

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

**March 29, 2019**

**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

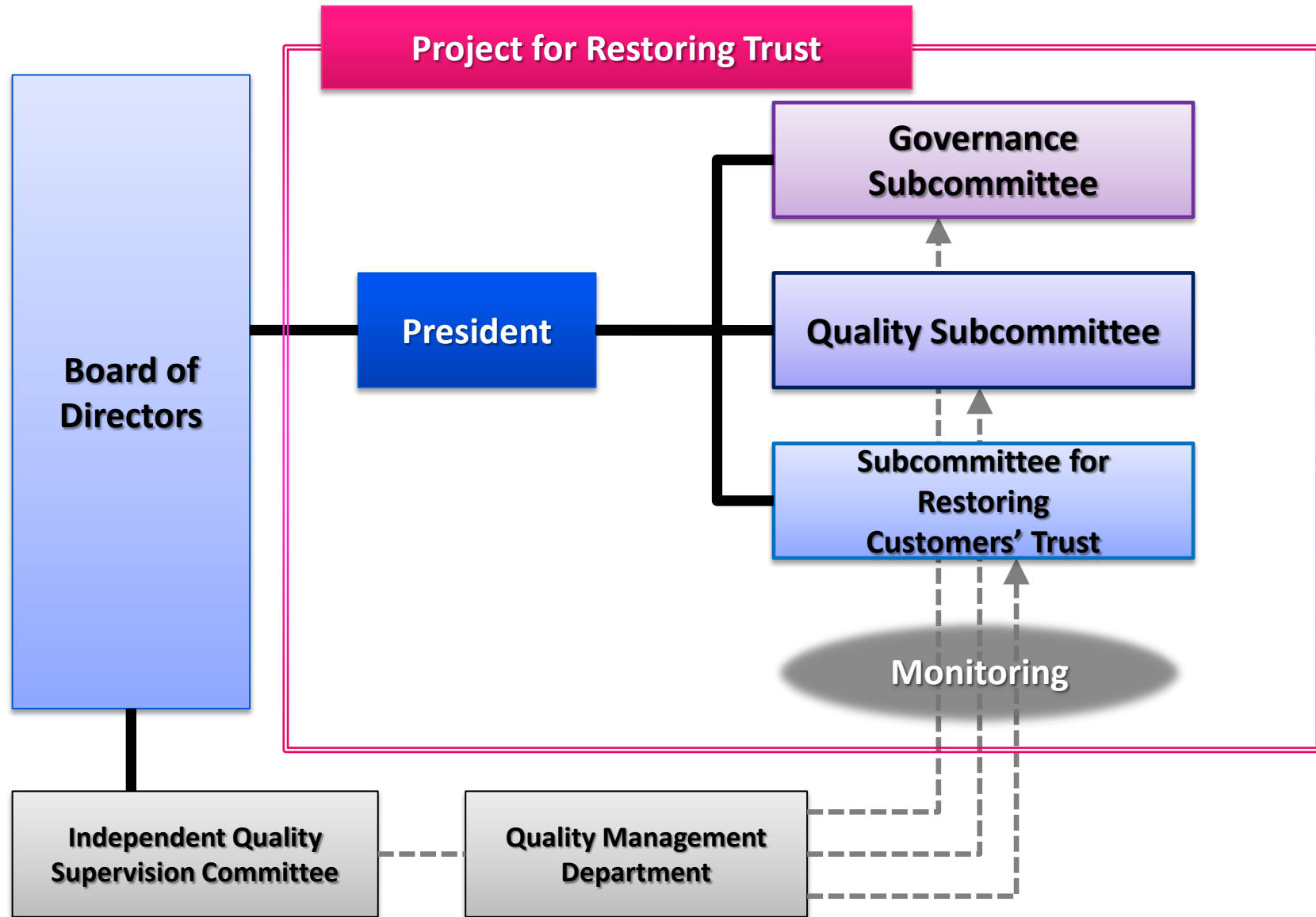
## III . Process – Strengthening of Quality Control Processes

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

Measures to Prevent Reoccurrence 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	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	To be Implemented in April 2019	
<b>II Management – Ensuring Quality Control</b>			
1	Measures for Quality Management	Almost Completed	
2	Rotation and Development of Quality Assurance Personnel	Partially Completed	
3	In-house Education Programs Regarding Quality	In Progress	
4	Quality Audit by the Head Office	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	Correction and improvements 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
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

