January 24, 2025

No. 2024080

Company name	Kawasaki Heavy Industries, Ltd.
Representative	Yasuhiko Hashimoto Representative Director President and CEO
Securities code	7012 TSE (Prime Market)/NSE (Premier Market)
Contact	Takashi Torii Executive Officer Group Manager, Corporate Communications Group Tel. (Tokyo): +81-3-3435-2130 Tel. (Kobe): +81-78-371-9531

(Progress on Disclosed Matters)
Notice Regarding the Findings of the Special Investigative Committee for Marine Engines (Interim Report)

As first announced in a press release published on August 21, 2024, Kawasaki Heavy Industries, Ltd., recently discovered misconduct in the testing of its marine engines. The Company takes this incident very seriously and offers its assurances to all stakeholders that it will take resolute steps to ensure that such misconduct does not happen again. On August 30, 2024, the Company announced that it had established the Special Investigative Committee for Marine Engines, a committee of external legal experts, to conduct an independent investigation into this misconduct. This committee today presented the Company with an interim report of its findings, which the Company has also publicly released. Please refer to the attached copy of the report for details. (To protect personal and confidential information, partial redactions were made to the report prior to it being made public.)

Beginning in July 2024, when this misconduct in testing was originally identified, the Company explored the impact of this misconduct on compliance with regulations governing NOx emissions*1 and CO_2 emissions, namely, the energy efficiency design index (EEDI)*2 and the energy efficiency existing ship index (EEXI),*3 as well as conducted an analysis of the root causes of this misconduct and implemented corrective measures. The Company also outlined the actions it was taking to prevent recurrence. On September 27 and December 25, 2024, the Company reported on the progress of its own internal investigation to Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and disclosed pertinent information publicly.

In contrast, the report prepared by the Special Investigative Committee for Marine Engines contains the findings of an objective probe into this misconduct by third-party experts. In addition to clarifying the facts uncovered by the committee and analyzing the causes identified, this report makes recommendations for steps to be taken by the Company to prevent such an incident from happening again.

The Company announced its own actions for preventing recurrence on December 25, 2024. The Special Investigative Committee for Marine Engines has stated that, while it has no objections to the approach represented by those actions, it would also like to see further concrete measures implemented based on the recommendations in its report. The Company will take the recommendations of the committee into full consideration and pledges to implement measures to prevent recurrence in line with those recommendations, in addition to its own actions.

The Company is currently examining whether this matter will impact its financial results and will immediately issue notification should such an impact be confirmed.

The report submitted by the Special Investigative Committee for Marine Engines is based solely on the results of its investigation into this particular incident of misconduct in testing. The Company has also commissioned the committee to conduct a separate investigation into the presence or absence of similar cases at the Company and its domestic subsidiaries. This second investigation is ongoing, with results to be submitted in the form of a final report subsequent to its completion.

*1 NOx emissions regulations for marine engines are based on Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL), which came into effect in May 2005, with the aim of preventing air pollution caused by exhaust emitted from ships. These regulations were applied retroactively to ships the keels of which were laid on or after January 1, 2000. Tier II and Tier III NOx emissions regulations, setting more stringent targets, came into effect for engines installed in ships the keels of which were laid on or after January 1, 2011, and January 1, 2016, respectively. Tier III regulations apply only to the specified ships while operating in Emission Control Areas.

*2 The EEDI, which applies to new ships of 400 gross tonnage or above that will engage in international voyages, aims to reduce the CO_2 emissions and environmental impact of individual ships by assessing their energy efficiency.

*3 The EEXI is used to assess the energy efficiency of existing ships of 400 gross tonnage or above that are engaged in international voyages.

— End of document —

Interim Report

January 24, 2025

This document is an English translation of the Interim Report (the "Report") provided to Kawasaki Heavy Industries, Ltd. ("the Company") by the Special Investigation Committee dated January 24, 2025. The Report in Japanese is the original and this English translation shall be used only for reference. Due to time limitations in the preparation of the English translation, this document is subject to further review and change. In the event of any discrepancy between the Japanese original and this English translation, the Japanese original shall prevail. The Company makes no assurance and warranty with respect to the completeness and accuracy of this English translation and assumes no responsibility for this translation or for direct, indirect or any other forms of damages arising out of the translation.

Kawasaki Heavy Industries, Ltd.
Special Investigative Committee

January 24, 2025

To the Board of Directors of Kawasaki Heavy Industries, Ltd.

Kawasaki Heavy Industries, Ltd.
Special Investigative Committee

Chairperson: Makoto Hayashi

Member: Mugi Sekido

Member: Yasuhiko Fujitsu

Contents

1. Outline of the Investigation by the Special Investigative Committee

1.1 Background to the Establishment of the Special Investigative Committee

In July 2024, Kawasaki Heavy Industries, Ltd. ("**KHI**") received a request from the Ministry of Land, Infrastructure, Transport and Tourism of Japan to conduct an investigation into whether there have been any inappropriate incidents in relation to the NO_x[1] emissions verification tests carried out in accordance with the Act on Prevention of Marine Pollution and Maritime Disaster (the "**Act on Prevention of Marine Pollution**") where measurements or procession of data were done in a manner that did not align with the aim or purposes of the same act. In response, from early to mid-July 2024, KHI conducted an internal investigation on marine engines subject to regulations governing NO_x emissions ("**NO_x Emissions Regulations**"), manufactured by KHI Energy Solution & Marine Engineering Company (sometimes referred to as "**ES&MC**"), which were installed on vessels constructed after January 2000. This investigation confirmed that data regarding the fuel consumption and fuel consumption rate of two-stroke engines had been tampered with, and that false values had been entered in the Results of Shop Trials and submitted to customers.

Thereafter, KHI continued to conduct the internal investigation, and it was confirmed that, in addition to the fuel consumption and fuel consumption rate described above, the unauthorized alteration had also been done and false entries had been made in the Results of Shop Trials with respect to exhaust gas temperatures, water brake torque indicators, and turbocharger compressor inlet temperatures (such false entries in the Results of Shop Trials due to these unauthorized alterations are collectively referred to as the "**Misconduct**").

In response to this situation, KHI announced in its press release titled "Notice Regarding Misconduct in the Testing of Marine Diesel Engines" dated August 21, 2024 that it had confirmed the unauthorized alteration of fuel consumption rates and that it would promptly establish a special investigative committee of third-party experts. On August 28, 2024, the Board of Directors of KHI established a special investigative committee (the "**Special Investigative Committee**") and requested the Special Investigative Committee to conduct an investigation (such investigation by the Special Investigative Committee is hereinafter referred to as the "**Investigation**").

In addition, while KHI has been conducting the internal investigation as stated above, on August 30, 2024, KHI formally established an internal investigative committee (the "**Internal Investigative Committee**") consisting of a team investigating causes and formulating measures to prevent recurrence and a team investigating records and formulating technical responses, with the General Manager of the Quality Assurance Division of Energy Solution & Marine Engineering Company as the individual in charge, and decided to hand over the results of the internal investigation to the

[1] NO_x (nitrogen oxides) refers to nitrogen monoxide (NO) and nitrogen dioxide (NO_2) that are produced when atmospheric nitrogen (N) and oxygen (O_2) combine. NO_x is said to be an air pollutant that has a negative effect on the respiratory system.

Special Investigative Committee at a later date.[2]

As stated in **1.2 below**, while the Investigation not only looks into the Misconduct but also whether there have been any incidents similar to the Misconduct, this Interim Report provides a report on the results of the investigation into the Misconduct only, given that KHI has requested that it would like to receive an interim report on the results of the investigation into the Misconduct and on the causes and recommendations for measures to prevent recurrence within the scope of such investigation by the end of 2024. The Special Investigative Committee plans to submit a final report upon the completion of its investigation regarding the existence of the similar incidents.

1.2 Purposes of the Investigation

The purposes of the Investigation are as follows:

(i) Investigate facts regarding the Misconduct
(ii) Investigate whether there have been any incidents similar to the Misconduct
(iii) Investigate the causes of the Misconduct
(iv) Recommend measures to prevent recurrence (including verifying the appropriateness of the corrective measures to be taken by KHI)

1.3 Structure of the Investigation

(1) Composition of the Special Investigative Committee

The composition of the Special Investigative Committee is as follows:

Chairperson: Makato Hayashi (lawyer, Mori Hamada & Matsumoto)
Member: Mugi Sekido (lawyer, Mori Hamada & Matsumoto)
Member: Yasuhiko Fujitsu (lawyer, Mori Hamada & Matsumoto)

(2) Technical Experts and Research Assistants

In order to receive advice on technical matters related to its investigation, the Special Investigative Committee appointed the following two persons from the National Maritime Research Institute[3],

[2] In February 2024, a tax investigation discovered that fictitious orders for submarine repair work had been made at the Kobe Shipyard's Ship Repair Department of the Ship & Offshore Structure Business Division. In response to this, on April 16, 2024, KHI established the Special Compliance Promotion Committee, which is chaired by Representative Director, President, and CEO Yasuhiko Hashimoto. This committee is working diligently not only to identify incidents of misconduct within the KHI Group, but also to scrupulously reform KHI's compliance and government framework and prevent recurrence through the building of systems that prevent misconduct, strengthening of detection capabilities, and reform of its corporate culture on a company-wide basis. The Special Compliance Promotion Committee will also work in collaboration with the Special Investigative Committee.

[3] As a core research institute for maritime and marine technology, the National Maritime Research Institute is said to be engaging in research on technologies for improving the safety and efficiency of marine transportation,

National Institute of Maritime, Port and Aviation Technology as technical advisors.

Akiko Masuda:	Director, Marine Environment & Engine System Department Deputy Director, Center for International Cooperation (concurrent post)
Yoichi Niki:	Head of Research Group, Marine Environment & Engine System Department

The Special Investigative Committee has also appointed the following lawyers from Mori Hamada & Matsumoto (meaning Mori Hamada & Matsumoto and Mori Hamada & Matsumoto LPC; the same applies hereinafter) and the following certified public accountants from PwC Risk Advisory LLC (sometimes referred to as "**PwC**") as assistants to assist with its investigation.

Organization	Name
Mori Hamada & Matsumoto	Mikio Sonoda, Seijun Lee, Kazuhisa Kita, Toru Yamada, Shoichi Niwa, Hiroyuki Sato, Yasuna Itane, Chihiro Tsukada, Kota Yamaoka, Kei Nishijo, Yuta Miyamoto, Shota Okada, Yuichiro Ishida, Hiroki Kuwahara, Ryoya Ishikawa, Rio Ichii, Minami Sakata, Jimmu Nakaya
PwC Risk Advisory LLC	36 persons in addition to Mihoko Nasu, Shunsuke Ueno, La Romand, Kowashi Mitsuyuki, Satomi Nakamura, Yuya Yamaue, Mai Coggins, Kayoko Yamagata

1.4 Outline of the Investigation

(1) Investigation Period

The Special Investigative Committee, established on August 28, 2024 in accordance with a resolution by the Board of Directors of KHI, conducted the Investigation from September 2, 2024 to December 27, 2024.

(2) Period Covered by the Investigation

According to the results of the internal investigation at the time of commencement of the Investigation, it was speculated that the Misconduct began back in the 1980s at the latest. However, the Special Investigative Committee decided that, in principle, the Investigation would cover the period from the year 2000 onwards, and to the extent possible, the period before that, taking into account that (i) the retention period for some documents related to the Misconduct is 10 years under KHI's internal rules and therefore only some of the past materials and data remain, (ii) there are only a few people still working at KHI who know what happened in the 1980s, and their memories of relevant events have been fading, and (iii) as stated in **2.3(2)(a) below**, the earliest case where NO_x Emissions Regulations would apply is for ships whose construction began on or after January 1, 2000.

technologies for effectively using marine resources and marine space, and technologies for preserving the marine environment.

(3) Investigative Methodology

The specific methodology of the Investigation is as follows.

(a) Inspection and Examination of Related Materials, Etc.

The Special Investigative Committee reviewed materials including contracts and other documents related to the Misconduct, minutes of the Board of Directors meetings of KHI, and related internal regulations to the extent that the Special Investigative Committee deemed necessary (such materials subject to the investigation are hereinafter referred to as the "**Materials Subject to Investigation**").

(b) Hearing of Internal Investigation Results, Etc.

The Special Investigative Committee received explanations and materials from executives and employees of KHI regarding the status and results of the internal investigation conducted by the Internal Investigative Committee as well as the status of KHI's operations and organization.

(c) Inspection of Works

On September 24, 2024, the Special Investigative Committee visited Kobe Works of KHI to inspect the facilities related to the Misconduct and received explanations from executives and employees of KHI regarding those facilities.

(d) Interviews

The Special Investigative Committee conducted interviews with a total of 54 current and former executives and employees of KHI (the "**Interviews**").

(e) Digital Forensic Investigation

The Special Investigative Committee requested PwC to (i) preserve electronic data recorded on computers provided by KHI (the "**Company-Provided Computers**"), external storage media, Domino server emails, Exchange server emails, Teams chat and OneDrive data, and some data on file servers that are currently being used or were used in the course of business for a total of 41 current and former executives and employees of KHI, (ii) carry out a recovery operation to the extent necessary and possible on the emails, attachments, and Teams chat data for a total of 41 people, and (iii) conduct a search using the keywords set by the Special Investigative Committee. As a result, a total of 100,648 emails, attachments, and Teams chat data were detected. The investigation was conducted with PwC conducting a primary review of the data and the Special Investigative Committee conducting a secondary review (the "**Digital Forensic Investigation**").

(f) Written Questionnaire

The Special Investigative Committee conducted a written questionnaire on all 33,825 executives and employees[4] of KHI and its domestic subsidiaries (the "**Questionnaire**").[5] The notice under the name of the Representative Director, President, and CEO of KHI requesting employees to cooperate with the Questionnaire states that, in order to "eliminate all wrongdoing," if employees respond to the Questionnaire regarding any quality-related misconduct in which they have been involved, and cooperate with the Investigation with sincerely and honesty, KHI will exempt them from liability; on the other contrary, if they do not respond to the Questionnaire, and should later be found to have been involved in such misconduct, KHI will inevitably have to determine that they have engaged in active acts of concealment.

The Special Investigative Committee received responses to the Questionnaire from 28,151 of the 33,825 employees subject to the Questionnaire by December 15, 2024 (a reply rate of 83.23%). Based on KHI's request to receive an interim report on the Misconduct by around the end of 2024, the Special Investigative Committee decided that, up to the time of submission of this Interim Report, it would give priority to examining the responses related to the Misconduct, and that after the submission of this Interim Report, it would continue examining the responses related to matters other than the Misconduct.

(g) Dedicated Hotline

On November 11, 2024, the Special Investigative Committee established a dedicated hotline to collect a wide range of information from the executives and employees of KHI and its domestic subsidiaries (the "**Hotline**").

While there were two cases where information was provided to the Hotline before this Interim Report was submitted, in each case, the provided information related to matters other than the Misconduct. Therefore, based on KHI's request as stated in **1.4(3)(f) above**, the Special Investigative Committee decided to continue examining the information.

(h) Sampling Survey

As a verification procedure to confirm whether there are any incidents similar to the Misconduct, the Special Investigative Committee decided to conduct a sampling of inspection processes in

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[4] Employees who are referred to as "trainees" at KHI, who are in their first year after graduating from high school, and employees on leave have been excluded from this number.

[5] From the perspective of improving the effectiveness of the Questionnaire, the Special Investigative Committee made the content of the Questionnaire different for the employees of ES&MC (including employees of domestic subsidiaries under the jurisdiction of ES&MC; the same applies in this footnote), who are likely to have been aware of the Misconduct, and for the other employees of KHI and its domestic subsidiaries. Specifically, for the former, some questions were explicitly asked about the Misconduct and other questions were asked about quality-related misconduct with respect to products in the KHI Group; meanwhile, for the latter, the questions were not classified in this way; that is, questions were asked about quality-related misconduct with respect to products in the KHI Group in a comprehensive manner.

consideration of the level of risk that similar incidents would occur at KHI and its domestic subsidiaries, and confirm whether there are any inconsistencies between the actual measured values and the data submitted to customers (the “**Sampling Survey**”).

However, based on KHI’s request to receive an interim report on the Misconduct by around the end of 2024, the Special Investigative Committee decided to conduct the Sampling Survey before submitting the final report. Therefore, the results of the Sampling Survey are not reflected in this Interim Report.

(4) Assumptions and Prerequisites for the Investigation

The main limitations and constraints of the Investigation are as follows. As stated in **1.1 above**, this Interim Report is an interim report on the results of the investigation into the Misconduct in the Investigation and does not include the results of the investigation into similar incidents.

(a) Purpose-based Constraints

The Investigation is an investigation into the Misconduct and incidents similar thereto and does not comprehensively cover all misconduct and inappropriate acts at KHI.

(b) Limitations of a Voluntary Investigation

Unlike investigation agencies that are able to use coercive means such as searches and seizures, or impose legal sanctions, the Investigation is based on the voluntary cooperation of pertinent individuals, and as such, the degree of cooperation from those pertinent individuals naturally affects the Interviews and the requests for submission and examination of the Materials Subject to Investigation. In addition, due to the nature of the voluntary investigation, the means of confirming the authenticity, completeness, or comprehensiveness of the details of the interviews or the Materials Subject to Investigation were limited.

(c) Time Constraints

The Investigation was conducted during the investigation period stated in **1.4(1) above** and there were strict time constraints on the Investigation. Therefore, the confirmation and examination of the details of the Interviews and the authenticity, completeness, and comprehensiveness of the Materials Subject to Investigation were subject to these time constraints.

(d) Limitations of the Interviews

As stated in **1.4(3)(d) above**, the Special Investigative Committee conducted the Interviews with a large number of pertinent individuals; however, there were also several pertinent individuals who were unavailable for an interview because they had already left KHI at the time of the Investigation.

(e) Limitations of the Digital Forensic Investigation

As stated in **1.4(3)(e) above**, the Special Investigative Committee conducted the Digital Forensic Investigation mainly on email data. However, the email server (Domino email server) that KHI had used before transitioning to a new email system in 2023 was operated so that, in principle, each user could only store up to 200MB of email; therefore, the Digital Forensic Investigation could not be conducted on any email data exceeding this amount, except in cases where the user had stored it as an archive on a business-use PC provided by KHI.

Furthermore, before the transition to the new email system stated above, if a user were to delete email data, the data would also be deleted from the server as well. Since it was impossible to restore the deleted email data due to server specifications, the Digital Forensic Investigation could not be conducted on the data.

(f) Limited Scope of Information Collection

As stated in **1.4(3)(f) and (g) above**, the scope of the Questionnaire and the Hotline is limited to KHI and its domestic subsidiaries. This is at the request of KHI for reasons including differences between its overseas subsidiaries and its domestic subsidiaries. Therefore, the collection of information regarding the existence of incidents similar to the Misconduct at KHI's overseas subsidiaries was severely restricted.

Mainly due to these limitations and constraints of the Investigation, it is not possible to deny the possibility that the results of the Investigation may have been different if more time had been spent and other investigation methods had been adopted or if other investigation methods that could not have been implemented had in fact been implemented. Therefore, the Special Investigative Committee cannot guarantee that the results of the Investigation are complete.

