

# Progress of the Measures Promoted by the Kobe Steel Group to Prevent Recurrence of the Misconduct

October 30, 2018

**KOBE STEEL, LTD.**

**Causal Analysis**

① Management style that overemphasized profitability and inadequate corporate governance

② Imbalanced operation of plants that resulted in the reduced awareness of quality compliance among employees

③ Insufficient quality control procedures that allowed the Misconduct to take place



## I . Governance – Building a Quality Governance System

- 1. Penetration of the Corporate Philosophy
- 2. Desirable State of the Board of Directors
- 3. Restructuring of the Risk Management System
- 4. Reformation of the Organization
- 5. Restructuring of the Group Companies

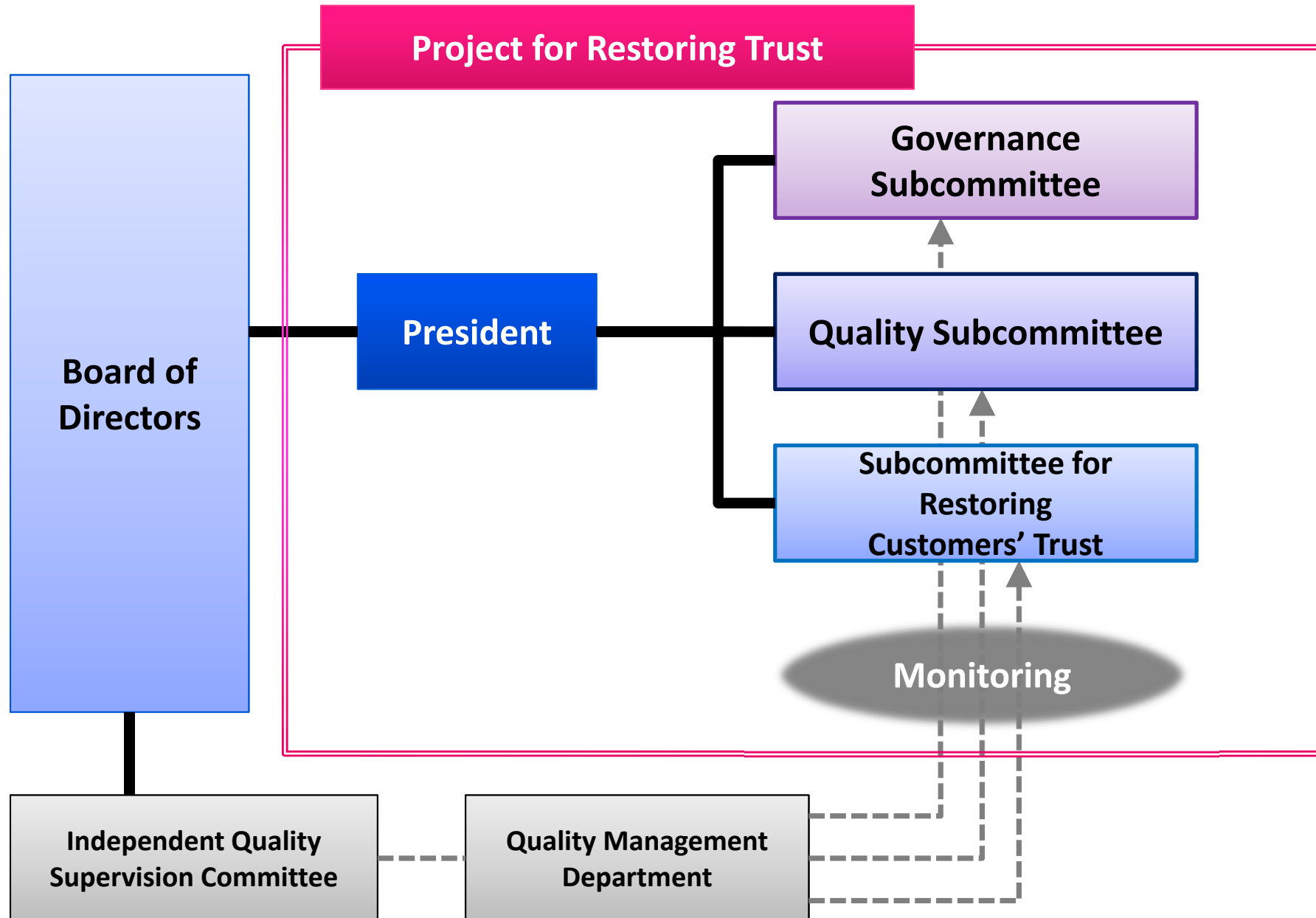
- 6. Rotation of Personnel Among Divisions
- 7. Understanding of Issues Occurring at Worksites
- 8. Establishment of the Quality Charter
- 9. Restructuring of the Quality Assurance System
- 10. Restructuring of Our Management Indicators

## II . Management – Ensuring Quality Control

- 1. Measures for Quality Management
- 2. Rotation and Development of Quality Assurance Personnel
- 3. In-house Education Programs Regarding Quality
- 4. Support by the Head Office

## III . Process – Strengthening of Quality Control Processes

- 1. Elimination of Opportunities for the Improper Handling of Test and Inspection Data and Unification of Shipping Standards
- 2. Understanding of Process Capabilities and Their Utilization (with respect to the materials businesses)
- 3. Review of the Approval Process (a) for Accepting New Purchase Orders, and (b) when Changing the Manufacturing Process
- 4. Promotion of Quality Risk Assessment in Capital Investments



# Preventive Measures – Status Overview ①

Measures to Prevent Recurrence of the Misconduct	Status
<b>I . Governance – Building a Quality Governance System</b>	
1 Penetration of the Corporate Philosophy	In Progress
2 Desirable State of the Board of Directors	Completed
3 Restructuring of the Risk Management System	In Progress
4 Reformation of the Organization	Under Consideration
5 Restructuring of the Group Companies	Under Consideration
6 Rotation of Personnel Among Divisions	Under Consideration 【New System to be implemented in April 2019】
7 Understanding of Issues Occurring at Worksites	In Progress
8 Establishment of the Quality Charter	Completed
9 Restructuring of the Quality Assurance System	Completed
10 Restructuring of Our Management Indicators	Under Consideration 【To be introduced from April 2019】

