# Automotive Suspension Springs
# Automotive Seating
# StrategyBriefing


**TSE Prime: 5991**

**NHK Spring Co., Ltd.**

**September 10, 2025**

# Agenda

1. Greeting
2. Automotive Suspension Springs Business
3. Automotive Seating Business

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1. Greeting
2. Automotive Suspension Springs Business
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# Appreciation for your continuing support

**We would like to express our sincere gratitude for your ongoing patronage.**

**We would also like to extend our heartfelt thanks that you have taken time out of your busy schedule to attend today's business briefing.**

Thank you!

# A once-in-a-century period of transformation

**Electrification**

**Autonomous driving**

**Carbon neutrality**

**The automotive industry is undergoing major changes**

# Expectations for Our Company

## Suspension springs

## Seats

Weight reduction

High durability

Environmental considerations

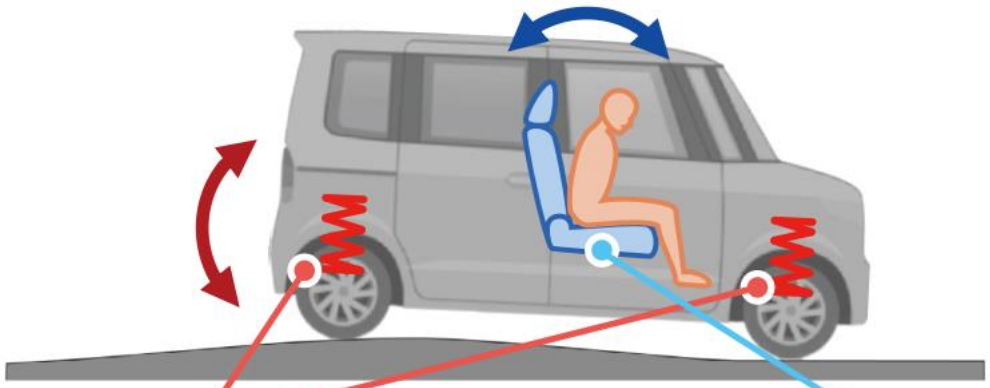
Autonomous driving support

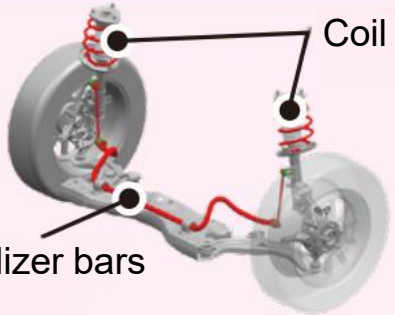
Ride comfort

# Proposal for BEVs: Suspension Springs + Seats

**Point**

We are the only company that handles both suspension springs and seats.






Suppressing vehicle motion using suspension springs

Bundled development available


Suppressing occupant's motion using seats

# 2026 Medium-Term Management Plan


## Respect for people

- Strengthening trust with stakeholders
- Build a safe and secure company and a rewarding and comfortable
- Supporting the growth and development of a diverse employee base

## Contribute to society

- Providing indispensable key components
- Speeding up actions towards global environmental changes
- Contributing to the local community

## Purchase appropriately, manufacture accurately, market and sell properly

- "Quality First" & elevating the power of manufacturing
- Promoting Digital Transformation (DX) & strengthening competitiveness
- Promoting fair transactions and strengthening CSR in procuremens

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1. Greeting
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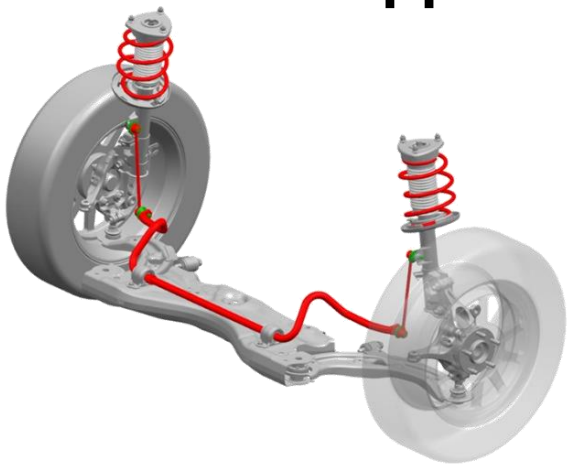
3. Automotive Seating Business

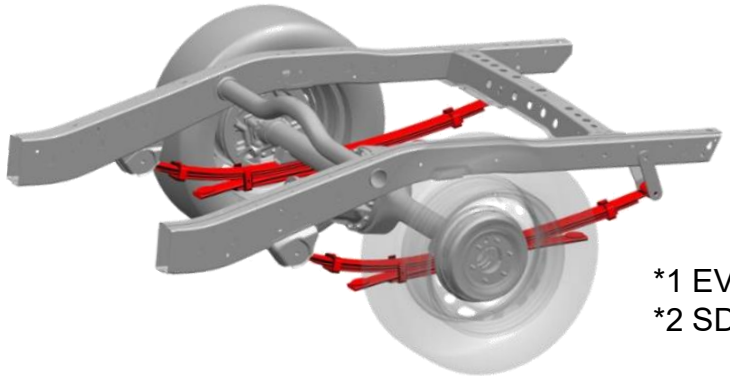
# Automotive Suspension Springs Business

**Suspension springs are components that maintain vehicle posture and determine ride comfort.**

**We produce a wide range of suspension springs to meet the needs of passenger cars, light cars, and trucks, primarily for Japanese automakers.**

**Adoption of EVs*1 has led to increased vehicle weights, while SDVs*2 have improved ride comfort.**
**→ This is an opportunity to enhance added value!**





*1 EV: Electric Vehicle
*2 SDV: Software Defined Vehicle

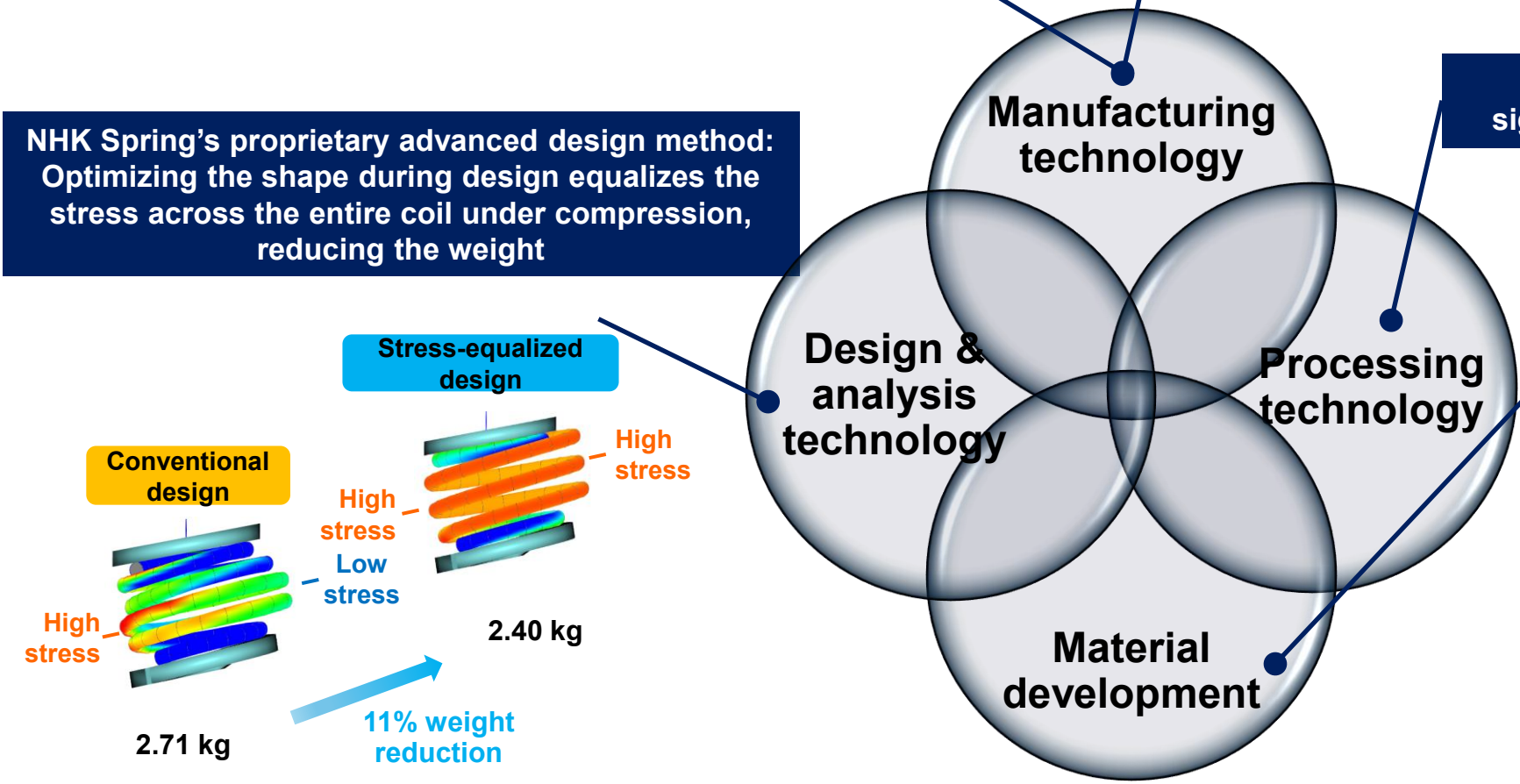
# Strengths of NHK Spring

Toward realizing next-generation lines that reduce "knack-based" manual operations: Stabilizer bars shape automatic feedback system

Heat treatment methods for carbon neutrality, such as electric current heating quenching and high-frequency heating quenching equipment

NHK Spring's proprietary advanced design method: Optimizing the shape during design equalizes the stress across the entire coil under compression, reducing the weight

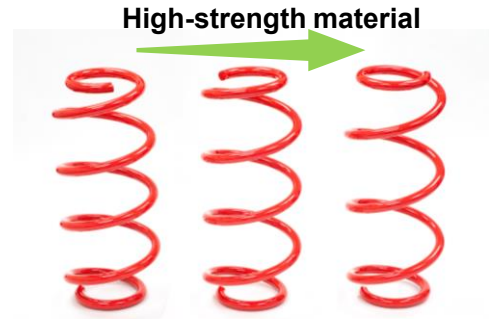
Warm stress shot-peening technology that significantly reduces the weight of coil springs







Weight reduction of coil springs using high-strength, environmentally durable materials



