TOHSHIN TECHNICAL CO., LTD.

CREATE IT FIRST and THINK IT

Ring Grinding Solution

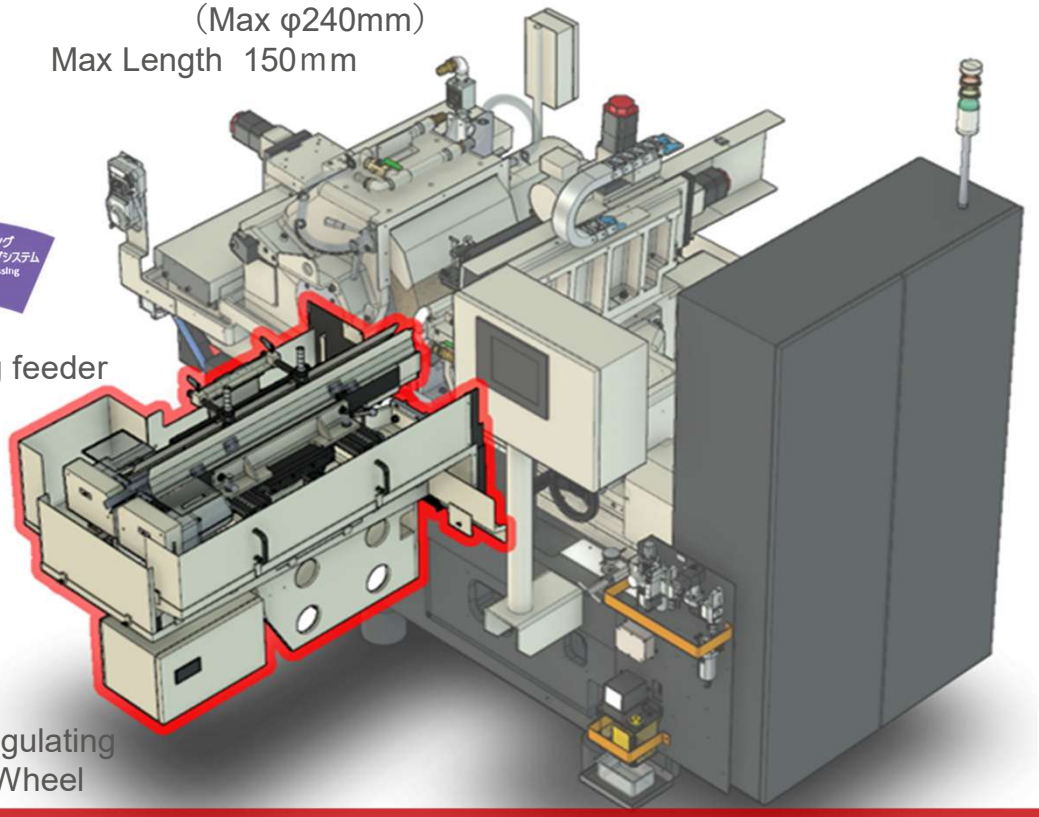
Challenges

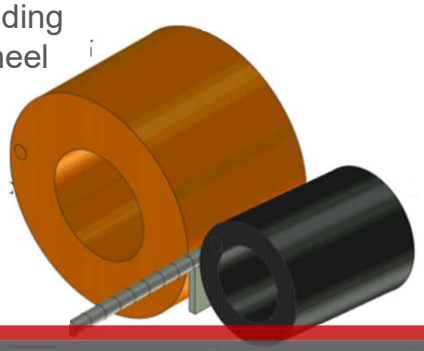
- Takes a long time for setup.
- Machining accuracy is unstable.
- Lack of know-how for ring grinding.

Proposal

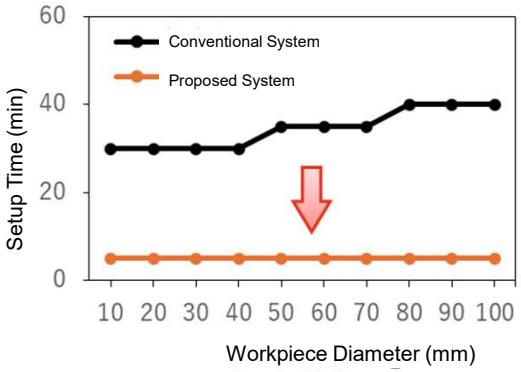
- Centerless grinding machine with ring feeder
- Running dress function
- Ring grinding expertise

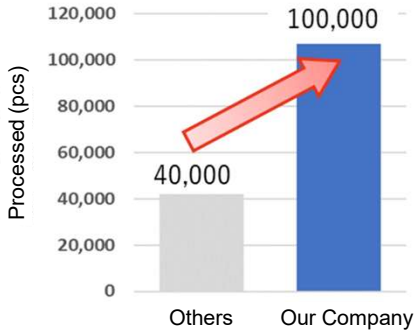
Workpiece ⌀20-55 mm
（Max φ240mm）
Max Length 150mm





Results





Ring Grinding Process

Ring grinding typically uses a ring feeder (RF) system. Achieving stable, high-quality grinding requires precise alignment between the workpiece being ground and those on the RF, accurate guide positioning, optimal ring contact points, and extensive know-how.