As the Investigation was conducted for KHI, the Special Investigative Committee is not responsible to any third parties other than KHI.

2. Overview of KHI and Other Relevant Information

2.1 Overview of KHI

(1) Business Overview

As the main company within the KHI group (the "**KHI Group**"), KHI operates the following businesses: Aerospace Systems, Rolling Stock, Energy Solution & Marine Engineering, Precision Machinery & Robot, Powersports & Engine, and others. The description of the main business activities in each segment are as follows.

Business segments	Description
Aerospace Systems	Manufacture and sale of aircraft, aircraft engines, and space-related equipment, etc.
Rolling Stock	Manufacture and sale of rolling stock, snow removal machinery, etc.
Energy Solution & Marine Engineering	Manufacture and sale of energy-related equipment and systems, hydrogen-related facilities, marine propulsion machinery and systems, plant-related equipment and systems, ships, crushing machines, etc.
Precision Machinery & Robot	Manufacture and sale of hydraulic machinery, industrial robots, etc.
Powersports & Engine	Manufacture and sale of motorcycles, off-road four-wheelers (SxS, ATV), personal watercraft (PWC) known as "JET SKI," general-purpose gasoline engines, etc.
Others	Intermediation and mediation of commercial transactions, sales, and receipt of orders, management of welfare facilities, etc.

The manufacture and sale of two-stroke marine engines, the main subject of the Investigation, is situated within the marine propulsion machinery business, which is a part of the Energy Solution & Marine Engineering segment above.

(2) Basic Information and History

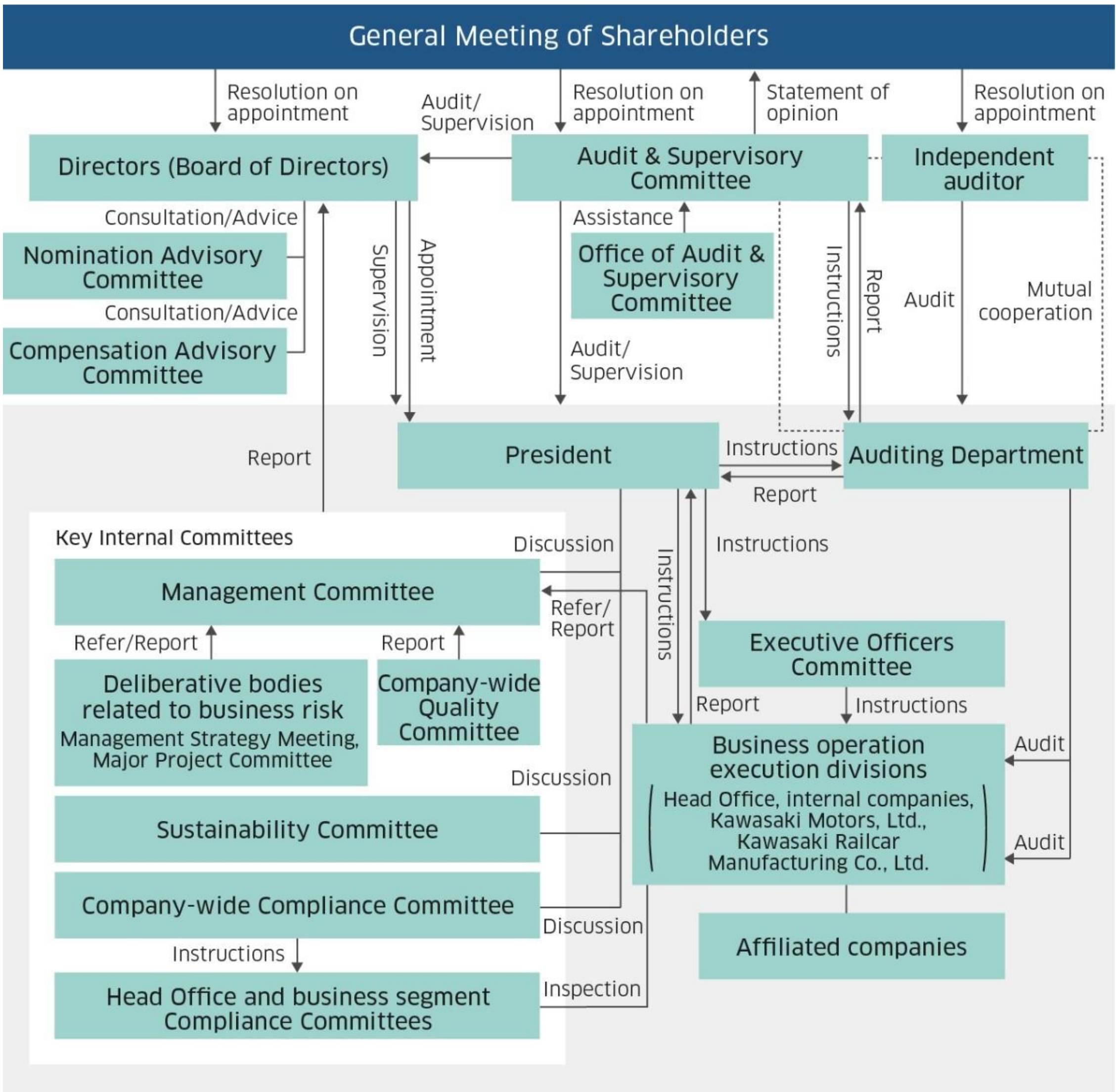
(as of March 31, 2024)

Company name	Kawasaki Heavy Industries, Ltd.	
Incorporation date	October 9, 1896	
Paid-in capital	104,484,658,872 yen	
Listed markets	Tokyo Stock Exchange (Prime Market) Nagoya Stock Exchange (Premier Market)	
Accounts closing date	March 31	
Shareholder composition (figures in parentheses represent the ratios of shares held to the total number of issued	**Shareholder name**	**Number of shares**
	The Master Trust Bank of Japan, Ltd. (Trust Account) (15.71)	26,382,000
	Custody Bank of Japan, Ltd. (Trust Account) (8.34)	14,014,000
	Nippon Life Insurance Company (3.42)	5,751,000
	Kawasaki Heavy Industries Employees Shareholder Association (3.14)	5,280,000

shares (excluding treasury stock) (%))	Kawasaki Heavy Industries, Ltd. Kyoueikai (2.46) STATE STREET BANK AND TRUST COMPANY 505001 (2.07)	4,145,000 3,483,000
Representative	Yasuhiko Hashimoto	
Location of head office	1-1 Higashikawasaki-cho 3-chome, Chuo-ku, Kobe	
Number of employees	39,689	
Business description	Aerospace Systems, Rolling Stock, Energy Solution & Marine Engineering, Precision Machinery & Robot, Powersports & Engine, and others	
Accounting auditor	KPMG AZSA LLC	
Organizational Structure	Company with a board of directors; company with an audit and supervisory committee	

(3) Governance Structure of KHI

KHI is a company with an audit and supervisory committee under the Companies Act, and its management organizations and corporate governance structure are shown in the diagram below (as of March 31, 2024).



KHI has established the Nomination Advisory Committee and the Compensation Advisory Committee as advisory bodies to the Board of Directors, and has also established the Management Committee, the Executive Officers Committee, and others as executive bodies.

The Management Committee, consisting of Representative Directors, presidents of internal companies, and others, serves as an advisory body to the President on overall group management and mainly deliberates on important matters related to business execution.

The Executive Officers Committee consists of all executive officers and is chaired by the President. In addition to issuing business execution policies based on the management policies and management plans determined by the Board of Directors and decisions made by the Management Committee, the Executive Officers Committee also performs duties such as exchanging opinions on management issues.

With respect to corporate ethics and legal compliance, the Company-wide Compliance Committee has been established to deliberate and decide on various measures to ensure thorough compliance within the KHI Group and to monitor the achievement of targets and compliance with such measures. In addition, business segment Compliance Committees have been established within the structure of each business segment.

A company-wide enterprise risk management (ERM) framework has been established for risk management, under which the Risk Management Department of the Head Office's Corporate Planning Division has secretariat functions, and each department within the Head Office cooperates to promote and support company-wide risk management. Each business segment has built the same structure for risk management, under which the head of the business segment serves as the person in charge.

With regard to internal control and internal audits, the Head Office's Corporate Planning Division is responsible for group-wide internal control planning functions, the Auditing Department conducts internal audits for independent monitoring, and the compliance department of each business segment supplements the internal audit function of the Auditing Department by voluntarily conducting internal audits of their respective business segment.

(4) Quality Control System

As a general rule, KHI's quality control system operates in accordance with the Quality Assurance Regulations, and as for the quality assurance departments, the TQM Department of the Corporate Technology Division has been established at the Head Office and each internal company has its own quality assurance department.

The TQM Department of the Head Office's Corporate Technology Division was established in 2019 in response to the manufacturing defects in the N700 Series Shinkansen train bogie frames that occurred in 2017. The TQM Department is responsible for formulating policies for company-wide quality assurance initiatives and initiative promotion plans for each fiscal year, ascertaining the status of the implementation and results thereof, and supporting each internal company's quality assurance activities based on its requests, etc. Specifically, the TQM Department is in charge of organizing KHI's company-wide TQM activities and carries out company-wide efforts to maintain and improve quality assurance and quality control systems, which includes conducting quality level surveys, quality control education, and company-wide TQM level evaluations.

Each internal company's quality assurance department is responsible for formulating the quality assurance policies and initiative promotion plans for the relevant internal company each fiscal year, as well as for managing the status of the implementation thereof. More specifically, each internal company's quality assurance department promotes the TQM activities and carries out inspections and efforts for various quality assurance and management in the relevant internal company with respect to each of the above measures implemented by the TQM Department, and also independently implements its own measures and efforts related to quality control and quality assurance within the internal company.

In addition, KHI has established the Company-wide Quality Committee as a meeting body for quality control, which is responsible for building, strengthening, and otherwise managing the company-wide total quality management (TQM) system. Led by the TQM Department, the Company-wide Quality Committee's meetings are held four times a year on a quarterly basis as a place for activities such as the sharing of information on the status of quality assurance and product defects throughout KHI and the formulation and sharing of measures to prevent recurrence.

(5) Changes in the KHI Group's Financial Results

(a) Changes in the KHI Group's Consolidated Financial Results

Changes in the KHI Group's consolidated financial results for the three most recent fiscal years as published by KHI are as follows.

(Millions of yen)

Period (fiscal year)	Consolidated revenue	Business profit	Profit attributable to owners of the parent
Fiscal year ending March 31, 2024 (FY 2023)	1,849,287	46,201	25,377
Fiscal year ending March 31, 2023 (FY 2022)	1,725,609	82,355	53,029
Fiscal year ending March 31, 2022 (FY 2021)	1,500,879	30,366	12,638

According to the summary of consolidated financial results in the KHI Group's annual securities report for FY 2023, although the KHI Group's consolidated orders received in the relevant consolidated fiscal year (i.e., FY 2023) decreased mainly in the Rolling Stock segment and the Precision Machinery & Robot segment, increases in other segments, particularly in the Aerospace

Systems segment, have led to an overall increase. Consolidated revenue also increased over the previous fiscal year as a whole due to higher sales mainly in the Rolling Stock segment and the Aerospace Systems segment.

As for profits, overall business profit decreased over the previous fiscal year, mainly due to deteriorations in the Aerospace Systems, Powersports & Engine, and Precision Machinery & Robot segments, despite increased profits in the Energy Solution & Marine Engineering segment and other segments. Profit attributable to owners of the parent also decreased, mainly due to lower business profit.

(b) Changes in Financial Results by Segment

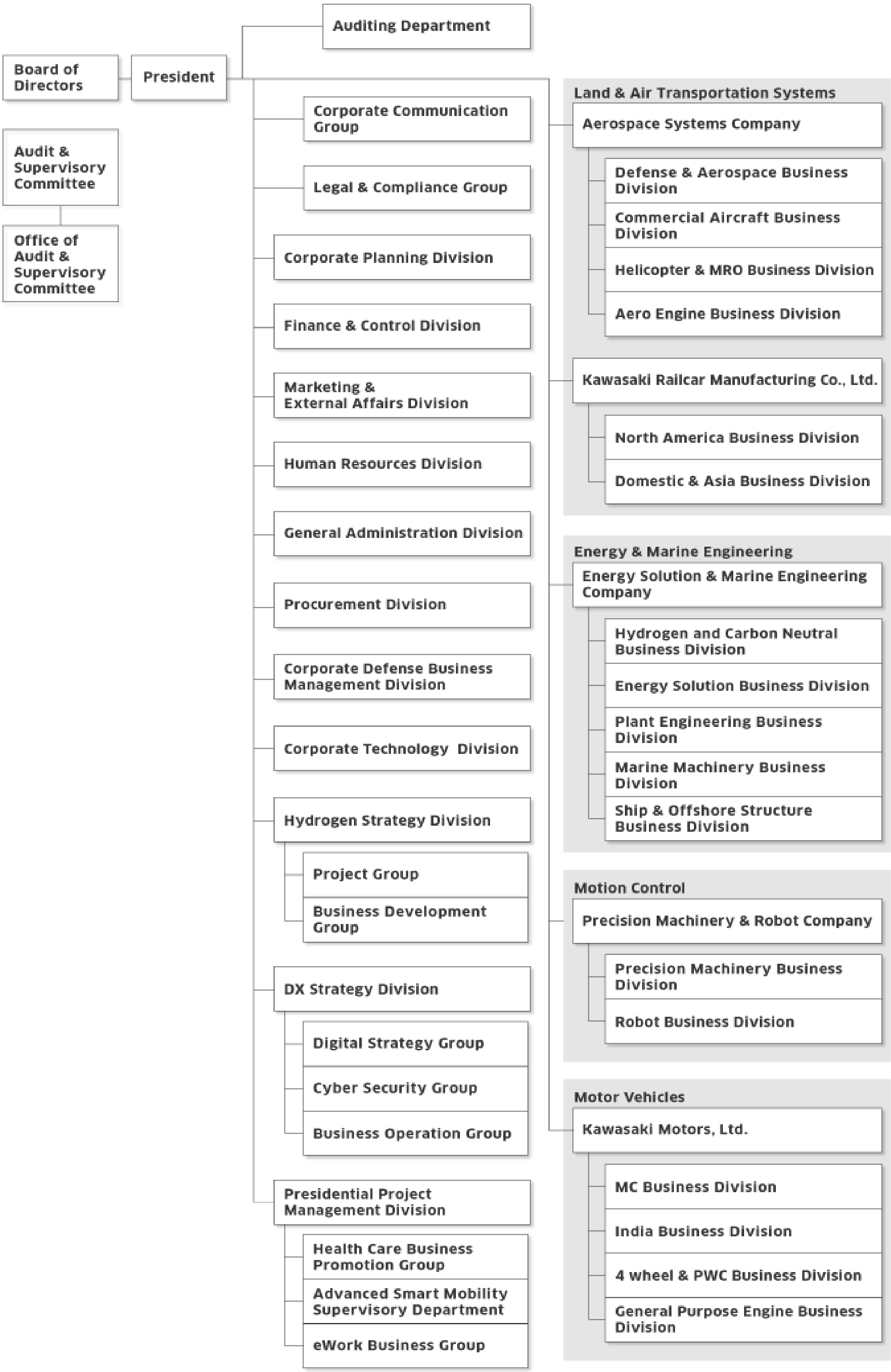
Financial results for each segment for the fiscal year ending March 31, 2024, are as follows.

(Millions of yen)

Reporting segment	Revenue	Segment profit (loss)
Aerospace Systems	408,288	(15,004)
Rolling Stock	195,956	3,752
Energy Solution & Marine Engineering	379,736	31,911
Precision Machinery & Robot	245,873	(1,947)
Powersports & Engine	593,594	48,071
Total of reporting segments	1,849,287	67,924
Adjustments	-	(21,723)
Consolidated results	1,849,287	46,201

(6) Organizational Structure of KHI

KHI’s organizational chart as of July 1, 2024 is as follows.


Board of Directors
President
Audit & Supervisory Committee
Office of Audit & Supervisory Committee
Auditing Department
Corporate Communication Group
Legal & Compliance Group
Corporate Planning Division
Finance & Control Division
Marketing & External Affairs Division
Human Resources Division
General Administration Division
Procurement Division
Corporate Defense Business Management Division
Corporate Technology Division
Hydrogen Strategy Division
Project Group
Business Development Group
DX Strategy Division
Digital Strategy Group
Cyber Security Group
Business Operation Group
Presidential Project Management Division
Health Care Business Promotion Group
Advanced Smart Mobility Supervisory Department
eWork Business Group
Land & Air Transportation Systems
Aerospace Systems Company
Defense & Aerospace Business Division
Commercial Aircraft Business Division
Helicopter & MRO Business Division
Aero Engine Business Division
Kawasaki Railcar Manufacturing Co., Ltd.
North America Business Division
Domestic & Asia Business Division
Energy & Marine Engineering
Energy Solution & Marine Engineering Company
Hydrogen and Carbon Neutral Business Division
Energy Solution Business Division
Plant Engineering Business Division
Marine Machinery Business Division
Ship & Offshore Structure Business Division
Motion Control
Precision Machinery & Robot Company
Precision Machinery Business Division
Robot Business Division
Motor Vehicles
Kawasaki Motors, Ltd.
MC Business Division
India Business Division
4 wheel & PWC Business Division
General Purpose Engine Business Division

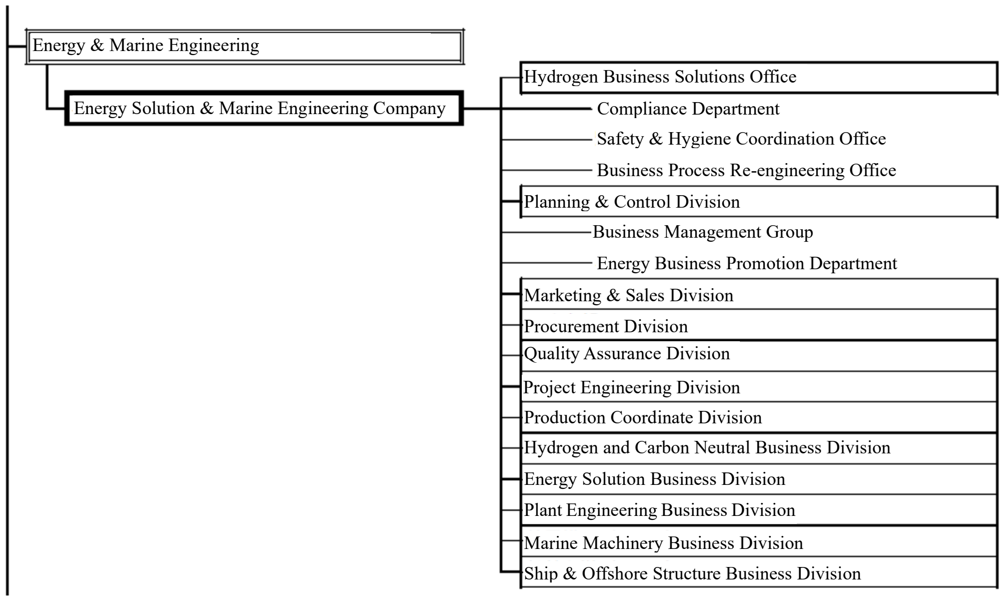
KHI’s organization is largely divided into the planning and administration departments, strategy and development departments, and business segments.