# Strengthening Competitiveness (Development Products)

| Development Theme | Initiative | Aims | | | |
|---|---|---|---|---|---|
| | | Weight reduction | Compact design | Large diameter adaptation | Improved ride comfort |
| 1. Exploration of optimal suspension spring design [DX Initiative] | Set-based design and manufacturing feedback system | ✓ | | | |
| 2. Development of heat treatment methods after raw material forming | Raw material forming line and development of process elements | | | ✓ | |
| 3. Development of XT coil material processing and mass-production line | XT rolling processing technology and XT coil manufacturing technology | ✓ | ✓ | | |
| 4. Joint development of springs, seats, and the R&D center | Proposals to improve ride comfort and convenience, made possible by NHK Spring's unique capability to develop springs, stabilizer bars, and seats together | | | | ✓ |

Promoting technological development that contributes to vehicle electrification

# Strengthening Competitiveness (DX Initiatives)

## Leveraging DX to enhance product competitiveness

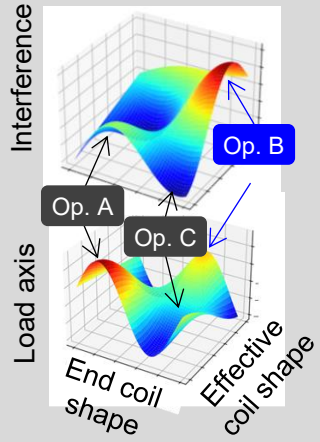
**Expected effects**

**The Vision We Aim For**

## Improving manufacturability and added value to enhance product competitiveness

### Product design (Operation start: FY2025 Q2)

**Build technology for set-based design that can explore optimal shapes while considering multiple performance requirements**



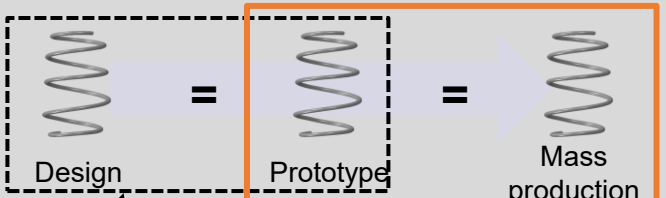

Building a win-win relationship!


NHK Spring


Customer

### Manufacturing (Application to mass-production plants: FY2025 Q3)

**Build technology for a manufacturing feedback system that can realize designed shapes in mass production**




Optimal design through set-based approach

Build technology for application to mass production

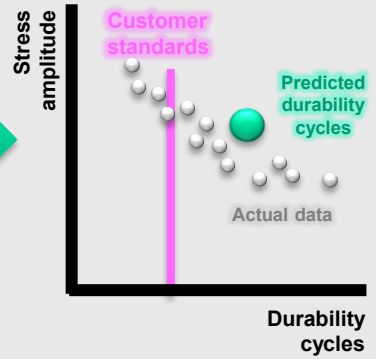
### Development of a durability prediction model using AI

| Sample A |
|---|
| No. 1 |
| No. 2 |
| No. 3 |
| No. 4 |
| No. 5 |
| ・・・ |

| Quality investigation |
|---|
| Shape |
| Hardness |
| Roughness |
| Grain size |
| Decarburization depth |
| Residual stress |

**AI-based prediction model for atmospheric durability cycles**

**S-N curve**



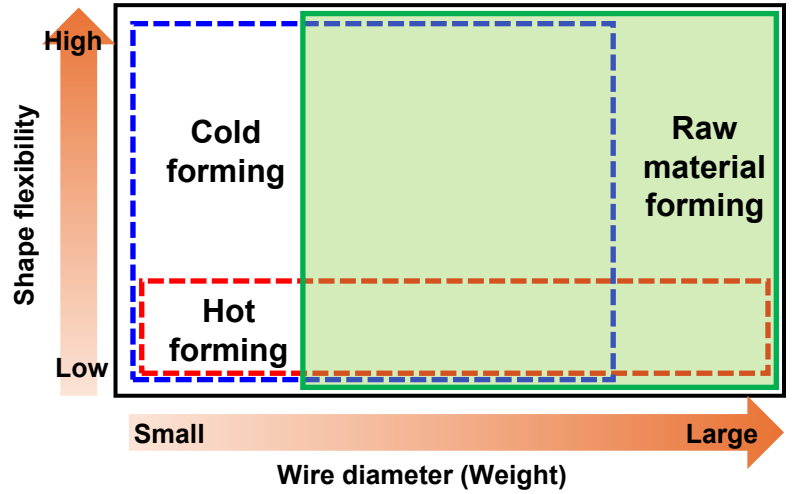

### Evaluation (Operation start: FY2025 Q3)

# Strengthening Competitiveness (Raw Material Forming)

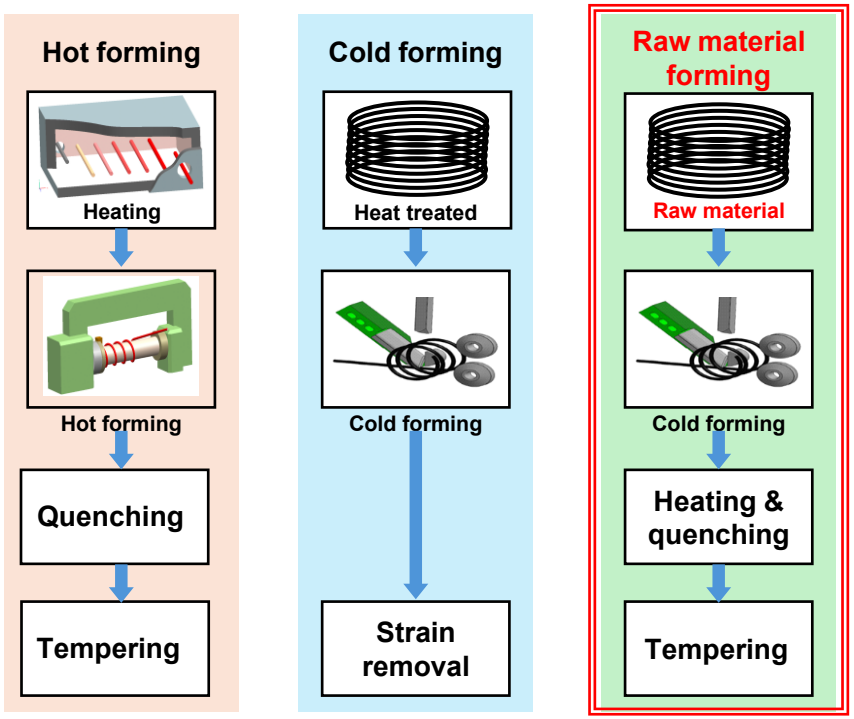
**A new forming method to produce high-performance springs with high shape flexibility**

| | |
|---|---|
| **Advantages of hot forming** | **Easier to wind thicker diameter materials** |
| **Advantages of cold forming** | **High shape flexibility** |
| **Advantages of raw material forming** | **(1) Enables forming of thicker diameter materials with high shape flexibility**<br>**(2) Contributes to carbon neutrality by changing heat treatment methods** |

**Enables production of thick-diameter coil springs that meet the demands of increased vehicle weight due to electrification and the need to save space**




**Process Comparison**

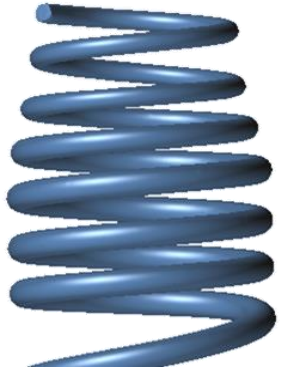



**Afterward, the same process is applied until completion**

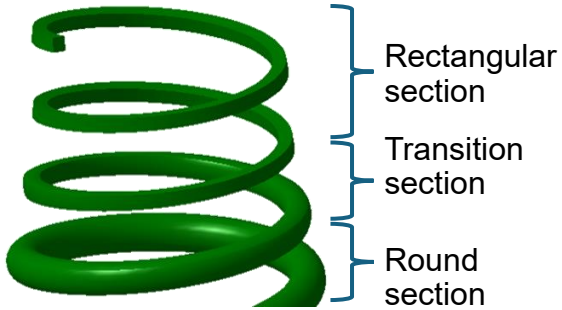
# Strengthening Competitiveness – XT Coil (eXtreme Taper)

**The world's lightest non-linear coil spring achieved through new taper forming technology**

**Conventional product (Round taper)**



**XT coil**




**Material cross-section shape**


| Features | Conventional product | XT coil |
|---|---|---|
| Mass | **Heavy** | **Light** |
| Non-linear stroke range | **Narrow** | **Wide** |
| Mounting space | **Wide** | **Narrow** |

## XT taper rolling process technology

**Establishment of XT taper forming technology that does not rely on manual "knack-based" operations**

**Conventional** **Cutting process** ▶ **New** **Rolling process** ▶ **Reduction of material waste**

## XT coil manufacturing technology

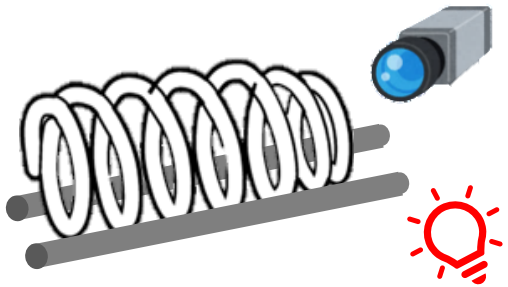
**Establishment of optimal manufacturing conditions for XT coils**

# Strengthening Competitiveness (Production Equipment and Productivity Improvement)

## ◆Toward reducing equipment, maintenance, and manual operations

### Coil spring

New transfer system



**Rotate the spring, detect end positions with a camera or sensor, and position accordingly**

Improvements through higher positioning accuracy:
- Stabilized quality
- Reduced troubles
- Reduced scrap

| # | Item | Effects |
|---|---|---|
| ① | New transfer system | Stabilized quality, improved productivity, reduced scrap |
| ② | Improved shape measuring machine | Improved productivity |
| ③ | Automatic coiling setup | Improved productivity, reduced scrap, enhanced safety measures |
| ④ | New SP method | Improved productivity, reduced weight |
| ⑤ | Improved painting method | Improved productivity, reduced scrap, reduced auxiliary materials and costs |