Total Grinding System

Our centerless grinder with RF includes setup support functions that automatically adjust the regulating wheel slide position and blade height. It also features a running dressing system that enables in-process dressing without stopping production. We will also share our proven grinding know-how and practical tips based on years of experience.

Key Benefits/Results

Setup time is significantly reduced, as manual adjustments such as blade height, guide position, and workpiece protrusion are no longer required. Productivity improves by approximately 2.5 times compared to conventional systems, enabled by continuous grinding and in-process dressing.

TOHSHIN TECHNICAL CO., LTD.

＜Internal Group Case＞

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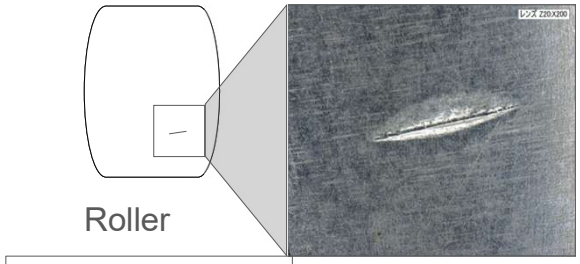
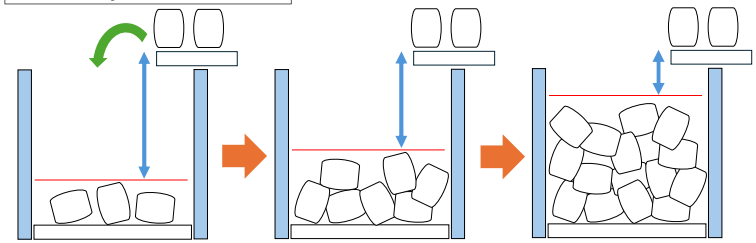
Reduction of dent occurrence rate at the 1μm level

Challenges

Dropping rollers from a high position into the steel container causes dents from collisions with the container or other rollers.

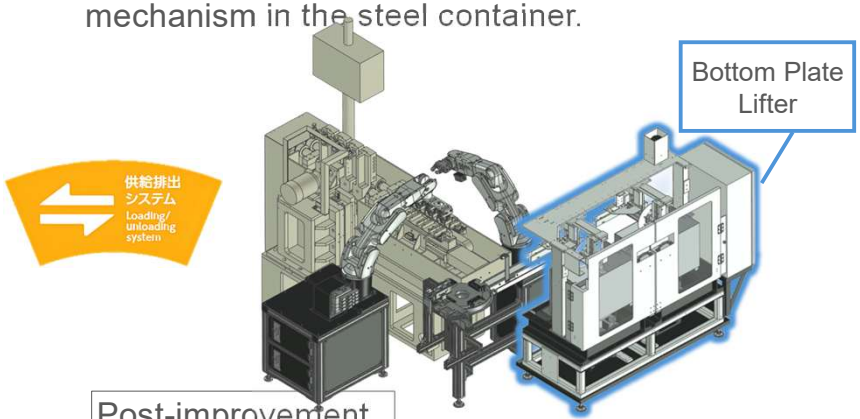


Pre-improvement

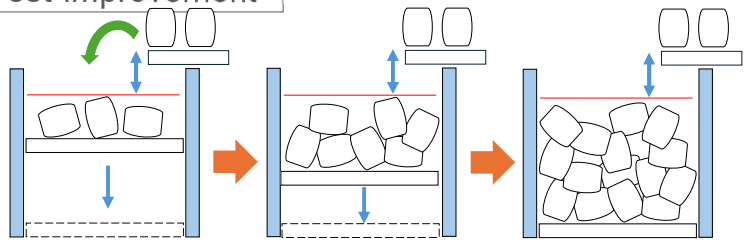


Proposal

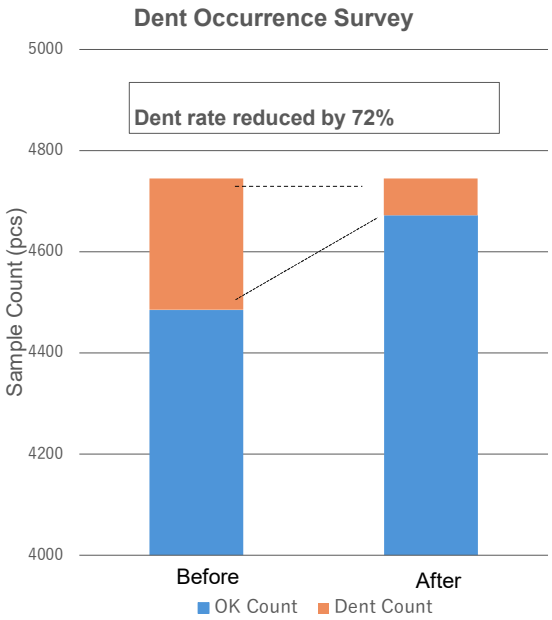
Introducing a height-adjustable bottom plate mechanism in the steel container.



Post-improvement



Results



Dent Occurrence

Dents on rollers mainly occur on the grinding surfaces (outer diameter and end face), the R surfaces, and the chamfered areas (bottom and edge). Collisions between rollers, steel containers, and tooling cause dents, with depths typically ranging from 1 to 5 μm.

