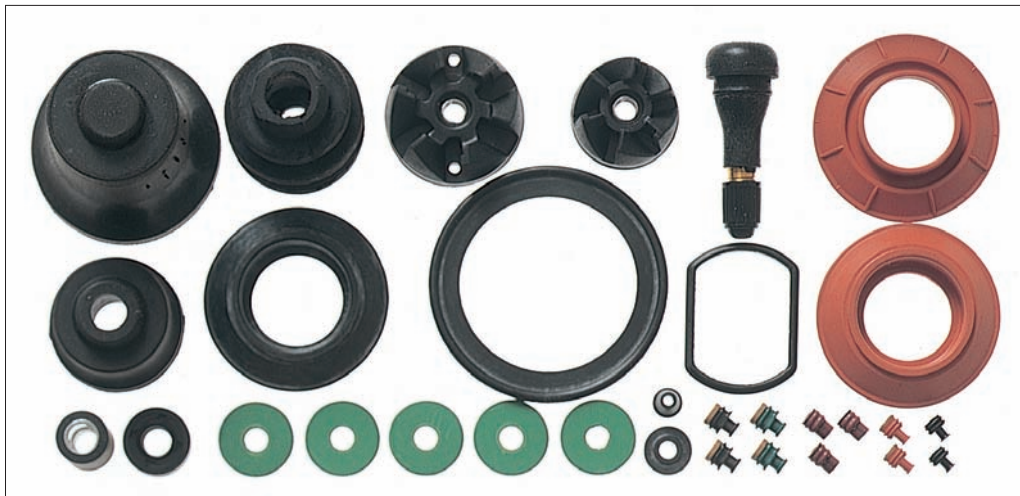
- **Metallic parts**

NTN parts feeders can align and feed anything from general nuts and bolts to specific industrial metal parts. For feeding springs which are easily tangled, the parts feeder is provided with a special unraveling mechanism.



- **Rubber parts**

Rubber parts are soft and thought to be difficult to feed due to rubber's large coefficient of friction, but NTN parts feeders can align and feed rubber parts using technologies we have developed such as matching the vibration characteristics with the rubber's characteristics and a special-processing of the bowl.



*While NTN part feeders are used in applications handing a wide range of uniform parts it also handles parts that may surprise you.*

### • Plastics

As the engineering of various molded plastic parts improves, their shapes tend to become more complicated.

NTN parts feeders' optimum aligning and feeding systems can accommodate complicated shapes.



### • Electronic equipment parts

A variety of feeder systems are available from NTN for electronic parts, from transistors to condenser or microchip components. Special units for high speed, high frequency operation can be prepared.



### • Foodstuffs

NTN parts feeders can convey various foodstuffs, such as candies and crackers, products in cartons such as ice cream or dry soups, or other packaged goods. The parts feeders can accommodate the wide ranges of size, shape and weight.

### • Medical equipment

NTN parts feeders are important contributors to the clean environments required in the manufacture of medications in pill or tablet form, as well as for medical equipment, such as syringes.



# Selection of Bowl and Unit

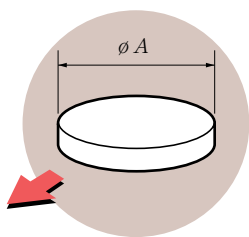
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When selecting a parts feeder, first determine the bowl size and type and then the feeder unit. The graphs below and on the following pages will identify the three basic shapes of most parts and the bowl dimensions (for either a cylindrical or stepped bowl) and feeder unit to accommodate them.

As a practical matter, consider all of the variables, such as the shape, material, weight, feeding capacity, feeding position and feed-in quantity. The graphs serve as a standard guideline.

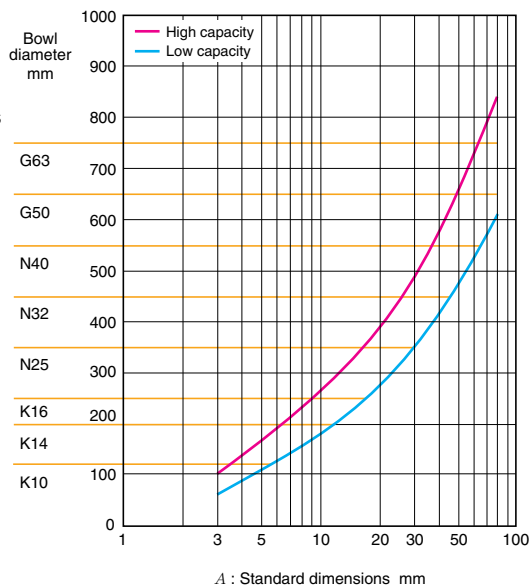
Literature cited: For the Application of Parts Feeder/Japan Parts Feeder Industrial Committee.(Oct.1994)