### Stabilizer bars

Automatic shape correction

**Laser-based shape measurement with automatic calculation of correction values**

Benefits of stabilized quality:
- Improved productivity
- Reduced scrap

| # | Item | Effects |
|---|---|---|
| ① | Automatic shape correction | Stable quality, reduced scrap |
| ② | Equipment monitoring | Numerical control, predictive maintenance, enhanced safety measures |
| ③ | Automated inspection | Reduced man-hours, standardized inspections |
| ④ | Simplification of equipment | Reduced minor stops and repair costs |
| ⑤ | Sequential changeover | Reduced line downtime |

# Strengthening Competitiveness (Improvement of Heavy Duty Work Operations)

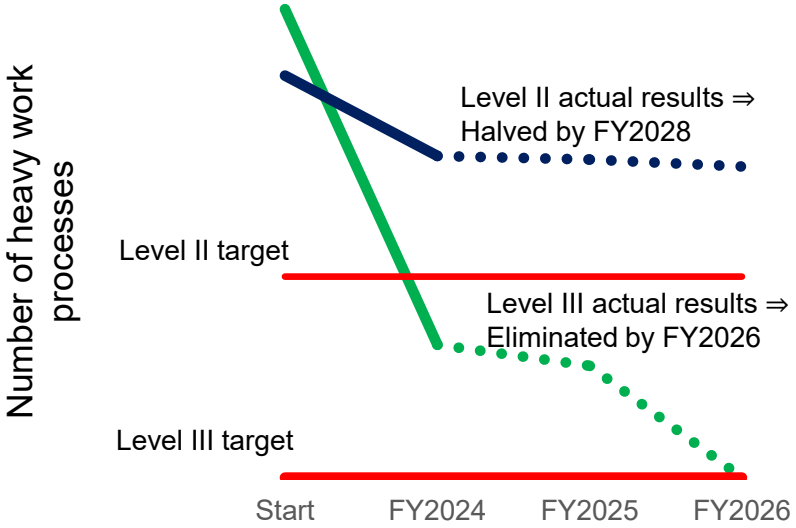
## Transporting plastic containers



## Other improvements in heavy duty work operations

| | |
|---|---|
| Coil springs: Work to clean chemical solution piping | Weight reduction by changing the piping from steel pipe to resin hose |
| Coil and leaf springs: Transport of heavy carts | Adoption of high-resilience urethane casters reduces rolling resistance |
| Railway coil springs (20 kg): Loading operations | Direct pallet loading ⇒ Installation of lifters to improve loading/unloading posture |

## Improvement progress by level




| | Weight |
|---|---|
| Level III | Over 25 kg |
| Level II | 15–25 kg |
| Level I | 10–15 kg |
| Level 0 | 10 kg or less |

# Productivity Improvement in the U.S.

**<Advancing the Reconstruction Plan>**

**Achieving profitability by FY2026**

<Background>

**Easing of labor shortages due to an improved employment environment**

**Urgent need for in-house production due to U.S. tariffs and soaring transportation costs**

**Acceleration of improvement efforts through large-scale personnel support from Japan**

Schedule

| Period | Item | Effects | FY2025 | FY2026 | FY2027 | Target KPI |
|---|---|---|---|---|---|---|
| Short | Support through personnel dispatching | Workforce reduction | → | → | | -28% |
| | | Improved productivity | → | → | | +25% |
| | | Reduced scrap | → | → | | -77% |
| | | Reduced auxiliary materials and costs | → | → | | -22% |
| Medium to long | Fundamental measures by element development and equipment modification | Improved productivity, reduced scrap, reduced auxiliary materials and costs | Development | Domestic cultivation | Overseas expansion | |

# Further Expansion in the Indian Market

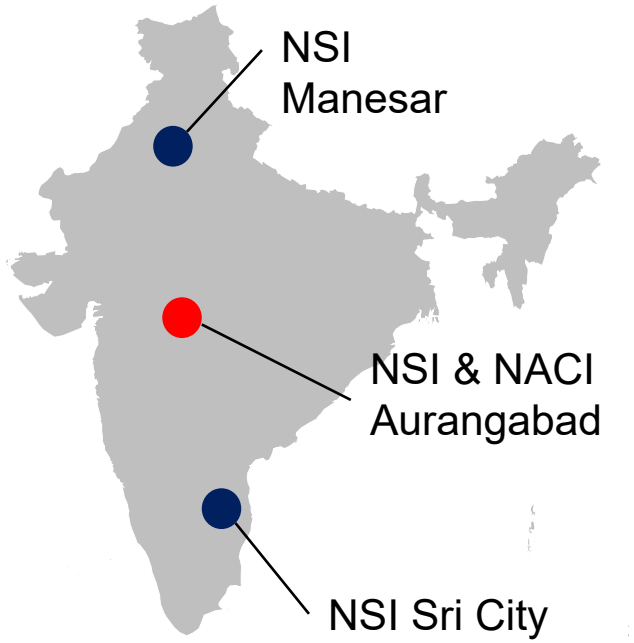
**Establish a new plant in the western region, the center of the automotive industry**

- Establish a new plant adjacent to NACI, the precision parts base.
- Optimize investment by sharing facilities, etc.
- Aim to expand operations as the core base for the future suspension spring and precision parts business in India.

**Capture new orders and expand market share**

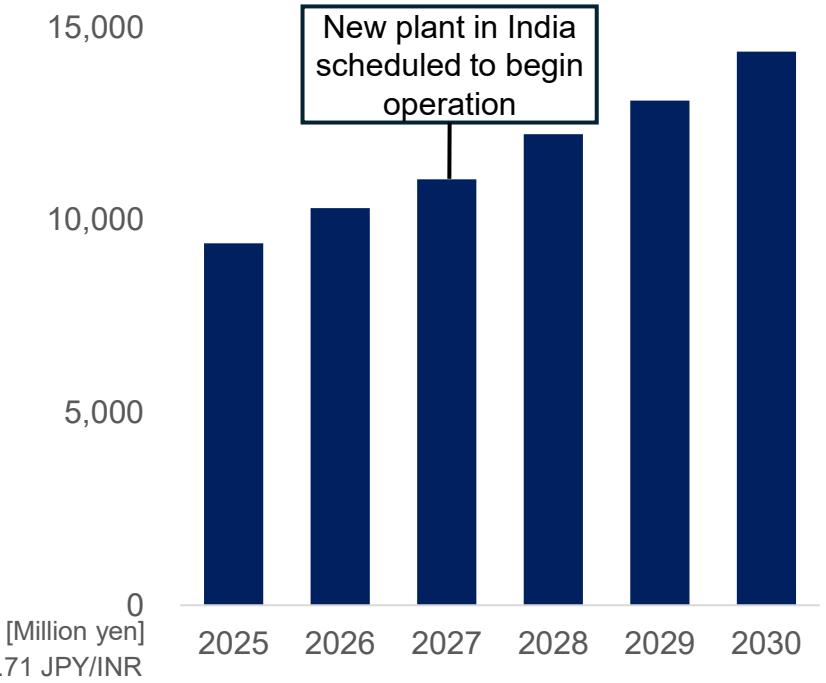
**Maintain the top market share in India**

## Indian bases

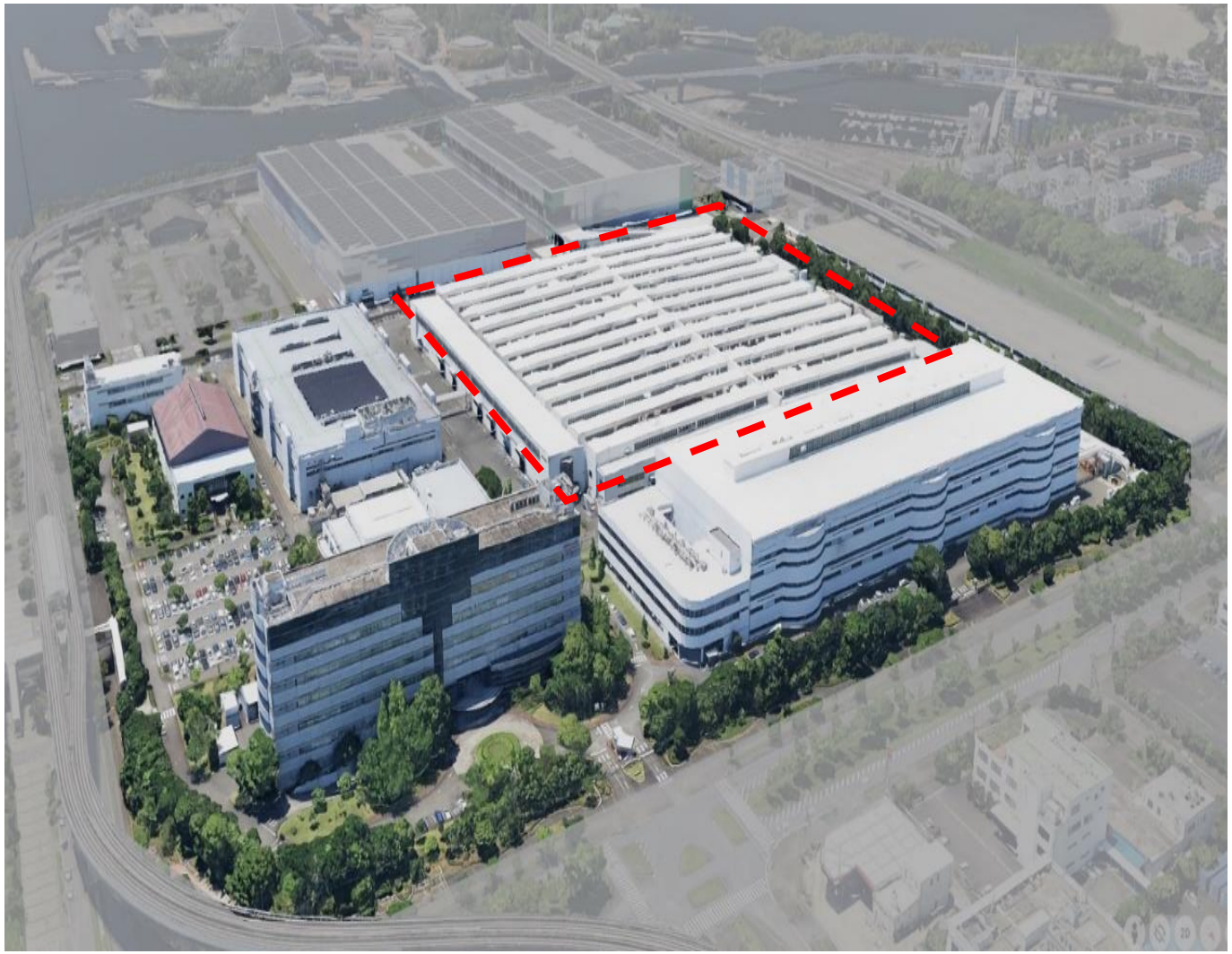



Suspension spring base: NSI (NHK Spring India)
Precision parts base: NACI (NHK Automotive Components India)

## Sales plan of NSI



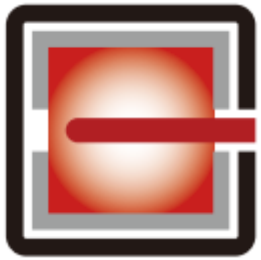
# Overview of Yokohama Plant (Suspension Springs)



| | |
|---|---|
| Start of operation | 1987 (relocated from Isogo Plant) |
| Site area | Entire Yokohama Office: 123,749 m² |
| Building area | Spring building: 35,915 m² |
| Floor area | Spring building: 38,835 m² |
| Employees | 378 (As of end of April 2025) |
| Building structure | Single-story |

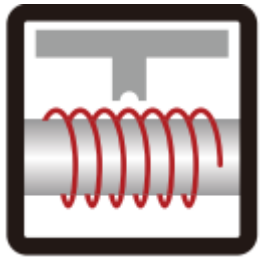
# Coil Spring Production Process

### Heating



Materials delivered from the manufacturer are cut and fed into the heating furnace.