Automatic Bottom Plate Lifting Mechanism

To prevent dents, drop height must be minimized. This system starts with the bottom plate in a raised position at the beginning of production and gradually lowers as the number of stored rollers increases. It keeps drop height consistently low.

Improved Yield Rate

By reducing impact force from drop height, dent occurrences decreased from 5.5% to 1.5%, achieving a 72% reduction. Tohshin Technical continues to propose equipment and peripheral systems aimed at improving quality and creating an environment for stable production of good products.

TOHSHIN TECHNICAL CO., LTD.

＜Case Study Within the Group＞

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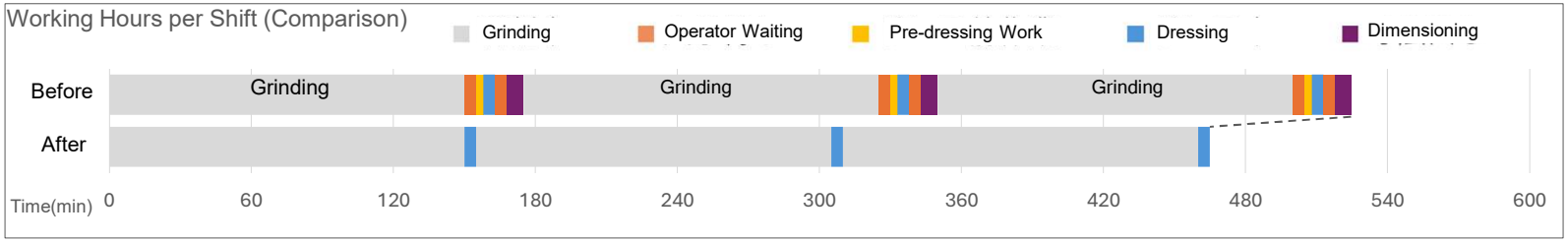
Automation of Interval Dressing

Challenges

- Production Start
- Interval Dressing Production Stop
- Operator Wait Time **15 min / shift / machine**
- Pre-Dress Operations **9 min / shift / machine**
- During Dressing
- Operator Wait Time **15 min / shift / machine**
- Measurement Output **21 min / shift / machine**

Results



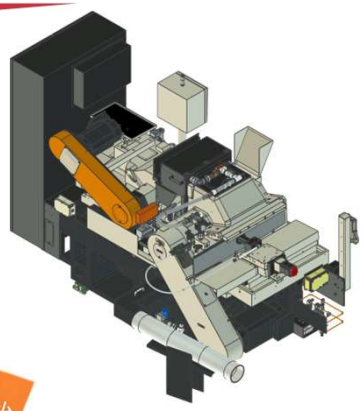
Proposal

・Replace the grinding and G-dressing valve with a solenoid valve
⇒Automate pre-dress operations

・Use an in-process gauge for measurement feedback
⇒Automate post-dress accuracy adjustments

ツルーイング ドレッシングシステム Truing/dressing system

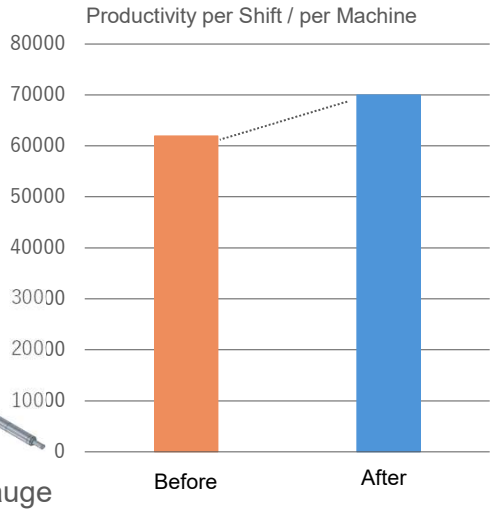
計測フィードバックシステム Measurement feedback system



Centerless Grinding Machine

Solenoid valves

In-process gauge



On-site Work

Upon reaching the interval dressing cycle, production stops and a warning is issued via the signal lamp. However, there is a noticeable delay before the patrolling operator begins the required pre-dressing procedures. These procedures involve manually switching the valves for the grinding and G-dressing section, and initiating the dressing operation.

Interval Dressing Automation

At the interval dressing cycle, solenoid valves for the grinding and G-dressing sections switch automatically, and dressing is executed. After completion, the valves switch back, and production resumes automatically. Using an in-process gauge for measurement feedback further reduces operator wait time after dressing.

Productivity Improvement

Eliminating pre-dressing tasks and manual size measurement cuts labor by 30 minutes per machine per shift. For 4 machines, this saves 2 hours per shift. Removing operator wait time reduces production downtime by 60 minutes per machine, boosting productivity by 13%.