## Standard graphs to select the bowl size and feeder unit.

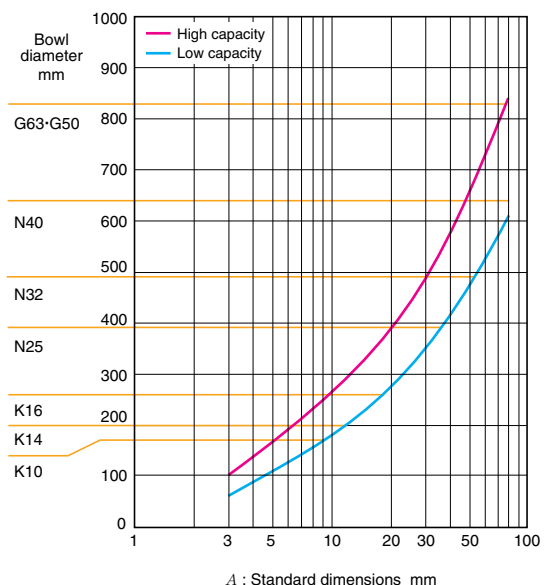


A : Standard dimensions

### ■ Cylindrical bowl

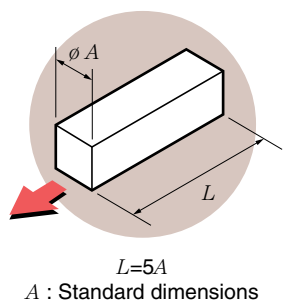


### ■ Stepped bowl

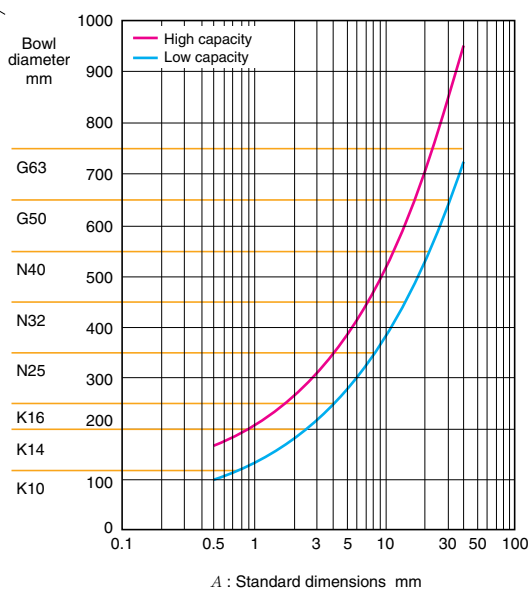




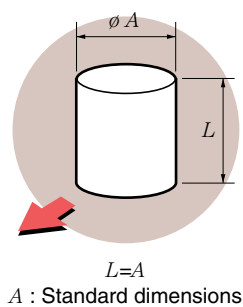
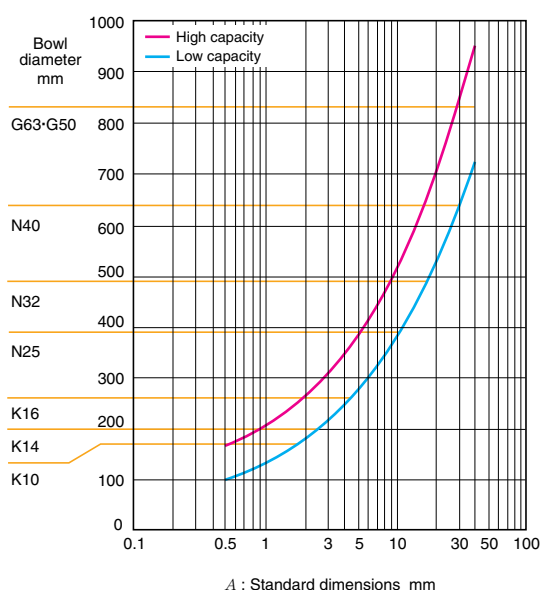
An NTN parts feeder enables you to choose the optimum system among a range of feeders.