Updates from the last announcement (February 5, 2019) are shown in **bold green 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]: In addition to heads of departments/sections of our domestic and foreign locations, from November 2018 the President initiated a round of dialogue sessions with assistant managers and general foremen at each business location, **hosting a total of 39 sessions at 50 locations as of March 15, 2019.**
- Employee Awareness Survey was conducted targeting all employees in July 2018. The result of the survey and action plans based on the result were announced to all employees in December 2018 via the company’s intranet and in print.
- We created a “video program for promoting the Next 100 project” aiming at recovering their self-confidence and pride. The video was also posted on Kobe Steel’s intranet.
- As a measure to uphold our commitment, we are instituting an education center (to be completed in the first half of fiscal 2019).



## 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. Contribution to the Society by 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

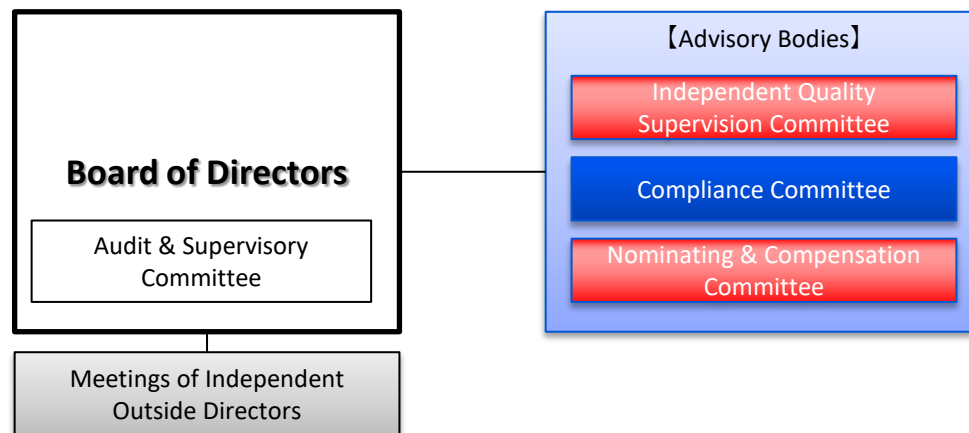
### Appointed a Director in Charge of Quality Assurance

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.
- The result of the survey was announced to all employees in December 2018 via the company’s intranet and in print.

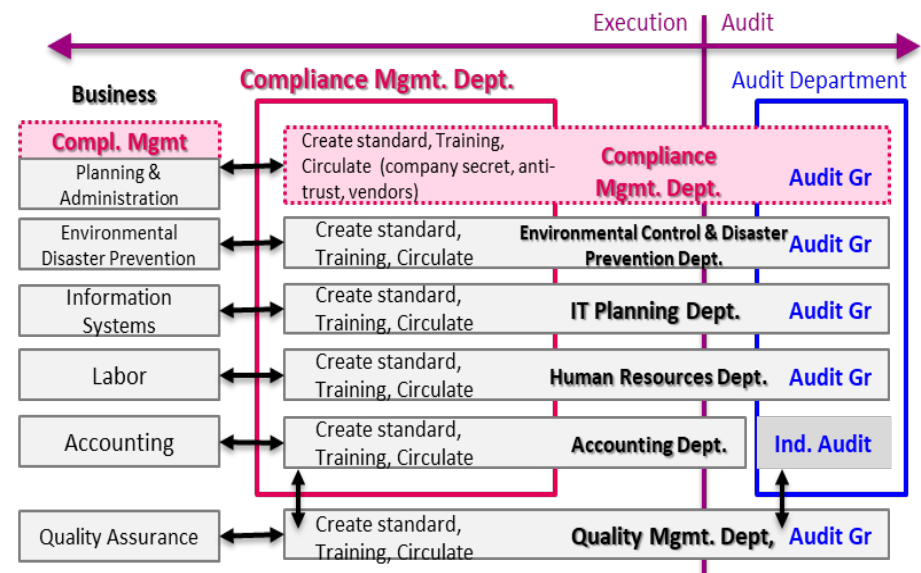
## Strengthen the Risk Management of the Kobe Steel Group