# Preventive Measures – Status Overview ②

Measures to Prevent Recurrence of the Misconduct		Status	
<b>II. Management – Ensuring Quality Control</b>			
1	Measures for Quality Management	Almost Completed	
2	Rotation and Development of Quality Assurance Personnel	Partially Implemented	
3	In-house Education Programs Regarding Quality	In Progress	
4	Support by the Head Offices	In Progress	
<b>III. Process – Strengthening of Quality Control Processes</b>			
1	Elimination of Opportunities for the Improper Handling of Test and Inspection Data and Unification of Shipping Standards	"KOBELCO Quality Guidelines" already enacted	Corrections and improvements will be checked by quality audit.
2	Understanding of Process Capabilities and Their Utilization (with respect to the materials businesses)		
3	Review of the Approval Process (a) for Accepting New Purchase Orders, and (b) when Changing the Manufacturing Process		
4	Promotion of Quality Risk Assessment in Capital Investments		

## I . Governance – Building a Quality Governance System

1. Penetration of the Corporate Philosophy
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8. Establishment of the Quality Charter
9. Restructuring of the Quality Assurance System
10. Restructuring of Our Management Indicators

Updates from the last announcement (August 1, 2018) are shown in **green bold text** or indicated as “Update” in the header.

# I-1. Penetration of the Corporate Philosophy ①

## Further Promotion of the “Next 100 Project”

- The President has started dialogue with employees 【from April 2018】: **31 dialogue sessions** with heads of departments/sections at **24 business locations and sites** have been completed as of the end of **October 2018**.
- **Employee Awareness Survey was conducted targeting all employees in July 2018.**
- We **created** a “video program for employees” aiming at remembering the quality misconduct and recovering their self-confidence and pride. **The video was also posted on Kobe Steel’s intranet.**
- **Opinions and comments from our customers following the misconduct were compiled as “Customers’ ‘Voices’” and has been used as material in inhouse training.**
- Measures Under Consideration: Additional measures for remembering the lessons learned from the misconduct (such as erecting a remembrance stone).



# I-1. Penetration of the Corporate Philosophy ②

## Establishment of “Core Values of KOBELCO Month”

- We have designated every October as the “Core Values of KOBELCO Month”.
- During the “Core Values of KOBELCO Month,” every department will promote a “Dialogue Platform.” At the platform, heads of departments/sections will select a topic from quality, compliance, safety, environment, work style reform, etc. and promote free and vigorous discussions between superiors and subordinates beyond the corporate hierarchy.
- We designated “quality” as our theme for this year. Starting in October 2018, every department is hosting a Dialogue Platform to openly discuss this topic among its employees.

## Revision of the “Six Pledges of KOBELCO Men and Women”

- The “Six Pledges” have been revised taking the Quality Charter into consideration.

Before Revision	After Revision
<p><b>2. Providing Superior Products and Services</b> We provide a safe, sound and innovative products and services to our customers, and thereby contribute to the well-being and advancement of the society.</p>	<p><b>2. <u>Contribution to the Society by</u> Providing Superior Products and Services</b> <u>Guided by our "Quality Charter"</u>, we provide safe, sound, and innovative products and services to our customers, and thereby <u>ensure customer satisfaction and</u> contribute to the advancement of the society.</p>



## I-2. Desirable State of the Board of Directors

➤ The following restructuring measures have been approved and implemented at the annual shareholders meeting on June 21, 2018.

### Increased Ratio of the Independent Outside Directors

Independent Outside Directors account for 1/3 or more of the board

### Restructured an Advisory Body of the Board of Directors

Established a Nomination and Compensation Committee

### Abolished Chairman Position and Introduced a New Election Scheme for Chairman of the Board

Abolished the Chairman Position and decided to appoint a Chairman of the Board from the independent outside directors

### Ceased the Practice of Appointing Each Division Head as Director

Appointed one director for each of the materials, machinery and electric power businesses

### Appointed a Director in Charge of Risk Management

Appointed a director who oversees and is in charge of risk management including compliance

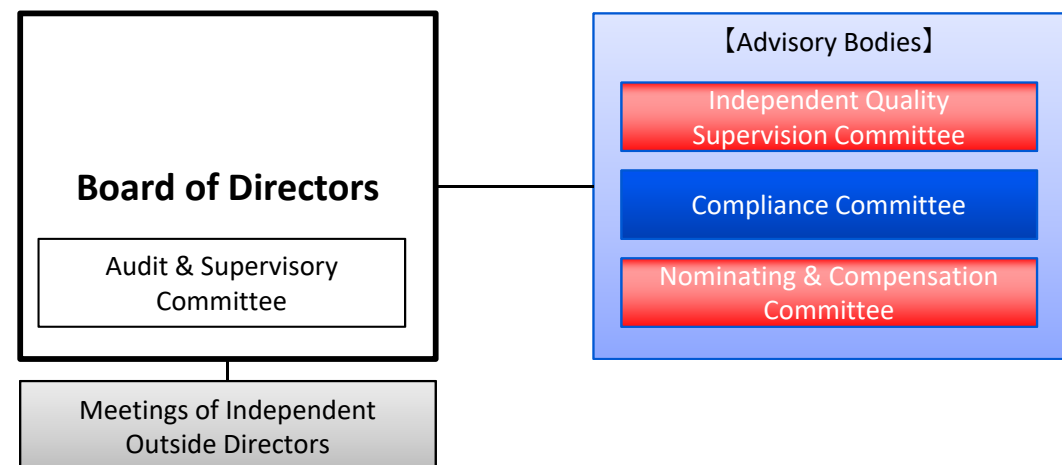
### Appointed a Director in Charge of Quality Assurance

Appointed a director who oversees and is in charge of quality assurance of the Company

### Appointed an Independent Quality Supervision Committee

Established an Independent Quality Supervision Committee, comprised of external experts, to focus on the company's quality assurance matters