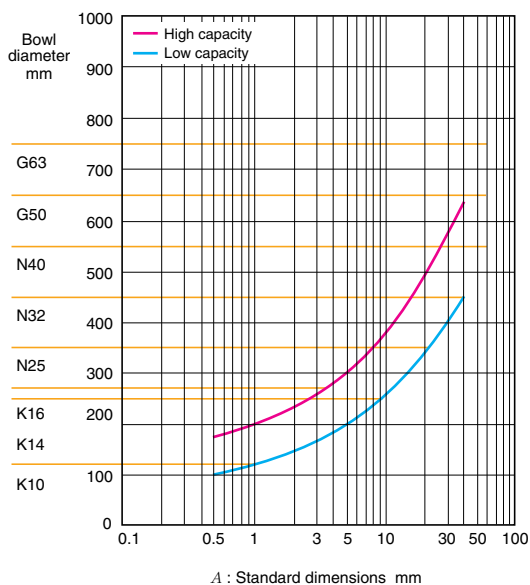
### ■ Cylindrical bowl



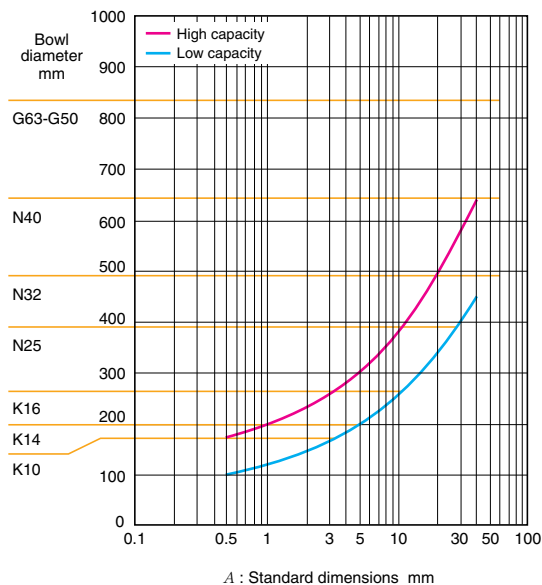
### ■ Stepped bowl



### ■ Cylindrical bowl



### ■ Stepped bowl



# Introduction of Series

## ● Bowl feeder series



### *K-series*

Aligns and conveys minute parts such as electronic parts and others.

- Maintains a stable and suitable full-wave vibration for aligning microparts.
- Easy spring adjustment due to a convenient cover-less construction.



### *F-series*

Conveys minute parts at high speed.

- Smoother feeding of parts at a higher speed than K series is possible by adopting a unique horizontal driver as small models and a suitable attachment angle of plate spring.



### *HF-series*

Precision conveyance of microparts such as electronic parts for chips.

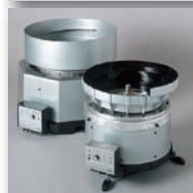
- Using the combination of a horizontal driving system and a high frequency driver, the precision feeding of parts at high speed is possible.



### *N-series*

Conveys middle size parts.

- Adopting the traditional isolated bottom and a horizontal driving system, this best-selling series is a typical NTN parts feeder that provides stable operation and high durability.
- An auxiliary hopper can be attached to the bowl to easily increase the storage capacity of parts.



### *G-series*

Aligns and conveys large and heavy parts.

- Adopting the powerful double spring unit, it can also readily handle large amplitude operation using a large size bowl.
- As with the N-series models, the isolated bottom can be provided. Even though heavy parts are thrown in, it maintains a stable feeding speed.

## ● Bowl series



### *Precision cut-out bowl*

Suitable for aligning and feeding minute parts.

- Various high precision track shapes can be formed because of precision machining.



### *Stepped bowl*

For general purposes (universal type)

- Clogging of parts does not occur in the bowl.
- Two materials are prepared: cast aluminum alloy which is very light and stainless steel which enables an easy assembly of attachment.



### *Cylinder bowl*

For general purpose and special applications.

- Installation of long attachments with complicated shapes are possible.
- Setting of the attachment is easy since the external form is even.



### *Cone bowl*

For general purpose.

- Clogging of parts does not occur in the bowl.
- Setting of the attachment is easy since the external form is even.



### *Dish bowl*

For high speed feeding of thin parts.

- Flat parts can be easily supplied at a high speed by providing slim tracks.

Various types of parts feeder can treat a wide variety of parts.

## Controller series



### Standard controller

General purpose amplitude control and ON/OFF control sensors.

- General purpose controller provided with many operational features and lots of variations.



### Constant voltage controller

Applicable where the power source voltage fluctuation is intense or facilities requiring 24-hour continuous operation.

- Prevents troubles due to power source voltage fluctuation and provides a stable continuous power supply.



### Constant amplitude controller

Applicable to conveyance facilities for heavy items such as auto parts.