With respect to the business segments, KHI has established separate internal companies corresponding to the principal business segments; namely, the Aerospace Systems Company, the Energy Solution & Marine Engineering Company and the Precision Machinery & Robot Company. The businesses of the Rolling Stock segment and the Powersports & Engine segment are operated by KHI subsidiaries Kawasaki Railcar Manufacturing Co., Ltd. and Kawasaki Motors, Ltd., respectively.

2.2 Outline of the Marine Machinery Business Division

(1) Outline of the Energy Solution & Marine Engineering Company

The organizational chart outline of the Energy Solution & Marine Engineering Company, to which the Marine Machinery Business Division belongs, is as follows.



The organization of the Energy Solution & Marine Engineering Company is largely divided into divisions in charge of planning & control and administration, marketing & sales, procurement, quality assurance, project engineering, and production, as well as the divisions responsible for the hydrogen and carbon neutral business, the energy solution business, the plant engineering business, the marine machinery business, and the ship & offshore structure business, respectively. In other words, the Hydrogen & Carbon Neutral Business Division is responsible for manufacturing and selling hydrogen-related facilities, the Energy Solution Division for manufacturing and selling energy-related equipment and systems, the Plant Engineering Business Division for manufacturing and selling plant-related equipment and systems, the Marine Machinery Business Division for manufacturing and selling marine propulsion machinery and systems, and the Ship & Offshore Structure Business Division for manufacturing and selling ships.

(2) Outline of the Marine Machinery Business Division

(a) History of the Marine Machinery Business Division

The Marine Machinery Business Division is a division of KHI that manufactures marine engines, marine propulsion systems, and other marine machinery.

KHI's energy and marine machinery system business began manufacturing marine steam turbines in 1907 as the engineering department of Kawasaki Dockyard Co., Ltd., and from the 1910s onward has manufactured various types of marine engines, including marine diesel engines. Furthermore, in the 1950s it also began manufacturing marine propulsion systems, and in 1972, the Prime Mover Division was established, which is capable of manufacturing all kinds of propulsion systems from various types of marine prime movers.

In 2001, KHI introduced the internal company system to reorganize the company-wide 13 business divisions into six internal companies, and the Machinery Division, which was based on the Prime Mover Division, became a division of the Gas Turbine & Machinery Company.

Subsequently, in April 2018, KHI reorganized these companies, and the Machinery Division was merged with the Plant & Infrastructure Company to establish the Energy System & Plant Engineering Company.

Furthermore, in April 2021, the Energy System & Plant Engineering Company merged with the Ship & Offshore Structure Company to establish the Energy Solution & & Marine Engineering Company with the aim of promoting the hydrogen-related business and core component engineering business, and the marine propulsion machinery business is now managed by the Marine Machinery Business Division of the Energy Solution & & Marine Engineering Company.

(b) Organizational Structure of the Marine Machinery Business Division

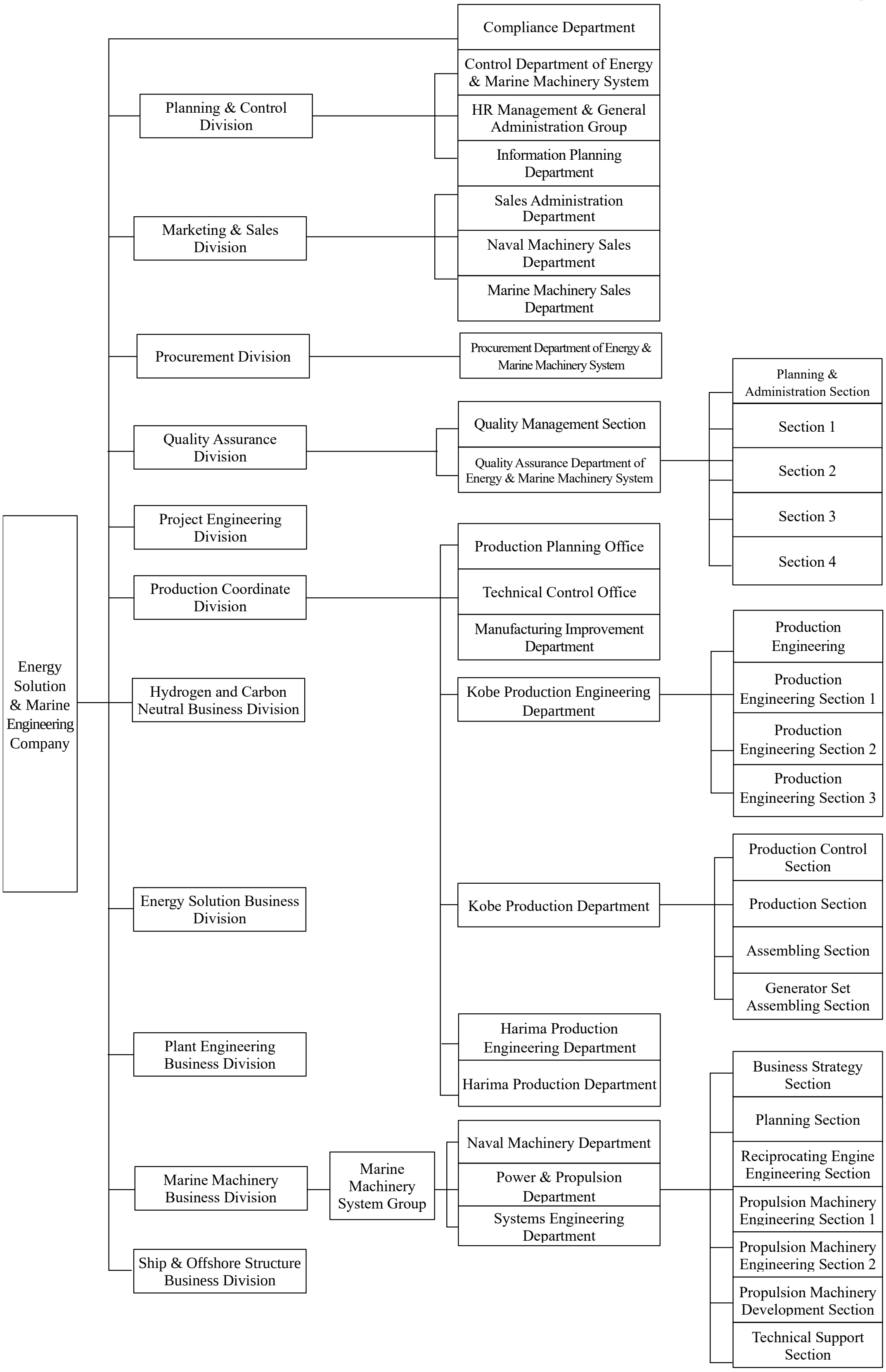
The Marine Machinery Business Division consists of the Marine Machinery System Group under the General Manager and the Deputy General Manager, with the Naval Machinery Department, the Power & Propulsion Department, and the Systems Engineering Department thereunder.

Further, the name of the Power & Propulsion Department was changed to the Diesel Engine Department in October 2006, then to the Marine Reciprocating Engine Department in April 2019, and then again to the current Power & Propulsion Department in April 2021.

The organizational chart of the departments related to the Marine Machinery Business Division as of April 1, 2024, is as follows.

Organizational Chart of the Energy Solution & Marine Engineering Company (related to the Marine Machinery Business Division)

As of April 1, 2024



(c) Outline of the Business of the Marine Machinery Business Division

The Marine Machinery Business Division mainly manufactures and sells marine gas turbines, reciprocating engines, marine propulsion systems, and other marine machinery.

Among these, KHI has been in a technical partnership for its reciprocating engines with MAN Energy Solutions SE (current company name) of Germany, and in particular with respect to the two-stroke marine engine business, KHI has entered into a license agreement with MAN Energy Solutions SE (the "**Licensor**") and obtained a license for two-stroke marine engines of the Licensor, which is still valid to date. All two-stroke marine engines manufactured and sold by KHI are produced under that license, and KHI does not independently develop any of these engines.

The following table shows the record of KHI's manufacture and sale of marine diesel engines[6](for four-stroke engines, only since 2000).

Year	Two-stroke	Four-stroke	Year	Two-stroke	Four-stroke
1980	9	-	2002	54	0
1981	13	-	2003	46	0
1982	5	-	2004	44	0
1983	9	-	2005	60	0
1984	27	-	2006	65	0
1985	23	-	2007	69	0
1986	20	-	2008	67	0
1987	5	-	2009	63	0
1988	10	-	2010	67	0
1989	14	-	2011	50	0
1990	20	-	2012	44	0
1991	28	-	2013	26	0
1992	32	-	2014	28	0
1993	18	-	2015	42	1[7]
1994	25	-	2016	35	0
1995	38	-	2017	26	0
1996	45	-	2018	28	0
1997	38	-	2019	19	0
1998	41	-	2020	7	0
1999	45	-	2021	13	0
2000	49	0	2022	5	0
2001	50	0	2023	12	1

In 1981, the number of two-stroke marine engines manufactured at KHI annually was approximately 10 units per year, which gradually increased, reaching a maximum of 69 units in 2007, but began to gradually decrease from around 2011, with further declines after 2019, with the annual number of the engines manufactured in 2023 being 12 units.

The main buyers of the two-stroke marine engines manufactured by KHI were shipyards in Japan,

6 These engines include those manufactured by sublicensees under the contracted manufacturing agreements and sublicensing agreements (since April 2012).

7 This is a fully equipped engine that was purchased from the Licensor and sold by KHI.

but after 2020, sale to external shipyards and to the Kobe Shipyard, which belongs to the Ship & Offshore Structure Business Division of the Energy Solution & Marine Engineering Company, ceased, and the engines are currently only sold internally to the Sakaide Shipyard, which belongs to the same Division.

With respect to four-stroke engines, KHI has been manufacturing and selling approximately two engines for submarines every year since 2000, as well as land engines and marine gas engines, with only one marine engine for civilian use being delivered to a ship owner in Japan in 2023.

(3) Organizational Structure regarding Two-Stroke Marine Engine Manufacturing

(a) Design Section for Two-Stroke Marine Engines

a. Changes in Design Section of Two-Stroke Marine Engines

As of the time of the preparation of this Interim Report, two-stroke marine engines are designed by the Reciprocating Engine Engineering Section established in the Power & Propulsion Department in the Marine Machinery System Group in the Marine Machinery Business Division at the Energy Solution & Marine Engineering Company.

Until March 2006, the two-stroke marine engines had been designed by the Two Stroke Diesel Engine Group established in the Power & Propulsion Department in the Machinery Division at the Gas Turbine & Machinery Company (as of that time). Following April 2006, the name of the Two Stroke Diesel Engine Group was changed to the Two Stroke Diesel Engine Section.

In April 2021, the Two Stroke Diesel Engine Section and the Four Stroke Diesel Engine Section, which had been in charge of designing diesel engines in the Power & Propulsion Department (the name used until September 2006), the Diesel Engine Department (the name used from October 2006 to March 2019; the department belonged to the Machinery Division in the Gas Turbine & Machinery Company from October 2006 to March 2018, and to the Marine Machinery System Group in the Energy System & Plant Engineering Company from April 2018 to March 2019), and the Marine Reciprocating Engine Department (the name used from April 2019 to March 2021; the department belonged to the Marine Machinery System Group in the Energy System & Plant Engineering Company), merged to establish the Reciprocating Engine Engineering Section (due to the reorganization of the internal companies in April 2021, the section now belongs to the Power & Propulsion Department in the Marine Machinery System Group in the Marine Machinery Business Division at the Energy Solution & Marine Engineering Company), which continues to date (regardless of the time period or the name of the section, the sections in charge of designing two-stroke marine engines are hereinafter collectively referred to as the "**design section**").

b. Organizational Structure and Division of Roles in the Design Section of Two-Stroke

Marine Engines

The design section of two-stroke marine engines is divided into multiple teams situated within either the Two Stroke Diesel Engine Section or the Reciprocating Engine Engineering Section, which are the sections mainly in charge of the design section, or within the departments in which such sections were established, namely the Power & Propulsion Department or its predecessor, the Diesel Engine Department. These teams within the design section share the design section's work, such as the development of two-stroke marine engines based on the designs of the Licensor, the determination of the specifications with each customer, the management and supervision of manufacturing, and the provision of after-sales services.

The table below states an outline of each team.

Team name	Section	Duties
Development Team (formerly the QA Team; the "**QA Team**")	Planning Section (existed until March 2021)	Improving and adjusting the performance of new engines developed by the Licensor; developing technologies for compliance with environmental regulations, etc.
Estimation Team	Planning Section (existed until March 2021)	Creating estimates for engine prices at the order-acceptance phase together with the Planning Team, etc.
Planning Team	Planning Section (until March 2021) Reciprocating Engine Engineering Section (from April 2021)	Negotiating with customers on engine specifications and determining specifications at the order-acceptance phase; estimating engine prices together with the Estimation Team in the Planning Section, etc.
Detailed Design Team (called the Drawing Team until March 2021)	Planning Section (until March 2012) Two Stroke Diesel Engine Section / Reciprocating Engine Engineering Section (from April 2012)	Preparing engine drawings for each customer based on the specifications determined by the Planning Team with the customer, etc.
Project Team (called the Production Team until March 2024; the "**Production Team**")	Two Stroke Diesel Engine Section / Reciprocating Engine Engineering Section	The team that manages and supervises the design and manufacturing project of a specific engine throughout the entire project, from accepting the order for the engine to its manufacture and shipment. This team is in charge of communicating with customers based on the specifications determined by the Planning Team, arranging purchased and outsourced products, preparing various documents, performing product inspections and trial operations, and other duties with regards to projects for which KHI has accepted orders.
Turbocharger Team	Two Stroke Diesel Engine Section / Reciprocating Engine Engineering Section (existed until March 2022)	Developing turbochargers (parts for two-stroke marine engines), etc.
Technical Service Team	Technical Support Section (until March 2021) Reciprocating Engine Engineering Section (from April 2021)	Providing after-sales services for engines after they have been loaded on ships and delivered.
Four-stroke Diesel Engine Team	Existed as the Four Stroke Diesel Engine Section until March 2021. Belongs to the Reciprocating Engine Engineering Section from April 2021.	Designing four-stroke engines, etc.

(b) Assembly and Production Section for Two-Stroke Marine Engines

As of the time of the preparation of this Interim Report, two-stroke marine engines are assembled and manufactured by the Production Engineering Section 2 in the Kobe Production Engineering Department and the Assembling Section in the Kobe Production Department, which have both been established in the Production Coordinate Division at the Energy Solution & Marine Engineering Company. The Production Coordinate Division is in charge of the overall assembly and manufacturing of the products manufactured by the Energy Solution & Marine Engineering Company, and manufactures various products in accordance with the designs and instructions, etc. of the sections in charge of the design for each product, mainly at KHI's Kobe Works and Harima Works. The two aforementioned sections are in charge of the assembly and manufacturing of two-stroke marine engines.

Both the Production Engineering Section 2 and the Assembling Section handle the same products but engage in different work. The Production Engineering Section 2 conducts work such as technical examinations for engine assembly and prepares instructions based on the drawings prepared by the design section, and then instructs the Assembling Section on the details of those technical examinations. The Assembling Section then performs the actual assembly work at the Kobe Works.

The Production Engineering Section 2 of the Kobe Production Engineering Department came to be in charge of the production engineering work for two-stroke marine engines after its establishment in April 2021; prior to this, the Assembling Section in the Production Department of Energy & Marine Machinery System was in charge of both production engineering work and assembly work.

This Assembling Section had been established in the Production Department in the Manufacturing Center in the Machinery Division at the Gas Turbine & Machinery Company at that time until April 2006 and was called the Assembling Group, but from April 2006, the name of the section was changed to the Assembling Section.

In addition, the Production Department in the Machinery Division (the Production Department in the Manufacturing Center at the Machinery Division until April 2008), in which the Assembling Section had been established, became the Production Department of Energy & Marine Machinery System in the Manufacturing Division at the Energy System & Plant Engineering Company due to the reorganization of the internal companies in April 2018, and from April 2021, the department was changed to the Production Department of Energy & Marine Machinery System in the Manufacturing Division at the Energy Solution & Marine Engineering Company.

Due to the reorganization of departments in April 2024, production control and production departments were established in both the Kobe Works and Harima Works, and the Assembling Section was placed under the Kobe Production Department (regardless of the time period or the name of the section, the sections in charge of manufacturing two-stroke marine engines are hereinafter collectively referred to as the "**assembly section**").

(c) Inspection Section for Two-Stroke Marine Engines

As of the time of the preparation of this Interim Report, the manufactured two-stroke marine engines are inspected by the Section 1 established in the Quality Assurance Department of Energy & Marine Machinery System in the Quality Assurance Division at the Energy Solution & Marine Engineering Company.

Until March 2006, inspections of two-stroke marine engines were conducted by the Inspection Group established in the Quality Assurance Department in the Machinery Division at the Gas Turbine & Machinery Company. Following April 2006, the name of the Inspection Group was changed to the Inspection Section. The Inspection Section was established in the Quality Assurance Department of Energy & Marine Machinery System *(kikai hinshitsu hoshobu; other instances where the "Quality Assurance Department of Energy & Marine Machinery System" is used refers to the enerugi hakuyosuishin hinshitu hoshobu)* in the Quality Assurance Division at the Energy System & Plant Engineering Company from April 2018, was then later established as the Inspection Section 1 in the Quality Assurance Department of Energy & Marine Machinery System *(enerugi hakuyosuishin hinshitu hoshobu)* from April 2021, and became the Section 1 in the Quality Assurance Department of Energy & Marine Machinery System from April 2023. In the past, separate from the Inspection Section in charge of inspections regarding the quality of actual products to check for defects and ensure fulfillment of the product specifications etc., there was a period when there was also a Quality Assurance Section in charge of establishing and maintaining various internal procedures and managing inspection systems for quality assurance and quality control. However, currently such work has been reorganized and classified to be allocated within each internal company's quality assurance department, and the sections have been merged (regardless of the time period or the name of the section, the sections in charge of the inspections of the two-stroke marine engines are hereinafter collectively referred to as the "**inspection section**").

(4) Manufacture and Sale Process of Two-Stroke Marine Engines

The process from the acceptance of an order to the sale of a two-stroke marine engine manufactured and sold by KHI is as follows.

(a) From Acceptance of Order to Design

When KHI receives an inquiry from a shipyard regarding engine manufacturing, KHI will receive an order for the engines in accordance with the specifications determined by the shipyard through negotiations with the ship owner.