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Automated Operation for Ring-Shaped Workpieces

Challenges

[Through-feed Grinding]

- Setup time is long when changing workpiece types
- Requires two operators for continuous grinding

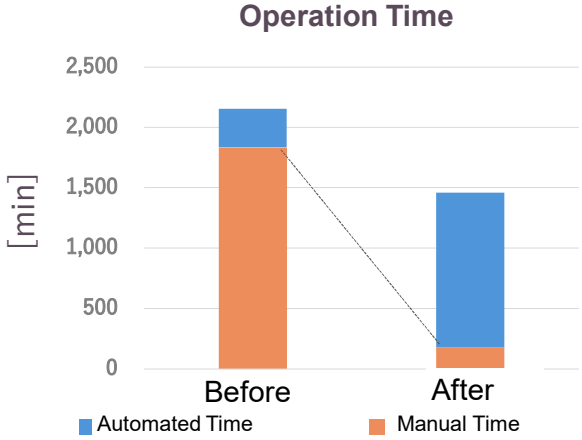
Proposal

[Infeed Grinding]

- Reduced setup time through external (offline) setup
- Faster precision adjustment with in-feed mechanism
- Automatic loading/unloading to the blade section by robot
- Automatic measurement and size compensation using an in-process gauge

Workpiece: ⌀100-200 mm
Maximum length: 39 m m

Watch the video



Challenges of Manual Operations

During setup for workpiece type changes, significant time is spent on precision adjustments of guides and ring feeders. In continuous grinding processes, two operators are required per machine to maintain operations.

Increased Automated Operation Time

External setup and in-feed mechanism eliminated adjustments, greatly reducing setup time. Robotic loading/unloading with automatic measurement and compensation enables fully automated operation.

Benefits of Implementation:

Manual operation time was cut to about one-tenth, and automated operation time increased by nearly 4 times. Adding end-face runout and surface roughness measurements enables simultaneous evaluation of accuracy beyond outer diameter.

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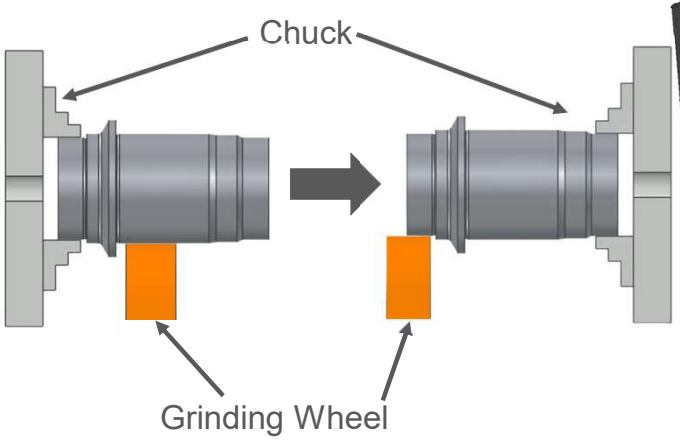
High Precision Grinding for Multi-Step Workpieces

心なし研削盤 Centerless Grinders | 供給排出システム Loading/unloading system | 計測フィードバックシステム Measurement feedback system

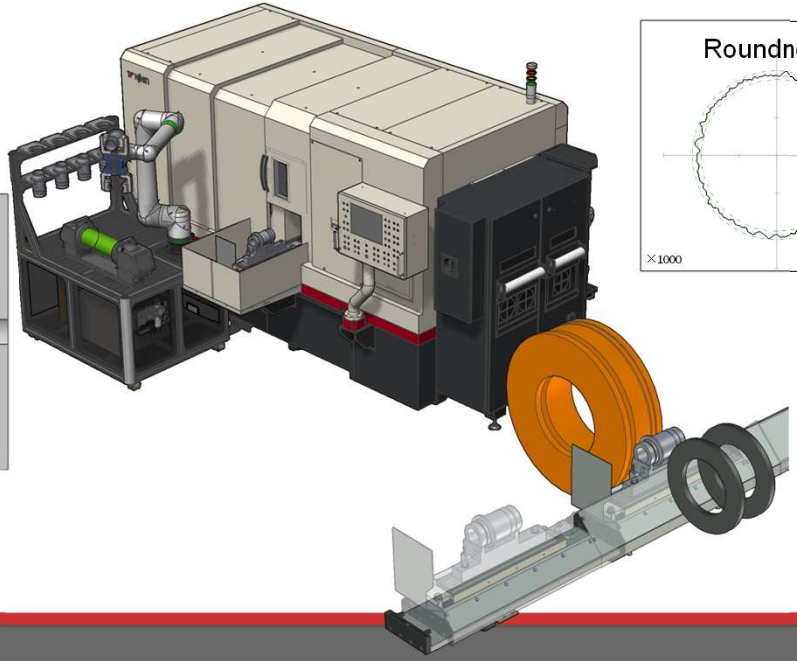
Challenges

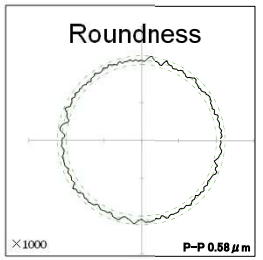
- No center hole, full circumference grinding is not possible
- Time-consuming centering work due to re-clamping
- Multiple grinding locations increase processing time