- Compensates automatically the change in the feeding speed due to the weight of parts to ensure a stable feeding.



### Variable frequency controller

Feeders can be operated regardless of the power source frequency.

- The conventional troublesome plate spring adjustment according to the weight of bowl and chute is unnecessary.
- Adjustment is unnecessary even though the equipment receives the different power frequencies.
- There are analog type controllers, variable frequency controllers (for the high frequency wave) and the newly developed digital control system variable frequency controllers. This controller has a highly stable frequency and more micro-computerized functions.



### Constant voltage twin controller

Suitable when using the combination of parts feeder and linear feeder.

- It is possible to control both the parts feeder and the linear feeder at the same time using one controller.
- Stable power voltage supply even if a power source voltage fluctuation occurs since the constant voltage circuit is installed.



### Timer unit

Applicable to expand functions of each controller

- It is possible to add functions of the ON/OFF control sensors and valve-drivers while in operation by adding this unit and connecting it with a controller.

## Linear feeder series



### S-series

General model (for conveyance to automated machines by combining with NTN Bowl Feeders series).

- The high-sturdy vibrator unit and the design of strong springs provide a uniform feeding speed and stable operation over a long period of time.
- Easy installation and adjustment location using the fitted base.



### HS-series

For the precision conveyance of microparts such as electronic chips.

- Used in combination with the NTN bowl feeder HF-series, the precision feeding of parts at high speed is possible.



### L-series

For high speed conveyance of thin parts.

- Introducing the horizontal driving system based on an entirely new principle of operation, smooth feeding with few jumps at a high speed is possible.
- Chute can be easily designed....The feeder can be driven with a good balance by placing the center of gravity of the chute at the center of the upper vibrator.

## Hopper series



### Detached hopper

Contains a high volume at storage and supplies a wide range of parts from small parts to large billets matching the bowl feeder series.

- Stable feeding of light works and heavy works is possible.



### Space-saving type hopper

Most suitable for saving installation space.

- The work storage tank is mounted above the parts feeder to make the installation space compact.
- The tank can be easily moved up and down, also turned to the rotation direction. It enables the easy maintenance of attachments and parts feeder.



### Automatic auxiliary hopper

For the storage and supply of parts which are light and have complicated shapes that conventional auxiliary hoppers cannot handle.

- A completely air-driven control moves the hopper up and down, eliminating the necessity of the electrical installation for a control panel.
- Similar to the conventional auxiliary hopper in the bowl, it saves space and is easy to detach.

### Rotary hopper

This separate type storage hopper can feed object such as fine powder to minute parts.

- Capable of discharging minute parts with minimal discharge rate hardly fluctuation.
- Works are discharged by the rotation of the drum which eliminates the generation of excess noise and vibration which is inherent to vibration type hoppers.



# Assembly Layout

<Typical combinations of products and boundary dimensions of combination> .....

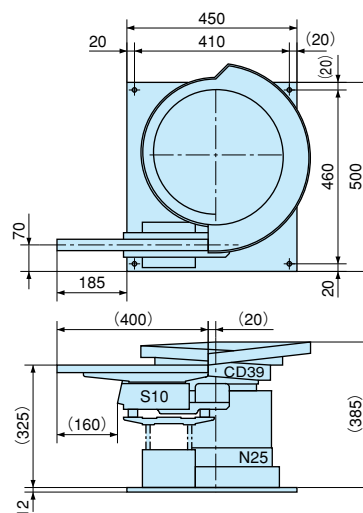
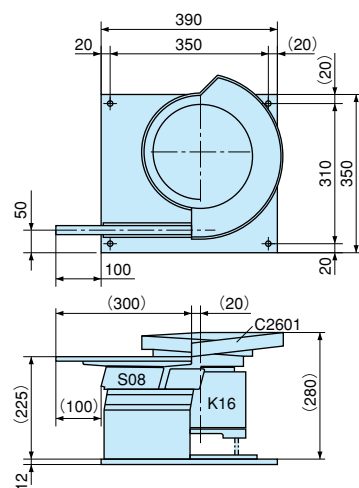
<div>Model</div> <div>Combination</div>	K10	K14
<div>Parts Feeder + Linear Feeder</div>		
<div>Parts Feeder + Linear Feeder + Detached Hopper</div>		
<div>Parts Feeder + Linear Feeder + Space-saving Type Hopper (Rotary hopper)</div>		

Note \* Parts feeders shall use the stepped bowl specifications.  
\* N25, 40 and G50 shall be in the free set base specifications.

