

No.541

Rebuilding Fully Participative QMS through “QC KENTEI”

Nippon Light Metal Group
TOYO RIKAGAKU KENKYUSHO
Quality Assurance Department
Tomoe Bamba

Living with Technology

Always, thinking of your satisfaction

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2 Quality Human Resource development through QC KENTEI activity

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2. What “QC KENTEI” is
3. Toyo’s QC KENTEI activities
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*QC KENTEI: Examination for Quality Control in Japan

3 Case studies

1. Toyo’s PRP
2. Quality first
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6. Summary

4 Future work

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NLM: Nippon Light Metal Group

Business

The NLM Group has been a comprehensive manufacturer of aluminum products with diverse offerings ranging from aluminum raw materials to fabricated products.

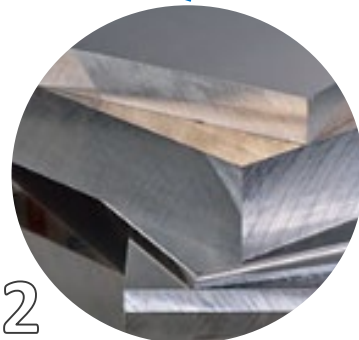
Company Overview

- **Business segments : 4**
- Companies : 76
- Employees : 15,000

Toyo belongs to the Aluminum Sheet & Extrusions Segment



1
Aluminum Ingot
& Chemicals



2
Aluminum Sheet
& Extrusions



3
Fabricated Products
& Others



4
Aluminum Foil,
Powder & Paste

Toyo: Toyo RIKAGAKU KENKYUSHO

TOYORIKAGAKU KENKYUSYO

Business

Toyo is a metal processing manufacturer with strong capabilities, providing fully integrated manufacturing solutions.

Company Overview

- **Employees: 300**
- Established: 1950
- Location: Niigata, Japan



Stamping



Milling



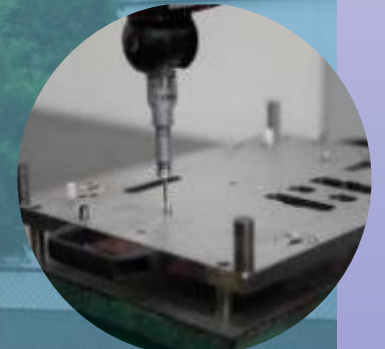
Surface Treatment



Assembly



Quality Assurance



Part 1

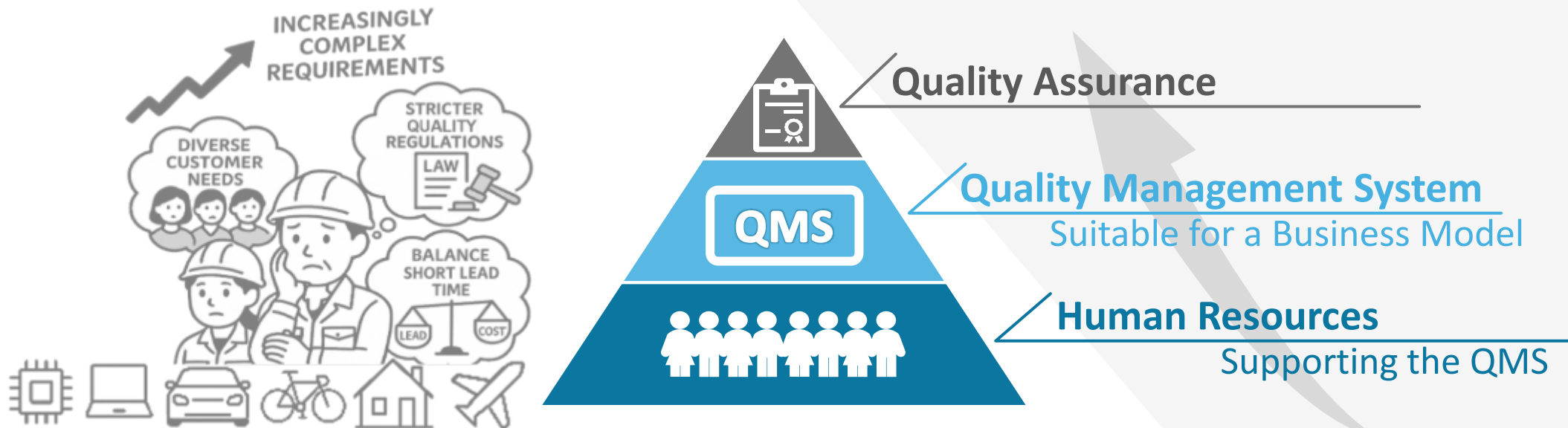
Introduction

Background

- **Quality Assurance (QA)** is a key responsibility in manufacturing
- The manufacturing environment is rapidly changing
- Increasingly complex requirements make QA challenging