- 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

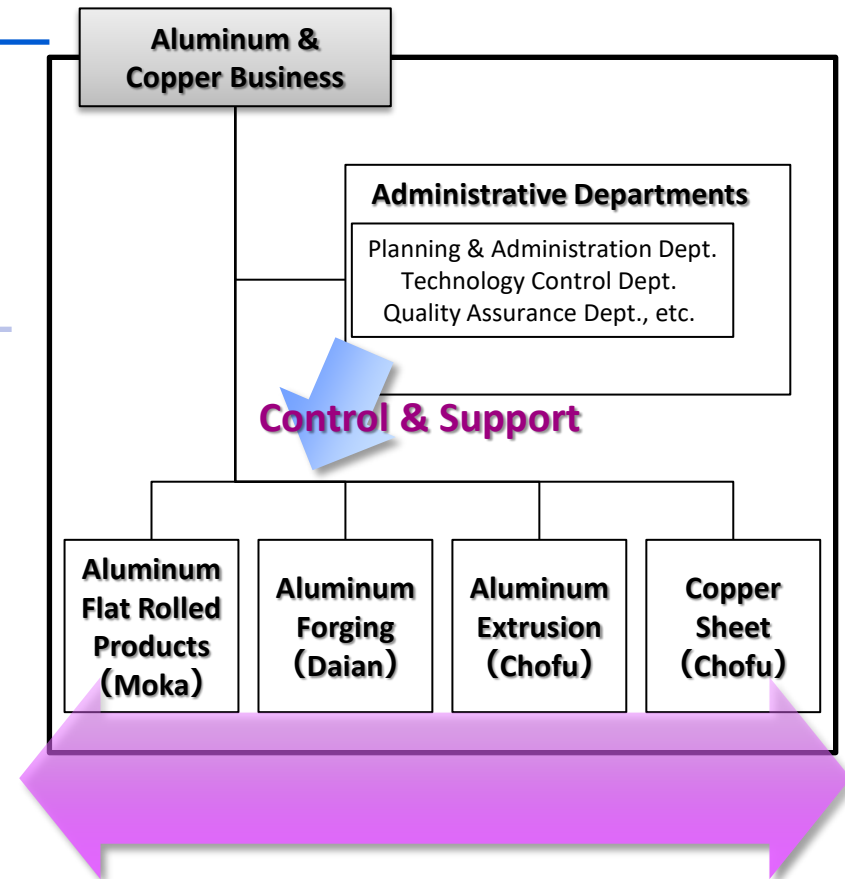
Personnel rotations among units (within the business division) and among business locations including the Head Office and the Headquarters has commenced.

### 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 was drafted in January 2019 and will be 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 **113** out of 132 locations by the end of **March 2019**. **In the interim, the team is providing necessary information and assistances to the remaining 19 locations to resolve issues.**
- **As the automation of the analysis, test and inspection processes is a primary challenge for each location, the Quality Caravan Team is focusing on assisting the locations to solve the issue.**



【Testing the machine that automatically measures the appearance (360° image) of molds】

# 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

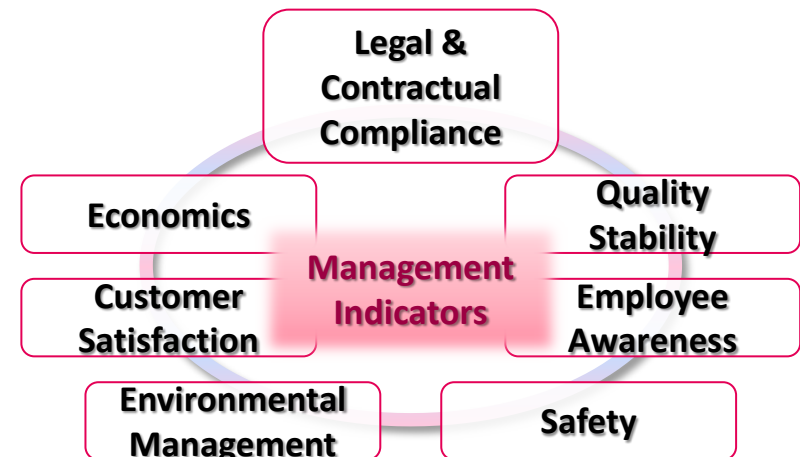
### Appointment of Executive Officer in Charge of Quality Management Department

- 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 (February 5, 2019) 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.