### Forming



In hot forming, wire diameters of 10–18 mm can be processed.

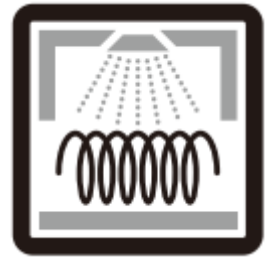
### Quenching

By immersion in temperature-controlled oil, the spring is hardened, increasing tensile strength.

### Tempering

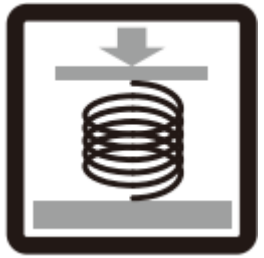
Heating at a constant temperature gives the spring toughness.

### Shot peening



Small metal particles are shot at high speed onto the spring surface, strengthening it and extending its service life.

### Setting



To produce springs less prone to setting, an overload is applied in the direction that the spring will be used.

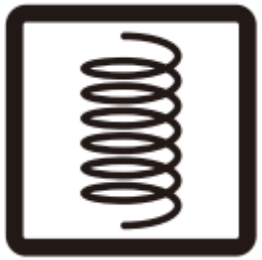
### Coating

Surface treatment is performed to improve corrosion resistance, wear resistance, and appearance.

### Loading condition

All springs are inspected to ensure that their load characteristics meet the specified requirements.

### Completion



It takes approximately 150 to 270 minutes to complete.

# Agenda

1. Greeting
2. Automotive Suspension Springs Business
3. Automotive Seating Business

# Automotive Seating Business

As an Non-affiliated relationship seat manufacturer, we produce a wide range of seats that meet customer needs, from those for SUVs to light cars and trucks.

Our seat development and design capabilities achieve both strength and weight reduction, delivering superior ride comfort.
(World-class safety performance, seats that reduce fatigue even when sitting for long periods, and various components that support autonomous driving and electrification)

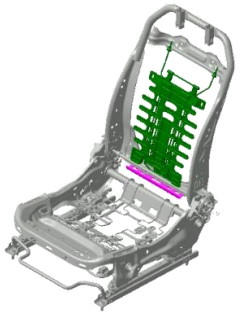
Our cutting-edge manufacturing is based on TPS, with a strong focus on safety, quality, and the environment.
(Automation, AI utilization, carbon neutrality initiatives, DX, and co-creation with partners)

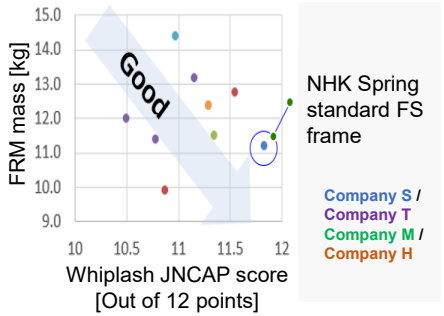
# Strengths of NHK Spring

Point

## Increased seat strength

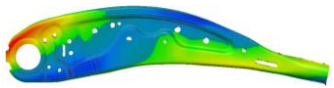
✓ Achieves world-class safety and lightweight seats
✓ With steel manufacturers, co-developed ultra-high-tensile steel materials for seats



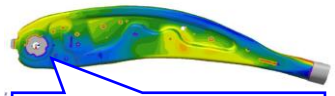



✓ Advanced metal processing and press-forming analysis technologies

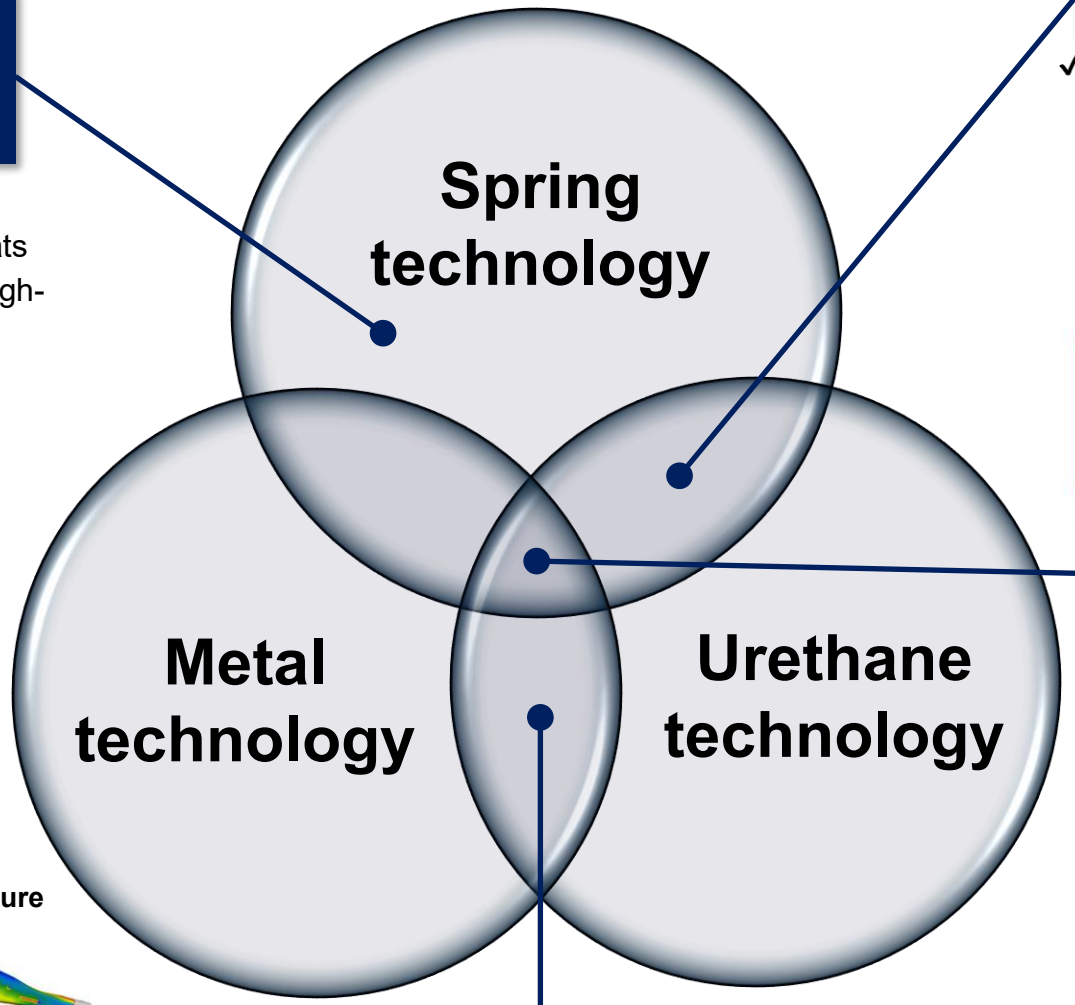
**Before countermeasure**



**After countermeasure**



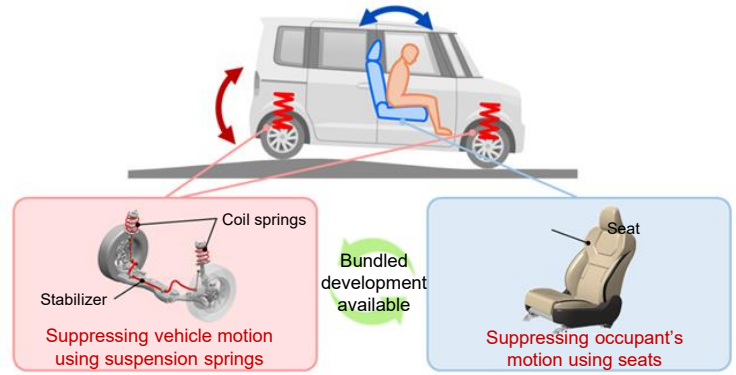

**Shape measurement results**




## Lighter seats

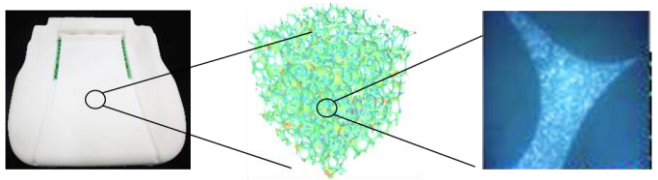
## Optimization of ride comfort

✓ Creation of new added value through collaborative development of springs and seats




## Thinner seats

✓ The only seat manufacturer capable of developing urethane formulations
✓ Developed and mass-produced high-performance urethane pads for thin seats




<u>At NHK Spring, development of urethane starts from the bubble structure and resin structure.</u>

# Introduction of Development Products: Roadmap

**Flexibly responding to seat needs in an era of transformation**

Entertainment

Wellness

Environment

Comfort

Safety

- VR
- Personal sound
- Exercise function
- Aluminum die casting
- Biomass urethane
- Easy disassembly (improved recyclability)
- Recycled resin
- Optimization of suspension springs and seats
- Personalization (interchangeable covers, design)
- Occupant condition control
- Carsickness reduction technology
- Automatic control of thermal comfort
- Multi-posture safety
- Countermeasures for frontal impact change points
- Compliance with assessment (as needed)
- VT compliance
- Development of multi-posture analysis model
- Emergency avoidance safety for autonomous driving