### [Corporate Governance System]



# I-3. Restructuring of the Risk Management System

## Conduct a Compliance Awareness Survey on a Regular Basis

- **A Compliance Awareness Survey**, intended for all employees, **was conducted** concurrently with an Employee Awareness Survey in **July 2018**.
- **We are planning to provide feedback on the surveys to the employees after results have been finalized.**

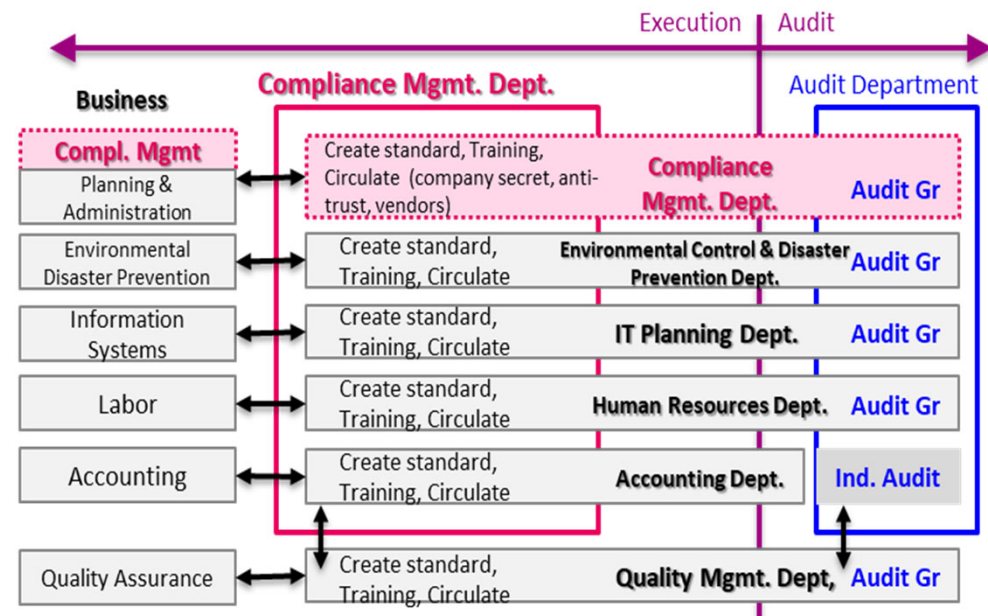
## Strengthen the Risk Management of the Kobe Steel Group

- Create ground rules to be complied by the Kobe Steel Group under the **“Standard Practices for the Group.”**
- In an effort to implement the Standard Practices for the Group at each Group Company, the Planning & Administration Department of each business division (in overseas operations, regional headquarters) played a central role to support the implementation.
- Created the **“KOBELCO Quality Guidelines,”** which were implemented effective May 1, 2018 (English and Chinese versions available).

## Establish Compliance Management Department

- Established Compliance Management Department on April 1, 2018, in order to strengthen risk management and compliance across the Kobe Steel Group, as well as to improve their effectiveness.
- Engaging in activities to increase awareness for managing risks across business divisions all while implementing and promoting risk management by consolidating risk-management duties of relevant audit functions. ※1

※1: Safety, environment, IT departments. Quality-related departments will be overseen by the Quality Management Department, which will be described later.



## I-4. Restructuring of Business Divisions

### Correct the Insular Nature of Each Unit in the Aluminum & Copper Business

Personnel rotations among units (within the business division) and among business locations including the Head Office and the Headquarters has commenced.

### Reform the Level of Quality Control and the Divisional Culture of the Aluminum & Copper Business

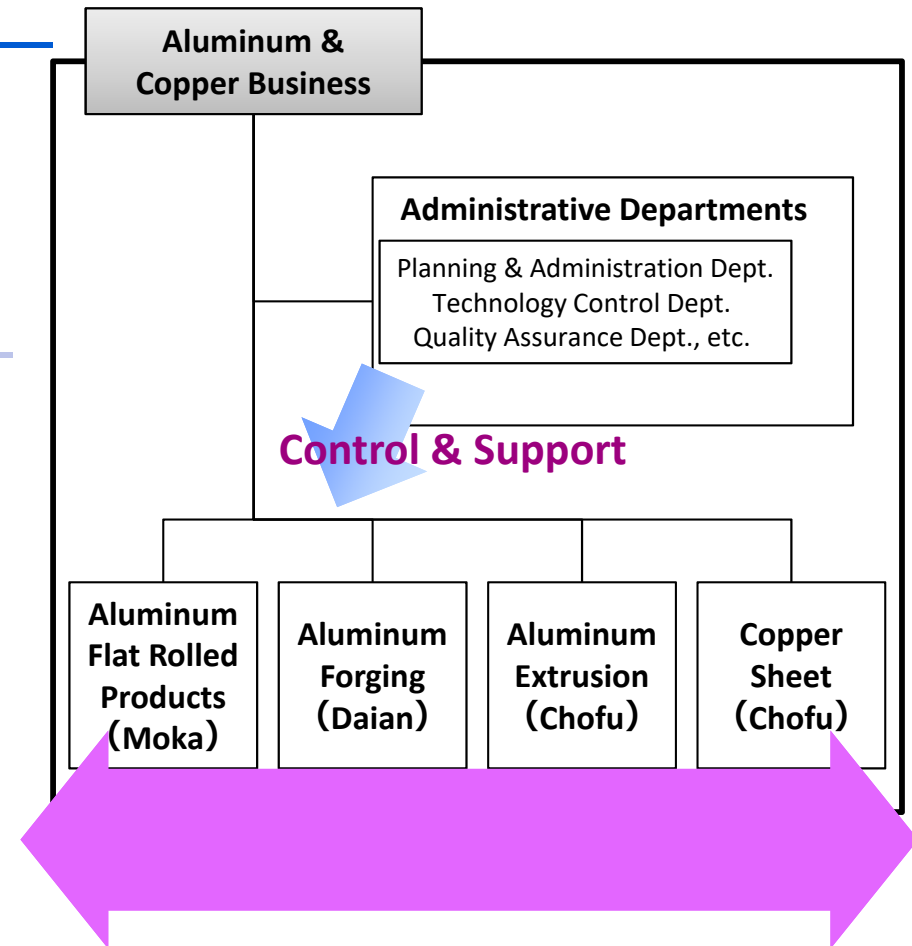
- Continue efforts to improve the overall quality management with support and quality audit from Quality Management Department.
- Assign personnel from the Iron & Steel Business to some Aluminum & Copper Business departments to enhance the quality control function.