Key Solutions

1. **Establish an effective Quality Management System (QMS)**
2. **Develop skilled Human Resources to support it**



Part 1

Introduction

Toyoto's Goal

Establish a “Fully-participative QMS”

Key challenge

Close the knowing - doing gap at manufacturing sites

Cause: Limited quality knowledge & experience

Toyoto's Two Key Efforts

1. Develop quality-focused Human Resources

2. Revise the QMS for:

focus on preventive actions & address complex requirements

Motto



*Quality is Everyone's
Responsibility*



“Quality First”

Part 2. Quality-focused Human Resources Development through “QC KENTEI Activity”



A Company-Wide Cross-Functional Effort

Part 2

1. Toyo's Quality Human Resources

TOYORIKAGAKU KENKYUSYO

Toyo's Ideal Quality Personnel

- **Compliance with rules and standards**
- **QC & QA based on the 5-Gen principle**

Quality Education and Training

Target Group: All employees

- Across departments & organizational levels

Training Content: Basic Quality Control

- QC KENTEI Grade 3 Level

5-Gen principle



Toyo Quality Cross-functional Team

Part 2

2. “QC KENTEI”

What “QC KENTEI” is (Qualification Exam for Quality Control)

- **Widely used in Japan to assess QC knowledge**
- **Covers both the theoretical & practical application of QC**
- **Around 80,000 examinees each year**
- **Organized by JSA* & JUSE****

** JSA: Japanese Standards Association Group*

*** JUSE: Union of Japanese Scientists and Engineers*



Qualification levels

- **Grade 4: Basic quality awareness (Entry-level)**
- **Grade 3: Practical use of basic QC tools in the workplace - Toyo's target**
- **Grade 2: Statistical & Managerial application**
- **Grade 1: Quality leadership (Expert-level)**

Part 2

2. “QC KENTEI”

Exam Details for “QC KENTEI Grade 3”

- About 100 questions (multiple choice)
- 90-minute exam duration
- Pass mark: 70% or higher
- Examinees: 50,000 per year
- Overall pass rate: About 50%

Sample Questions

- Based on workplace QC concepts
- Develop practical QC skills


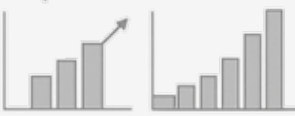
Q1: The purpose of quality control is to improve product quality and customer ____ .

A. promotion **B. satisfaction** C. production D. cost

Q2: A high Cp but low Cpk suggests that the process is wide enough but not ____.