2024 2026 2030 2035 2040

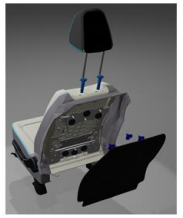
# Introduction of Development Products: Environmentally Friendly Seat

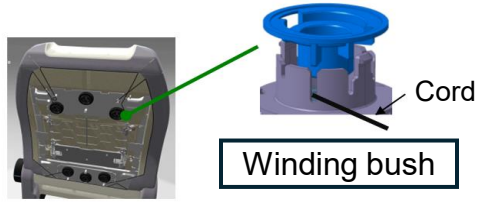
## What seats can do for the future of our planet


* Patent pending

## Recycling

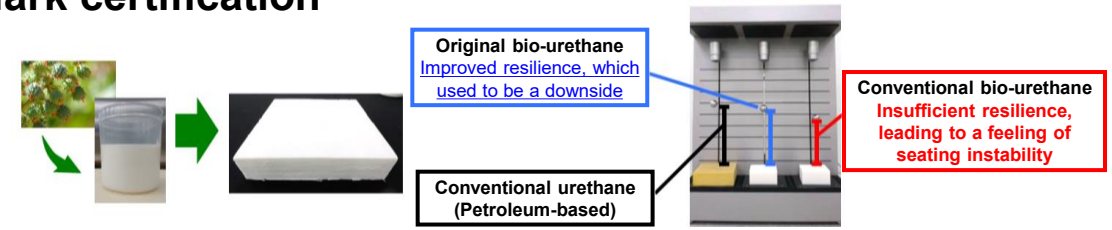
- Can be disassembled in about half the usual amount of time
- Improves recyclability and contributes to the realization of a sustainable society






## Biomass materials

- Eco-friendly cushion pad that has obtained Biomass Mark certification




## Comfort

- Relaxation headrest that reduces the degree of carsickness to about one-third
- Eco-friendly seat that is comfortable for driving thanks to optimized thin cushions and suspension mats

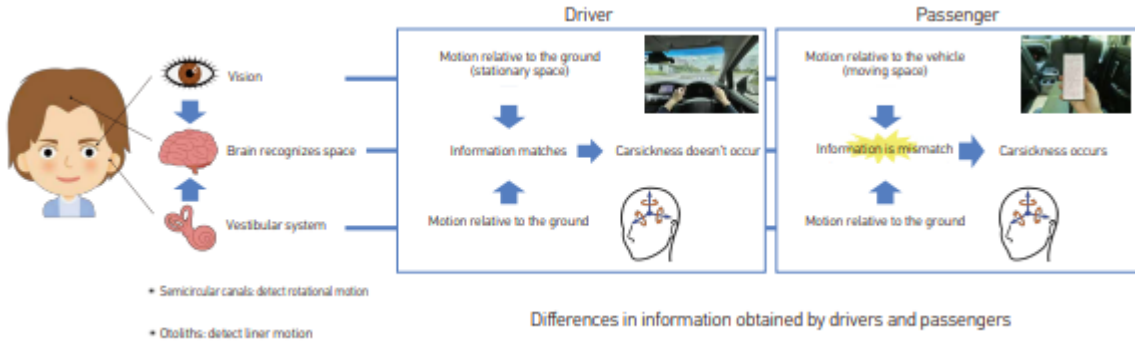
# Introduction of Development Products: Carsickness Reduction Seat

## The need to reduce carsickness

- Passengers may experience carsickness, which often worsens when using smartphones or watching videos.
- During autonomous driving, drivers are also freed from the need to operate the vehicle, which raises concerns of carsickness like that of passengers.

## The mechanism of carsickness

- Humans perceive body tilt and movement through information from their vision and the vestibular system.
- Carsickness can be alleviated by reducing mismatches in such information.



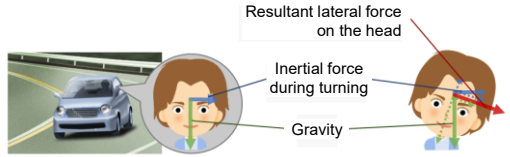
Differences in information obtained by drivers and passengers

## Countermeasures for and effects of carsickness reduction

### Approach to reduce mismatches based on vestibular information

**[Cause of carsickness]**

When the head tilts while the vehicle is turning or accelerating, the gap with visual perception increases.



Forces acting during vehicle turning　Forces acting when the head tilts

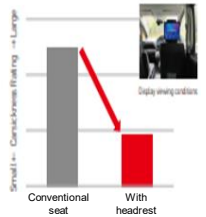
**[Countermeasure]**

Supporting the head with a headrest and proper seating posture suppress head roll/pitch motion.

**[Effects]**

- Carsickness while watching an in-vehicle display is reduced to one-third.
- Additionally, display visibility is improved.


Carsickness reduction seat



Effects

### Approach to reduce mismatches based on visual information

**[Cause of carsickness]**

When using a smartphone while looking downward, it is difficult to see the outside scenery, and the smartphone's movement increases the information mismatch.

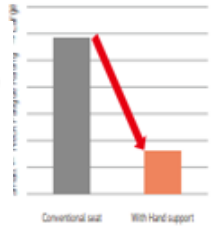
**[Countermeasure]**

Supporting the hands and elbows with a hand support enables the smartphone to be held in a higher position.

**[Effects]**

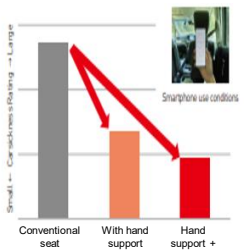
- Hand support reduces carsickness when using a smartphone by half, and combined with a headrest, reduces carsickness to one-third.
- In addition, head fatigue is reduced to about one-fourth, and smartphone screen visibility is improved.


Field of view when using hand support



Effect of hand support alone

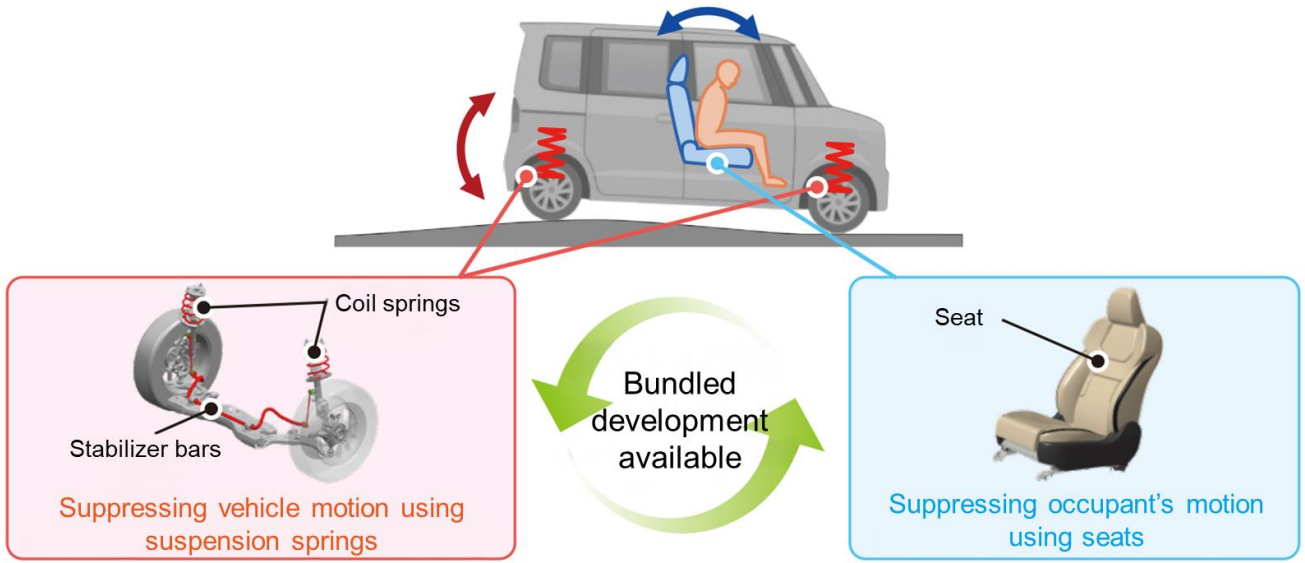
Concept seat for reducing carsickness



Effect of headrest + hand support

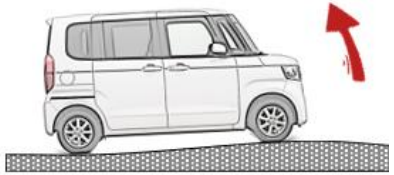
# Introduction of Development Products: “Suspension Springs + Seats” Proposal for BEVs

## Suppression of passenger movement during BEV body pitch

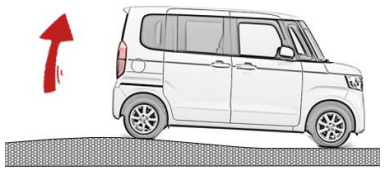



Watch video

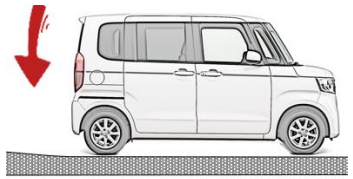
(1) Front wheel ride up



(2) Rear wheel run-up



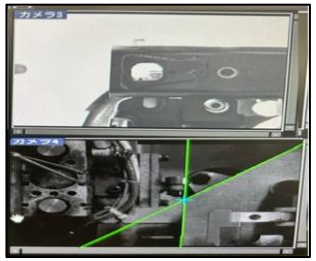
(3) Rear wheel landing



# Strengthening Competitiveness: Automation Initiatives

## Automation of heavy load transfer

Manual replacement

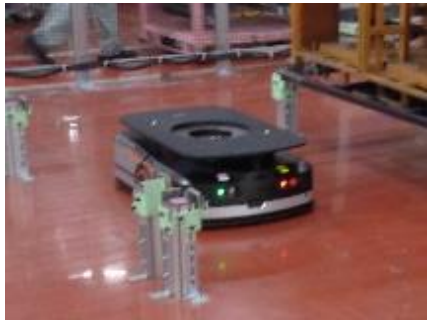


Position correction with
3D cameras
+
Automatic supply to
conveyor lines
by collaborative robots