### Restructure the Materials Businesses From a Strategic Perspective for Critical Market Segments

- Commenced a study for restructuring the organization to strengthen our materials businesses.

## I-5. Restructuring of Group Companies

- Review and assess each Group Company's risk management capability as part of efforts to strengthen governance of Kobe Steel Group.
- Initiated substantial discussions on detailed enhancement measures for some Group Companies.



# I-6,7. Rotation of Personnel Among Divisions / Understanding of Issues Occurring at Worksites

## I-6. Rotating Personnel Among Business Divisions

### Organizational System with High Mobility of Human Resources among Different Business Divisions

- Consider a new rotation system from perspectives of ① development of employees with a broad and flexible mindset; ② vitalization of the organization through personnel mobility; and ③ enhancement of inter-divisional cooperation to achieve business strategies.
- The new policy to encourage personnel rotation is slated to be drafted in November 2018 and implemented in April 2019.
- **Inter-divisional personnel rotation has been carried out in some areas.**

## I-7. Understanding Issues Occurring at Worksites

### Dialogue between Management and Employees

- Concurrently through promoting activities of the “Next 100 Project,” we have been continuing dialogues not only by the President, but also by other members of management and the heads of each business division.

### Employee Awareness Survey

- Concurrently **conducted in July 2018** along with the aforementioned Compliance Awareness Survey.

### The Quality Caravan Team

- The team is comprised of Head Office departments such as the MONODZUKURI (Production System Innovation) Planning and Promoting Department, the IT Planning Department, and the Technical Development Group, and tasked to provide consultation to business divisions on their issues.
- The team has visited a total of **68** out of 132 locations by the end of **October 2018**.
- **At this time, the automation of analysis, test and inspection processes has been raised as a primary technical challenge at the business locations.**
- **We are currently in discussion to make the Quality Caravan Team’s activities a permanent measure.**

# I-8,9,10. Quality Charter, Quality Assurance System, Restructuring of Management Indicators

## I-8. Establishment of the Quality Charter

- Established on February 6, 2018

## I-9. Revision of the Quality Assurance Structure

### Introduction of Multi-Level Quality Assurance System

- Implemented the following layered structure for quality assurance. (The Quality Management Department is also assisting Group Companies with the implementation.)
  - ✓ 1<sup>st</sup> level: Manufacturing sites and plants: Separation of the quality control function and the quality assurance function (independent quality assurance function)
  - ✓ 2<sup>nd</sup> level: Business Divisions: Placement of quality assurance bodies under direct supervision of each business division
  - ✓ 3<sup>rd</sup> level: Headquarters: Establishment of Quality Management Department

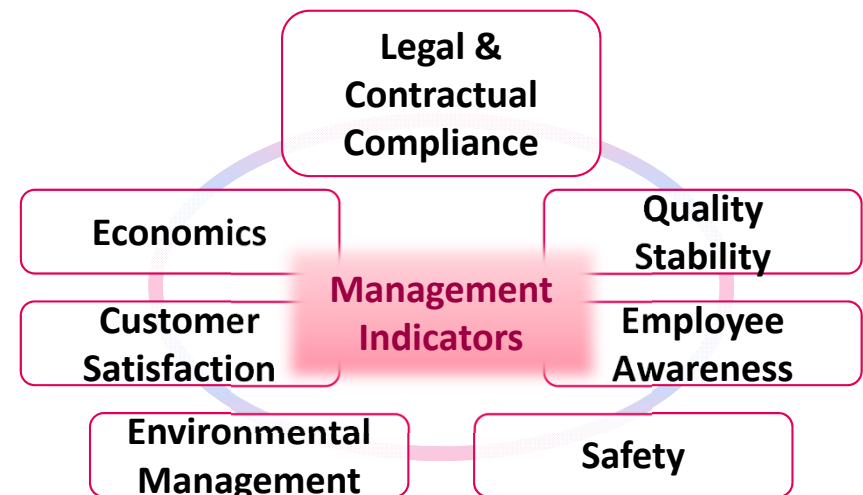
### Appointment of Executive Officer in Charge of Quality Management Department

- Appointed on April 1, 2018.

## I-10. Restructuring of Management Indicators

### Management Indicators

- We are restructuring current management indicators from the standpoint of economics, customer satisfaction, employee awareness, safety, sustainable quality, environmental friendliness, and legal and contractual compliance.
- We will set forth both performance indicators (quantitative progress against a goal) and management indicators (indicators that can evaluate the process itself), and create a system where PDCA cycle functions properly. (To be implemented in April 2019).



## Ⅱ . Management – Ensuring Quality Control

1. Measures for Quality Management
2. Rotation and Development of Quality Assurance Personnel
3. In-house Education Programs Regarding Quality
4. Support by the Head Office

Updates from the last announcement (August 1, 2018) are shown in **green bold text** or indicated as “Update” in the header.

# II-1. Measures for Quality Management ①

## Establishment of Quality Management Department (January 1, 2018)

- Conduct quality-related audits while being in charge of overseeing quality assurance departments of each business division.
- Gather information and understand issues concerning quality assurance in each business division (e.g., quality management indicators, complaints, etc.), report these issues to the management on a regular basis, and create company-wide measures to improve the overall quality assurance practice.

## Establishment of Quality Assurance Departments under Direct Supervision of Business Divisions (~ January 1, 2018)

- Established quality assurance departments under the direct supervision of each business division. Selected quality assurance staff are designated to co-serve in the Quality Management Department and participate in discussions concerning companywide measures.

## Enhancement of Quality Assurance Management at Manufacturing Sites

- Guidelines enacted in order for quality assurance departments to secure independence from manufacturing and processing departments and to maintain unwavering independence from manufacturing or processing environments in making proper judgments on products and preventing nonconforming products from being shipped.