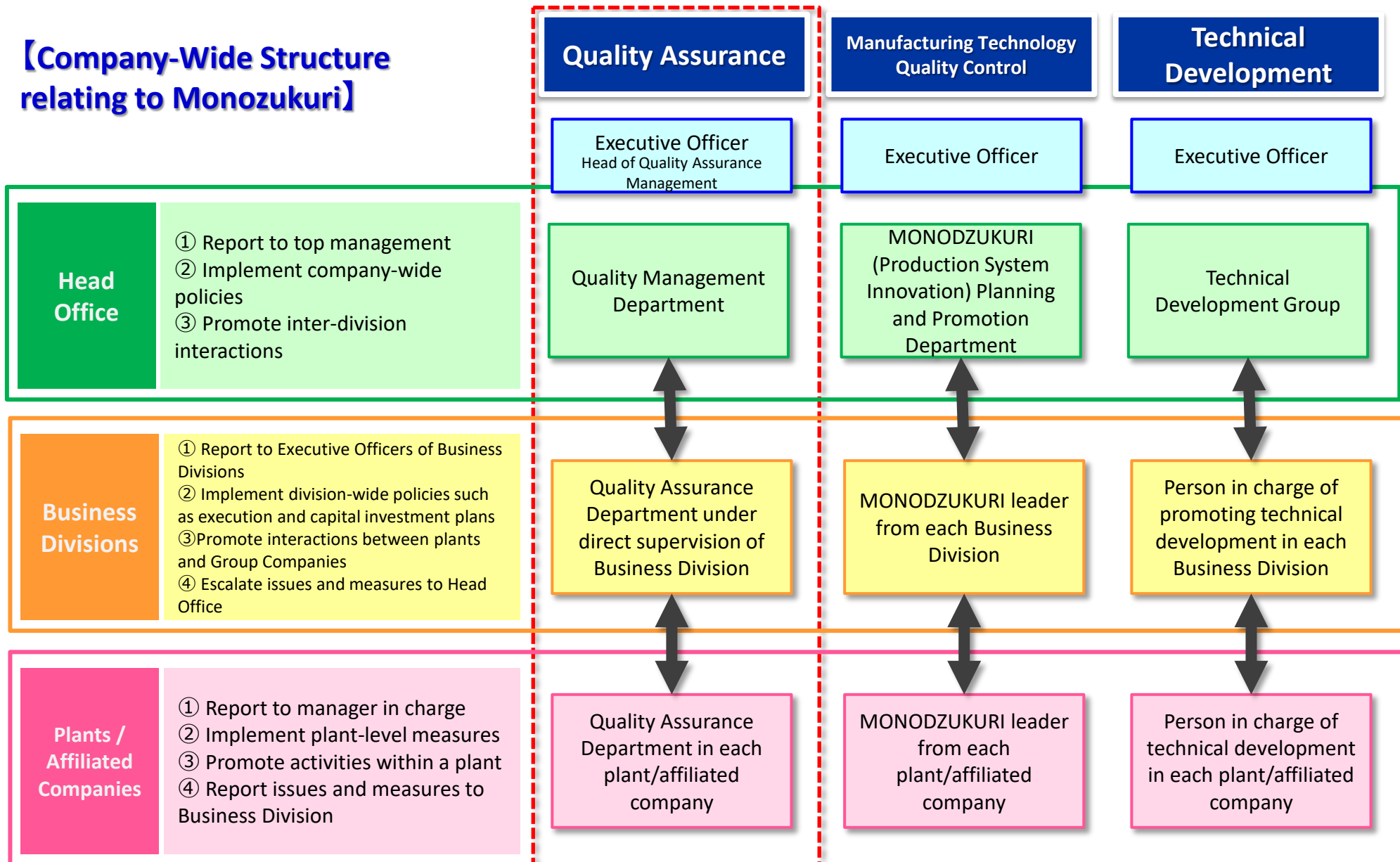
<b>i</b> Place Quality Assurance Department directly under the head of the business division and maintain independence from design (for machinery businesses) and manufacturing departments	<b>iii</b> Separate the issuer of inspection certificates from design (for the machinery businesses) and manufacturing 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

- Quality assurance leaders from Kobe Steel and Group Companies will be invited to review implementation status of various measures, and share information related to quality control activities.
- The Quality Management Department hosted the Group Quality Leader Conference twice in Japan (Tokyo, Kobe) as well as China, Southeast Asia and the United States. We plan to continue this effort into the next fiscal year and beyond.