**Automation of seat frame (approx. 10–15 kg) transfer, reducing the burden on workers**

## Automation of cart transport operations

Manual cart transport

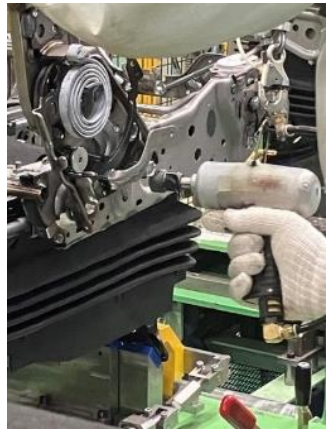


Automation of transport
using automated guided vehicles
(AGVs)/autonomous mobile robots (AMRs)

**Automating transport operations to reduce the burden of walking**

# Strengthening Competitiveness: Automation Initiatives

## Automation of bolt fastening



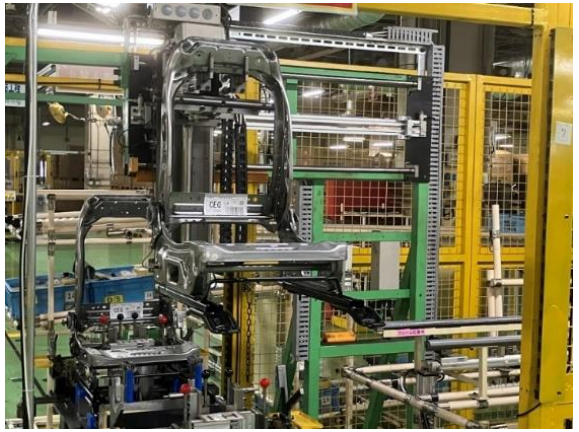
Tightening with hand tools

Setting seat frames on unmanned transport vehicles and tightening them with robots

**Automation of 2,000 repetitive tasks per shift, reducing the burden on workers (less strain on wrists and fingers)**

## Automation of heavy material handling

Manual replacement



Automatic supply of seat frames transported by unmanned vehicles to conveyor lines

**Automated transfer of seat frames (approx. 10–15 kg × 500 times per shift), reducing the burden on workers**

# Strengthening Competitiveness: Improvement of Heavy Duty Work Operations

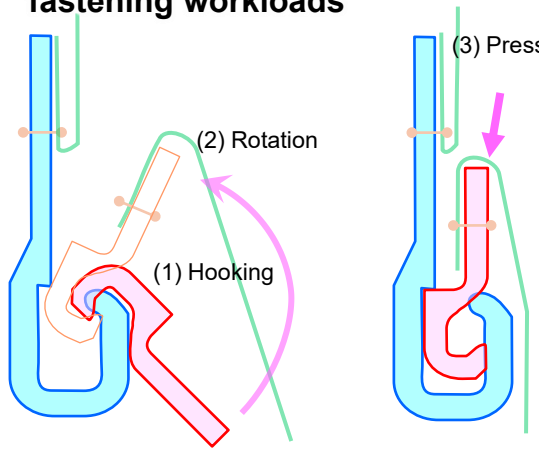
## Automation of heavy material handling

600–800 boxes per shift (each box weighing over 10 kg)


## Work improvement through process and product development

Establishing NHK's original fastener structure (patent pending)

**Development of tools to reduce fastening workloads**




## Definition of workload levels in heavy duty work

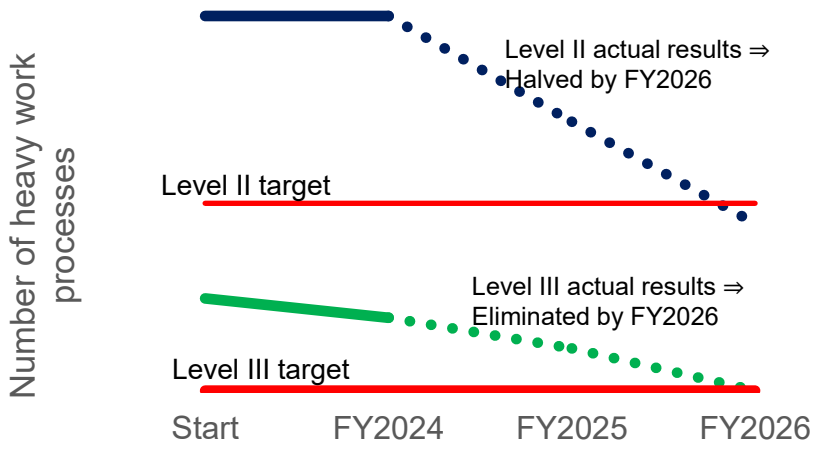
[Evaluation points]

(1) Posture & weight score: Defined by weight, posture, and frequency

(2) Upper limb score: Defined by the load applied to the upper limbs

| | Male | Female | Senior |
|---|---|---|---|
| Level III | × | × | × |
| Level II | ○ | × | × |
| Level I | ○ | ○ | × |
| Level 0 | ○ | ○ | ○ |

## Improvement progress by level



# Strengthening Competitiveness: DX Initiatives

**Shortening trial verification periods with actual equipment by 25%**

Build an environment that uses simulation tools to identify problems that may occur during the launch of new production lines before arranging the actual equipment.

## Problem

Many defects are discovered only during actual trials, leading to extended preparation periods for mass production.

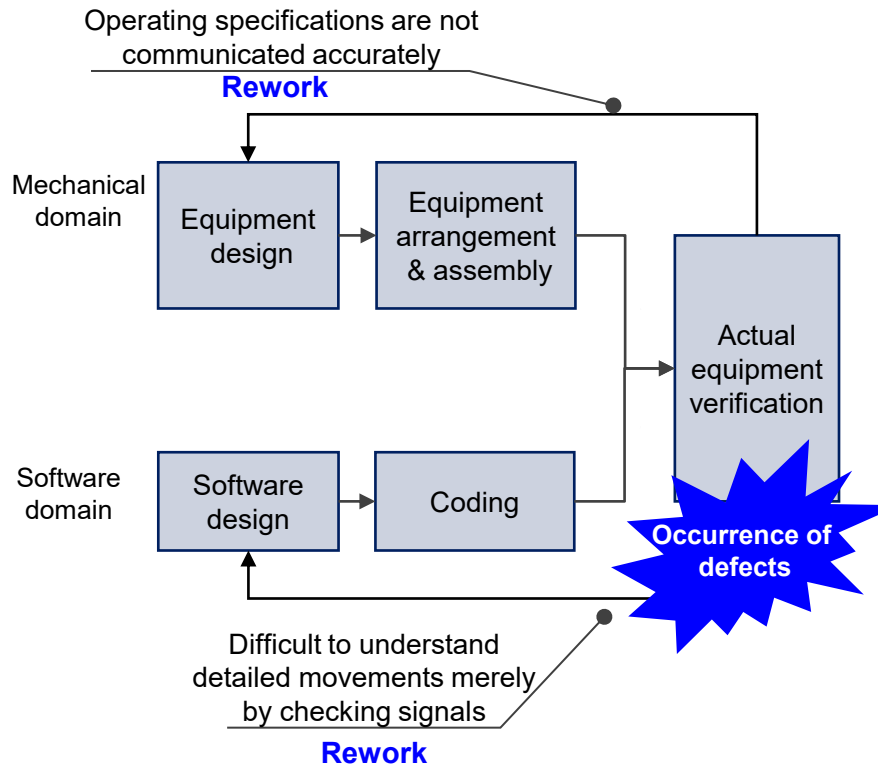
## Initiatives

Establish a production process simulation environment using 3D data and various control programs.

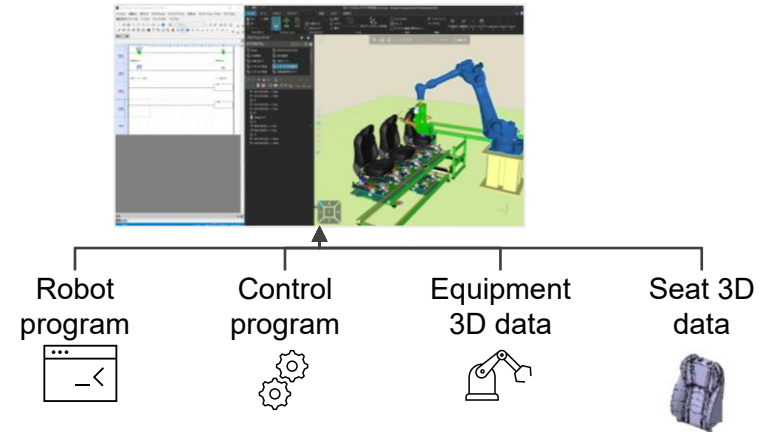
## Vision

Reduce rework after trials and shorten production preparation periods through pre-verification in virtual space.