When receiving an order, the marketing & sales departments and the design section (mainly the

Planning Team) of the Power & Propulsion Department cooperate to conduct sales activities. Specifically, documents such as the Specifications for Inquiry and Request for Quotation are submitted by the customer through the marketing & sales departments, and the marketing & sales departments and the design section will then prepare documents such as the Standard Specifications, Response Document, and Cost Estimate and carry out negotiations over matters such as adjustments to specifications and performance requested by the customer and the cost estimate.

Upon the acceptance of the order, documents such as the Design Specifications and Specification Sheet, which describe the performance, specifications, and other matters of the product that have been agreed upon with the customer, are circulated to the Detailed Design Team and the Production Team in the design section as well as other related sections in KHI.

The Detailed Design Team then redraws and customizes the design based on the license from the Licensor in Japanese in accordance with the specifications requested by the customer, and then prepares a set of detailed Manufacturing Drawings which include the Parts Drawings of the parts to be manufactured and the Assembly Drawings.

Each product for which an order was accepted is managed with a number called a "production number," particularly in the Power & Propulsion Department, and each individual in the Production Team of the design section takes responsibility for supervising and managing each product with a specific production number through the entire process from its design to manufacturing.

(b) Manufacturing

The Manufacturing Drawings prepared in the process set out in **2.2(4)(a) above** are sent from the individuals in charge in the Production Team of the design section to the assembly section along with manufacturing instructions therefor and also send instructions for ordering parts to the procurement departments, and the manufacturing starts thereafter.

The individuals in charge in the Production Team also serve as the point of contact for the shipyard and the customer during the manufacturing process.

The assembly section then manufactures the product in accordance with the instructions from the Production Team.

(c) Tests and Sea Trials

After the engine is assembled and manufactured, tests (trial operations) are conducted in order to confirm that the engine satisfies the performance requirements agreed upon with the customer through documents such as the Design Specifications and Particulars of Specification. The results of the final on-land shop trial (the "**Official Trial**") are recorded in the document titled "Result of Shop Trial" (the "**Results of Shop Trials**"), which is then submitted to the customer.

Trial operations conducted after assembly include shop trials (such as run-in operations, matching runs, preliminary runs, and the Official Trials) and trial operations called sea trials conducted offshore after the engine subject to the trial is loaded onto the ship.

a. Outline of Trial Operations

The table below states the outline of trial operations.

Name	Land / offshore	Outline of trial operations	Teams in charge in the design section
Run-in operations	Land	So-called break-in operations; conducted prior to or simultaneously with the matching run.	QA Team Production Team
Matching runs		Test operations of the first of a specific model of two-stroke marine engines to be specifically tuned in accordance with the specifications and performance requirements agreed with the customer (the "**Parent Engine**"), conducted when making such specific tunings to verify the engine's output and performance while making adjustments and replacements of various parameters (settings) and parts in order to meet the specifications and performance requirements agreed upon with the customer as well as to comply with various environmental regulations, including those on NOx emissions. The tunings adopted based on the results of the matching run of the Parent Engine are adopted as are for the engines coming after the Parent Engine with the same specifications (the "**Member Engines**"). The individuals in charge from the Licensor were occasionally present for the matching runs.	QA Team (The results of the matching runs were shared with the Production Team, whose members also attended discussions on the details of the tunings.)
Preliminary runs		Trial operations conducted before the Official Trials, without the customer present, to confirm whether the engine can operate in a manner which satisfies the performance requirements agreed upon with the customer during the Official Trials.	Production Team
Official Trials		The final performance testing operation conducted with the customer present to confirm that the engine satisfies the performance requirements agreed upon with the customer. For new-type engines, the individuals in charge from the Licensor also occasionally attended the Official Trials.	Production Team
Sea trials	Offshore	Trial operations conducted offshore on the ship with the subject engine loaded.	Conducted by the customer who purchased the engine; with the Production Team in attendance.

As stated in the table above, the performance of each type of two-stroke marine engines are confirmed through various adjustments made during the matching runs of the Parent Engine. The results of the matching runs are shared by the QA Team that conducted the matching runs with the Production Team, and the Production Team also participates in the discussions regarding the replacements and adjustments of the parameters and parts of each engine made during the matching runs.

The performance values of each engine measured during the matching runs are recorded in a document titled "Summary of Matching Run Results" and shared by the QA Team with the Production Team and the individuals in the design team pertinent to the engine of the production number. After the manufacturing of the engines of a particular production number is completed, the engines are delivered to the customer, and the ships with the engines are put into service. The "Summary of Matching Run Results," along with the results of the trial operations, including the Official Trials, conducted after the matching runs through their shipment, is saved on the shared file server of the design section, which members of the design section are able to freely access.

b. Contents of Official Shop Trial and Results of Shop Trials

The instruments and fuel used during Official Trials, and the procedures for Official Trials such as the test load and testing time under which the trial operation would be conducted are stated in the Contents of Official Shop Trial prepared and provided to the customer at the time of the contract with the customer, and the Official Trials are conducted in accordance with the procedures prescribed in such Contents of Official Shop Trial. While engine performance at a certain load (such as 75% or 85%) was prescribed at the contracting stage with the customer as the performance guaranteed under the contract, during the Official Trials, trial operations at loads outside of those prescribed in the contract are also conducted in accordance with the Contents of Official Shop Trial.

The results of the Official Trials are stated in the Results of Shop Trials and submitted to the customer after the Official Trials.

The values for each inspection item during the trial operation at each load measured during the Official Trials are recorded in the Results of Shop Trials. The specific items to be inspected and recorded are mainly as follows.

- The loads at which the engine was operated, rotation speed, torque, and fuel index
- Ambient conditions (temperature, pressure, and relative humidity)
- Temperature and pressure of engine lubricating oil, piston cooling oil, turbocharger lubricating oil, fuel oil, and cooling freshwater
- Hydraulic oil pressure, etc.
- In-cylinder maximum pressure, in-cylinder compression pressure, exhaust gas temperature, and the like for each cylinder
- Turbocharger compressor rotation speed, turbocharger compressor inlet temperature, temperature of exhaust gas turbocharger turbine inlet, and temperature and pressure of exhaust gas turbocharger outlet
- Consumption and consumption rate of fuel oil and fuel gas

As stated in **3. below**, from among the above measurement items, the values for the following items were altered through the Misconduct: (i) the fuel oil consumption test data, (ii) the fuel oil/gas consumption rate test data, (iii) the exhaust gas temperature test data, (iv) the water brake torque indicators, and (v) the turbocharger compressor inlet temperature adjustment function

Fuel consumption is the total amount of fuel oil or fuel gas consumed during operation. In the Results of Shop Trials, the figure for daily fuel consumption test data is stated using the unit “ton/day.”

Fuel consumption rate is the amount of fuel oil or fuel gas consumed per output per hour and is calculated by dividing the fuel consumption per hour (g/h) by the output (kw). In the Results of Shop Trials, the figure is stated using the unit “g/kWh.”

With regards to exhaust gas temperature, the exhaust gas temperature for each cylinder is stated as “Exh. Gas” of “Cylinder,” and the temperature before and after suction into the turbocharger turbine is stated under “inlet” and “outlet” of “Turbine” of “Turbocharger,” respectively.

Torque is measured using a water brake installed in the Kobe Works and is stated using the unit “kNm” (kilonewton meter).

The turbocharger compressor inlet temperature is stated under “inlet” of “Compressor” of “Turbocharger.”

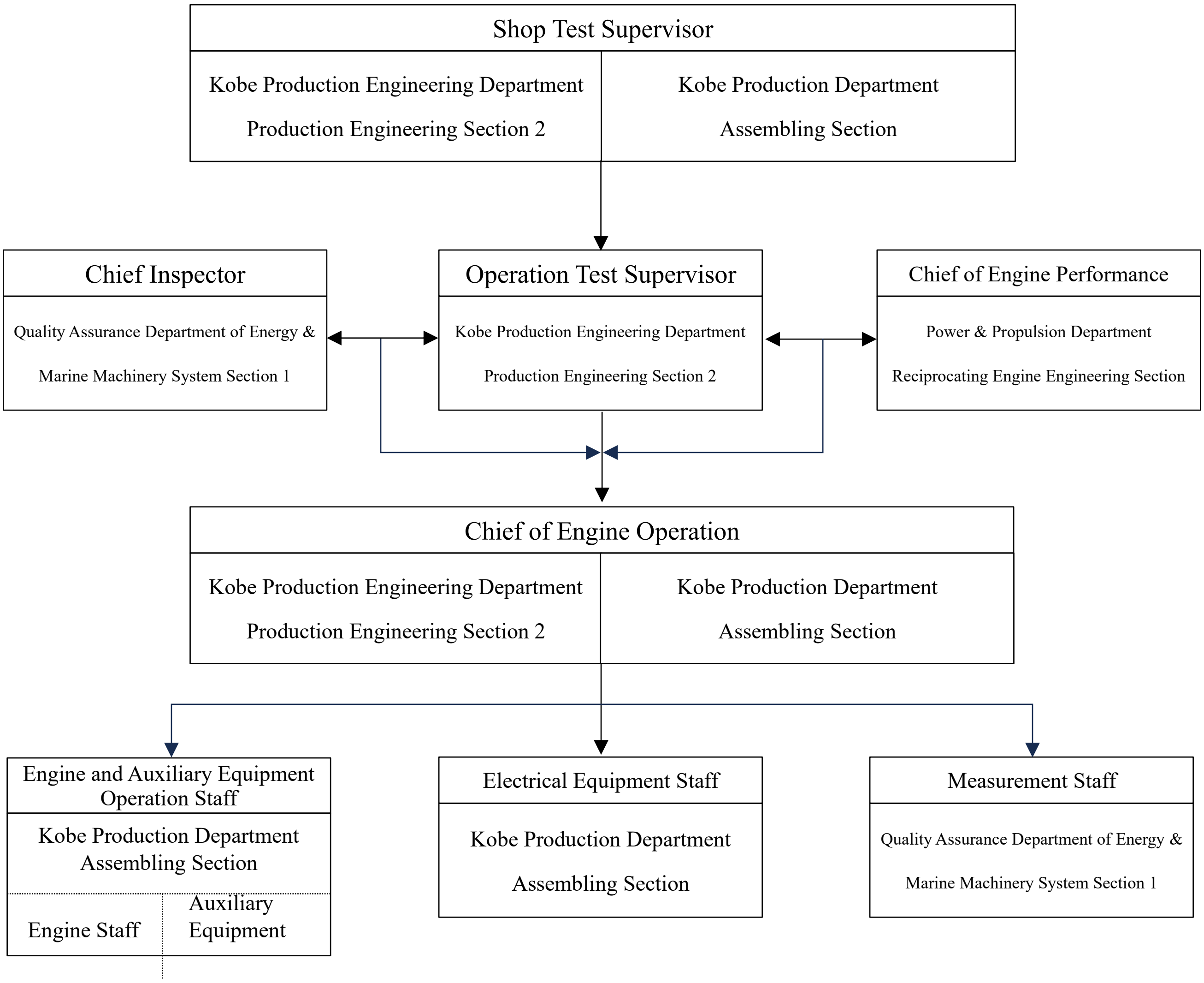
c. Individuals in Charge of Trial Operations

All trial operations on land are conducted at KHI’s Kobe Works, and the individuals involved differ depending on the phase of the trial operation.

As stated in **2.2(4)(c)a. above**, the matching runs and run-in operations are mainly conducted by the QA Team in the design section, and the results thereof have been shared with the Production Team. (Similarly to the Official Trials described below, although the on-site employees in the assembly section attended the matching runs and run-in operations as the individuals in charge of the actual operation of the engines, they were mainly only operating the engines and instruments on site in accordance with the instructions given to them by the QA Team.).

An outline of the individuals in charge during an Official Trial is as stated in the diagram below. However, the individuals involved and the departments to which they belonged differ depending on the time period in question.

Organization Chart of Shop Test Running
(Marine Two-Stroke Diesel Main Engine)



The employees in the assembly section (as stated in **2.2(3)(b) above**, the assembly section is currently divided into the Production Engineering Section 2 and the Assembling Section) which assembled and manufactured the product serve as the supervisors for the shop trials (from run-in operations to the Official Trials), and the individuals in charge in the inspection section, which is in charge of the performance and quality control of the product, and the individuals in charge in the Production Team in the design section, which is in charge of designing the product and managing and supervising the entire project, respectively, attend the shop trials as well. Specifically, as the department head, the section leader of the assembly section takes the role of the general supervisor of the shop trial and is supposed to manage and supervise the trial operations in its entirety; and thereunder, persons called engineering staff from the production departments administer the Official Trials as the Operation Test Supervisors and the Chiefs of Engine Operation, and persons called on-site employees from the production departments operate the product as Engine and Auxiliary

Equipment Operation Staff and Electrical Equipment Staff. Employees from the inspection section attend the Official Trials as the Chief Inspectors and conduct work such as explaining the test items to the customer and reporting the test results. Employees from the inspection section are also in charge of measuring various values during Official Trials by operating the measurement computers as the Measurement Staff (it was also the case with the inspection section that the Chief Inspectors were engineering staff and the Measurement Staff were on-site employees at the works.). However, in reality, the Official Trials were controlled by the individuals in charge in the Production Team of the design section who were involved in designing the engine subject to the trial, possessed deep knowledge of the technical aspects of such engine such as its specifications and performance, and attend the Official Trials as the Chiefs of Engine Performance.

In this way, the employees in the assembly section that had assembled and manufactured the engine subject to the testing were, on the surface, the supervisors of the Official Trials, but in reality, the individuals in charge in the Production Team who were involved in the designing and manufacturing of the engine subject to the trial and possessed deep knowledge of the specifications and performance of such engine supervised the Official Trials, and during trial operations, the individuals in charge in the assembly section and the inspection section were operating the engine subject to the trial operation and the measuring instruments in accordance with the instructions of the individuals in charge in the Production Team.

d. Sea Trials

Sea trials are trial operations conducted offshore on the ship with the manufactured two-stroke marine engines actually loaded after the Official Trials. The sea trials are conducted by the shipyard, which is the customer, and attended by KHI employees from the Production Team. However, because the sea trials are affected by environmental conditions, whether the performance of an engine is in line with its specification values is confirmed not through the sea trials but the Official Trials.

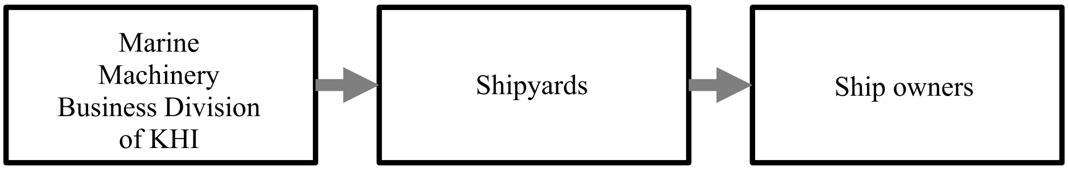
(5) Contracts, etc. regarding Engine Manufacturing

(a) Business Flow of Contracts with Customers Regarding Engine Manufacturing

There are two types of business flows through which KHI delivers engines to its customers, as shown in the diagram below: (i) the business flow in which the Marine Machinery Business Division of KHI delivers the engines to the Ship & Offshore Structure Business Division of KHI, which then delivers the ships equipped with those engines to the ship owner, which is the customer; and (ii) the business flow in which the Marine Machinery Business Division of KHI delivers the engines to external shipyards.

Business Flow (i)

Business Flow (ii)



(b) Shipbuilding Contracts between KHI and Ship Owners

In the business flow shown in (i) above, the customer of KHI is the ship owner, and a shipbuilding contract is executed between KHI and the ship owner. The shipbuilding contract is a contract under which KHI manufactures and delivers a ship to the customer (the ship owner) based on the specifications agreed upon by both parties, and in principle such shipbuilding contract is executed using KHI's standard template.

Shipbuilding contracts mainly specify the hull, propelling machinery, speed, fuel consumption rate and cargo tank capacity as the specifications of the ship. If the delivered ship is found to be lacking in terms of its speed, fuel consumption rate, or cargo tank capacity, the buyer (ship owner) has the right to request a price reduction or cancellation of the contract. For example, if the fuel consumption rate falls short of the guaranteed value specified in the shipbuilding contract by a ratio of more than a certain percentage (e.g., 5% below the guaranteed value), the buyer (ship owner) can request a price reduction in proportion to such shortfall, and if the fuel consumption rate falls significantly short of the guaranteed value (e.g., more than 10% below the guaranteed value), the buyer (ship owner) may cancel the shipbuilding contract.

In addition, it is agreed in shipbuilding contracts that the ship will be built under the supervision of a classification society (e.g., Nippon Kaiji Kyokai). Nippon Kaiji Kyokai stipulates the engine testing methods in its "Rules for the Survey and Construction of Steel Ships, Part D, Machinery (June 2024)," and if KHI agrees in the shipbuilding contract to follow the rules of Nippon Kaiji Kyokai, KHI will carry out its engine testing in accordance with the Rules for the Survey and Construction of Steel Ships.

(c) Contracts between KHI and Shipyards regarding Engine Manufacturing

In contrast to the case stated in **2.2(5)(b) above**, the customer of KHI in the business flow described in (ii) in (a) above is the shipyard, and a contract regarding engine manufacturing is executed between KHI and the shipyard.

The contract regarding engine manufacturing is executed between KHI and the shipyard through the exchange of documents such as the order form and order specifications submitted by the shipyard to KHI and the specification sheet prepared by KHI based on the documents the shipyard submits. In this way, no written contract is prepared between KHI and a shipyard in Japan[8], and the contract conditions are indicated in documents such as the order form.

The order specifications prepared by the customer are drawn up using the customer's own form, so the items indicated in the order specifications differ depending on the customer, but the engine's fuel consumption rate and output are specified in all such specifications, and the tolerance for the fuel consumption rate is also specified within a range of 3% to 6%. In addition, some customers also specify the exhaust gas temperature. On the other hand, the specification sheets prepared by KHI were drawn up using KHI's own form, in which it was usual for the exhaust gas temperature as well as the fuel consumption rate to be specified.

In addition, the parties agree to the applicable rules in the specification sheet, such as compliance with the rules of Nippon Kaiji Kyokai, and in accordance with such agreement, KHI and the shipyard also prepare Contents of Official Shop Trial (a document specifying the method for the shop trial run of the engine)[9].

In the case of the business flow described in (i) in **2.2(5)(a)** above, the Ship & Offshore Structure Business Division of KHI would be the shipyard, but the order forms and other documents described above would be basically exchanged in the same way between the Marine Machinery Business Division of KHI, which manufactures the engines, and the Ship & Offshore Structure Business Division of KHI, which builds the ships.

2.3 Relevant Laws and Ordinances, Etc. regarding Regulations Governing Nitrogen Oxide (NO_X) Emissions from Ships

The marine engines manufactured by KHI are known to emit NO_X when operating, and an outline of the relevant laws and regulations, etc. regarding the regulations governing NO_X emissions from ships is as follows.

(1) Effectiveness of Annex VI to MARPOL 73/78, Etc.

At the Assembly Session held in September 1997, the International Maritime Organization adopted

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[8] However, in the case of shipyards overseas, contracts may be prepared separately from order forms and other documents.