<b>i</b> Place Quality Assurance Department directly under the head of the business division and maintain independence from design (for machinery businesses) and manufacturing departments	<b>iii</b> Separate the issuer of inspection certificates from design (for the machinery businesses) and manufacturing departments
<b>ii</b> The Head of the Quality Assurance Department will not co-serve as the Head of the design (for the machinery businesses) and manufacturing departments	<b>iv</b> Establish a quality management system

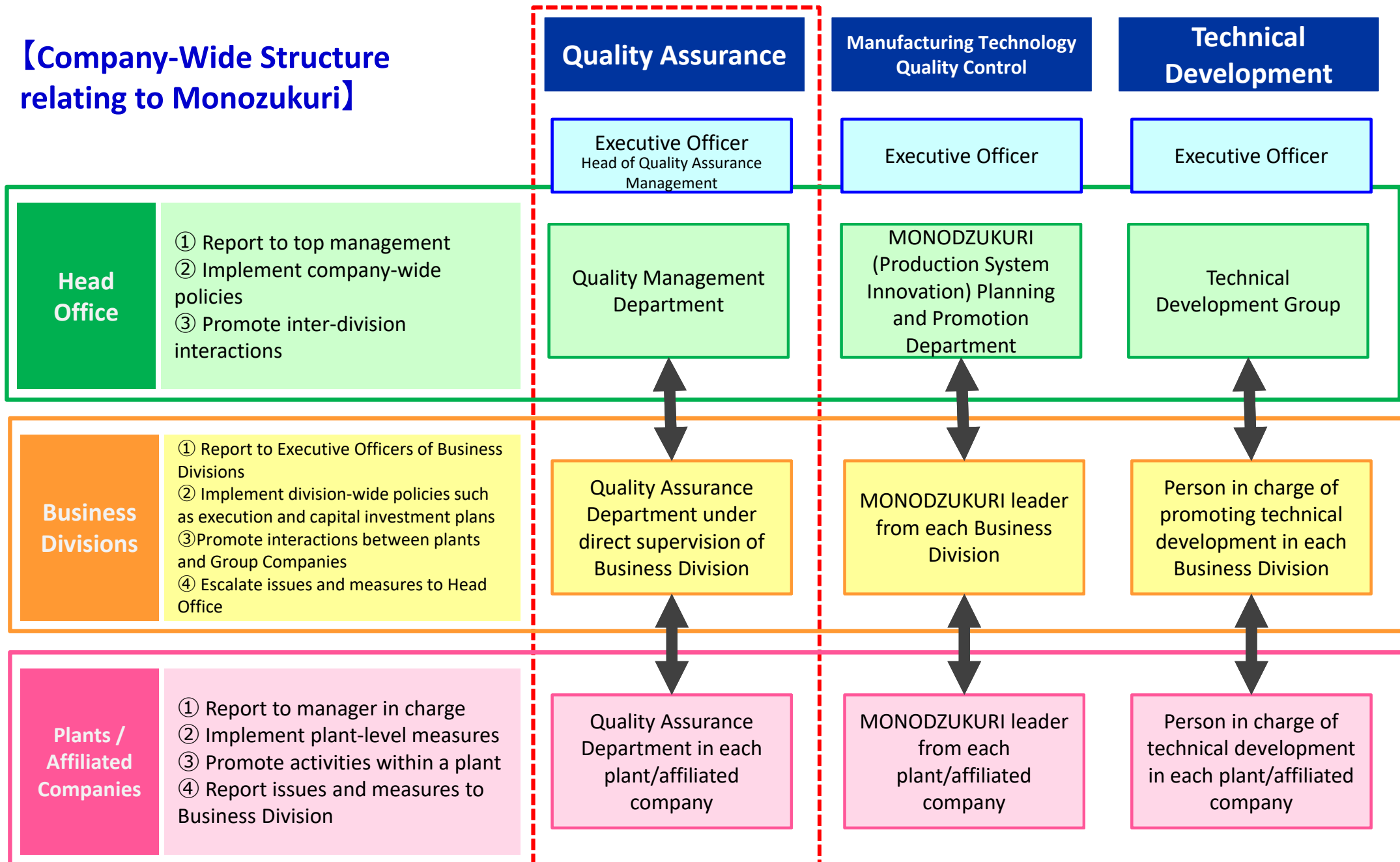
## Group Quality Leader Conferences (scheduled for September, October and November 2018)

- Quality assurance leaders from Kobe Steel and Group Companies will be invited to evaluate recommendations/proposals and review implementation status of various measures, and share information related to quality control activities.
- The conferences have been held in Japan (Tokyo, Kobe) and overseas (China and Southeast Asia) in September and October 2018. A conference in the U.S. is scheduled for November 2018.



# II-1. Measures for Quality Management ②

## 【Company-Wide Structure relating to Monozukuri】





# II-1. Measures for Quality Management ③

## 【Roles of Quality Management Department】

## 【Roles of Quality Management Department】

- Conduct quality-related audits while being in charge of overseeing quality assurance departments of each business division
- Gather information and understand issues concerning quality assurance in each business division (e.g., quality management indicators, complaints, etc.), report these issues to the management on a regular basis, and create company-level measures to improve the overall quality assurance practice

		Head Office	Iron & Steel	Welding	Aluminum & Copper	Machinery	...
<b>Quality Assurance Management as a Head Office Department</b>	① Office for the Independent Quality Supervision Committee	●					
	② Report to the management on the operational status regarding company-level quality control	●					
	③ Centrally manage public certifications across the company	●					
	④ Head Office contact point for certification bodies and governments	●					
	⑤ Report the results of audits to the Independent Quality Supervision Committee 【Quality Audit Section】	●					
<b>Function to Manage Laterally between Business Divisions</b>	⑥ Create an annual plan for quality assurance, and announce quality compliance policy	●	●	●	●	●	
	⑦ Gather information and understand issues related to quality from each business division	●	●	●	●	●	
	⑧ Create an education and training plan	●	●	●	●	●	
	⑨ Consider and propose personnel assignments	●	●	●	●	●	
	⑩ Gather and provide information related to quality (e.g., revision of JIS and ISO)	●	●	●	●	●	
	⑪ Gather and provide information related to quality from industry organizations	●	●	●	●	●	
	⑫ Conduct relevant quality-related audits 【Quality Audit Section】	●	●	●	●	●	
	⑬ Follow up on audit results 【Quality Audit Section】	●	●	●	●	●	