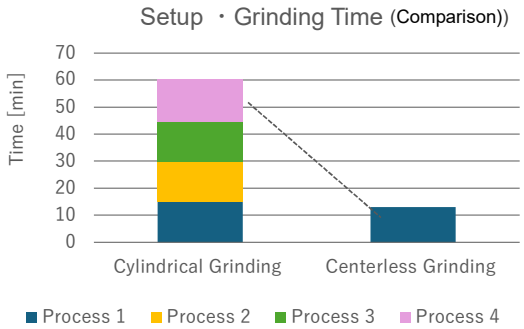
Proposal

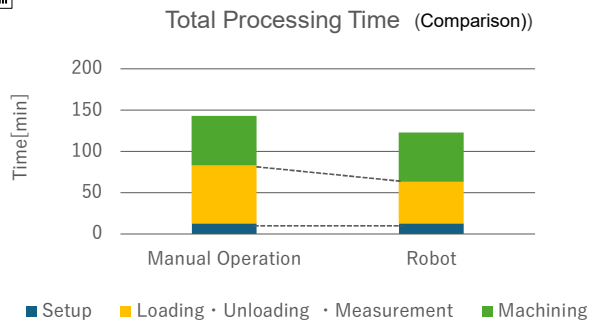
- Centerless Grinding Machine TO-6040 Ⅱ TM-IF
- Workrest Sliding Mechanism + Robotic System





Results





Processing Method for Multi-Step Workpieces

When using a cylindrical grinding machine, machining a multi-step profile workpiece without a center hole requires re-clamping for each section. This often leads to misalignment of the center and chuck marks on the workpiece surface.

Three Principles of Centerless Grinding Machines

Free Support・Regenerative Centering
・Friction Braking

Total Grinding System

By combining a workrest slide-type infeed centerless grinding machine with a robot and an in-process gauge, the entire process—from loading and unloading to measurement—can be fully automated.

Key Benefits/Results

No axial misalignment occurs since all stages are machined simultaneously. Chuck marks are eliminated by free support through centerless holding. Full automation reduces loading time from supply to discharge and measurement by 28%. Measurement consistency improves, minimizing variation from manual inspection.
This enables stable, high-precision machining regardless of operator skill.

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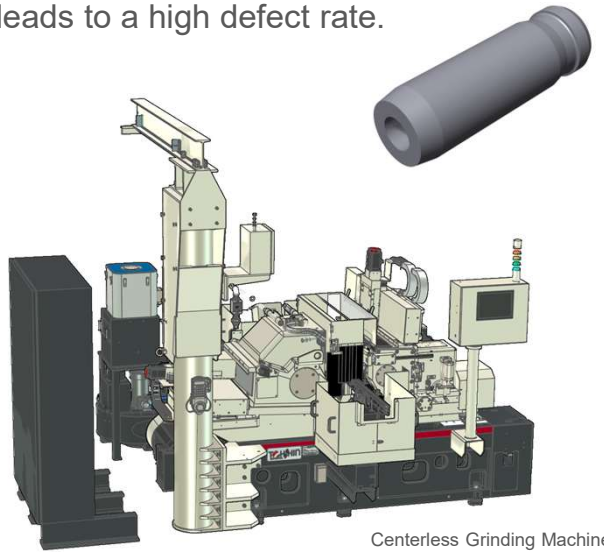
Machining Quality Improvement of Sintered Materials

Challenges

- The grinding wheel wears quickly, requiring frequent dressing.
- Large outer diameter variation leads to a high defect rate.



Centerless Grinding Machine:TO60Ⅱ

Proposal

- Grinding wheel with micro-fracturing abrasive grains to create fresh cutting edges, extending wheel life

研削砥石 Grinding wheel

- Grinding fluid with superior cooling performance to reduce the impact of processing heat

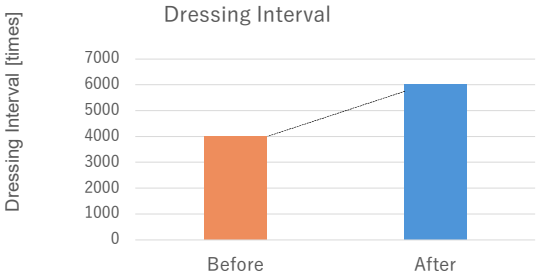
研削液と処理システム Coolant and coolant system

- Higher rigidity centerless grinding machine to reduce dimensional variation caused by machining load
- Insulated structure to minimize dimensional variation from processing heat

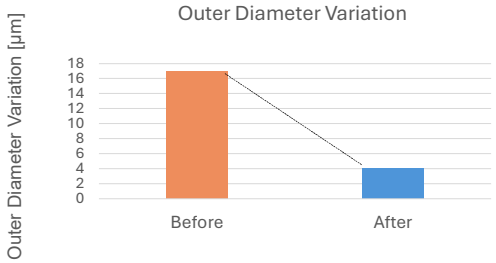
心なし研削盤 Centerless Grinders

Results

Dressing Interval Improved by 50.0%



Outer Diameter Variation Reduced by 76.5%



Requirements for Sintered Materials and Grinding Machines

Sintered materials made by powder metallurgy enable easy formation of complex, near-net shapes, reducing pre-grinding steps and boosting productivity. This raises demands for grinding machines to achieve higher productivity and stable quality.

Total Grinding System

Tohshin Technical offers a Total Grinding System approach, addressing customer challenges not only through centerless grinding but with a multidimensional strategy, proposing various solutions to effectively resolve issues.