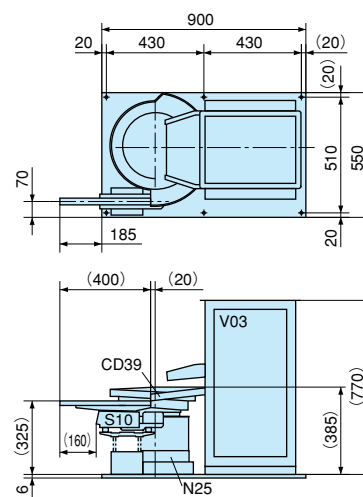
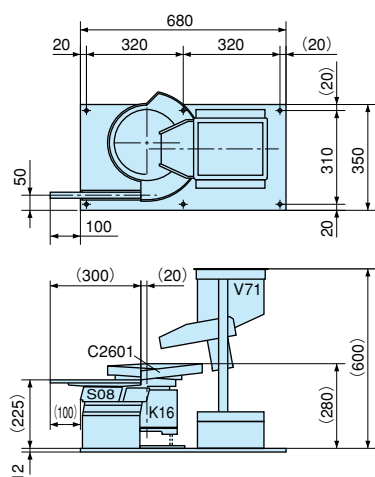
For the customer who has difficulty in providing enough space, a space-saving model is available.

Model	K16	N25
Combination		

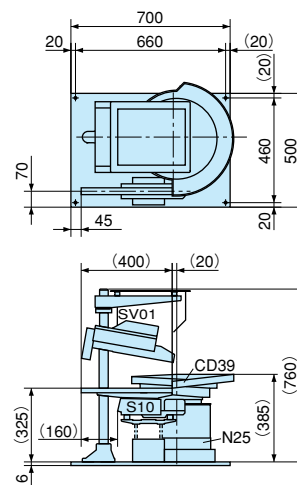
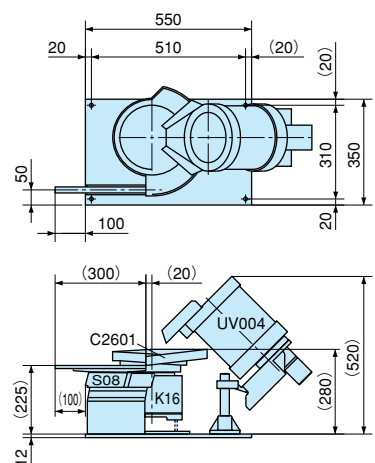
Parts Feeder  
+  
Linear Feeder



Parts Feeder  
+  
Linear Feeder  
+  
Detached Hopper

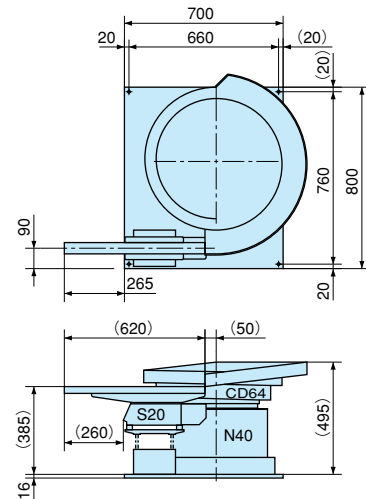
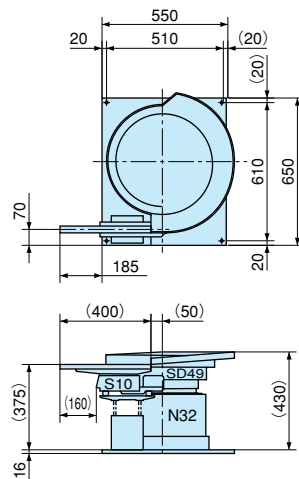


Parts Feeder  
+  
Linear Feeder  
+  
Space-saving  
Type Hopper  
(Rotary hopper)

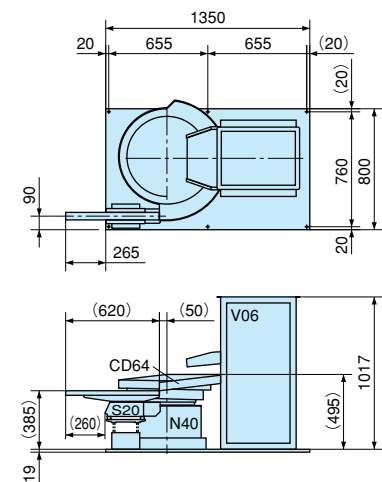
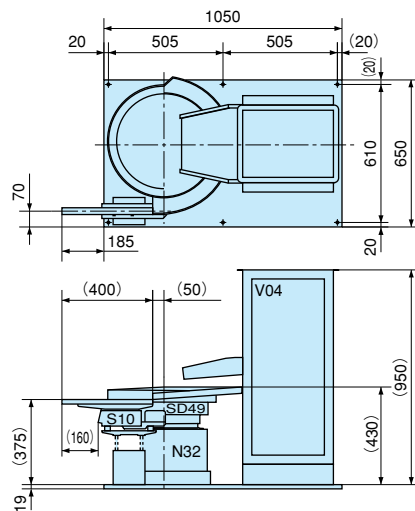