## II-2,3. Rotation and Development of Quality Assurance Personnel/In-house Education Programs Regarding Quality

### II-2. Rotation and Development of Quality Assurance Personnel

#### Rotation of Quality Assurance Personnel

- A quality assurance personnel diagram of Kobe Steel and Group Companies will be created, and we will carry out job rotations between the Head office, business division/plants, and Group Companies.
- As a first step, Quality Audit Section of the Quality Management Department at the Head Office will hire experienced individuals, educate and train them, and dispatch them to business divisions and Group Companies as well as build a rotation structure. (Currently in progress)

#### Development of Quality Assurance Personnel

- We will systematize quality-related education (including obtaining qualifications), and reflect it to the Group's FY2019 training program. (~ October 2018)
- As for quality risk management and prevention measures, we launched a pilot training program on FMEA (Failure Mode and Effect Analysis)
- / FTA (Fault Tree Analysis) / DR (Design Review) focusing on the products at the plants.

### II-3. In-house Education Programs Regarding Quality

#### Quality and Compliance Trainings

- We are implementing quality and compliance training targeting heads of departments/sections (approximately 600 individuals) of Kobe Steel and its Group companies (August 2018 – March 2019). The training has been expanded to all employees through the Dialogue Platform (October 2018 – March 2019).
- Sharing and penetration of the Quality Charter not only to quality assurance departments, but also to all employees of Kobe Steel Group (e.g., quality and compliance trainings, quality website, e-learning).



#### Promotion of Other Quality-Related Education Program

- The "Quality" page was created on Kobe Steel's intranet in September 2018, on which the progress report on the Project for Restoring Trust will be shared.
- Additionally, education on quality will be offered via e-learning, and relevant information will be shared via internal newsletters (from November 2018 onward)

## II-4. Support by the Head Offices

### Audit by Quality Audit Section of Quality Management Department

Audit Item		Schedule
<b>i ) Review of compliance status (on-site audit)</b> <ul style="list-style-type: none"> <li>Cross-reference inspection results of subject products are audited on-site against legal specifications and customer specifications.</li> <li>Disposal of reserved and nonconforming products are also audited.</li> </ul>		<p>Started in May 2018</p> <p>Conducted in <b>65</b> out of 118 locations by the end of <b>October 2018</b></p>
<b>ii ) Review of quality management systems from the anti-fraud perspective</b> <ul style="list-style-type: none"> <li>Review laws and regulations related to quality, review the means of determining customer specifications, and confirm the administrative department in charge.</li> <li>Assess consistency between the instructions given to manufacturing lines and how they are actually carried out.</li> </ul>		
<b>iii ) Assessment of compliance awareness</b> <ul style="list-style-type: none"> <li>Assess the level of awareness of the top management as well as factory workers through interviews in order to prevent misconducts.</li> <li>Check whether training on quality compliance is properly provided.</li> </ul>		
<b>iv ) Review of the implementation status of the preventive measures</b>		
<ul style="list-style-type: none"> <li>Plants where misconducts were identified:</li> </ul>	<p>Review status and effectiveness of the implementation of the preventive measures.</p>	
<ul style="list-style-type: none"> <li>Plants where there was no misconduct:</li> </ul>	<p>Review the implementation status and effectiveness of measures that were recommended after quality audits.</p>	

### III. Process – Strengthening of Quality Control Processes

1. Elimination of Opportunities for the Improper Handling of Test and Inspection Data and Unification of Shipping Standards
2. Understanding of Process Capabilities and Their Utilization (with respect to the materials businesses)
3. Review of the Approval Process (a) for Accepting New Purchase Orders, and (b) when Changing the Manufacturing Process
4. Promotion of Quality Risk Assessment in Capital Investments

#### 【Notes】

- In order to promote the points above, we established the “KOBELCO Quality Guidelines” of the Kobe Steel Group. The Guidelines went into effect on May 1, 2018 and we are disseminating and enforcing the Guidelines among the Group Companies.
- We will monitor the actual enforcement and progress of the above through quality audits.

### III-1. Eliminating Improper Handling Opportunities in Tests/Inspections and Unifying Shipment Standards

#### Automation of Tests/Inspections Recording and Elimination of Manual Data Entry by One Person

- We are gathering information concerning test/inspection devices (i.e., purpose, number of devices) used in each business location (including Group companies) and creating an investment plan for automation.
- For manual tests/inspections, we are striving to understand the needs for automation, provide solutions, and expand the practice across business locations through activities of the Quality Caravan Team.
- For manual tests/inspections, we continue to implement additional measures such as review of work logs and double confirmation.

#### Adjustment of Shipping Standards

- We are in the process of eliminating opportunities for any improper conduct caused by the existence of double standards (customer specifications and internal standards).
  - ⇒ Under the new rule, customer specifications are used as a default standard for shipment approval instead of Kobe Steel's internal standards.

### III-2. Understanding and Utilizing Process Capabilities (in Materials Business)

#### Application and Utilization of Process Capability Index

- Understanding Process Capability Index: Understand how quality properties deviate from the required standards in manufacturing processes for each category (i.e., production lines, product types, tests/inspections, and customers).
- Utilizing Process Capability Index: The degree of deviation found in the quality properties of manufacturing processes will be used for deciding whether to accept or reject orders. If the process capability is deemed insufficient in light of a specification, either of the following options shall be considered:
  - ✓ Improve the process capabilities, including upgrading facilities; or
  - ✓ Work with a customer to relax a customer specification pursuant to the predetermined procedures.