# II-1. Measures for Quality Management ②

## 【Company-Wide Structure relating to Monozukuri】



## 【Roles of Quality Management Department】

Quality Assurance  
Management as a Head  
Office Department

	Head Office
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】	●

**【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

Function to Manage Laterally between  
Business Divisions

	Head Office	Iron & Steel	Welding	Aluminum & Copper	Machinery	...
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

- We have started creating a diagram of our quality assurance personnel among the Group. We are focusing on education and development of the mid-hire quality audit staff in order to carry out personnel rotations across the Group and enhance the internal quality assurance functions (to be commenced in April 2019)

#### Development of Quality Assurance Personnel

- We will streamline definitions of skills and evaluation of skill levels required for company-wide quality assurance staff, systematize quality-related education (including obtaining qualifications), and reflect it to the Group's FY2019 training program
- As for quality risk management and preventive measures, we are engaging in 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.



【FMEA training at a business location】

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

#### Quality and Compliance Trainings

- We completed quality and compliance training targeting heads of departments/sections (approximately 600 individuals) of Kobe Steel and its domestic Group Companies in November 2018. The training has been expanded to all employees through the Dialogue Platform (through March 2019). We are also in the process of hosting the training sessions in our overseas Group Companies.
- 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.
- Education on quality was offered via e-learning (November 2018) and circulation of relevant information via internal newsletters (starting in December 2018).



### 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><b>Completed at 117 locations by the end of March 2019</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>	

Note: The originally targeted 118 locations for the quality audit were downsized to 117 locations as a result of the reorganization (separation and consolidation) of some of the business locations.

### 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-1,2. Eliminating Improper Handling Opportunities, Unifying Shipping Standards / Understanding and Utilizing Process Capabilities

### 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 planning to achieve automation for approximately 1,800 testing/inspection machines by the end of FY2020 (targeting approximately 50% completion by the end of FY2018 and approximately 80% by the end of FY2019).

- A total number of machines automated / to be automated (cumulative)

FY2017	1H FY2018	2H FY2018 (est.)	FY2019 (planned)	FY2020 (planned)
Approx. 300	Approx. 400	Approx. 850	Approx. 1,500	Approx. 1,800

- We are continuing extra measures such as confirmation of work logs and four-eye check process for the tests and inspections yet automated.

#### 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.

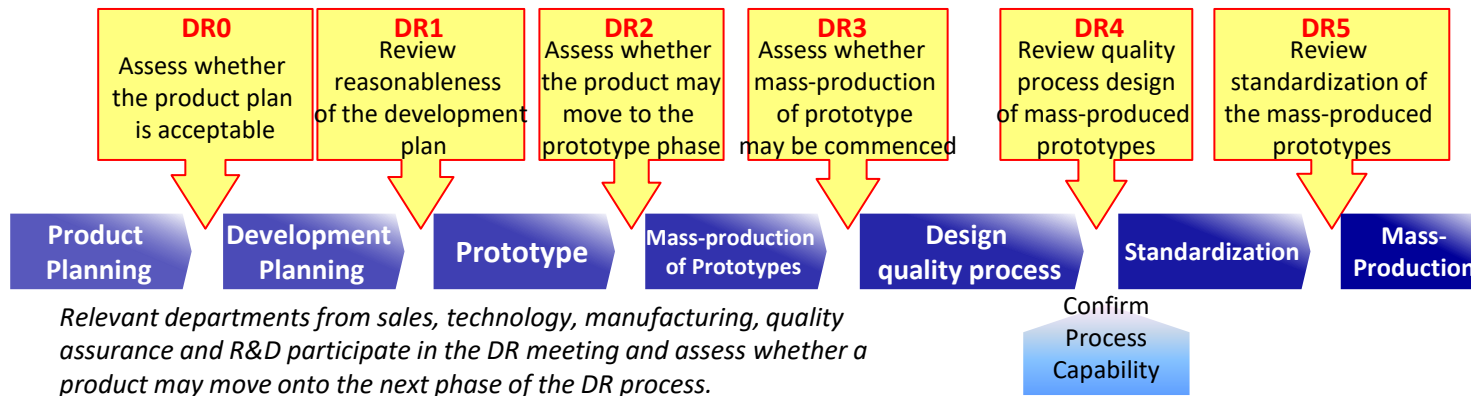
# III-3,4. Review of the Approval Process / Promotion of Quality Risk Assessment