Model	N32	N40
	Combination	

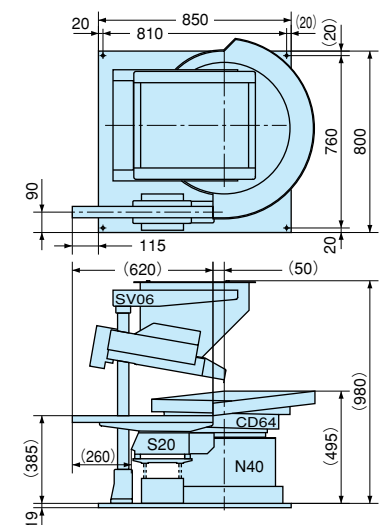
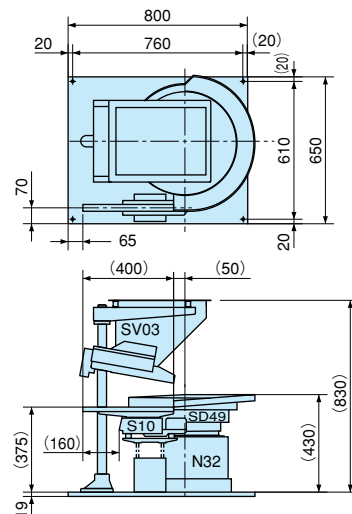
**Parts Feeder  
+  
Linear Feeder**



**Parts Feeder  
+  
Linear Feeder  
+  
Detached Hopper**



**Parts Feeder  
+  
Linear Feeder  
+  
Space-saving Type Hopper**

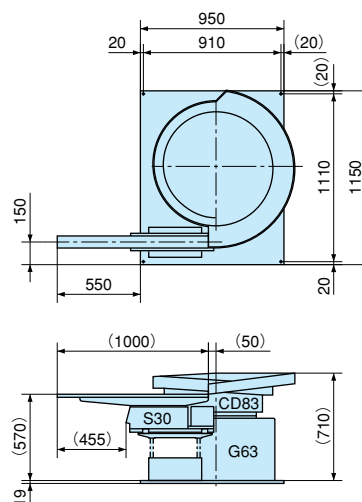
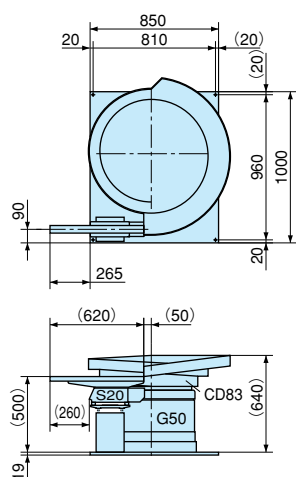




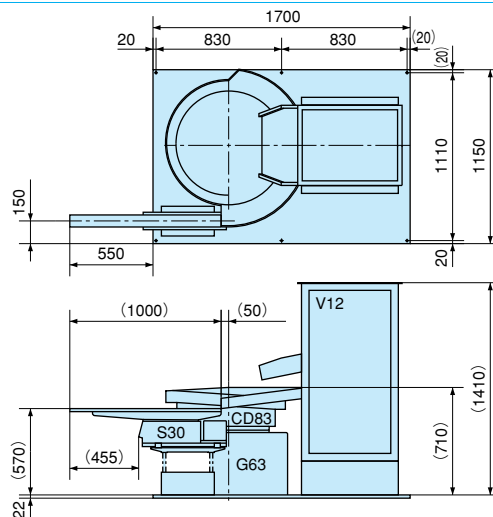
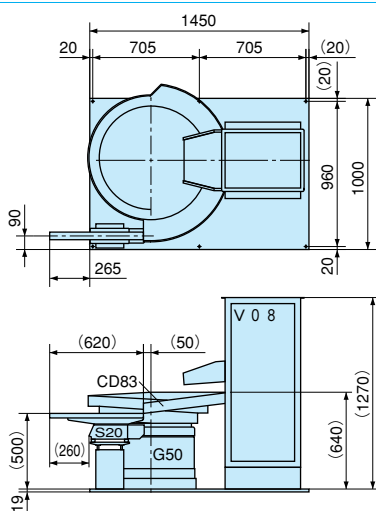
Note \* Parts feeders shall use the stepped bowl specifications.  
\* N25, 40 and G50 shall be in the free set base specifications.