Toward Higher Efficiency and Precision

By applying solutions derived from extensive machining experience, we have increased actual machine uptime and improved productivity. Additionally, high-precision machining has become achievable. Aiming even higher, we will continue to take on new challenges by leveraging group synergy.

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Long Workpiece Grinding Solution

Challenge

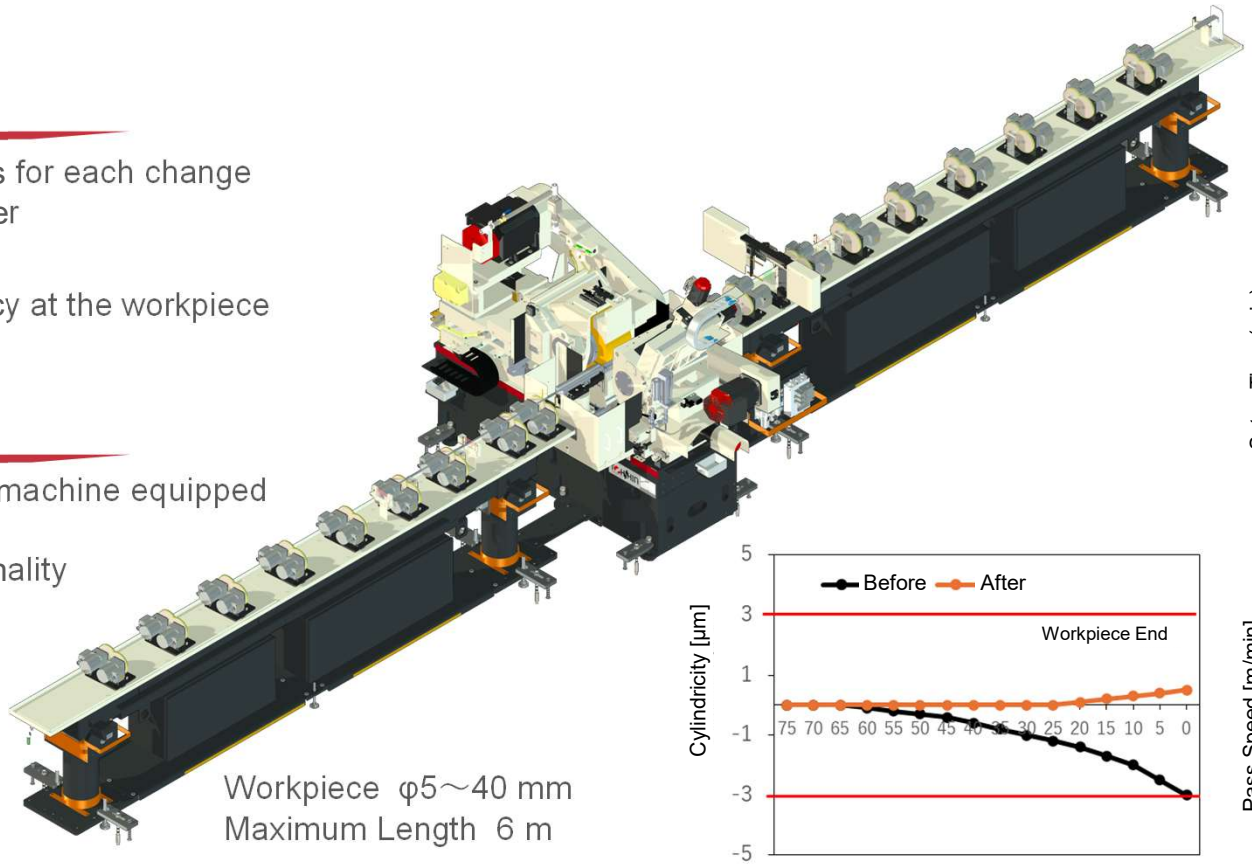
- Setup time increases for each change in workpiece diameter
- Grinding time is long
- Dimensional accuracy at the workpiece end is unstable

Proposal

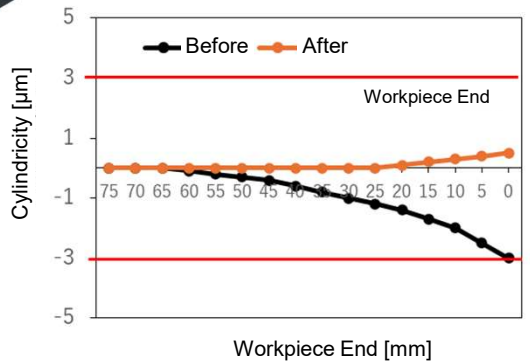
- Centerless grinding machine equipped with a bar feeder
- Setup-assist functionality