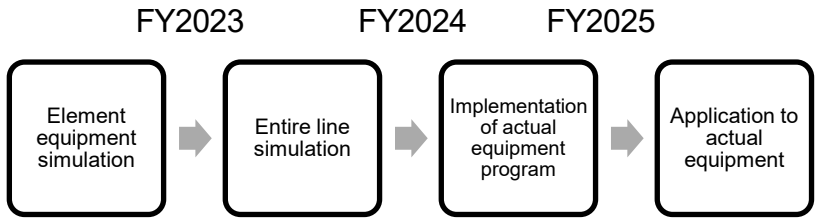
### ■ Process design flow



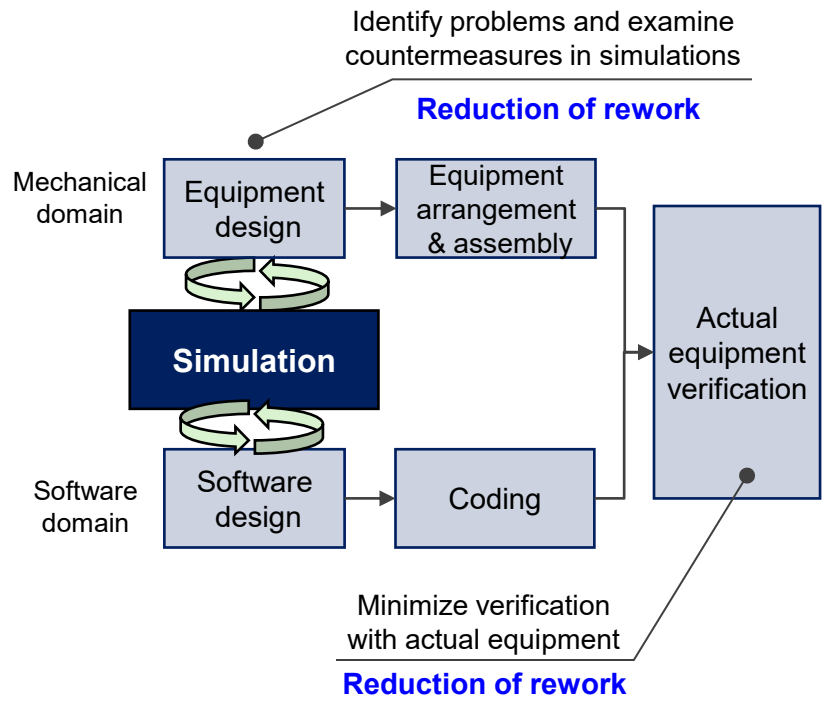

### ■ Simulation tools




### ■ Activity steps



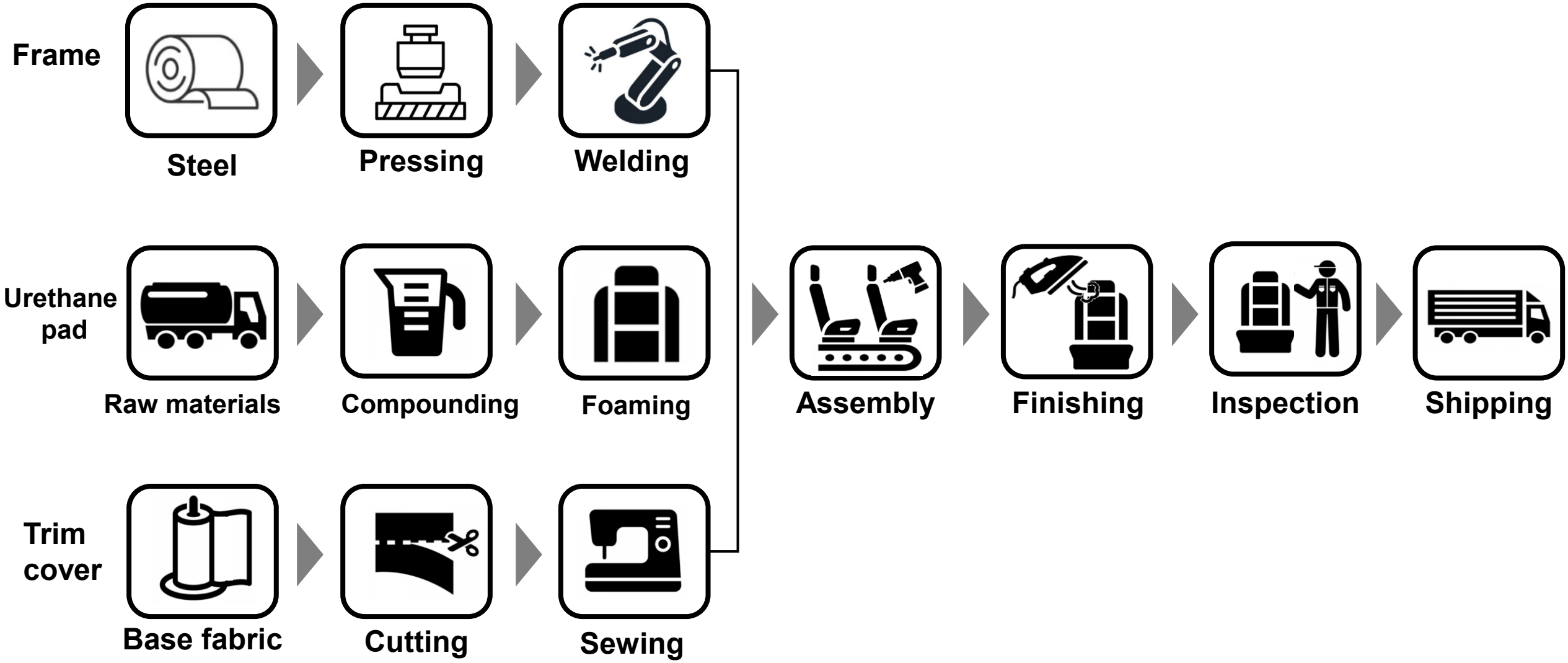

### ■ Process design flow



# Overview of Yokohama Plant (Seating)

| | |
|---|---|
| Start of operation | 1990 (relocated from Kawasaki Plant) |
| Site area | Entire Yokohama Office: 123,749 m² |
| Building area | Seat building: 12,613 m² |
| Floor area | Seat building: 35,840 m² |
| Employees | 250 (As of end of June 2025) |
| Building structure | 1F Production area<br>2F Production area<br>3F Prototyping and evaluation testing area |

# Seat Production Process



# Supplementary Information

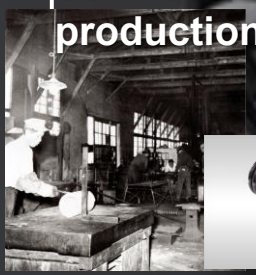
# History of the Automotive Suspension Springs Business