Model	G50	G63
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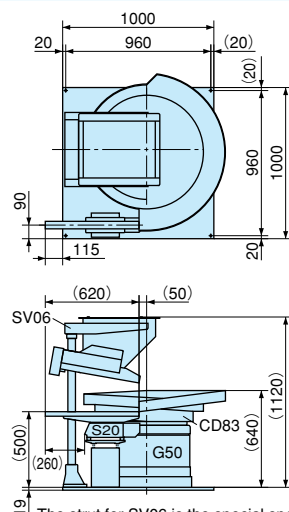
Parts Feeder  
+  
Linear Feeder



Parts Feeder  
+  
Linear Feeder  
+  
Detached Hopper



Parts Feeder  
+  
Linear Feeder  
+  
Space-saving Type Hopper



The strut for SV06 is the special specification.

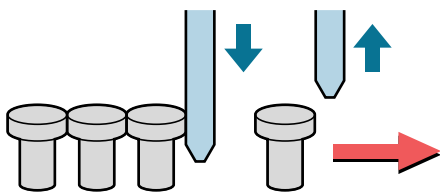
# Escapement and Peripheral Equipment

## Escapement

The word, "escapement" means to detach and separate parts one at a time or in several pieces which are conveyed forward continuously after aligning by the parts feeder.

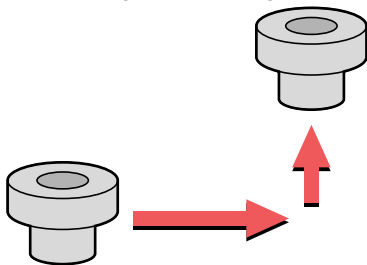
- **Separating one part.**

Using a cylinder, it separates a part.



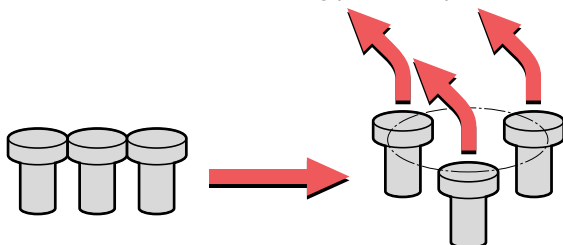
- **Lift-up.**

A part is elevated using the hole as a guide.



- **3-row feeding by pneumatic pressure.**

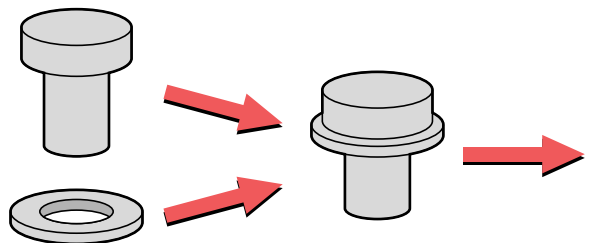
This process distributes parts in single row alignment into three rows and feeds them using pneumatic pressure.



NTN can suggest the most suitable escapement to match the customer's requirements using our many years of experience.

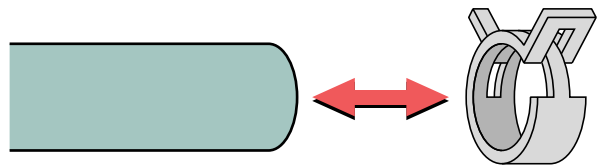
- **Combining.**

Combines parts fed separately and sets them mechanically.



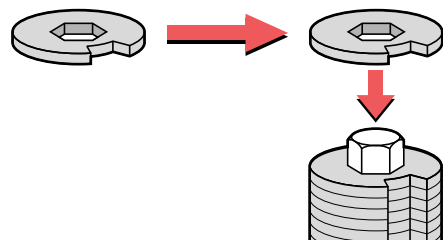
- **Assembly of the hose clamp.**

Loosens the hose clamp metal fitting and loads it onto a hose.