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

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

While understanding the process capability for each order, we are in the process of adopting, restructuring and implementing Design Review (hereinafter, “DR”: examination of designs defined by the JIS and ISO9000). The implementation of DR for domestic locations is scheduled in FY2019.

An Example of Design Review (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

- Some plants and offices have begun considering quality-related capital investment by evaluating quality risks from quantitative factors such as impact, frequency and detection rate. The company will start utilizing the quality assessments in decisions for key capital investments going forward beginning fiscal 2019.

## 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 (February 5, 2019) 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 Dept.
- Share information such as progress of measures and challenges at business locations in the quarterly quality conferences within business divisions.
  - Sales departments participated and shared our customers' voices.
  - Implementation and application of DR at each business location are shared across business divisions.

## II - 2. Education

- Planning and promoting education program from awareness and knowledge perspectives, and developmental activities related to quality compliance.
  - Awareness: Raise awareness for quality compliance through dialogues with the management and heads of plants
  - Education seminars from the customers' perspective (invite a customer to speak on quality safety, etc.)
  - Active engagement in quality-related education (encourage to acquire third-party certificate)

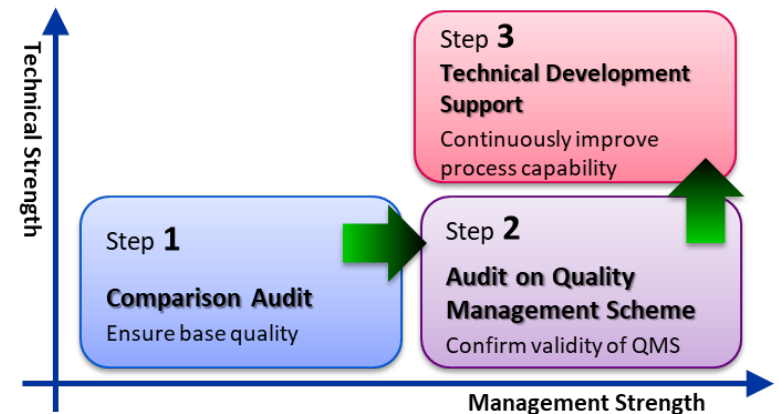
## II - 3. Audit and Support

**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. In 2H of FY2018, we completed an audit on the scheme, targeting 19 locations, in March 2019.