A. centered B. recorded C. repeated D. counted

Topics: QC Implementation & Methods

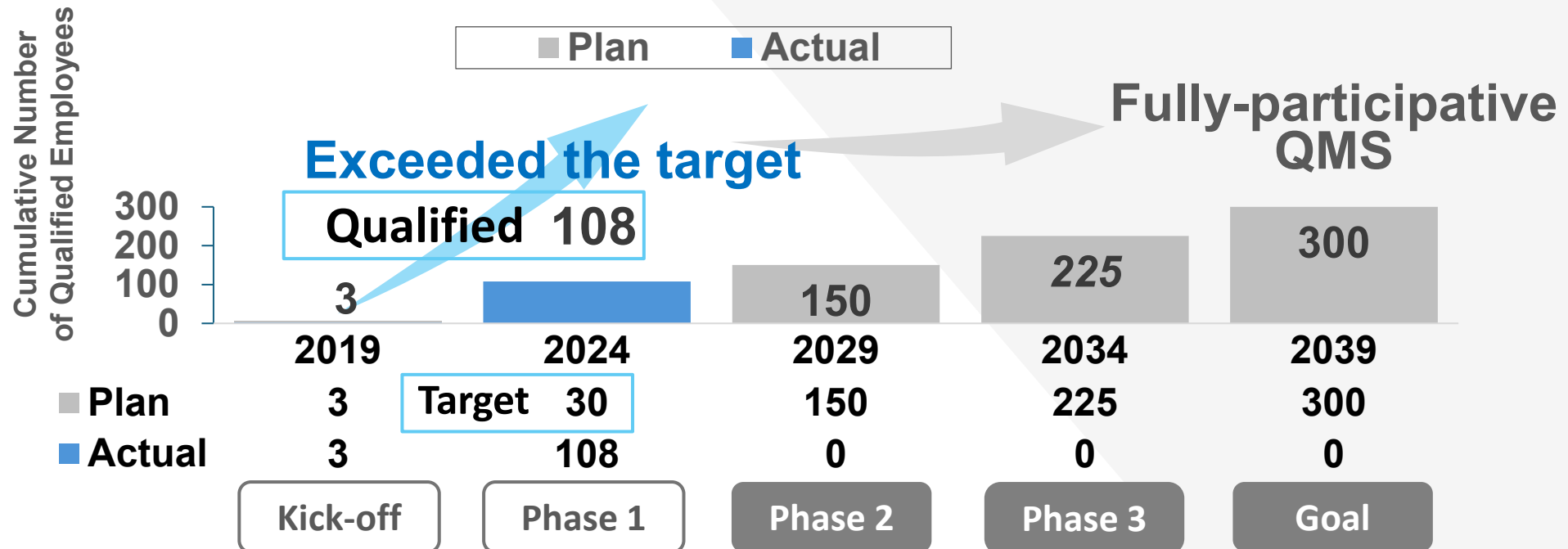
IMPLEMENTATION	METHODS
<p>Knowledge of how to promote QC activities</p> <ul style="list-style-type: none"> • Procedure from finding problems to improvement • Application of QC story and PDCA cycle • How to summarize team activities and reports 	<p>Analytical techniques using data</p> <ul style="list-style-type: none"> • Analysis tools such as the seven QC tools • Histogram, Pareto chart, control chart, correlation • Visualizing data and utilizing it for judgement/improvement 

Part 2

3. Toyo's QC KENTEI Activity

Milestones of Toyo's QC KENTEI Activities

- Long-term initiative (2019-2039)
- In Phase 1, exceeded the target (2019-2024)
 - Short-term target: 30 qualified employees, 10% of all
 - Result: 108 qualified employees, 36% of all