[9] In addition, the Shop Trial Procedural Manual specifies that water brakes must be used during a shop trial.

a protocol to add a new Annex VI titled “Prevention of Air Pollution from Ship” to the “Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships, 1973” (“**MARPOL 73/78**”) in order to prevent pollution caused during a ship’s voyage, and adopted the “Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines” (the “**Technical Code**”), which sets out the requirements for testing, inspection, and certification, etc. related to the regulations governing NO_X emissions. As a result, under the provisions of Annex VI to MARPOL 73/78, after Annex VI came into effect, marine diesel engines to which Annex VI applies became required to comply with the provisions of the Technical Code.

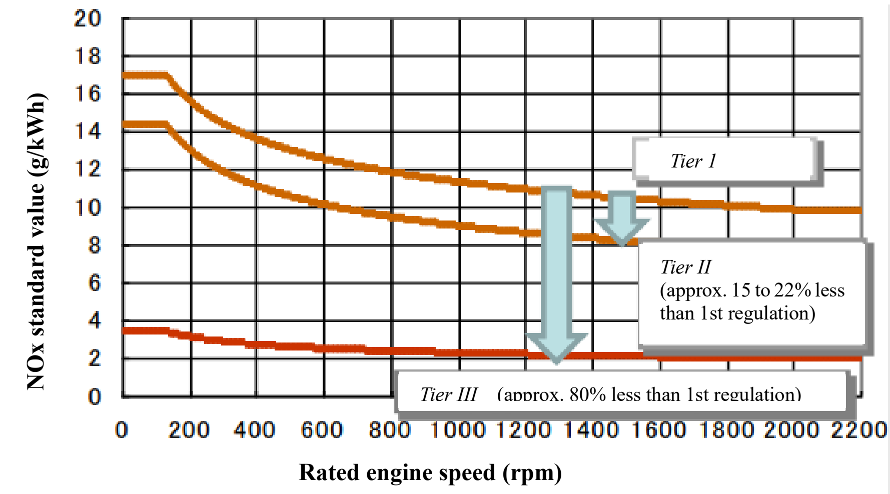
(2) Domestic Legislation Based on Annex VI to MARPOL 73/78

In Japan, as Annex VI to MARPOL 73/78 was adopted and came into effect, domestic legislation was advanced, which resulted in the Act on Prevention of Marine Pollution being amended and coming into effect on May 19, 2005. Since then, Annex VI to MARPOL 73/78 and the Act on Prevention of Marine Pollution have been amended several times.

An outline of the regulations governing NO_X emissions from ships under the Act on Prevention of Marine Pollution is as follows.

(a) Emission Standards for NO_X Emissions

For ships equipped with engines with a rated output of more than 130kW, the emission standards (g/kWh) for NO_X emissions are specified according to the rated engine speed (rpm), as shown in the diagram below[10] (Article 19-3 of the Act on Prevention of Marine Pollution and Article 11-7 of the Enforcement Order of the Act on Prevention of Marine Pollution).



As shown in the diagram above, the applicable emission standards for NO_X emissions according

[10] Excerpt from the materials prepared by the Ministry of Land, Infrastructure, Transport and Tourism (https://www.mlit.go.jp/common/001198530.pdf) (last checked date on website: December 21, 2024)

to an engine's rated engine speed (rpm) differ depending on the period in which an engine was manufactured, etc., and are classified into three regulations in chronological order from oldest to newest: the first regulation (i.e., Tier I), the second regulation (i.e., Tier II) and the third regulation (i.e., Tier III), with these standards gradually becoming more stringent. Namely, the standards, applicable periods, and relevant laws and regulations that apply depending on the period in which an engine was manufactured, etc., are as follows.

Class	Applicable period	Relevant laws and ordinances
Tier I	・Ships that engage in international voyages whose construction began or whose engines were modified on or after January 1, 2000 ・Ships that do not engage in international voyages whose construction began or whose engines were modified on or after May 19, 2005	・Article 7 of the Amended Supplementary Provisions of Act No. 36 of April 21, 2004
Tier II	・Engines installed on ships that were built on or after January 1, 2011 (excluding cases where the same type of engine as the previous engine has been installed through replacement)	・Article 6 of the Amended Supplementary Provisions of Cabinet Order No. 139 of May 19, 2010
Tier III	・Ships built on or after January 1, 2016 that navigate in the Emission Control Areas (which are the emission areas in the upper column of the table in Article 11-7 of the Enforcement Order of the Act on Prevention of Marine Pollution) (excluding cases where the same type of engine as the previous engine has been installed through replacement)	・Article 2 of the Amended Supplementary Provisions of Cabinet Order No. 295 of August 12, 2015 ・Article 2 of the Amended Supplementary Provisions of Cabinet Order No. 2298 of September 30, 2020

(b) NO_X Emissions Verification by the Minister of Land, Infrastructure, Transport and Tourism or a Classification Society

Based on the emission standards for NO_X emissions from each of the abovementioned engines, for ships with Japanese registry, the manufacturers, etc. of the engines installed on such ships must, in principle, have the NO_X emissions from such engines be verified by the Minister of Land, Infrastructure, Transport and Tourism (emissions verification) to confirm that NO_X emissions from those engines conform with such emission standards before the engines are installed on the ship (Article 19-4, Paragraph 1 of the Act on Prevention of Marine Pollution)[11].

When a classification society such as Nippon Kaiji Kyokai has verified that NO_X emissions from the engines conform with the emission standards for such engines, approved the engine technical manual (i.e., the Technical File) therefor, and issued a document equivalent to an EIAPP Certificate, the verification, approved engine technical manual, and issued document for such engines are respectively deemed to be the emissions verification performed, the engine technical manual

[11] The Minister of Land, Infrastructure, Transport and Tourism may cause the Japan Craft Inspection Organization to perform the clerical work relating to the approvals for the engine technical manual and issuance of the Engine International Air Pollution Prevention Certificate (the "EIAPP Certificate"), including verification of emissions from engines installed on ships with less than 20 gross tonnage (Article 19-10, Paragraph 1 of the Act on Prevention of Marine Pollution).

approved, and the EIAPP Certificate issued, by the Minister of Land, Infrastructure, Transport and Tourism (Article 19-15, Paragraph 2 of the Act on Prevention of Marine Pollution).

(c) Preparation of the Engine Technical Manual, and Approval by the Minister of Land, Infrastructure, Transport and Tourism or a Classification Society

In addition, the manufacturer, etc. of the engines that have received emissions verification must prepare an engine technical manual that indicates the specifications and performance of the engine, the matters that must be observed when installing, operating, and maintaining the engine, and the method for verifying the status of NO_X emissions from the engine, and obtain approval thereon from the Minister of Land, Infrastructure, Transport and Tourism or a classification society (Article 19-5 and Article 19-15, Paragraph 2 of the Act on Prevention of Marine Pollution).

(d) Issuance of an EIAPP Certificate by the Minister of Land, Infrastructure, Transport and Tourism or a Classification Society

Furthermore, when performing emissions verification and approving the engine technical manual, the Minister of Land, Infrastructure, Transport and Tourism or a classification society must issue an EIAPP Certificate to the manufacturer, etc. of the engine, etc. (Article 19-6 and Article 19-15, Paragraph 2 of the Act on Prevention of Marine Pollution)[12].

(e) Installation of EIAPP Certified Engines by the Ship Owner

After taking the above procedures, when installing an engine on a ship, the ship owner must, in principle, install an engine for which an EIAPP Certificate has been issued (Article 19-7, Paragraph 1 of the Act on Prevention of Marine Pollution)[13].

(3) Methods, etc. for Verifying NO_X Emissions

The methods, etc. for verifying NO_X emissions are conducted pursuant to the Technical Codes, etc., an outline of which is set out below.

When verifying NO_X emissions, the Minister of Land, Infrastructure, Transport and Tourism or a classification society will calculate the NO_X emissions and NO_X emission rate during the shop trial and then determine whether or not such NO_X emission rate conforms with the emission standards for

[12] Persons who have obtained an EIAPP Certificate or a document issued by a classification society by deception or other such wrongful acts shall be subject to a fine of up to 1,000,000 yen (Article 56, Item (7) of the Act on Prevention of Marine Pollution), and if a representative or employee of a corporation commits such violation with respect to the corporation's business, the corporation itself may also be subject to the same fine (Article 59 of the Act on Prevention of Marine Pollution).

[13] Persons who have operated an engine installed on a ship in violation of this provision shall be subject to a fine of up to 10,000,000 yen (Article 55, Paragraph 1, Item (10) of the Act on Prevention of Marine Pollution), and if a representative or employee of a corporation commits such violation with respect to the corporation's business, the corporation itself may also be subject to the same fine (Article 59 of the Act on Prevention of Marine Pollution).

NO_X emissions as provided for in the Act on Prevention of Marine Pollution.

Specifically, NO_X emissions are calculated based on the exhaust gas flow rate that is calculated using the so-called "carbon balance method," taking into account (i) the measured NO_X concentration and (ii) CO_2 measurements and fuel consumption, etc.

Based on the above, the NO_X emission rate is calculated on the weighted average basis by multiplying (x) the value of the mass (g) per hour calculated on the assumption that the NO_X emitted when the engine is operated under the operating conditions in which the ratios of rated output to output are 0.25, 0.5, 0.75, and 1.0, respectively, is entirely nitrogen dioxide, by (y) a certain factor determined for each engine usage pattern and operating condition (Article 41 of the Ministerial Order for Technical Standards for Ship Facilities, Etc. under the Provisions of the Act on Prevention of Marine Pollution).

If the components (NO_X components) that affect NO_X emissions characteristics, such as the Parent Engine and main engine specifications (rating (output)), turbocharger, and combustion chamber specifications, etc. are identical, engines may be considered as Member Engines of the same engine group, and if NO_X emissions of the Parent Engine are measured, NO_X emissions of the Parent Engine will be applied to Member Engines, and those Member Engines will be exempted from measurement.

3. Facts Found as a Result of the Investigation

The outline of the facts concerning the Misconduct found as a result of the Investigation is as follows.

3.1 Outline of the Misconduct

(1) General

With respect to the two-stroke marine engines manufactured by KHI under the license from the Licensor (collectively, the "**Marine Engines**"), the Licensor published the planned fuel consumption rate of the engines (calculated by "fuel consumption per hour (g/h) ÷ engine output (kW)") under operating conditions of a certain ratio of engine output to rated output ("**Load**") and the tolerance for each model taking into account individual differences of the engines (including the tolerance, the "**Nominal Value**"). KHI guarantees customers a specification value of the fuel consumption rate, which is basically the same value as the Nominal Value (including the tolerance range unless otherwise specified; the same applies hereinafter), and if the fuel consumption rate does not meet the specification value (if the value of the fuel consumption rate exceeds the upper limit of the tolerance), KHI is contractually liable to the customer. In addition, KHI was required to calculate the fuel consumption rate (g/kWh) required to calculate the NOx emissions of the Marine Engines at a Load of 25%, 50%, 75%, and 100% under NOx Emissions Regulations.

Even when the actual measured fuel consumption rate in Official Trials fell within the tolerance range, customers sometimes requested that the fuel consumption rate specification value not include the tolerance, or in the case of customers who had been sold the same type of engine, the customer requested an explanation of the variation in the fuel consumption rate value compared to that of the engine in question. Furthermore, in some cases, the actual measured values for the fuel consumption rates did not fall within the tolerance range and could not meet the specification values guaranteed to customers.

Therefore, since the 1980s at the latest, as stated in **3.1(2) and (3) below**, KHI has been tampering with the values of fuel consumption rates in Official Trials directly or through tampering with the actual measured values of fuel consumption, which is the basis for calculating fuel consumption rates in order to make the variation in the values of fuel consumption rates within the tolerance range appear small, or to make the values of the fuel consumption rates appear to meet the specification values. KHI subsequently delivered the Results of Shop Trials to customers with false values of fuel consumption rates. False fuel consumption rate values were also included in the NOx Technical File submitted to classification societies for compliance with NOx Emissions Regulations.

The following categories of unauthorized alteration were conducted with respect to the Marine Engines, including unauthorized alteration of the fuel consumption and fuel consumption rates (collectively, "**Fuel Efficiency**"), and false statements were made in the Results of Shop Trials.

(i) Unauthorized alteration of fuel consumption test data

(ii) Unauthorized alteration of fuel consumption rate test data

(iii) Unauthorized alteration of exhaust gas temperature test data

(iv) Unauthorized alteration of water brake torque indicators

(v) Unauthorized alteration of turbocharger compressor inlet temperature adjustment function

Each category of unauthorized alteration of test data was performed by the individuals in charge in the design section of the Production Team, which was substantially in charge of supervising the Official Trials for the Marine Engines, by themselves or by instructing the individuals in charge in the assembly section or the inspection section, who were in charge of the Official Trials, to perform the unauthorized alterations, and the specific details are as described in detail in **3.1(2) through (6) below**.

(2) Unauthorized Alteration of Fuel Consumption Test Data

When measuring fuel consumption, the engine to be measured is started, fuel is supplied from the fuel measurement tank, and combusted, and the amount by which the fuel in the tank has decreased (weight) is measured using a device called a load cell. A load cell is a sensor that measures the force (load, mass, etc.) when force is applied to an object, and the weight is measured by converting the size of the force applied to the sensor part to an electrical signal (voltage).

The load cells are then set up with a conversion formula for how much weight to convert to when a certain voltage is generated, and KHI has commissioned an outside contractor to regularly calibrate the load cells to ensure that they function properly.

However, as stated in **3.1(3) below**, if the value of the fuel consumption rate measured in the preliminary run had a variation that was within the tolerance range but for which the customer may demand an explanation, or if the value did not meet the specification values, the individuals in charge in the Production Team instructed the individuals in charge in the assembly section, who were in charge of operating the load cells for measuring the fuel consumption rate that is the basis for calculating the fuel consumption rate in the Official Trials, to carry out unauthorized alteration of the load cell amplifier after calibration to make the variation in the value within the tolerance range appear small, or to make it appear that the specification values were met.[14]

Thus, through the unauthorized alteration of the load cell amplifiers, KHI caused the fuel consumption to be measured differently from the actual fuel consumption, and by using such false fuel consumption values as a basis for further alteration of the fuel consumption rates as stated in

[14] For example, if the conversion formula was set to "1 volt = 100 kg" and then changed to "1 volt = 90 kg" by an unauthorized adjustment, the resulting weight would be 10 kg less in the above example even though the same voltage was generated, and said reduction in fuel (10 kg) would not be recognized through the load cell.

3.1(3) below, KHI stated false values of fuel consumption rates in its Results of Shop Trials and submitted them to its customers. Although in many cases the fuel consumption was altered so that less fuel consumption was measured than the actual measured values, in some cases, the fuel consumption was altered so that more fuel consumption was measured than the actual measured values when the purpose was to show less variation within the tolerance range.

KHI began manufacturing LPG-fired dual-fuel marine engines in July 2020, and since then it has not accepted any new orders for marine engines that only use conventional fuel oil. When measuring the fuel consumption of LPG-fired dual-fuel marine engines, it is necessary to measure the consumption of LPG as well, but the amplifier mounted in the flow meter used for LPG gas consumption could not be altered by KHI due to its structure. Therefore, it has become difficult to tamper with values of fuel consumption in the aforementioned manner, and unauthorized alteration of fuel consumption is no longer conducted.

(3) Unauthorized Alteration of Fuel Consumption Rate Test Data

As stated in **3.1(2) above**, the individuals in charge in the Production Team tampered with the values of the fuel consumption rates during the Official Trials in order to make the variation of the fuel consumption rates within the tolerance appear small or to make the fuel consumption rate values appear to meet the specification values, and delivered the Results of Shop Trials with false values of fuel consumption rates to customers.

Specifically, the individuals in charge in the Production Team first examined what value of the fuel consumption rate should be appropriate when conducting the Official Trials, based on the results of the preliminary run of the Marine Engines and the results of previous preliminary runs and the Official Trials of similar engine types, and determined the target value of the fuel consumption rate (sometimes called the "target value"). Then, from around 1980 at the latest, when the automatic measurement system for measuring the performance of the Marine Engines ("**Automatic Measuring System**") was introduced, the individuals in charge in the Production Team issued instructions by delivering a piece of paper containing target values, etc. prior to the Official Trials to the individuals in charge in the inspection section, who were in charge of checking the values of the fuel consumption rates at Official Trials by using computers used for measurement ("**Measurement Computers**") that operate the Automatic Measuring System, to tamper with values of fuel consumption rates by using the manual fuel consumption rate value adjustment function in the Automatic Measurement System.[15]

According to the Interviews, during the development of the Automatic Measuring System, the Production Team and others made requests to enable manual fine-tuning of the fuel consumption rate

[15] The value of the fuel consumption rate is calculated by converting the test conditions, such as temperature, to standard conditions, and since the "target value" is the value after conversion to standard conditions, the value was altered to be precisely the value derived by inverse conversion from the target value based on the test conditions on the day of the Official Trial.

measurement values, and therefore the system included a function that allows the values of the fuel consumption rates to be changed manually.[16] Although it is not necessarily clear under what background or circumstances such requests were made, it is difficult to justify manually adjusting the values of fuel consumption rates, which are measurement results in the Automatic Measuring System, and it is thought that this function was installed solely to enable tampering with the values of fuel consumption rates. In addition, although the timing could not be clarified, a specification was added whereby instances where the value of the fuel consumption rate was being tampered with could be seen only on the screen of the Measurement Computer that could not be easily viewed by customers, and not on the display the customers and others present at Official Trials were watching.

As stated in **3.3(2) below**, around 2015, when individuals in charge in the inspection section raised the issue of the involvement of the inspection section in the Misconduct, the individuals in charge in the inspection section stopped receiving instructions from the Production Team regarding the Misconduct, and since then, until the Misconduct was discovered, the individuals in charge in the Production Team had been altering the values of the fuel consumption rates by operating the Measurement Computers by themselves.

(4) Unauthorized Alteration of Exhaust Gas Temperature Test Data

The heat energy contained in the exhaust gas discharged from the Marine Engines ("**Exhaust Gas**") is generally assumed to be sent to a boiler, etc. and utilized as a heat source, and the temperature of the Exhaust Gas at a certain Load is described in the specification sheet prepared by KHI. The Exhaust Gas temperatures were to be measured for each of the Exhaust Gases discharged from the multiple cylinders comprising the Marine Engines, and the respective values and the overall average values were to be recorded in the Results of Shop Trials.

However, if the Exhaust Gas temperature values measured in preliminary runs were within the range of specification values but varied to the extent that the customer might demand an explanation, or if they deviated from the upper or lower limits of the specification values, the individuals in charge in the Production Team instructed the individuals in charge in the inspection section, at least from around 2000 onward, to tamper with such values to make the variation appear small or within the range of specification values in Official Trials, for example, by delivering a piece of paper in advance stating the Exhaust Gas temperature values at each Load, and using the Temperature Adjustment Function installed in the Measurement Computers to perform a so-called zero-point adjustment[17] ("**Temperature Adjustment Function**") to tamper with the values of the Exhaust Gas temperatures recorded in the Measurement Computers. As stated in **3.1(6) below**, it also appears that the values

[16] The Automatic Measuring System has been updated multiple times since its installation to the present, but the ability to manually adjust values of the fuel consumption rate has been consistently maintained.