心なし研削盤 Centerless Grinders

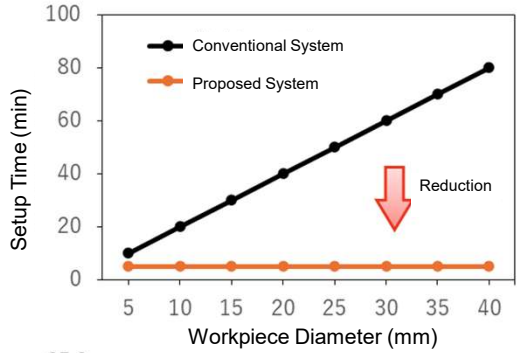
供給排出システム Loading/unloading system

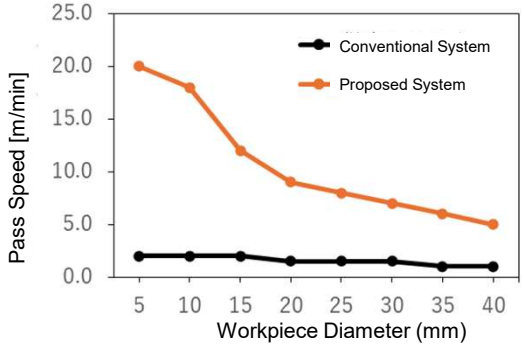


Workpiece φ5～40 mm
Maximum Length 6 m



Results





Long Workpiece Grinding

In long workpiece grinding, standard centerless grinders with fixed grinding wheels experience frequent through-center misalignment due to changes in workpiece and wheel diameters. This requires repeated alignment between the grinder and bar feeder. Additionally, the outer diameter tends to increase near the workpiece's rear end (about 100 mm) due to pinch-out.

Total Grinding System

Setup support functions automate slide and bar feeder movement, eliminating manual setup skill. Sliding mechanisms for grinding and dressing wheels, combined with a tilting workrest slide, ensure consistent through-center alignment regardless of workpiece or wheel diameter. Pinch-out control adjusts the outer diameter at the workpiece's rear end.

Key Benefits/Results

The setup-assist function eliminates operator-dependent techniques, significantly reducing setup time. Setup can be completed in just five minutes with the push of a button, ensuring consistent centerline alignment across the entire workpiece. This allows precise machining to the very end, effectively eliminating tail-end material loss.

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Automated Operation System

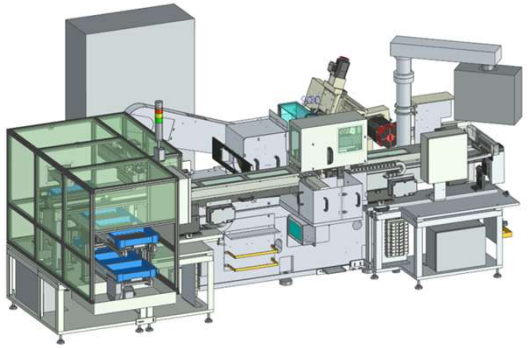
Challenges

Due to manual loading and unloading operations, the operator must remain near the equipment at all time and cannot step away.

- Workpiece loading into the machine — 20 Min (manual)
- Workpiece unloading from the machine — 20 Min (manual)
- Dimensional measurement after grinding — 10 Min (manual)
- Workpiece alignment on pallet — 10 Min (manual)

Proposal

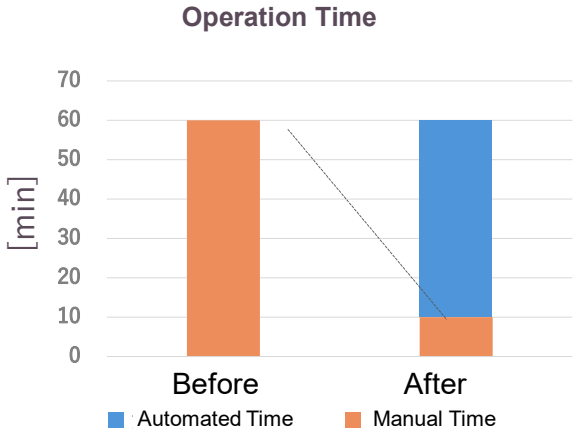
- Palletizing Equipment
- Workrest Slide
- Automatic Sizing Device
- Line Connection to the Next Process



Watch the video

供給排出システム Loading/unloading system

- Pallet loading/unloading for palletizing — 10 Min (manual)
- Workpiece loading/unloading to/from machine — 20 Min (automated)
- Dimensional measurement after grinding — 10 Min (automated)
- Workpiece transfer to the next process — 10 Min (automated)



Impact on Operator Workload and Productivity

Operators must stay near the machine to handle tasks such as loading/unloading, dimensional measurement, and pallet alignment. This creates a high workload and requires one operator per machine at all time.

Proposal for Automated Operation System

A palletizing system enables pallet-based workpiece stock. With a workrest slide and automatic sizing device, workpiece supply and dimensional control are fully automated. Line connection to the next process eliminates the need for intermediate stock and pallet alignment.

Implementation Benefits

Previously, operators had to stay at the machine continuously. With automated operation, up to 50 minutes of unattended running is now possible. Increasing pallet stock capacity can extend this even further.