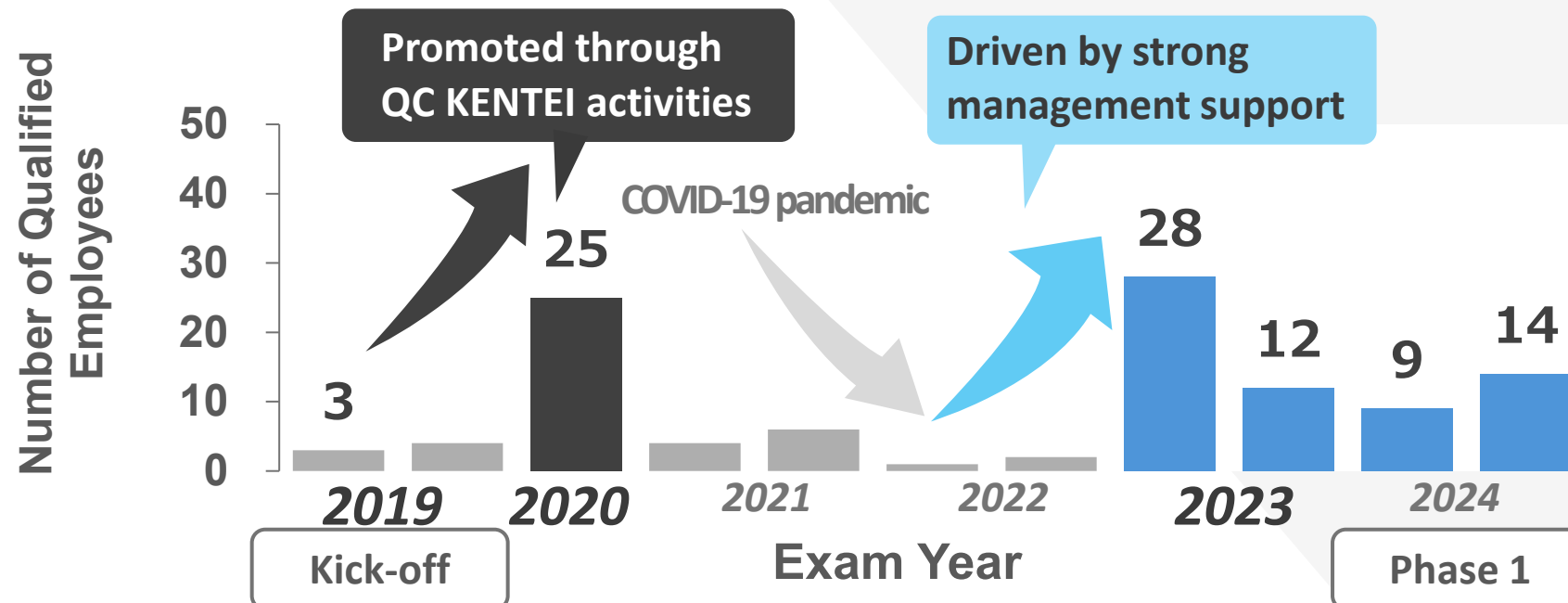
Part 2

3. Toyo's QC KENTEI Activity

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Toyo's QC KENTEI Exam Participation

- Started in 2019 with only 3 qualified employees
- Sharp increase in 2020 through QC KENTEI activities
- Temporary drop during the pandemic, recovery in 2023
- Toyo's average pass rate: 72% (national average: about 50%)