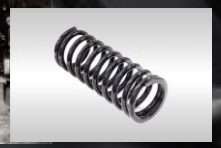
1940
Start of leaf spring production

1955
Three-leaf spring

1958
Start of torsion bar production

1941
Start of coil spring production



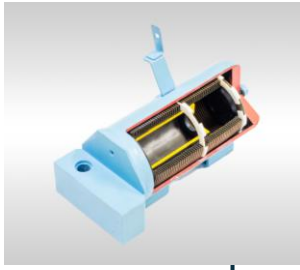


1957
Start of solid stabilizer production

1985
Start of hollow stabilizer bars production

1985
FRP leaf spring

1989
Accumulator



1992
Stabilizer link

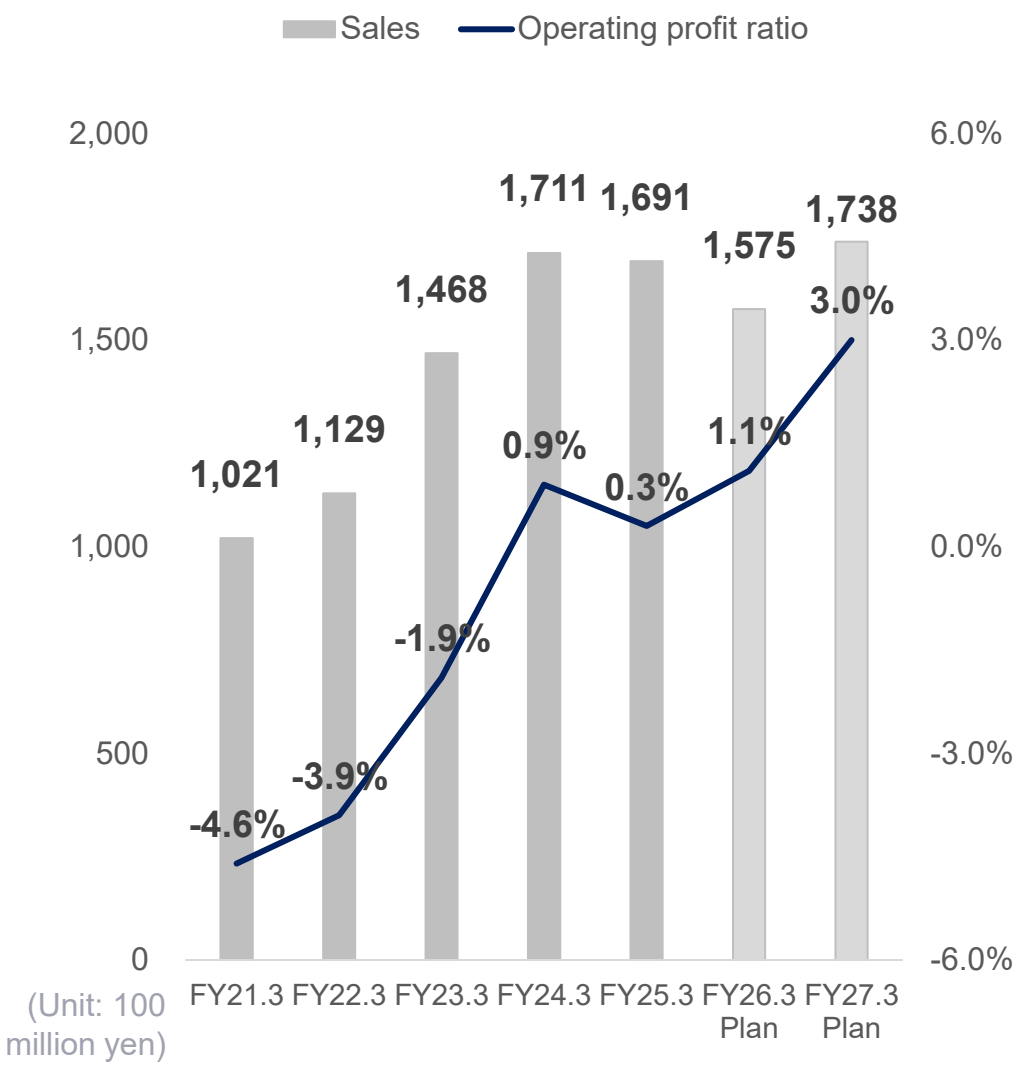

1999
L-type spring

2015
Bush-bonded stabilizer

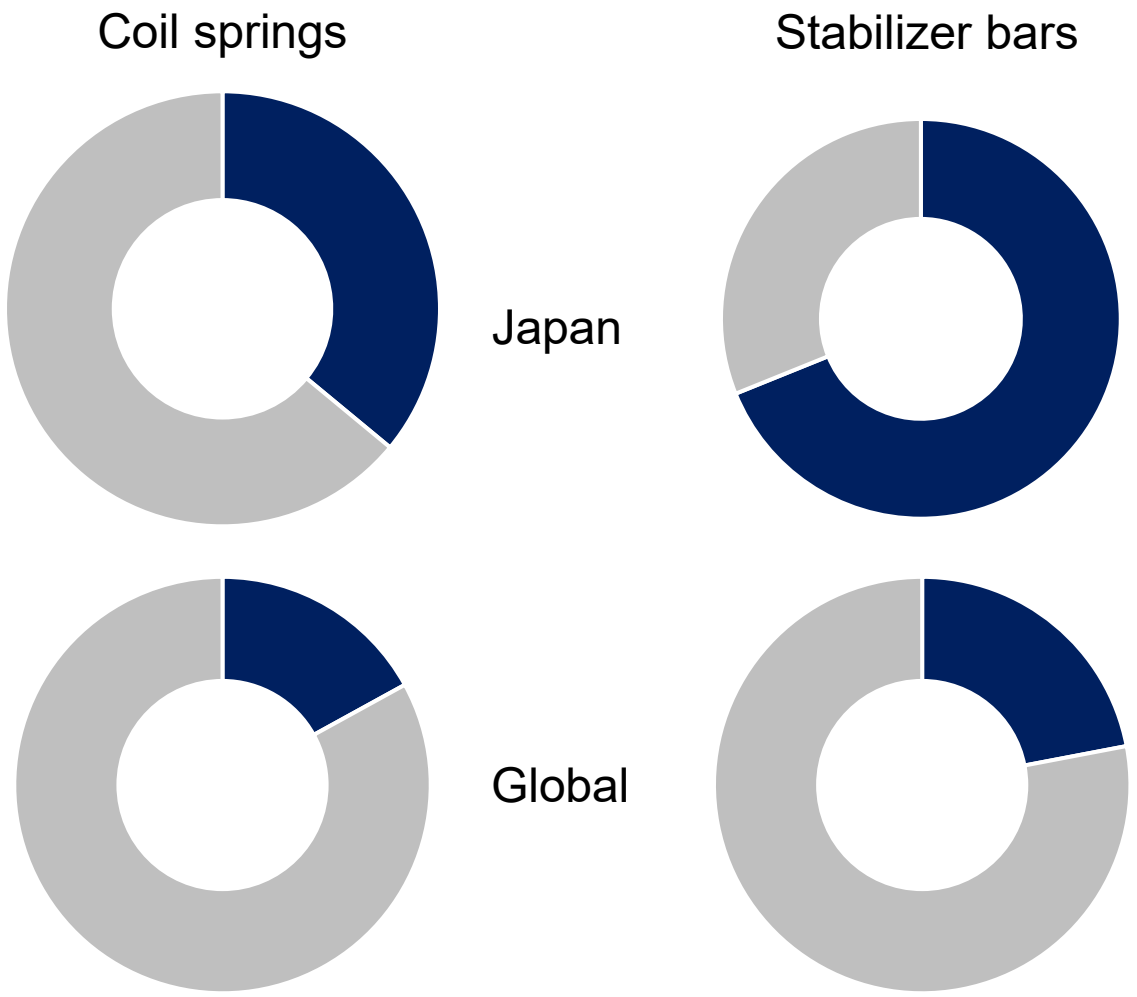
2004
Brake-use accumulator

# Automotive Suspension Springs Business: Sales and Profit

## Sales and profit



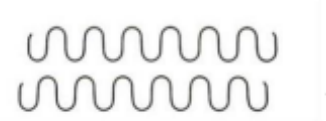

## Market share by product

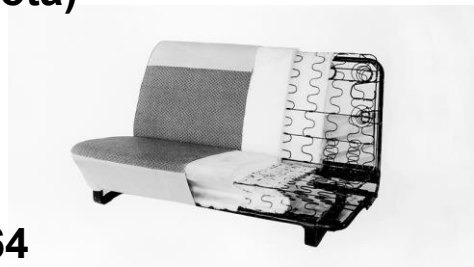



Source: FY2024 Results, NHK Spring survey

# History of the Automotive Seating Business

**1956**
Nagoya (present-day Toyota) Plant established
Start of seat spring production
* For Toyota





**1962**
Kawasaki Plant established
Seat production for Nissan and Isuzu begins

**1964**
Start of integrated-foam urethane seat production

**1969**
Gunma Plant established
Seat production for SUBARU begins

**1973**
Start of seat production at NHK Spring (Thailand)

**1986**
SNIC established
Increased production for Suzuki

**1987**
Seat production begins in the U.S.
(GSA established)

**1995**
ITES established
Increased production for Isuzu

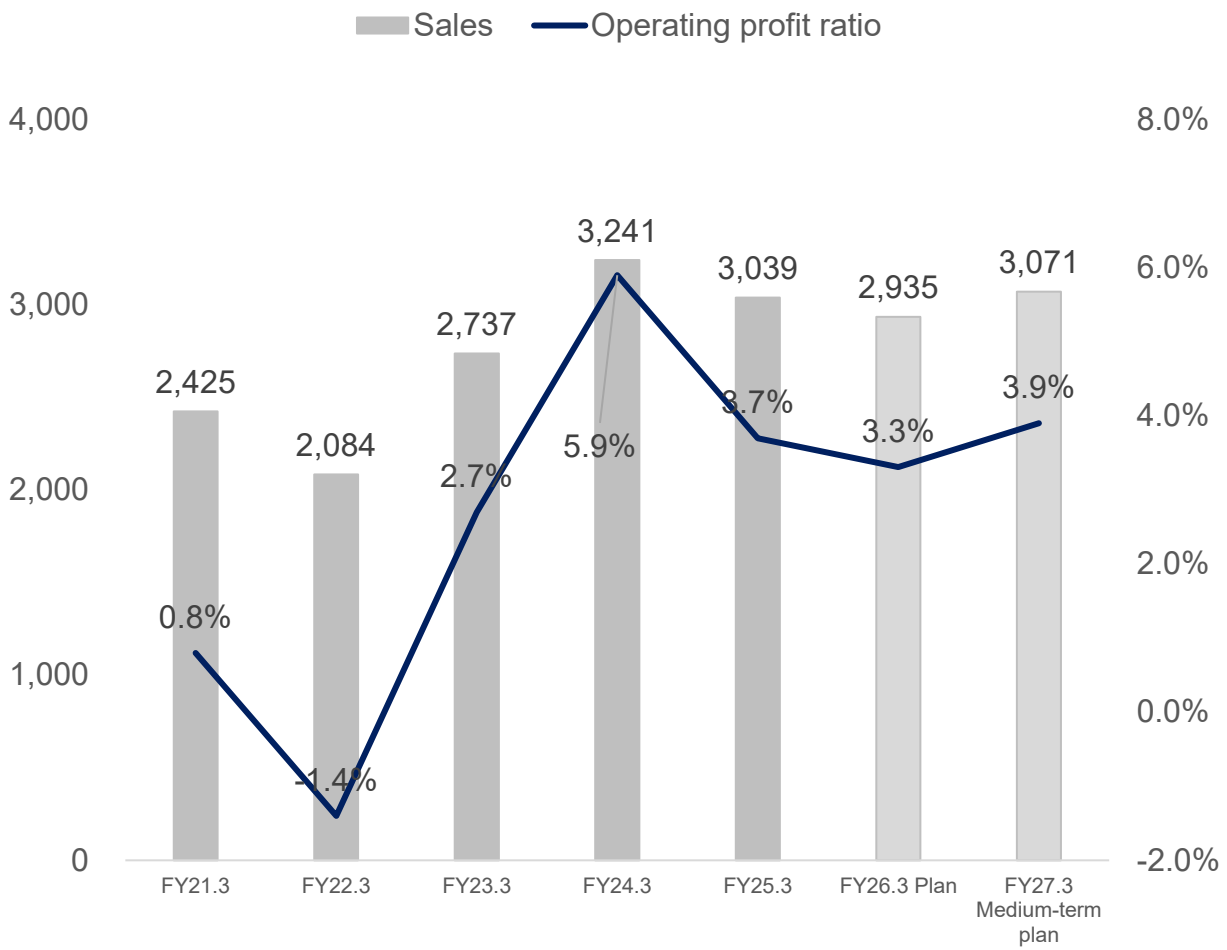
**2001**
Faurecia-NHK and Faurecia-NHK Kyushu established
Increased production for Nissan

**2016**
Seat production begins in Indonesia
(NKS established)

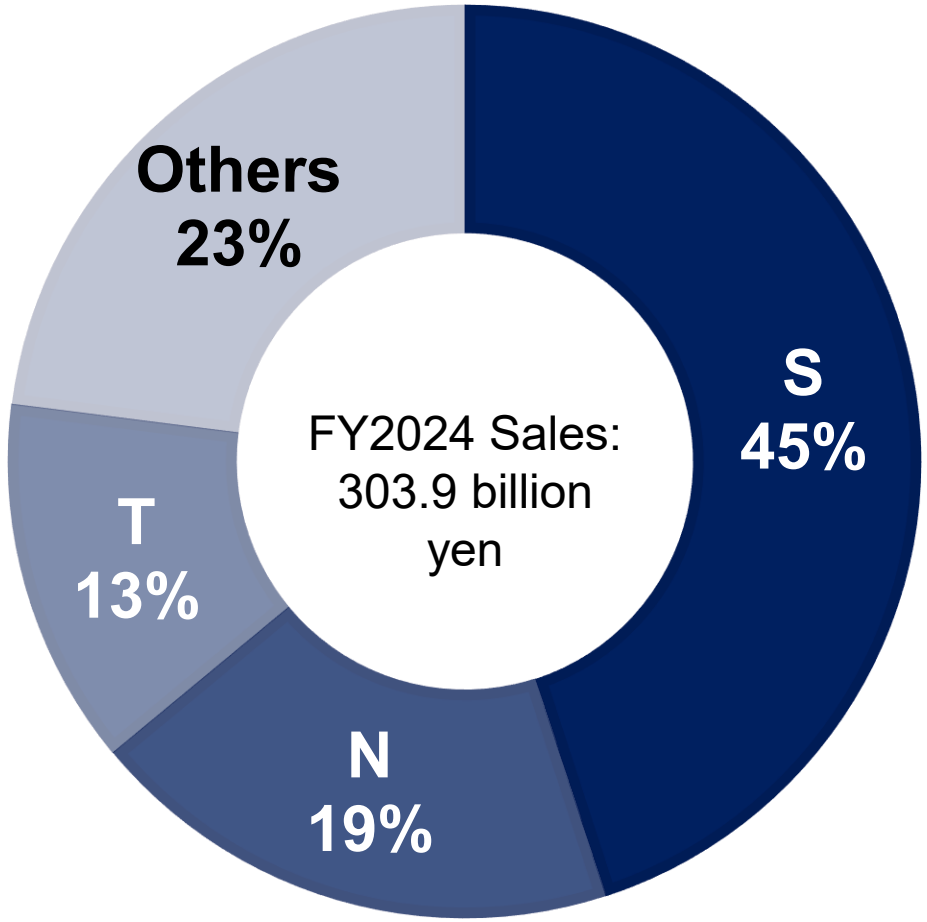
**2017**
NHK Spring Mizushima established
Increased production for Mitsubishi

# Automotive Seating Business: Sales and Profit

## Sales and profit




## Sales composition ratio by customer




- The predictions and plans by NHK Spring Co., Ltd. listed in this document are forecasts related to future results and performance, and contain risks and uncertainties. Please note that the actual results may differ from the forecasts due to fluctuations in important variables, such as economic conditions, market trends, foreign exchange trends, and so forth.
- The data listed in this document is included for the purpose of providing information, it is not designed to encourage investment.
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