[17] For example, this refers to cases enabling accurate measurement by adjusting a temperature by minus 1°C when the temperature is actually 0°C but it is displayed as 1°C.

of Exhaust Gas temperatures were sometimes tampered with through tampering with turbocharger compressor inlet temperatures (defined in **3.1(6) below**). In some cases, the individuals in charge in the Production Team instructed the individuals in charge in the assembly section to perform the tampering instead of the individuals in charge in the inspection section, and in other cases, the individuals in charge in the Production Team performed the tampering themselves.

As stated in **3.3(2) below**, around 2015, when the individuals in charge in the inspection section raised the issue of the involvement of the inspection section in the Misconduct, the individuals in charge in the inspection section stopped receiving instructions from the Production Team regarding the Misconduct, and since then, the individuals in charge in the Production Team have tampered with the values of the Exhaust Gas temperatures by operating the Measurement Computers themselves.

No unauthorized alteration of Exhaust Gas temperatures has been detected from since around March 2020. According to the results of the Interviews, this is because, as stated in **3.1(2) above**, as the LPG-fired dual-fuel marine engines, which KHI began manufacturing in July 2020, were only sold internally to its own plants, there was no longer a requirement to be so strict about the Exhaust Gas temperatures.

(5) Unauthorized Alteration of Water Brake Torque Indicators

A water brake is a machine that measures the engine's rotation speed and torque (the amount of force exerted when an object rotates around a fixed rotating shaft), and the engine output (kW) is calculated by multiplying the rotation speed and torque, as described in the formula below. The engine output and engine rotation speed were specified in the specifications and specification statements, and torque values were to be stated in the Results of Shop Trials.[18]

As stated in **2.2(5) above**, the Contents of Official Shop Trial stipulates that engine output is to be calculated using a water brake, and KHI has measured the rotation speed and torque required to calculate engine output using a water brake for the Marine Engines.

However, many of the water brakes used by KHI were old, and there had often been a discrepancy between the value of engine output estimated from the mean effective pressure (Pme) in the cylinder and the value of engine output calculated as a result of the measurement by the water brakes. Therefore, a number of KHI employees believed that the water brakes could not accurately measure engine output and that the engine output estimated based on Pme was closer to the actual value.

Therefore, the individuals in charge in the Production Team instructed the individuals in charge in the assembly section to alter the amplifiers for water brakes subsequent to calibration and had them adjust the torque value displayed on the water brakes so that the value of the engine output, which was considered to be the actual value, could be measured by referring to the engine output estimated

[18] Since the engine output is calculated by multiplying the engine rotation speed and torque as described above, if the specification values for the engine output and engine rotation speed are defined, the torque value that should satisfy them will also naturally be determined.

from Pme based on the results of the preliminary runs, etc. and the output of the same type of Marine Engines in the past.

Given that the measurement was supposed to be done by water brakes, it is clear that it is improper to alter the amplifiers for water brakes subsequent to calibration. However, as a result of the verification by KHI and discussions with related organizations conducted after the discovery of the Misconduct, it has been confirmed that the engine output shown in the Results of Shop Trials does not deviate significantly from the actual output.

As stated in **3.1(1) above**, the fuel consumption rate (g/kWh) is calculated by dividing the fuel consumption per hour (g/h) by the engine output (kW). Because the engine output is calculated by the following formula, it is logically possible to alter the value of the fuel consumption rate by altering the amplifiers for water brakes to adjust the value of the torque.

$$\text{Output [kW]} = \frac{2\pi \times \text{rotation speed} \left[\frac{1}{min}\right] \times torque\ [Nm]}{60} \times \frac{1}{1000}$$

However, the range of adjustment of the torque value was limited because the specification values for engine output and the rotation speed had been set, and the influence on the fuel consumption rate by adjusting the value of torque measured by the water brakes was limited (compared to altering the fuel consumption) because of the calculation formula of the engine output. Additionally, it would have been possible to tamper with the fuel consumption rate, which has a more direct impact on the fuel consumption rate, as stated in **3.1(2) above**, and the fuel consumption rate itself had been tampered with as stated in **3.1(3) above.** In light of these facts, altering the amplifier of the water brakes for the purpose of tampering with the values of the fuel consumption rates would have been a roundabout approach. In addition, given the fact that the alteration of the amplifiers for water brakes was conducted even in the matching runs[19], where the purpose was to check the engine performance of the Parent Engines and the results were not reported to customers, etc., it is believed that the primary purpose of altering the amplifiers for water brakes was making the engine output closer to what was considered to be its actual output, based on the recognition that the performance of the water brakes was not reliable, rather than tampering with the values of the fuel consumption rate.

However, in the documents that summarize the results of the matching runs, there are some statements that seem to indicate that the individuals in charge were considering keeping the values of the fuel consumption rates within the Nominal Value by altering the amplifier of the water brakes when the actual value of the measured fuel consumption rates in the matching runs did not fall within the Nominal Value, and based on this, it cannot be denied that the fact that the true values were not clear due to the low accuracy of the water brakes served as an excuse for altering the amplifier of the

[19] Adjustments were also made to make water brakes heavier (lowering measured torque values).

water brakes, and that there was some awareness that slight differences of fuel consumption rates could be adjusted by alteration of the amplifiers for water brakes.

No alteration of the amplifiers for water brakes have been detected since around 2022. This is believed to be due to the fact that the number and types of Marine Engines manufactured have gradually decreased, and that only the water brakes that were considered to be the most accurate among those used by KHI at the time were used, reducing the necessity to alter the amplifiers for water brakes.

(6) Unauthorized Alteration of Turbocharger Compressor Inlet Temperature Adjustment Function

A turbocharger is a device that feeds compressed air into an engine, and the compressor rotates at high speed to feed the inlet air into the engine. The lower the temperature of the air that the compressor takes in ("**Inlet Temperature**"), the more compressed the air is and the higher the air density, which increases the amount of oxygen fed to the engine, thereby improving the combustion efficiency of the engine and thus the value of the fuel consumption rate. Therefore, the fuel consumption rate measured at the actual ambient air conditions during the test must be converted to a fuel consumption rate based on standard ambient air conditions, and the Inlet Temperature, which is that of the ambient air condition during the test, are included in the Results of Shop Trials. As stated in **3.1(3) above**, when the fuel consumption rates were subject to unauthorized alteration, values inversely converted from the target values under the test conditions were entered in the Results of Shop Trials, and the ambient air temperature was one of the parameters necessary for such inverse conversion. Also, for the Exhaust Gas temperature mentioned in **3.1(4) above**, the value measured under the actual ambient air conditions during the test must be converted to the Exhaust Gas temperature based on standard ambient air conditions, and the Inlet Temperature, which is the ambient air condition during the test, also affects the value of the Exhaust Gas temperature through said conversion.

In this regard, since the turbocharger compressor inlet is relatively large, the measurement results vary depending on the point at which the temperature is measured. Therefore, for the Parent Engines, KHI used a temperature measuring device with eight sensors (called "octopus legs") to measure the average temperature of the eight measurement points ("**Average Ambient Air Temperature**"). However, this temperature measuring device could not be calibrated and could not be used as a measurement device for Official Trials, and only a temperature measuring device with one measurement point could be used as a measurement device for Official Trials.

Therefore, KHI searched for a point where the temperature was close to the Average Ambient Air Temperature calculated using the octopus legs for the Parent Engines, and a point where the temperature difference was at the same level as the temperature difference between the Average

Ambient Air Temperature and air temperature measured by the octopus legs on the Parent Engines in the past for the Member Engines, and at those points, the temperature was measured using a temperature measuring device with a single measurement point. However, if the temperature measured at the same point deviates, it is necessary to re-install the temperature measuring device at another point, and it was troublesome to do so for each measurement. In some cases, despite the fact that a point where the Inlet Temperature required to achieve the target Exhaust Gas temperature could be measured was found and the temperature was measured at that point using a temperature measuring device, for some reason the targeted temperature could not be measured as expected.

Therefore, the individuals in charge in the Production Team used the Temperature Adjustment Function of the Measurement Computers to adjust the temperature in order to make it appear that the temperature was appropriate based on the temperature difference between the Average Ambient Air Temperature and the air temperature of the Parent Engines in the past and the air temperature on the days of the Official Trials, or to make it appear that the exhaust gas temperature was within the specification value.

(7) Involved Departments

Among the unauthorized alterations stated in **3.1(2) to (6) above**, it was generally recognized by KHI that the unauthorized alteration concerning the water brake torque indicators was an unavoidable adjustment to bring the actual measured value closer to the actual value that should be measured under circumstances where the reliability of the water brakes was low, and the unauthorized alteration was not fraudulent in terms of its purpose, and therefore, many people involved in the manufacture of the Marine Engines were aware of and tolerated the unauthorized alterations. The departments involved in unauthorized alteration of the categories explained above, excluding the unauthorized altercation of the water brake torque indicators and the resulting tampering with numerical values pertaining to the Fuel Efficiency, Exhaust Gas temperatures, and turbocharger compressor Inlet Temperatures, and the awareness of such alterations by those departments are as follows. Other departments (marketing & sales departments, and control and administration departments) related to the Marine Engines, are basically found not to have been involved or aware of these matters.

(a) Regarding the Design Section

As stated in **3.1(2) to (6) above**, the people who led all of the unauthorized alterations were the persons who had been successively in charge in the Production Team of the design section in the past, and as such, basically those within the Production Team had been aware of all of the unauthorized alterations. The QA Team members who had been in charge of the matching runs of the Parent Engines since at least around 2001 were also aware that the fuel consumption rates did not meet the specification values in many matching runs of the Parent Engines and that the Exhaust Gas temperatures also did not meet the specification values, although not in as many cases as for the fuel consumption rates. Such QA Team members were also aware that the Results of Shop Trials submitted to customers as a result of Official Trials for the Parent Engines or Member Engines had "neat" numbers that met the specification values. Therefore, it is believed that many of the QA Team members were also aware that the Fuel Efficiency and Exhaust Gas temperatures had been tampered with, even though they may not have had knowledge of the specific tampering methods.

With regard to the past section managers of the design section (under the current organizational structure, the manager of the Reciprocating Engine Engineering Section) who supervised the Production Team and QA Team, etc., those who had experience working in the Production Team were aware of the tampering with the Fuel Efficiency. Even if that was not the case, many of the past section managers were aware, to varying degrees, that fuel consumption performance had been tampered with, since they had been asked for prior approval of the target fuel consumption rates by the individuals in charge in the Production Team, or had been cc'd in emails instructing the assembly section personnel to carry out the unauthorized alteration of the fuel consumption data. On the other hand, those who did not have experience working in the Production Team or the QA Team could not be said to have been generally aware of the tampering with the Exhaust Gas temperatures and the turbocharger compressor Inlet Temperatures, and it is thought that there were cases both where they were aware and unaware of the tampering.

It is considered that the managers in charge of the design section (under the current organizational structure, the general manager of the Power & Propulsion Department) who had experience in working with the Marine Engines were aware of the tampering with the Fuel Efficiency to varying degrees, but there were also thought to be cases both where they were aware and unaware of the tampering with the Exhaust Gas temperatures and the turbocharger compressor Inlet Temperatures.

(b) Regarding the Assembly Section

As stated in **3.1(2) above**, the individuals in charge of trial operations in the assembly section were aware of the tampering with the Fuel Efficiency because they had been carrying out unauthorized alteration of Fuel Efficiency until around 2020 in accordance with the instructions of the individuals in charge in the Production Team.

However, since the individuals in charge in the assembly section were in a position to perform their duties based on instructions from the design section at the Official Trials, the past section managers and general managers of the assembly section (under the current organizational structure, the manager of the Production Engineering Section 2 and the general manager of Kobe Production Engineering Department, respectively) were generally not aware of the tampering with the Fuel Efficiency, except when they were individually consulted or received reports from the individuals in charge in the assembly section.

The assembly section is basically found to not have been involved in the tampering with the Exhaust Gas temperatures and the turbocharger compressor Inlet Temperatures.

(c) Regarding the Inspection Section

As stated in **3.1(3) and (4) above**, the individuals in charge of trial operations in the inspection section were aware of the tampering with the Fuel Efficiency and the Exhaust Gas temperatures because they had been carrying out such unauthorized alteration of the fuel consumption rates and the Exhaust Gas temperatures until around 2015 in accordance with the instructions of the individuals in charge in the Production Team.

However, since the individuals in charge in the inspection section were in a position to perform their duties based on instructions from the design section at the Official Trials, the past section managers and general managers of the inspection section (under the current organizational structure, the manager of the Quality Assurance Section 1 and the general manager of Energy and Marine Machinery Quality Assurance Department, respectively) were generally not aware of the tampering with the Fuel Efficiency and the Exhaust Gas temperatures, except when they were individually consulted or received reports from the individuals in charge in the assembly section.

The inspection section is basically found to not have been involved in the tampering with the turbocharger compressor Inlet Temperatures.

(d) Higher Ranks of Reporting Line

Since each of the cases of the unauthorized alteration and the tampering with numerical values were basically not reported to those in the reporting line higher than the section managers of the design section, it is not generally found that the department head, who was in charge of the general production of Marine Engines (under the current organizational structure, the general manager of the Marine Machinery System Group and the head of the Marine Machinery Business Division), and officers and employees in higher ranks of the reporting lines than the department head (under the current organizational structure, they include individuals such as the company president of Energy Solution & Marine Engineering Company), except in the case of those from the design section, were aware of the Misconduct.

As stated in **3.3(1) below**, when the issue was raised by a person in charge in the assembly section around 2010, it appears that the tampering with the Fuel Efficiency through the unauthorized alteration of fuel consumption was reported to the senior management of the Machinery Division at that time, but those details could not be confirmed in the Investigation.

3.2 Background of the Misconduct

(1) Background of Unauthorized Alteration of Fuel Efficiency of Marine Engines

As stated in **3.1(2) and (3) above**, the unauthorized alteration of the Fuel Efficiency was basically conducted in the Official Trials. On the other hand, the Fuel Efficiency measured in the matching runs to check the engine performance of the Parent Engines is considered to be close to the actual values of the Marine Engines, since there was no unauthorized alteration of that data (as stated in **3.1(5) above**, although the alteration of the amplifiers for water brakes was conducted in the matching runs, it was confirmed that no significant deviation from the actual output was observed as a result of verification by KHI and discussions with the relevant agencies).

According to the document summarizing the results of the matching runs, it was concluded that the fuel consumption rates fell within the range of specification values for all Parent Engines for the matching runs conducted from May 2001 to February 2003. According to the results of the Interviews, the measured fuel consumption rates for most of the Marine Engines seemed to fall within the range of the specification values in the period around the 1980s. In light of the above, it is believed that in many cases where values of fuel consumption rates were tampered with until around 2003, the actual measured values of fuel consumption rates fell within the specification values, however it is believed that the unauthorized alteration of the Fuel Efficiency was conducted to make the variations within the tolerance range appear smaller, and it also seems that there was a sense among those involved that this was not a major issue because there was no deviation from the specification values, and adjustments were made only to make the variations appear smaller.

However, subsequently the number of Parent Engines with values of fuel consumption rates that deviated from the range of the specification values increased, and from around 2008 or 2009, the values of fuel consumption rates measured in the matching runs for the majority of Parent Engines were determined to have deviated from the range of the specification values.[20] However, after many years of the unauthorized alterations to the Fuel Efficiency within the range of tolerance, and as the sense of resistance to altering the Fuel Efficiency had weakened, tampering with the Fuel Efficiency to make it appear to meet the specification values, even when the values of fuel consumption rates deviated from those specification values, had started and become common. In addition, since there were growing consequences of such tampering coming to light, it became a vicious cycle where nobody could speak up.

As stated in **3.1(1) above**, given that the values of the fuel consumption rates and the tolerance thereof that KHI guarantees to its customers is basically the Nominal Value of the fuel consumption

[20] Of course, the matching runs and the Official Trials are different trial runs, and there is no guarantee that the resulting calculated values of fuel consumption rates will be the same for each. However, if the fuel consumption rate calculated based on the data from the trial run, which is the result of adjusting the Marine Engines to operate properly by conducting matching runs several times, deviates considerably from the guaranteed value, it is considered to be reasonably difficult to keep the fuel consumption rate within the range of guaranteed value in the one-shot Official Trials thereafter.

rates published by the Licensor, if KHI determined that it could not meet the specification values of the fuel consumption rates for a certain type of engine, essentially it should have discussed the possibility of changing the design or revising the Nominal Value (increasing the range of tolerance) with the Licensor.[21]

In this regard, in the Interviews some interviewees mentioned that there were times when individuals in charge in the design section discussed the fuel consumption rates with personnel of the Licensor, indicating that such discussions were sometimes held at the working level. However, at the company level, no fact could be confirmed that KHI had discussed any changes in the design or revision of the Nominal Values with respect to the Marine Engines with the Licensor.

(2) Regarding Four-stroke Marine Engines

Among the engines installed on vessels that started to be manufactured after 2000, the four-stroke marine engines manufactured by KHI differ from the Marine Engines (2-stroke engines) stated in **3.2(1) above** in that they were not manufactured under license from the Licensor, but were developed and manufactured by KHI itself.

According to the documents and other information provided by KHI, the fuel gas flow required to calculate the fuel consumption rate that KHI guarantees to its customers for said marine engines is based on actual measurements and is appropriately stated in the Results of Shop Trials. According to KHI, it then calculates the fuel consumption rate appropriately based on the value of said fuel gas flow. Based on the results of KHI's internal audit conducted in July 2024, it was confirmed that the measuring instruments used in the Official Trials for said marine engines did not have functions to alter coefficients as stated in **3.1(2) above, etc.** or to adjust measurement results during the Official Trials as stated in **3.1(3) above, etc**.

Based on the above, it was confirmed within the scope of the Investigation that there had been no Misconduct or similar quality-related misconduct with respect to the four-stroke marine engines.

(3) Regarding Relationship to NOx Emissions Regulations

As stated in **3.1(1) above**, in relation to NOx Emissions Regulations, fuel consumption or values of fuel consumption rates that had been tampered with were also recorded in the NOx Technical File, and compliance with NOx Emissions Regulations was determined based on such false values. Therefore, it is necessary to confirm whether any of the Marine Engines violate NOx Emissions Regulations.