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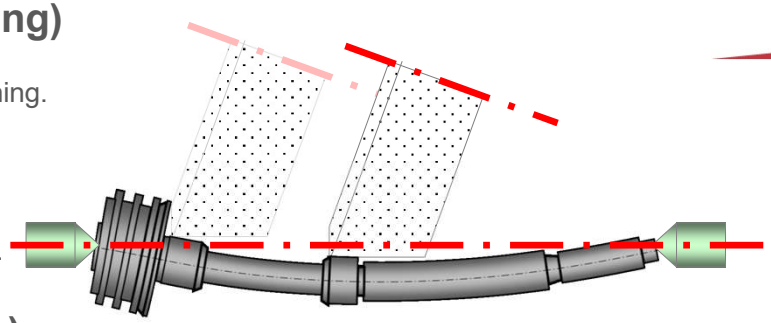
Grinding Solution for Small-Diameter Long Workpieces

Challenges(Center-Supported Machining)

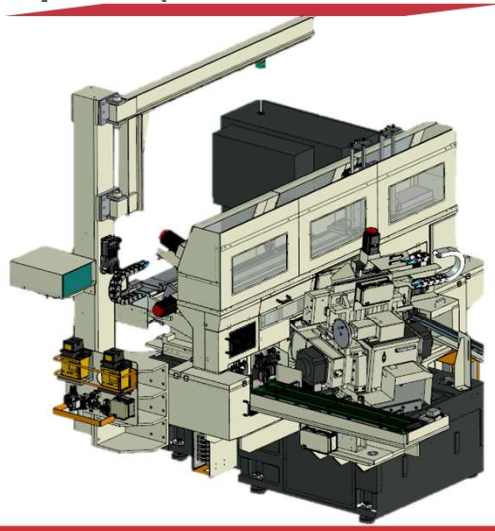
・Lack of workpiece stiffness causes slipping during machining.

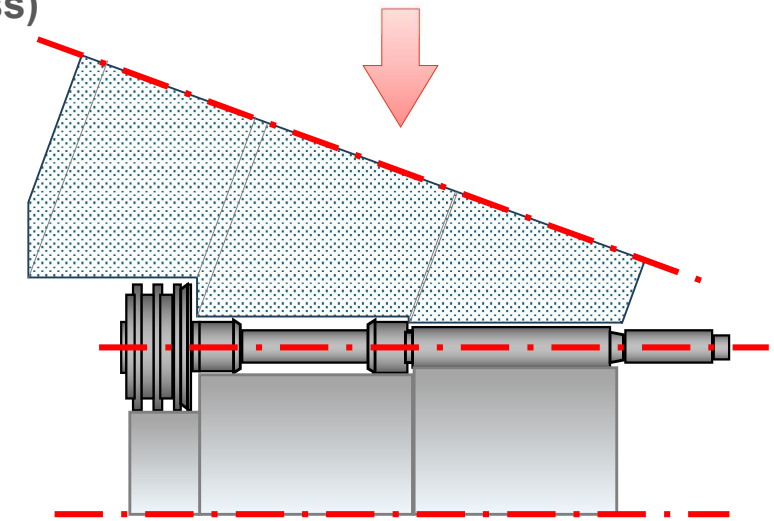
・Unable to increase the infeed amount, resulting in longer machining times (limiting production volume).

・Workpiece slipping leads to unstable roundness accuracy.

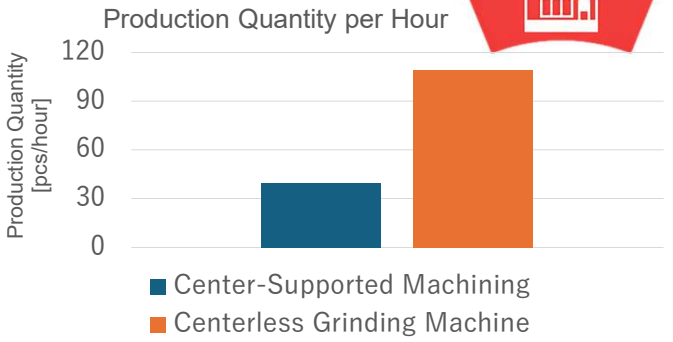


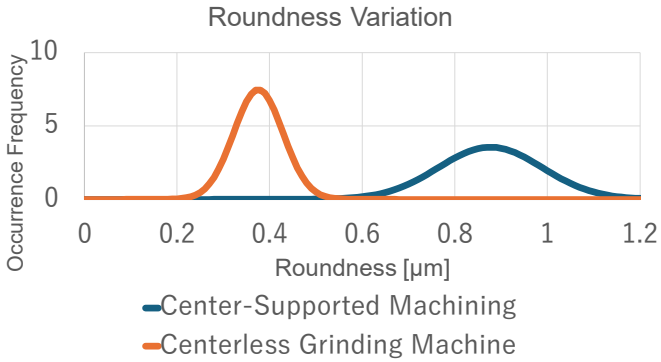
Proposal (Centerless Grinding Process)





Results





Small-Diameter Long Workpiece

Small-diameter long workpieces are machined using a cylindrical grinder, but chucking at both ends can cause deflection under high grinding loads, making it difficult to achieve stable roundness. Additionally, each section needs to be processed separately, leading to multiple setups and longer machining times.

Angular Centerless Grinding Machine

In centerless grinding, the regulating wheel supports the entire grinding surface of the workpiece. As a result, no deflection occurs during machining, ensuring stable and accurate processing. Additionally, since all sections—including the end faces—are ground simultaneously, the process can be consolidated.

Key Benefits/Results

Roundness is consistently maintained within 1 μm, and productivity increases by up to three times. Simultaneous grinding of all sections, including end faces, reduces both setup frequency and time, boosting overall efficiency. Floor space and labor costs are also reduced. With external setup jigs, stable and consistent machining is achievable regardless of operator skill.