# III- 1. Process – Emergency Measures –

## Emergency Measures in Aluminum & Copper Business

### 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

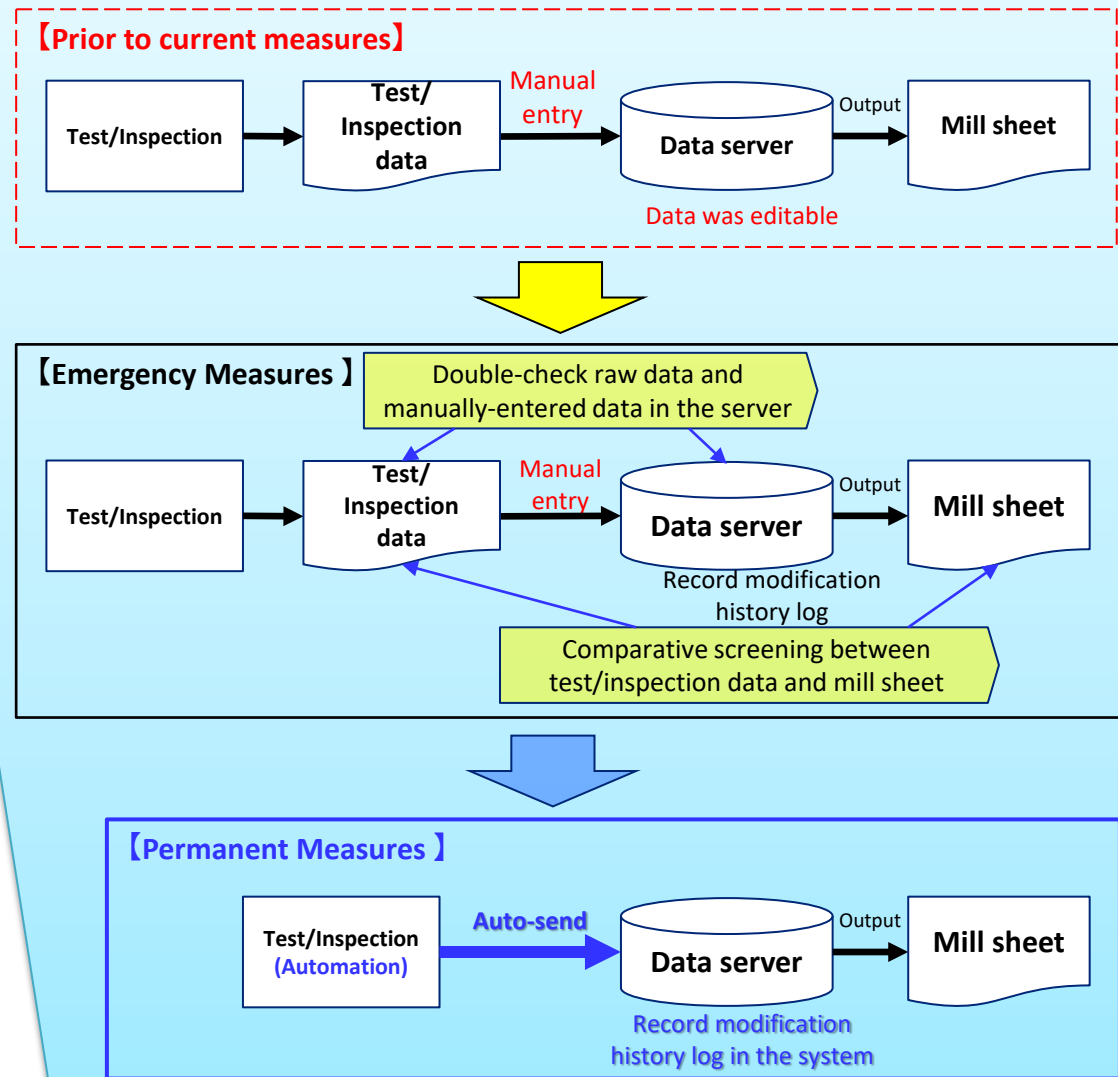
### iv) Adjust Shipment Standards [operational] (in progress)

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

### vi) Enforce Rules for Handling Nonconforming Products (in progress)

## 《Emergency Measures ⇒ Permanent Measures》

- Shift to less manual and more sound tests by automating the process
- Record and monitor modification history logs
- Additionally streamline manual screening process such as comparison analysis and four-eye checks
  - ※ The currently remaining tests will be continued by the four-eye checks of raw data and comparison with mill sheets, while moving forward with the automation effort.



### 【Permanent Measures】

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

- Create a system environment where data falsification is impossible.  
⇒ Aiming for automation of all targeted inspection machines by March 2020.

#### 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.  
⇒ Completed with the exception of some plants.

#### iii, iv ) Understanding Process Capabilities and Improving Inspection Capability

- ⇒ Starting in FY2018, we are taking improvement measures such as capital investment and technical development while understanding our process capability.