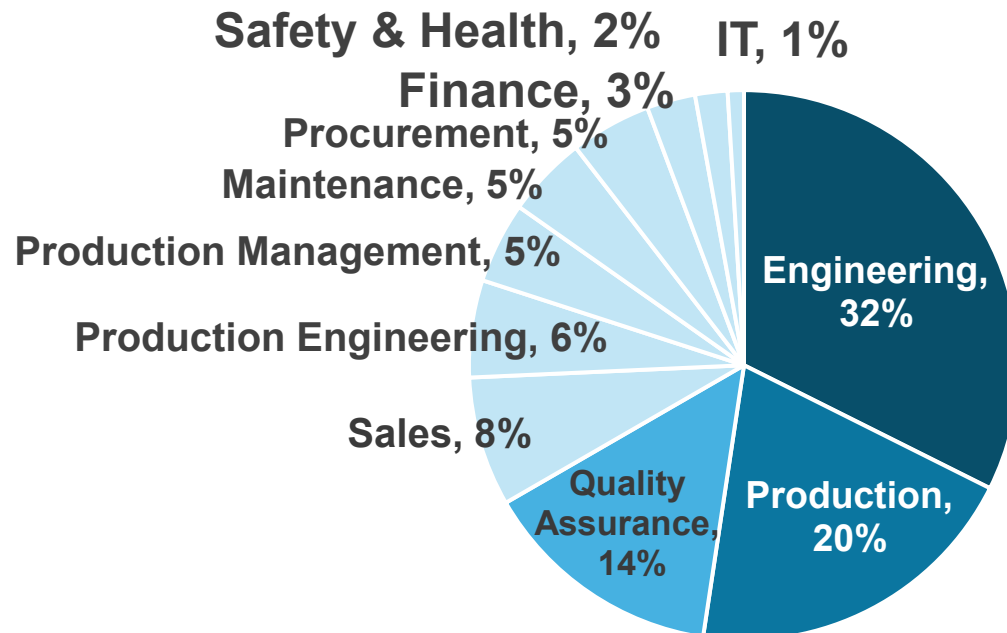
Part 2

3. Toyo's QC KENTEI Activity

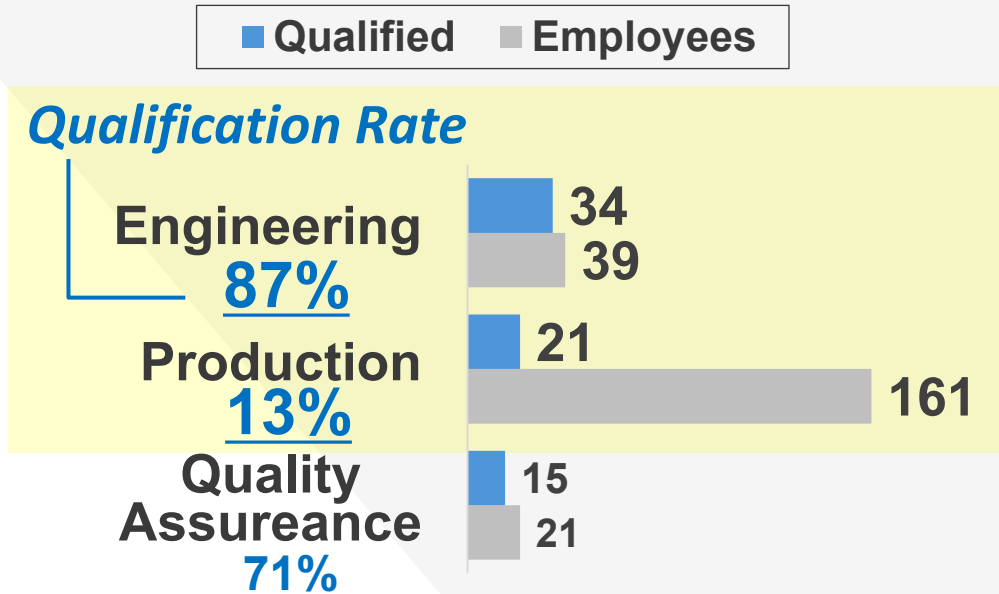
Company-wide Initiative

- Most departments are involved (including back-office areas)
- It is well rooted across the company
- Key challenge: Closing qualification gap between departments

Share of the Qualified Employees by Department



Qualification Rates by Department



Part 2

4. Education Program

Support for Employees

1. Free materials & coverage of exam fees
2. In-House study sessions during working hours
3. Support from the promotion team:
Exam registration & result tracking



Toyo's In-house Study Sessions



**Promotes
Effective
Learning**



**Fosters
Quality
Mindset**

Part 2

4. Education Program

In-House Study Session Highlights

- **Follow QC KENTEI Grade-3**
- **8 sessions, 2 hrs each, total 16 hrs**
- **Cover QC theory & Statistical Process Control (SPC)**
- **Trained by the promotion team & qualified employees**

Key Strengths

1. **Train-the-trainer model**
2. **Practical examples
based on trainer's experience**
3. **Effective study curriculum
refined through survey feedback**
4. **94% satisfaction**

Toyo's In-House Study Session



Part 2

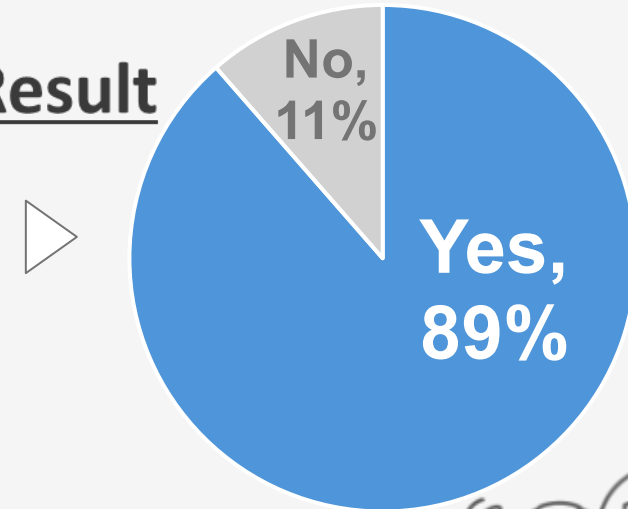
5. Participants' Voices

Survey Results from QC KENTEI Activity Participants

Question

Do you think QC KENTEI activity is effective for promoting a Fully-participative QMS?