In this regard, according to the results of the matching runs, there were several Parent Engines that

[21] The Special Investigative Committee is not in a position to express an opinion as to whether the fact that the performance of fuel consumption rates, etc. of some of the Marine Engines deviated from the Licensor's Nominal Value was due to the Licensor's design or the Nominal Value setting itself, or whether it was due to manufacturing processes at KHI.

were determined to not only deviate from the specification values of fuel consumption rates, but also to be in breach of NOx Emissions Regulations. However, the individuals in charge in the QA Team and the Production Team did not conduct further improvement activities even if they were determined to be in breach of NOx Emissions Regulations in the matching runs, as they expected that the calculated value of the NOx emission values would be reduced as a result of tampering with the values of fuel consumption rates in the Official Trials. Due to the characteristics of diesel engine combustion, in many cases, there is a trade-off between the value of the fuel consumption rate and the value of NOx emissions, with the former decreasing (improving) and the latter increasing (worsening) in contrast. Based on the Technical Code stated in **2.3(3) above**, if only the calculated value of the fuel consumption rate is tampered with and made smaller, and the other parameters are left unchanged, the value of the fuel consumption will also be smaller, resulting in a decrease in NOx emissions.

However, according to KHI, in the matching runs, the determination of whether the NOx Emissions Regulations were violated or not was based on the upper limit of the tolerance (margins assuming engine adjustments and other factors that lead to higher NOx emissions) of the parameters of the operational conditions related to the NOx emissions within the operational range of the Marine Engines, and as a result of KHI's recalculation based on the actual measured values after the discovery of the Misconduct, it was verified, except for the Marine Engines still undergoing verification, that the NOx Emissions Regulations would not be violated due to the reduction of such tolerance.[22]

3.3 Opportunities for Correction

According to the results of the Interviews and the Questionnaire, it was discovered that while the Misconduct had continued for a long period of time and a considerable number of persons were involved, it was assumed that there were times when questions or concerns about the Misconduct were raised at the workplace, and there were, at least, the critical opportunities described below to correct the Misconduct. However, KHI failed to use any of these opportunities to correct the Misconduct.

(1) Issues Raised by the Individual in Charge in the Assembly Section and Measures Taken

Around 2010, the individual in charge in the assembly section reported the unauthorized alteration of fuel consumption test data conducted by the assembly section to the section leader of the assembly section (under the organizational structure at that time, the Assembling Section in the Production Department at the Machinery Division).

22 Regarding the reduction of the tolerance, KHI will seek agreement from the ship's flag states, classification societies, and ship owners.

It appears that upon receiving the report from such individual in charge, the section leader had the individual report the unauthorized alteration to the management of the Machinery Division. However, many of the pertinent persons at that time have already retired, and the memories of those who still working at KHI have faded, so in the Investigation it was not possible to specifically identify the person who received that report. In addition, it is still unclear as to what discussions, etc., were held at the Machinery Division after receiving such report.

In any case, as a result, the Misconduct continued even after such report was made, and the instructions from the individuals in charge in the Production Team to the individuals in charge in the assembly section regarding the unauthorized alteration of fuel consumption test data continued until the unauthorized alteration itself stopped as stated in **3.1(2) above**, and no specific measures to address the Misconduct were taken.

(2) Issues Raised by Individuals in Charge in the Inspection Section and Measures Taken

Around 2015, the individuals in charge in the inspection section (under the organizational structure at that time, the Inspection Section in the Quality Assurance Department at the Machinery Division) believed that it was necessary to stop the involvement in the unauthorized alterations by the inspection section, which was a part of the quality assurance departments, and reported the unauthorized alterations to the section leader of the Inspection Section at that time by submitting a note on which the instructions from the design section to commit the unauthorized alterations were written and provided their opinion to the section leader that the inspection section should stop being involved in such unauthorized alterations.

Upon receiving such report, the section leader of the Inspection Section requested the Manager of the Administration Section of Control Department at the Machinery Division (who was concurrently serving as the person in charge at the compliance department directly managed by the Gas Turbine & Machinery Company, which was in charge of the Machinery Division) to stop the design section instructing the inspection section to conduct the unauthorized alterations. The Manager of the Administration Section consulted with the general manager of the design section (under the organizational structure at that time, the Diesel Engine Department at the Machinery Division). The design section (under the organizational structure at that time, the Two Stroke Diesel Engine Section of the Diesel Engine Department) accepted such request, and thereafter no further instructions were given from the design section to the inspection section regarding the Misconduct.

However, the Misconduct did not end, and the individuals in charge in the Production Team came to conduct the unauthorized alterations of the fuel consumption rate test data and the Exhaust Gas temperature test data that the inspection section had previously been instructed to do. Furthermore, neither the section leader of the Inspection Section nor the Manager of the Administration Section provided any detailed report on this issue to the quality assurance departments or compliance departments.

(3) Discovery of Inappropriate Conduct in Quality Tests at a Subsidiary and Measures Subsequently Taken

When an incident of inappropriate conduct in quality tests was discovered in 2021 in which Kawasaki Thermal Engineering Co., Ltd. (“**KTE**”), a subsidiary belonging to the Energy Solution & Marine Engineering Company, stated false figures in inspection reports for the cooling capacity of products that exceeded the figures measured during pre-shipment commissioning, and a special investigation committee was established and announced in 2022, KHI began company-wide initiatives to retroactively review whether inspections had been carried out properly in accordance with the product manufacturing cycle over the last 3 to 5 years (the “**Companywide Inspection Process Review**”). As a result, a certain number of quality issues were identified, and KHI took measures to address them and decided to continue to conduct such review initiatives even after 2023. KHI conducted a second Companywide Inspection Process Review after October 2023, and took measures to address the quality issues identified as a result. However, even after these two Companywide Inspection Process Reviews, there was no report of the Misconduct, and KHI was unable to uncover any leads regarding the Misconduct.

In addition, in October 2022, KHI conducted a compliance awareness survey (the “**Awareness Survey**”) targeting all 36,892 officers and employees of the group in Japan and received a total of 30,335 responses (a response rate of 82%). Whereas the Awareness Survey basically asked for responses in the form of multiple-choice questions, for some questions that asked for open responses, a certain number of responses pointing out quality issues were received, and KHI conducted investigations into these responses. However, even in the Awareness Survey, no employee provided information regarding the Misconduct, and KHI was unable to obtain any leads regarding the Misconduct.

3.4 Status of Measures after Discovery of the Misconduct

(1) Measures Taken Immediately After Discovery of the Misconduct

As stated in **3.3(1) above**, when incidents of inappropriate conduct in quality tests at other marine engine manufacturers was reported, the individual in charge in the assembly section who had raised the issue of the unauthorized alterations of fuel consumption test data around 2010 reconfirmed the measures to be taken with the manager of the assembly section (under the organizational structure at that time, the general manager of the Kobe Production Engineering Department). Consequently, as stated in **1.1 above**, in July 2024, it was discovered that KHI had been engaging in the unauthorized alteration of fuel consumption test data and fuel consumption rate test data for the Marine Engines.

As stated in **1.1 above**, KHI conducted an internal investigation to ascertain the outline of the

Misconduct, and on August 28, 2024, the Board of Directors of KHI established the Special Investigative Committee and delegated the Investigation to the Special Investigative Committee, and on August 30, 2024 also formally established the Internal Investigative Committee.

(2) KHI's Implementation of Corrective Measures

Based on the results of the internal investigation, KHI has taken the corrective measures as stated in **(a) through (d) below** for each of the respective Misconduct.

(a) Unauthorized Alteration of Fuel Consumption Test Data

As stated in **3.1(2) above**, the unauthorized alteration of fuel consumption test data has not been occurring since KHI stopped accepting new orders for marine engines that only use conventional fuel oil, but employees continued to be able to operate the load cell amplifiers that granted the opportunity for such alterations to be made.

Thus, in response to the discovery of the Misconduct, KHI revised the production procedural manuals created in September 2024 that prescribe the management and operation of the fuel consumption measurement systems, adding two rules to the effect that (i) load cell amplifier gain dials would be covered and sealed after calibration (each seal has an exclusive identification code and if the seal is removed, a message to that effect appears) and that (ii) seals will be checked for irregularities before and after measuring fuel consumption. In addition, KHI implemented training on the importance of calibration work for the Quality Assurance Department of Energy & Marine Machinery System employees.

(b) Unauthorized Alteration of Fuel Consumption Rate Test Data

As stated in **3.1(3) above**, the unauthorized alteration of fuel consumption rate test data had been occurring using the function installed on the Measurement Computers that could be used to arbitrarily tamper with fuel consumption rate values. Accordingly, KHI modified the Measurement Computers to remove this function.

(c) Unauthorized Alteration of Exhaust Gas Temperature Test Data

As stated in **3.1(4) and 3.1(6) above**, the Exhaust Gas temperature and Inlet Temperature were altered by using the Temperature Adjustment Function installed on the Measurement Computers for other-than-intended purposes.

Accordingly, KHI configured the Measurement Computers so that a password would be required to use the Temperature Adjustment Function, with the passwords being controlled by the inspection section. Specifically, KHI set these passwords so that when the design section used the Temperature Adjustment Function during a shop trial, other sections would not be able to use the Temperature

Adjustment Function without the permission of the inspection section. The inspection section achieves this by allowing other sections to use the Temperature Adjustment Function by changing the password required therefor, and then changing the password again after the relevant section has finished using the Temperature Adjustment Function. In addition, the Temperature Adjustment Function has been modified so that a usage history remains when someone uses it, which allows the inspection section to confirm whether there have been any unauthorized logins.

(d) Unauthorized Alteration of Water Brake Torque Indicators

As stated in **3.1(5) above**, from around 2022 onward, employes began using only the water brakes considered to be the most accurate amongst KHI's water brakes, and the unauthorized alterations are no longer occurring. It has also once again been clarified that only the most accurate water brakes are being used.

In addition, similarly to the load cell amplifiers that measure fuel consumption amounts referred to in **3.4(2)(a) above**, the water brake amplifiers gain dials are now covered and sealed, which enables confirmation on whether there has been any adjustment made subsequent to calibration.

Further, in response to the discovery of the Misconduct, KHI modified the production procedural manuals created in August 2024 for calibrating water brakes, adding two rules to the effect that (i) the water brake amplifiers gain dials would be covered and sealed after calibration and that (ii) the seals will be checked for irregularities before and after measuring. In addition, training on the importance of calibration work was implemented for Quality Assurance Department of Energy & Marine Machinery System employees.

4. Analysis of Causes

As stated in **3. above**, the Fuel Efficiency and other values in the Results of Shop Trials for the Marine Engines continued to be altered at KHI over many years, led by the design section. Then, as stated in **3.3(1) above**, some individuals in charge in the assembly section raised the issue sometime around 2010, and although this issue was reported up to the management in the Machinery Division at the time, in the end no kind of corrections were made. In addition, as stated in **3.3(2) above**, some individuals in charge in the inspection section raised the issue sometime around 2015, and although the issue was reported up to the person concurrently in charge at the Compliance Department, only the instructions to the inspection section were stopped, and the Misconduct still continued to be carried out thereafter. Further, as stated in **3.3(3) above**, even in the Companywide Inspection Process Reviews and Awareness Survey implemented as a result of the inappropriate conduct in quality tests at KTE, no report on the Misconduct was made from the employees involved, and KHI failed to recognize the Misconduct.

The analysis of the Special Investigative Committee as to the causes of KHI's failure to implement corrections despite opportunities to do so and as to the ways in which the Misconducts pertaining to the Marine Engines continued over many years is as follows.

It should be noted that, as stated in **1.1 above**, because the investigation on other matters by the Special Investigative Committee has not yet completed, the statements herein are based solely on the results of the investigation into the Misconduct. Accordingly, it is possible that these statements will be revised in the final report based on the results of the investigation on other matters.

4.1. Business Environment of Marine Engines

As stated in **2.2(2)(c) above**, the downward trend in the number of the Marine Engines produced annually has continued, and although the businesses pertaining to the Marine Engines (collectively, the "**Marine Engine Business**") have been tending to shrink, KHI formerly manufactured and sold a reasonable number of the Marine Engines, and the Marine Engine Business was one of the main businesses in the Machinery Division (2001-2018), which supported the capacity utilization of the Kobe Works.

On the other hand, while the position of engine manufacturers is not necessarily strong within the marine industry hierarchy consisting of ship owners, shipyards, and engine manufacturers, the Marine Engine Business in particular has multiple domestic competitors who have received licenses from the Licensor to produce two-stroke marine engines, and so the Marine Engine Business existed in an environment in which it was competing in terms of soft aspects, such as pricing and services, for its marine engines, which basically have designs and capabilities that are identical to those of its competitors. Accordingly, a perception that the demands of shipyards, which are KHI's customers, must be met by any means was strongly at work at KHI. Furthermore, the Marine Engine Business, supported by its long track record, has been accepted by the shipbuilding industry around the world, and its relationship with customers was one in which customers would make orders because they were "the Licensor's engines," which includes the stability of its parts supply, its after-sales service system, and resale demand etc. Given this business environment surrounding the Marine Engine Business, it can be said that KHI's business position required difficult handling, in terms of its relationships with both customers and the Licensor.

Within such business environment, although a certain degree of tolerance in test data had been contractually permitted, there was an awareness at KHI that such tolerance could not in fact be allowed in its relations with customers, and as such, there was pressure on KHI's employees that KHI would fall behind its competitors if it failed to be highly evaluated by customers by achieving specification values without such tolerance. Even after the awareness that customers would in fact permit a certain degree of tolerance spread amongst the employees, there was also pressure on the employees that it was necessary to produce "neat figures" in terms of the Fuel Efficiency and other values. Even further, amidst the backdrop of the Licensor publicly releasing its Nominal Values for the Fuel Efficiency and other values as well as competitors setting their specification values based on those Nominal Values, there was strong pressure on KHI employees that KHI would significantly fall behind its competitors should they explain to customers that only the Marine Engines manufactured by KHI could not achieve the Nominal Values publicly released by the Licensor.

These pressures sustained under the aforementioned business environments served as the motive for the tampering with the Fuel Efficiency and other acts of the Misconduct.

4.2. Management System Issues

(1) Negative Aspects of the Product Department–based Organization

From April 2001 until March 2018, the fundamental organizational design at the Machinery Division, which was responsible for the Marine Engine Business, was that of a so-called "product department-based organization," in which the departments in charge of each product line were treated like self-sufficient business entities and the department heads in charge were responsible for the profit and loss of the products their department produced. As of now, changes to groupings, sending out of common functions, and other reorganizational activities have been conducted as the result of several organizational changes, but it appears that the Marine Engine Business had been strongly colored by the organizational culture of the former product department-based organization during the majority of the time in which the Misconduct had been committed. Namely, a department equivalent to the current Power & Propulsion Department (meaning either the Power & Propulsion Department or the Diesel Engine Department; the "**Marine Engine Departments**"), which had authority over the design section (meaning both the Two Stroke Diesel Engine Group and the Two Stroke Diesel Engine Section) as well as the assembly section (the Assembling Section under the

Production Department) and the inspection section (the Inspection Section under the Quality Assurance Department) had been established in parallel within the Machinery Division. Among these related sections, it was the Marine Engine Departments, with a focus on the design section, that bore responsibility for the profit and loss of the Marine Engine Business, while the assembly section and the inspection section were common departments, whose roles were to support multiple departments.

Under this organizational system, there was a strong perception even within the Marine Engine Departments that the design section, which handled the design work for the engines, was fully responsible for the performance aspects of the Marine Engines. Further, even within the design section, in their role of being responsible for project management, employees in the Production Team held onto problems themselves alone and could not report to the department heads in the Marine Engine Departments or the managers in the Machinery Division to discuss how to handle certain situations, even when a situation arose where specification values were not being met, due to the perception that they had to solve such issues at their own responsibility. In addition, it appears that there was a strong perception that as long as the Marine Engine Departments were responsible for the profit and loss of the Marine Engine Business and the design section had full responsibility for the performance aspects of the Marine Engines, the assembly section and inspection section, as the common departments, should step back.

These negative aspects, which constituted the flip side of the sense of responsibility under the product department-based organization, are believed to have existed in the background of the management system problems in the Marine Engine Business, which will be examined below.

(2) Lack of Checks-and-Balances between Sections

As stated in **3.1 above**, the individuals in charge in the assembly section and the inspection section carried out the Misconduct in accordance with the instructions of the individuals in charge in the design section. Originally, the checks-and-balances between the sections were expected to have worked in a manner such as by the individuals in charge in the assembly section and the inspection section, after receiving the instructions from the design section to commit the Misconduct, subsequently reporting thereon to their superiors in their respective sections, because such instructions were contradictory to the work performed in the assembly section and the inspection section. However, in reality, like in the cases stated in **3.3(1) and 3.3(2) above**, the issue was only individually raised by the individuals in charge to their section leaders.

In addition, when the individuals in charge in the assembly section raised the issue around 2010, the section leaders in the assembly section reporting the Misconduct to the management in the Machine Division did not result in any action being taken, and therefore the checks-and-balances function of the assembly section was nullified. Also, the response to the issue being raised by the inspection section around 2015 stopped at the individuals in charge merely wanting their section to no longer be involved in the Misconduct, so it is hard to say that the inspection section appropriately fulfilled its role of putting a check on the design section in order to stop the Misconduct.

In this context in which the checks-and-balances were not working, during the majority of the time the Misconduct was being committed and against the backdrop of the former product department-based organization, many employees felt (i) that it was the Marine Engine Departments, which were responsible for profit and loss, that had the strongest voices amongst the abovementioned parallel related sections, and (ii) that among the Marine Engine Departments themselves, it was the design section, which had total responsibility for the performance of the Marine Engines, that had the strongest voice. Accordingly, it appears that it was structurally difficult for either the assembly section or inspection section to employ any checks or balances against the design section.

(3) Dysfunction in Quality Assurance Systems

The quality assurance departments that handled the Marine Engines, which included the inspection section, had basically limited themselves to only checking whether there were any deficiencies in the Results of Shop Trials, both when those quality assurance departments were part of the Machinery Division and after they became situated directly under the Energy Solution & Marine Engineering Company, and they did not conduct any activities with the objective of detecting any individual misconduct, such as checking the processes of measuring the actual measured values or checking whether the actual measured values were consistent with the data in the Results of Shop Trials.

In light of resource limitations and other factors, this fact alone cannot be evaluated as deviating from any general standard of quality assurance activities, but as stated in **3.1 above**, until around 2015, the individuals in charge in the inspection section themselves had been carrying out unauthorized alterations pursuant to the directions of the design section. Thus, the very fact that the inspection section itself was participating in the Misconduct allowed the Misconduct to occur and continue.

Even following the subsequent organizational changes in which the quality assurance departments came to be under the direct control of the internal company and the inspection section became integrated within the quality assurance departments, it seems as though the individuals in charge in the inspection section themselves also felt guilty for having been involved in the Misconduct in the past, and so despite the fact that they would have been aware that the Misconduct was probably still ongoing, they made no request to the design section to correct the Misconduct nor any statements thereon in the Companywide Inspection Process Reviews or Awareness Survey.

From these facts, it must be said that the quality assurance systems for the Marine Engines Business were dysfunctional, and that even after the inspection section ceased to be involved in the Misconduct, the effects of such involvement continued to remain even after subsequent organizational changes.