### III-3. Reviewing the Approval Process for New Orders and Changes in the Manufacturing Process

#### Re-Evaluation of the Approval Process for New Orders

- Enforcing DR [Design Review]: In order to prevent our products from deviating from customers' requirements, each business division will go through a proper authorization process such as Design Review ("DR") covering each manufacturing step from product development to mass production before determining whether an order can be accepted.
- Specifically, each business division shall confirm its compatibility with the customer specifications, while evaluating manufacturing conditions, quality assurance methods, and process and manufacturing capabilities, before deciding whether to accept a purchase order. Furthermore, business divisions shall assess the process capability and customer satisfaction in the post-mass production phase to improve these indicators and DR.

#### Reviewing the Approval Process for Changes in the Manufacturing Process

- We will prevent potential defects by assessing beforehand the effect on quality when the 4Ms (men, machine, material, method) are changed and conformity with customer specifications.
- Specifically, we will assess risks and clarify the authorization process when changing the 4Ms in the manufacturing process.

### III-4. Promoting Quality Risk Assessment in Capital Investments

#### Introduction of Investment Standard in Consideration of Mitigating Quality Risks

- Previously, Kobe Steel had utilized the Internal Rate of Return (IRR) and the Payback Period Method to make decisions regarding capital investments.
  - Quality-related investments with low returns (e.g., installment of new test/inspection devices) were less likely to become a point of discussion.
- ⇒ We will attempt to mitigate quality risks through appropriate investments by incorporating the quality risk factor into a new investment standard.

## II . Management - Ensuring Quality Control

1. Establishment of the Quality Assurance Department in the Aluminum & Copper Business
2. Education
3. Audit and Support

## III . Process - Strengthening of Quality Control Processes

1. Emergency Measures
2. Permanent Measures

Updates from the last announcement (August 1, 2018) are shown in **green bold text** or indicated as "Update" in the header.

## Implementation Schedule for Preventive Measures

## II - 1. Management Structure

- Established Quality Assurance Department directly under the Aluminum & Copper Business in November 2017.
- With a 3-layered management structure, we are continuing quality-related plans and audits with the Quality Management Department.
- Share information such as progress of measures and challenges at business locations in the quarterly quality conferences within business divisions.

## II - 2. Education

- Planning and promoting education program from awareness and knowledge perspectives, and developmental activities related to quality compliance.

### [Education]

- Awareness: Raise awareness for quality compliance through dialogues with the management and heads of plants
- Knowledge: Active engagement in quality-related education (encourage to acquire third-party certificate)
- ✕ Education is offered at each plant

### [Development]

- Promote inter-divisional/departmental quality exchange (Quality management such as DR, automation, etc.)
- Seminars by external lecturers in the quarterly quality conferences

## II - 3. Audit and Support

- Step 1 『Comparison Audit』 (January 2018～)
- Step 2 『Audit on Quality Management Scheme』 (2H 2018 ～)
- Step 3 『Technical Development Support』 (September～)

- Step 1 has been completed. Audit will be continued in this fiscal year.
- Promoting and assisting the improvement of QMS at business locations, and currently auditing the scheme in the second half of FY2018.





# III - 1. Process – Emergency Measures –



## 【Emergency Measures】 (Completed or Work-in-Progress)

i ) Compare Test/Inspection Data and Mill Sheets  
(To be continued until permanent measures have been completed)

ii ) Review Manually-Entered Test/Inspection Results  
(To be continued until permanent measures have been completed)

iii ) Restrict Access to Databases, Manage Data Logs

iv ) Adjust Shipment Standards 【operational】

v ) Compare Customer Specifications and Manufacturing Standards (Completed in Self-Inspection)

vi ) Enforce Rules for Handling Nonconforming Products

The Quality Management Department is auditing whether each business location is continuously engaging in these emergency measures.

### 【Permanent Measures】

#### i ) Eliminate opportunities for mishandling the test/inspection data

- Create a system environment where data falsification is impossible.

#### ii ) Adjust shipment standards [system implementation]

- Improvement of the system: Change the system settings so that the customer specification is applied as the shipping standard.  
⇒ With the exception of some plants, we are aiming to complete by the end of March 2019.

#### iii ) Understanding Process Capabilities

- Create a mechanism to fully understand the process capability.

#### iv ) Improve Process and Test/Inspection Capabilities

- We have started with cases that were extracted for the purpose of the stabilization of functional characteristics such as heat dispersion improvements in heat treatment facilities and distortion control in the fabrication process. In business locations that lack testing / inspection capability, we will reinforce testing / inspection devices.  
⇒ Starting in FY2018, we are taking improvement measures such as capital investment and technical development in order to respond to the lack of testing / inspection capability.

### 【Permanent Measures】

#### v) Re-Evaluate Approval Process for New Orders

- Implement a DR (Design Review) method, and clarify the items to be confirmed and approved at each stage from inquiry to trial production, mass production and official order.
- Introduce a system for proper sales activities by ensuring separation between ordering and approving departments.
  - ⇒ Built the framework by the first half of FY2018 and have begun execution/trials in the second half of FY2018. We are evaluating the operation status at each plant.

#### vi) Re-Evaluate Approval Process for Changes in the Manufacturing Process

- ⇒ Brushed up the operation method and began execution/trials by the end of the first half of FY2018.

#### vii) Promote Quality Risk Assessment in capital investments

- ⇒ Preparing to apply for low-return quality-related investments.