- **Stacking.**

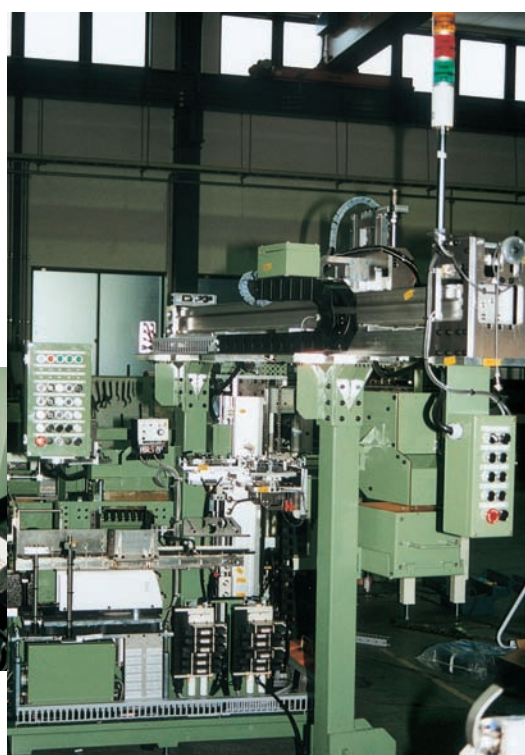
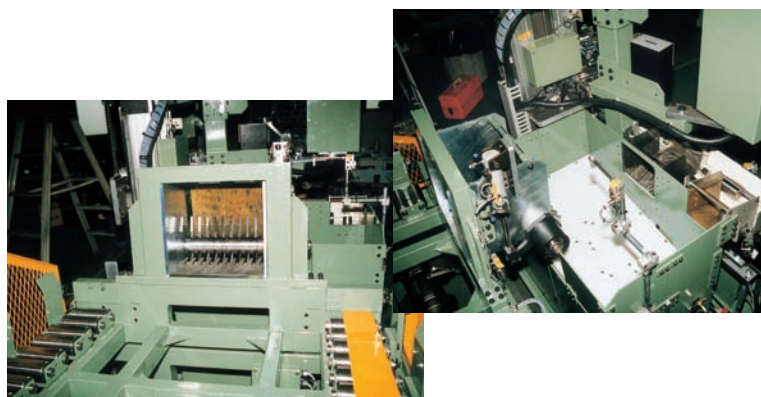
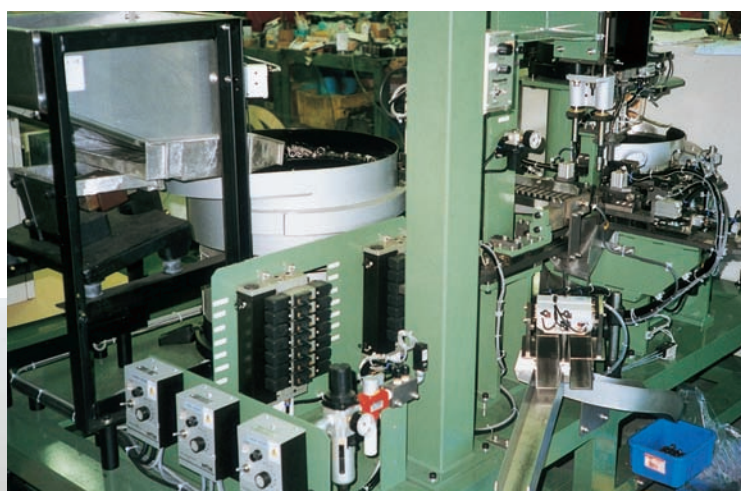
Aligns notched parts in the same direction, and skewers them onto a rod.



*Satisfactory presentation of the escapement and peripheral equipment enables customers to receive efficient and flexible service from us.*

### Peripheral equipment.

We can suggest the automated and energy-saving unit to match the customer's requirements such as the parts assembly unit, aligning and feeding units, testing and selection units by utilizing our feeding technology experience in developing parts feeders.





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## NTN Parts Feeder Estimation Request

- Fill in the necessary information in the blanks and send it to NTN by FAX.

Please paste your business card. (Or fill in the following items.)		Date : _____
		Quotation expiration date : _____
Company : _____		
Department : _____		
Person in charge : _____		
Phone : _____		Fax : _____

Work name/work material/condition		/	/	dry · rinse · oil · others
Feeding rate	Feeding rows	(     ) pieces / minutes / rows		(     ) rows
		Cycle time (     ) sec./ (     ) pieces (     ) rows		(     ) rows
Combined machine		Assembling machine · Forming machine · Inspection machine Others (     )		
Work posture at the parts feeder's exit.  (Customer shall present the work drawing to us.)		Side view at the exit		Front view at the exit.
		Mark the forward direction with an arrow.		
Remarks and Requests				

For your inquiries, refer to