#### v, vi) Re-Evaluate Approval Processes for New Orders and Changes in the Manufacturing Process

- ⇒ 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

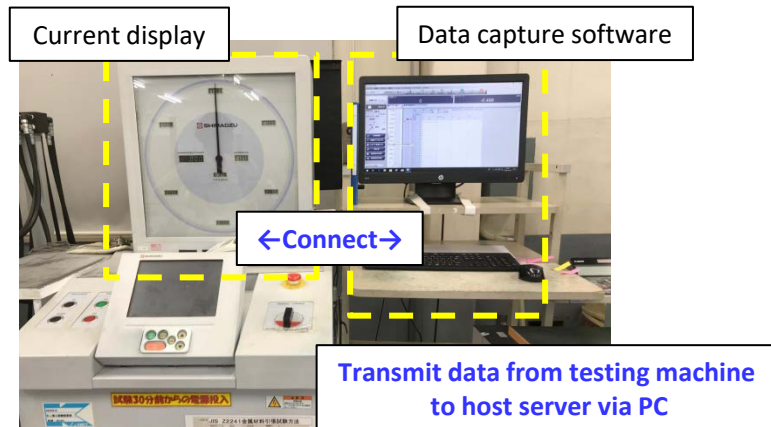
➤ Automation of testing/inspection machines are in progress on schedule (with plans to upgrade 380 machines by the end of FY2019 [95%]).

- Number of machines automated / to be automated

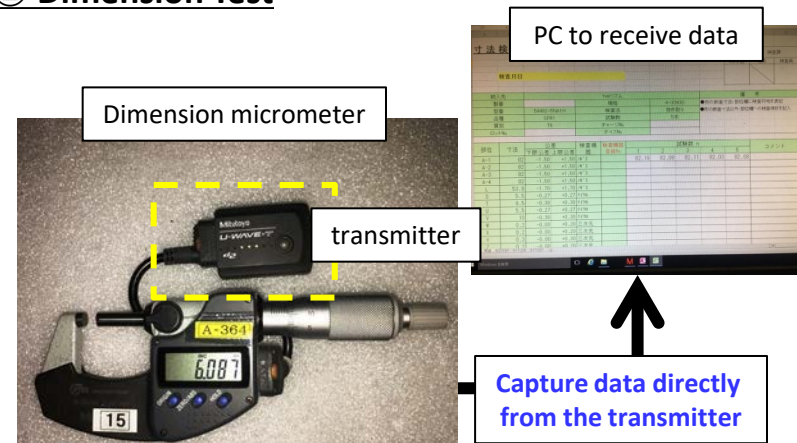
FY2017	1H FY2018	2H FY2018 (est.)	FY2019 (planned)	FY2020 (planned)
Approx. 20	Approx. 100	Approx. 250	Approx. 380	Approx. 400

### 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.**

a) 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

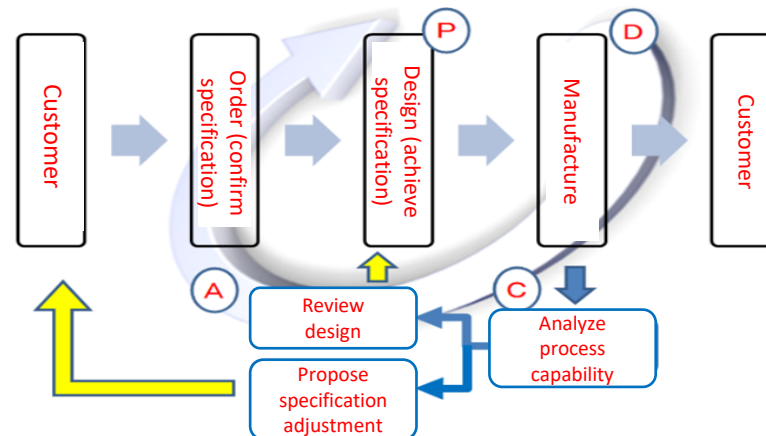
b) Inspection Items (Quality Property) – Correlation Diagram of Manufacturing Conditions

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**

#### **iv ) Improving Inspection Capability**

➤ **Continuously realizing and proposing improvement of process capability from the customers' perspectives.**



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

Aluminum & Copper Business	FY2018				FY2019	
	1 Q	2 Q	3 Q	4 Q	1 H	2 H
<b>Management</b>						
Organizational Restructure ※established Quality Assurance Department in November 2017						
Education			Education			Education
Audit (comparison, mechanism)	Comparison & scheme audit		Comparison & scheme audit			Comparison & scheme audit
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					
<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	Consider PDCA scheme					
Improve process and test/inspection capabilities	Execute Sequentially					
Re-evaluate approval process for new orders	Create rules, test operation / brush up				Launch full operation	
Re-evaluate approval process for changes in manufacturing process	Create rules, test operation / brush up				Launch full operation	