Result



Participants' Voices

89% answered **"Yes"**



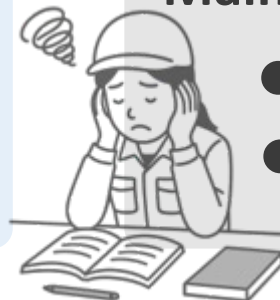
Reasons for "Yes"

- QC KENTEI is a valuable **"learning opportunity"**
- QC should be a **"company-wide effort"**

Reasons for "No"

Main issue: Difficulty of exam preparations

- No time for self-study
- Calculation questions are too hard

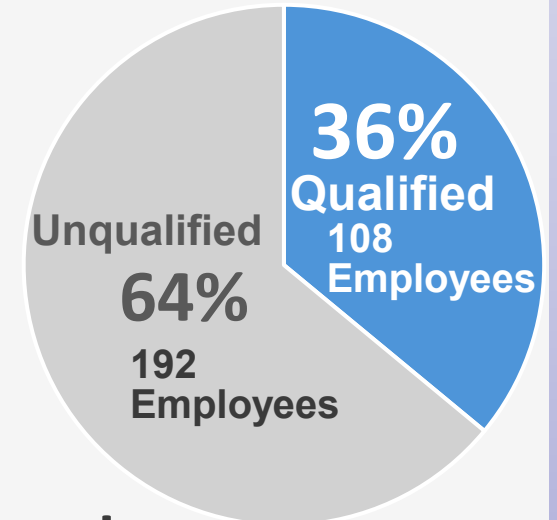


Part 2

6. Summary

- 1 **Toyo's QC KENTEI activities have effectively developed quality-focused Human Resources.**
- 2 **Phase 1 exceeded the target, with over one-third of employees qualified.**
- 3 **Employees' quality awareness & understanding of a fully-participative QMS have gradually improved.**
- 4 **The key challenge is closing the qualification gap between departments.**

Fig. Cumulative Number of Qualified Employees



Part 3. Case studies

How Toyo's QC KENTEI activities are applied in “*Daily Manufacturing*”

01

Toyo-PRP

Product
Realization
Process



02

Quality First

Quality is
Everyone's
Responsibility



03

In-Process Control

The Next Process
Is
Your Customer



04

Cp/Cpk Study

Process
Capability
Index



05

Continual Improvement

by
Quality Cross-
Functional Teams



Part 3

Case-1: Toyo's Product Realization Process (PRP)

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Problem

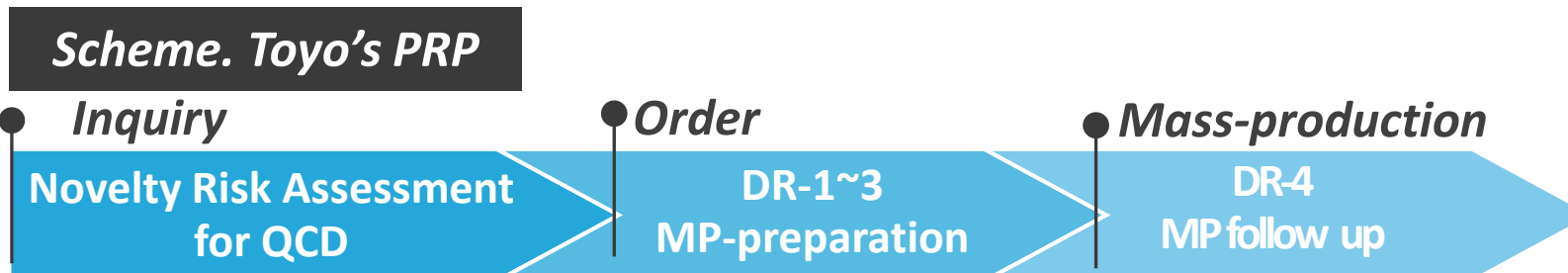
- **Quality issues during mass production (MP)**
 - Incomplete reflection of customer requirements
 - Lack of effective preventive actions

Solution by QC KENTEI activity & Fully-participative QMS

- **Revision of PRP with emphasis on:**
 - Focused on preventive actions & cross-functional team approach
 - Implementation of Novelty Risk Assessments

Result

- **Toyo's PRP is now well established & working effectively**



Part 3

Case-2: Quality First



Problem

- **Conflicting opinions across departments when quality problems arise**
 - These views delayed the initial response