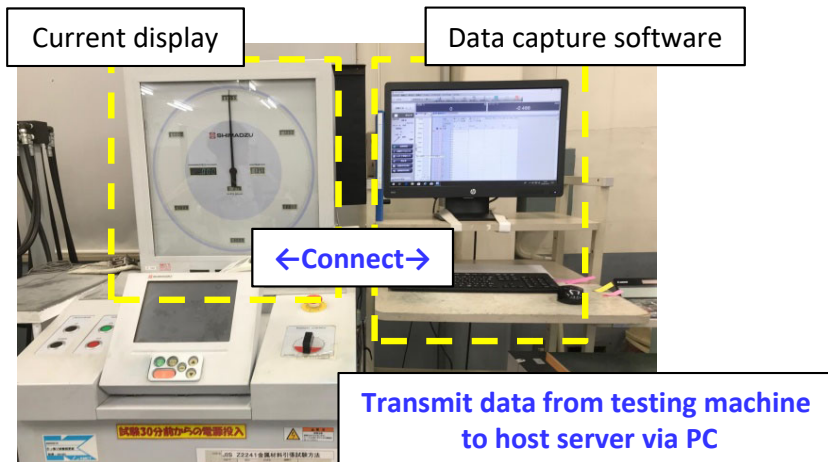
## 【Permanent Measures】

### i : Eliminate opportunities for mishandling the test/inspection data

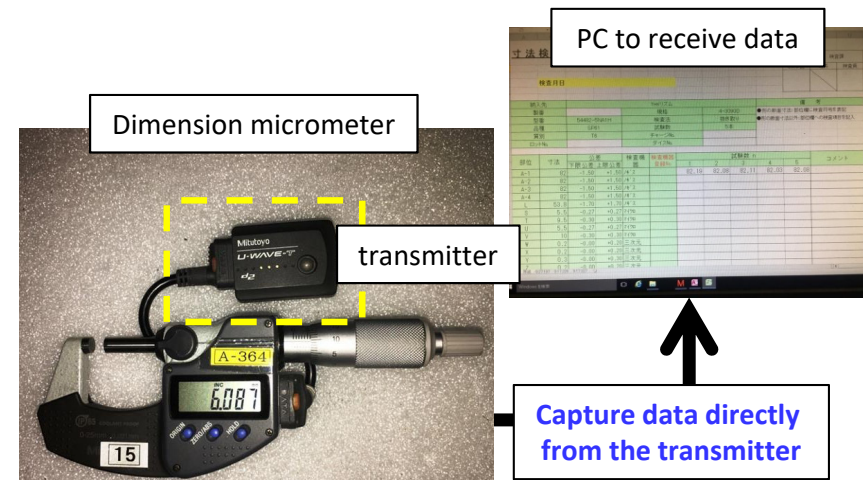
- Automation of applicable test/inspection devices has been undergoing as planned for targeted completion in March 2020.  
(Examples are shown in ① and ② below)
- As for the tests/inspections for which automation is difficult, we are continuing double confirmation and are promoting the implementation of history management and systemization of edit logs.

### Aluminum & Copper) Example of Automation

#### ① Mechanical Property Test



#### ② Dimension Test



#### Modify tensile testing machine

Install and connect data transmission software to tensile testing machine

- Eliminate opportunities for improperly handling of data via manual entry

#### Upgrade measurement instruments (micrometers)

Upgrade to dimension micrometer with auto-transmit function

- Eliminate opportunities for improperly handling of data when manually copying values

## 【Permanent Measures】

### iii : Understanding Process Capability

#### ➤ Promoting Visualization of Process Capability

Visualize the inspection data (through graphs/indexing) and correctly understand our process capability.

- Histogram, Process Capability Index (Cpk)  
Visualize the center value and variation of inspection data ➔ Isolate process incapability, determine whether an order can be accepted, monitor irregularity/changes
- Inspection Items (Quality Property) – Correlation Diagram of Manufacturing Conditions  
Visualize the correlation between inspection data and manufacturing conditions ➔ Identify manufacturing conditions that need improvement.

★ Implementation of the visualization tool would enable faster input and improvement

#### ➤ Example: Utilizing known process capability

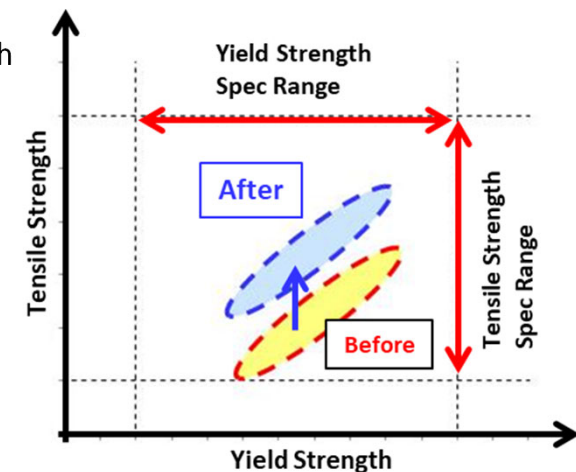
Learn the process incapability and its quality property: Understand tensile strength

- Isolate correlated manufacturing conditions A, B, C and D
- Optimize the conditions and improve the process

Optimize correlated manufacturing conditions				Improved Result (Right)	
Condition A	Condition B	Condition C	Condition D	Tensile Strength	Yield Strength
↑	↑	↓	↓	↑	→

Improve tensile strength by optimization of manufacturing conditions

↓  
Steady production



Example of Optimization (Image)

# Implementation Schedule for Preventive Measures in the Aluminum & Copper Business

Aluminum & Copper Business	FY2017	FY2018				FY2019		
	1H	1Q	2Q	3Q	4Q	1H	2H	
<b>Management</b>								
Organizational Restructure	○ Established Quality Assurance Departments							
Education	Discuss contents →			Education →	Education →		Education →	
Audit (comparison, mechanism)	Comparison & audit scheme →			Comparison & audit scheme →	Comparison & audit scheme →		Comparison & audit scheme →	
Technical Development Support						Technical development support →	Technical development support →	
<b>Process</b>								
<b>【Emergency Measures】</b>								
Compare test/inspection data and mill sheet	WIP							
Review manually-entered test/inspection results	WIP							
Restrict access to databases	→ Completed							
Adjust shipment standards (operational)	WIP							
Compare customer specifications and standard values	Completed in Self-Inspection							
<b>【Permanent Measures】</b>								
Eliminate opportunities for mishandling the test/inspection data		Automation by test items on a sequential basis →						
Adjust shipment standards (system)		Launch operation (some plants may require additional time to set up the system) →						
Understand process capabilities	Execute Sequentially →	Consider PDCA scheme →						
Improve process and test/inspection capabilities	Execute Sequentially →	Execute Sequentially →						
Re-evaluate approval process for new orders	Discuss details →	Create rules, test operation / brush up →				Launch full operation		
Re-evaluate approval process for changes in manufacturing process	Discuss details →	Create rules, test operation / brush up →				Launch full operation		