Solution by QC KENTEI activity & Fully-participative QMS

- **Building a company-wide Quality First culture**
 - Through QC KENTEI activities
 - Alignment of values
 - Raising quality awareness



Result

- **More people act with a Quality-First mindset**
 - The team's response capabilities have improved



02

Quality First

Everyone's Responsibility



Part 3

Case-3: In-Process Control ~ *Next Process Is Your Customer*

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Problem

- **Separation of Production and Inspection**
 - Many defects reached the final inspection
 - Increased risk of defect escape

Solution by QC KENTEI activity & Fully-participative QMS

- **Promotion of In-Process Quality Control**
 - Utilization of QC skills
 - Training for the Production Team
 - Early Detection and Response at the Source

Result

- **Production team takes responsibility for quality**
 - Toyo's In-Process Control is steadily improving
 - This reduces the burden on final inspection



03

In-Process Control

Next Process is Your Customer

Part 3

Case-4: Process Capability Study (Cp/Cpk)

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! Problem

- **Dimensional defects during MP**
 - Due to tight tolerances and product variation
 - The team was exhausted by 100% inspection



? Solution by QC KENTEI activity & Fully-participative QMS

- **Implementation of Cpk Study before MP**
 - Evaluation of processes meet specifications

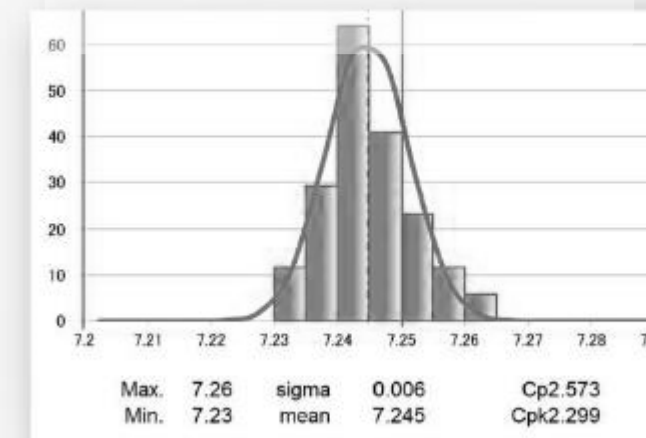


04 Cp/Cpk

Process Capability Index

✓ Result

- **Cpk study standardized as a Quality Gate**
 - Early identification and resolution of dimensional issues
 - Valuable initiative for QA



Part 3

Case-5: Continuous Improvement by Project Team

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Problem

- **Difficulty in ensuring stable MP**
 - Increased complexity of requirements
 - Shortened lead times

Solution by QC KENTEI activity & Fully-participative QMS

- **Cross-Functional Project Team Approach**
 - PRP management
 - Full scope coverage: Quotation to MP



05
Improvement
by Cross-Functional Project Team

Result

- **Quality has become more stable**
 - Growth in Customer Satisfaction
 - Improved profitability



Part 3

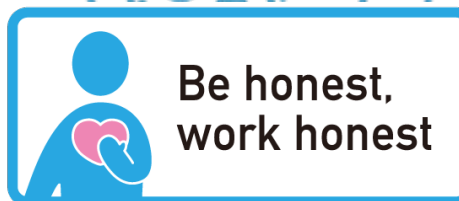
Summary

Key Elements of Quality Assurance

- 1 **Building an effective QMS with PRP optimized for the business model**
- 2 **Fostering a unified mindset and improving awareness of quality**
- 3 **Doing the obvious things consistently and reliably**



Effective QMS w/ PRP



Be honest,
work honest



Quality-focused Human Resources

Part 4

Future Work

Challenge 1 Continue and expand QC KENTEI activities

1

- Toward a “fully-participative QMS”

Challenge 2 Reduce qualification gap between departments

2

- Support operators and new employees
- Started offering QC KENTEI Grade 4 (entry-level)



Part 5

Conclusion

- 1 QC KENTEI activities have been implemented at Toyo and have taken root, boosting quality awareness and QC skills.**
- 2 Knowledge gained from QC KENTEI is applied daily, driving preventive actions and continuous improvement.**
- 3 A “Fully-participative QMS” delivers more reliable QA.**

Thank you very much
Toyo's QMS improvement never ends.