(4) Limits on Quality Audits

Although quality control was considered to be a key audit point in the internal audits conducted by KHI's audit departments, audits were merely conducted from perspectives such as whether the quality assurance systems were being maintained and whether quality assurance activities were being applied according to the rules, and as with the case in the quality assurance departments, audits to confirm inspection processes with the objective of detecting any individual misconduct had never been conducted. In addition, since the 1990s, while the quality assurance departments had also been implementing so-called "ISO audits" as independent audits (a quality audit) separate from the internal audits conducted by the audit departments, the quality assurance departments did not conduct any audits with the objective of detecting individual misconduct, either.

The audit departments are in charge of the general internal auditing of the KHI Group, which includes assessments on the internal control systems for financial reporting, and therefore the fact that the audit departments could not conduct the kinds of quality audits referred to above with the objective of discovering misconduct because the audit departments did not themselves have many technical experts on staff is realistically considered to be an unavoidable limitation. In addition, ISO audits, by their nature, also focus on confirming that operations are being performed in accordance with standards, and do not primarily aim to detect individual misconduct. Accordingly, these previous auditing practices themselves at KHI cannot be assessed to have deviated from general auditing standards.

However, because a case of inappropriate conduct in quality tests similar to the Misconduct had been detected at the subsidiary KTE in 2021, the KHI Group should have actively considered not only implementing procedures such as the Companywide Inspection Process Reviews and the Awareness Survey that were based on voluntary reporting by the individuals and sections involved, but also checking the processes of measuring actual measured values and the consistency between the actual measured values and the values recorded in the test result documents submitted to customers during the internal audits or the quality audits with the objective of detecting misconduct. However, KHI did not treat the inappropriate conduct case at KTE as an issue for the KHI Group overall and did not enhance its internal or quality auditing in this regard.

(5) Dysfunction in the Compliance Departments

As stated in **3.3(2) above**, with respect to the issue being raised by the inspection section around 2015, the person serving as the Manager of the Administration Section in the Control Department of the Machinery Division, who was concurrently serving as the person in charge of compliance and who had received a request from the section leaders of the inspection section to stop the design section from instructing the inspection section to carry out the Misconduct, only told the design section of such request, and did not cause the compliance departments to conduct any investigation or report to the management within the compliance departments on the details of the request.

The Manager of the Administration Section should have been able to easily recognize that misconduct concerning quality was occurring in light of the contents of the consultation with the inspection section. Due to the fact that, despite this, not only did the Manager of the Administration Section not consider the Misconduct itself to be a problem and merely request the design section to only halt the inspection section's involvement in the Misconduct, but also that no sufficient information sharing or reporting to superiors on this situation within the compliance departments occurred, it must be said that the compliance departments failed to appropriately perform their expected role. It is believed that the reason why this was dealt with in this way was influenced by the fact that, at that time, the Manager of the Administration Section was deemed mainly responsible for the managing duties of the Administration Section of the Control Department, and the role as the person in charge of compliance was merely secondly, and as such, the Manager of the Administration Section was more concerned about not wanting to make waves in the Marine Engine Business than about delving into compliance issues.

(6) Insufficiencies in the Check System for Measurement Equipment

As stated in **3.1 above**, when the Misconduct was being conducted, in addition to the fact that a feature for which the sole purpose was to enable the alteration of fuel consumption rate values had been installed on the Measurement Computers from the start, the use of the Temperature Adjustment Function on the Measurement Computers for purposes other than such function's original purpose had also been enabled. Further, there were no restrictions on adjusting amplifiers for load cells and water brake torque indicators subsequent to the amplifier configuration therefor. There were also no systems in place for the quality assurance departments, including the inspection section, to conduct checks on the specifications and settings of the measurement equipment either before or after the equipment was used in the Official Trials. Accordingly, it was easy for the employees in charge of the Official Trials to adjust the settings on the measurement equipment prior to an Official Trial and to operate the Measurement Computers in that Official Trial in an unauthorized manner.

Amidst this background, it is believed that the quality assurance departments as a whole were unable to sufficiently assess the risk of misconduct concerning quality occurring, even with the Automatic Measuring Systems, through the setting, etc. of the measurement devices.

(7) Pressure to Conform within an Unchanging Environment

There was a high level of technical expertise amongst the employees in the design section, which had been leading the Misconduct, and there were many individuals who were involved in the Misconduct and individuals who were otherwise aware of the Misconduct in the design section who were subsequently promoted to section leader positions within the design section and further promoted to manager positions within the Marine Engine Departments. In addition, within the design section, it was the Production Team that had especially been leading the Misconduct, and there were many individuals who had been in the Production Team for many years. On top of this, because of their technical expertise, the individuals who were involved in working with the Marine Engines essentially did not change, which was true for not only the design section but also the assembly section and the inspection section.

It was in this way that the same set of employees became involved in the Misconduct over many years, and because personnel turnover in the Marine Engine Departments was low, awareness of the Misconduct did not spread widely amongst employees within KHI's Kobe Works outside of the individuals in charge in the design section, assembly section, and inspection section who had been involved in the Misconduct. Within this unchanging environment, an intense pressure to conform was placed on individuals who were newly assigned to take on roles in those sections from the senior employees within those sections who were imbued with the pervasive way of thinking that the Misconduct was unavoidable and must continue to be covered up as exposure would seriously harm KHI.

As a result, it became difficult for the employees who had become involved in the Misconduct to speak out against it, and there were limited opportunities for individuals to speak up with an outside point of view or way of thinking to point out the issue of the Misconduct. It is believed that this kind of unchanging environment contributed to the Misconduct continuing over many years.

4.3. Issues concerning Employee Awareness

(1) Decreased Awareness and Vicious Cycle

As stated in **3.2(1) above**, although at first the unauthorized alterations concerning the Fuel Efficiency among the acts constituting the Misconduct were carried out in order to make the variations within the tolerance range appear small, as the number of engines whose values of fuel consumption rates deviated from the range of the specification values increased, the alterations to the fuel consumption rate came to be carried out not only to adjust the variations within the tolerance range, but also in cases where the fuel consumption rate deviated from the specification values. It is believed that the employees fell into a vicious cycle in which they felt it was too late to speak out against the Misconduct because their normative consciousness had been gradually decreasing and, as instances of the Misconduct accumulated, the consequences of the Misconduct coming to light had been ballooning.

(2) Perception that by Getting Through Official Trials the Misconduct Would Go

Undetected

Because a ship's ocean voyage depends on environmental conditions, it is fundamentally difficult to confirm whether or not a marine engine is meeting its specification values during the sea trial operations conducted after the Official Trials or on the actual voyages the ship makes thereafter. Because of this, the only opportunity in which customers and others concerned are able to confirm whether the performance of a Marine Engine was in line with its specification values is during the Official Trials conducted on land. Additionally, customers and others concerned are also verifying various check points during the Official Trials and are not necessarily always monitoring how an operator is using the Measurement Computers, nor are they performing an in-depth check of the settings for the various measurement devices. Further, as stated in **4.2(4) above**, no internal or quality audits in order to detect individual instances of misconduct were being performed at KHI, and even though records of measurement remained in the Measurement Computers' logs, neither the audit departments nor the quality assurance departments ever confirmed those logs.

Amidst these circumstances, a perception spread amongst those involved in the Misconduct in which they believed that as long as they could get through the Official Trials, the Misconduct would not be discovered.

(3) Lack of Appreciation for Integrity toward Customers

At first, the Misconduct was being committed in order to reduce the variations in the measurement results that would cause customers to request an explanation, but KHI should have originally explained to its customers and had them understand that such variations would inevitably arise in the measurement results to a certain extent due to the individual differences of each Marine Engine, which is why any tolerance is prescribed in the first place. However, as stated in **3.2(1) above**, because employees at KHI also had the perception that adjusting the variations within the tolerance range was not a significant issue, they would choose to avoid the risk of affecting the manufacturing process or losing orders due to the time and effort required to explain the results to customers by altering the Fuel Efficiency and other values to superficially improve the appearance of the results. Further, even if the Fuel Efficiency and other values deviated from the specification values and would be in breach of contract, in order to avoid any adverse effects that could occur when the actual situation was reported to customers, the employees would alter the Fuel Efficiency and other values to make it appear as if the specification values therefor were being met.

Let alone making false reports to customers to prevent the exposure of any breach of contract due to specification value deviations, the act of adjusting the variance in the results, even within the tolerance range, is no different than providing false information to customers, meaning only that KHI had been prioritizing deadlines and profits over integrity toward its customers.

Thus, it must be said that those involved in the Misconduct lacked an appreciation of what it means to be honest with customers.

(4) "Limitations of a Licensee Business" Justification

As stated in **2.2(3) above**, KHI had been manufacturing the Marine Engines as a licensee who received the license therefor from the Licensor. Therefore, KHI was restricted in that it would be requested to manufacture the Marine Engines in accordance with the Licensor's designs and could not itself arbitrarily change those designs.

As a result of the Interviews, many of the individuals in charge in the design section had the perception that although KHI was supposed to be manufacturing the Marine Engines according to the designs of the Licensor, they could not meet the Licensor's Nominal Values, and that so long as KHI was competing with multiple licensees on the premise of the identical performance, KHI could not be the only licensee that presented specification values to customers that deviated from the Nominal Values of the Licensor; therefore KHI, as a licensee, had no other choice but to alter the Fuel Efficiency and other values.

While the technical reasons for why the Fuel Efficiency and other values in many of the Marine Engines could not meet the Nominal Values of the Licenser are not clear, KHI should have attempted to technically clarify those reasons, and if KHI believed that performance such as the Fuel Efficiency and other values would not meet the Nominal Values despite following the Licensor's design, KHI could have and should have informed the Licensor to that effect and held discussions aimed at changing the Nominal Values or changing the design of the engine. However, as stated in **3.2(1) above**, although it appears that certain discussions and the like were held at the individual-in-charge level, regardless, there were no such company-to-company discussions with the Licensor, and the individuals in charge in the design section justified altering the Fuel Efficiency and other values on the grounds that they had no other choice as this was a limitation for a licensee business.

As for the background in which KHI fell into this situation, it appears that under the business environment set out in **4.1 above**, KHI was in fact not in a strong position in its relationship with the Licensor, and at the same time, as referred to in **4.3(3) above**, it is believed that there was also a perception at KHI in which employees wanted to avoid the risk of affecting the manufacturing process or losing orders due to the time and effort required to hold discussions, etc. with the Licensor and prioritized deadlines and profits.

(5) "Just Following Instructions from the Design Section" Justification

As stated in **3.1 above**, the period in which the individuals in charge in the assembly section and the inspection section were committing the Misconduct pursuant to the instructions of the design section continued for a long time. As stated in **4.2(1) above**, it is believed that as the flip side of the perception that the design section was fully responsible for the performance of the Marine Engines, the individuals in charge in the assembly section and inspection section had justified the Misconduct between themselves as something that was not their responsibility because they were just following the instructions of the design section.

In reality, among the individuals in charge in the inspection section who had been instructed by the design section to commit the unauthorized alterations, there were cases in which some individuals had kept the papers on which such instructions were written as "protection" (*omamori*) in case the Misconduct were to be discovered. In addition, even when raising the issue around 2015, it appears that the individuals in charge in the inspection section had the perception that the Misconduct was ultimately the responsibility of the design section, based on the fact that they requested that the instructions to the inspection section be stopped but did not request for the Misconduct itself to be stopped. Similarly, many of the individuals in charge in the assembly section and the inspection section believed that because the Misconduct was ultimately a design section issue, they did not need to themselves report on the Misconduct, and therefore did not report the Misconduct, even in the Companywide Inspection Process Reviews and Awareness Survey.

It is believed that such justification within the assembly section and the inspection section contributed to the Misconduct continuing over many years.

(6) "The Misconduct was Company Policy" Justification

As stated in **3.3(1) and (2) above**, individuals in charge in the assembly section and in the inspection section raised the issue of the Misconduct around 2010 and around 2015, respectively, but in practice the Misconduct continued unchanged.

These reporting instances and the details thereof were also conveyed to those involved in the Misconduct other than the individuals in charge in the assembly section and the inspection section who had respectively raised the issue. In particular, although when the issue was raised around 2010 it was reported up to the management in the Machinery Division at that time, no response was taken as a result to correct the Misconduct, and so for those involved in the Misconduct, they justified it is as being the company policy of KHI, as KHI as a company had appeared to have deemed the Misconduct to be acceptable on the grounds that it was unavoidable.

(7) Insufficient Understanding of the Significance of Inspection Processes

The above has been stated mainly with the unauthorized alterations of the Fuel Efficiency in mind, but many of the details thereof also apply fundamentally to the other kinds of unauthorized test data alterations.

However, as stated in **3.1(6) above**, with respect to the unauthorized alteration of turbocharger compressor inlet temperature adjustment functions, other than the cases in which it was conducted in order to satisfy the specification values for the Exhaust Gas temperatures, such act of the Misconduct was committed in order to save the time and effort for finding a point, by using a temperature measuring device with a single measurement point, where the Average Ambient Air Temperature difference would be at the same level as the one measured for the Parent Engine using the thermometer with octopus legs. In addition, as stated in **3.1(5) above**, the purpose of the unauthorized alteration of water brake torque indicators was mainly to match the test results to engine output estimated from the cylinder pressure, because the accuracy of the water breaks was unreliable and the engine output estimated from the cylinder pressure should have been closer to the actual value. In these cases, such acts of the Misconduct were justified as not being a big issue because they were not carried out with a wrongful purpose to record false figures in the Results of the Shop Trial that were higher than the actual values.

What these have in common is that the fact that the inspection processes, which measure and confirm the results of the actual measured values during the Official Trials, have significance-in other words, the fact that the processes through which engine performance is confirmed are carried out in accordance with the inspection protocols agreed upon by pertinent parties such as customers and classification societies (inspection protocols such as actually measuring the Intake Temperature, measuring the torque with calibrated water brakes, etc.) themselves have significance-was not sufficiently understood at KHI.

Originally, if any variations arose depending on measurement points, KHI should have replaced the measurement instruments with instruments that could be used in the Official Trials and that allowed for the equalization of those variations, and if measurement instruments had low accuracy, then KHI should have replaced them with instruments with higher accuracy, but KHI failed to perform these kinds of equipment replacements.

4.4 Corporate Culture Issues

As stated in **4.1 through 4.3 above**, various intertwined factors led to the Misconduct being committed continuously over many years, and it can be pointed out that a corporate culture existed in the background of these factors in which, with respect to the Marine Engine Business, as the flip side to the sense of responsibility employees held toward the work they were in charge of under the former product department–based organization, those employees focused on their own areas of responsibility and considered problems that occurred within those areas alone as their responsibility, and had little interest in matters for which other departments were responsible or did not consider such matters to be their own problems.

Further, this kind of corporate culture was not necessarily “vertically divided” according to the actual organizational structure. In the Marine Engine Business, a kind of community was formed centering on the design section within the Marine Engine Departments and involving the individuals in charge in the assembly section and inspection section who were mainly in charge of manufacturing and inspecting the Marine Engines. It appears that a consciousness had taken root of not sharing the secrets of this community with individuals who were not considered to belong to this community, such as those who were from other departments, even with those who were the superiors in the organizational structure of each section. For the part of the individuals who did not consider themselves to be a part of this community, it appears that they had a sense of taking a step back from getting involved in issues within that community because those within the community were responsible for solving such issues, even if under the organizational work structure those individuals who did not consider themselves to be a part of the community were the superiors in their respective departments or in positions in which they should have been performing checks and balances.

Further, even within the aforementioned community, the individuals in charge in the design section and the individuals in charge in the assembly section and inspection section were fractionalized. Moreover, even within the design section, it appears that the QA Team had the perception that their area of responsibility stopped at confirming the Marine Engine performance through the matching runs, and that even if the Fuel Efficiency or other values of a Parent Engine did not meet the specification values, that had nothing to do with the QA Team itself because anything beyond their area of responsibility fell within the area of responsibility of the Production Team, which was in charge of project management. Conversely, it appears that the Production Team had the perception that their area of responsibility stopped at delivering finished products to customers after having the customers confirm a "pass" with respect to the results of the Official Trials, with the assumption that the Fuel Efficiency and other values confirmed within the QA Team's scope of responsibility would not meet the specification values.

As a result of having this kind of divided sense of community, it is believed that those involved in the Misconduct had been put in a situation where they adhered to the pervasive way of thinking within the small community and became unable to firmly have a sense of the overall picture from the perspective of what was best for KHI.

5. Recommendations for Measures to Prevent Recurrence

Based on the analysis of the causes stated in **4. above**, the Special Investigative Committee makes the following recommendations on the policies for the measures to prevent the recurrence of issues such as the Misconduct. The Special Investigative Committee also expresses its views on the corrective measures that KHI has already implemented.

Many of these measures to prevent recurrence cannot be implemented in a short time. It is expected that KHI will finalize the content of such measures according to the actual situation, implement the measures in order of feasibility, and continue to verify whether they are established and function effectively.

It should be noted that, as stated in **1.1 above**, because the investigation on other matters by the Special Investigative Committee has not yet completed, the statements herein are based solely on the results of the investigation into the Misconduct. Accordingly, it is possible that such statements will be revised in the final report based on the results of the investigation on other matters.

5.1 Basic Perspective

Although KHI must endeavor to improve the business environments surrounding the Marine Engine Business and the pressures sustained thereunder, which served as the motives for the Misconduct, KHI cannot change such environments on its own. In addition, the technical reasons for why the Fuel Efficiency and other values in many of the Marine Engines manufactured by KHI could not meet the Nominal Value of the Licensor are unknown, and it is necessary to reconfirm whether the manufacturing technology or know-how pertaining to those Marine Engines were insufficient. However, because KHI is a licensee, it is not possible for KHI to change the design of the Marine Engines on its own. Therefore, incentives to tamper with the Fuel Efficiency and other values of the Marine Engines may still exist in the Marine Engine Business in the future.

Accordingly, the first thing to do is to eliminate any so-called "opportunities for misconduct" by making it impossible for employees to tamper with the Fuel Efficiency and other values even if they waned to. Among these, the immediate measures to prevent recurrence are to eliminate direct opportunities for misconduct to occur by taking technical measures to prevent the use of various measuring instruments for unauthorized purposes. However, it is impossible to deny the possibility of misconduct being committed by using new methods. Therefore, it is necessary to systematically eliminate opportunities for misconduct by establishing a system to ensure quality control, strengthening the quality audit system, and implementing other measures.

However, even if those measures are taken, it is impossible to deny the possibility that they could be nullified by a conspiracy between departments or superiors, so it is difficult to completely eliminate opportunities for misconduct. For this reason, it is essential to make the whistleblowing system easier to use, as it serves as a bypass line that enables KHI to detect misconduct that has been covered up by pertinent parties, and ultimately to reform the awareness of executives and employees and the corporate culture so that individual executives and employees do not justify unauthorized actions such as the Misconduct.

In addition, it is also important to clarify the supervisory responsibilities of certain executive-level individuals in order to clearly demonstrate that KHI will never tolerate unauthorized actions such as the Misconduct.

5.2 Elimination of Opportunities for Unauthorized Alteration of Measuring Instruments

As stated in **3.4(2) above**, the function to manually adjust the fuel consumption rate on the Measurement Computers has already been removed, and measures have also been taken to prevent the settings of the load cell amplifiers and water brakes from being arbitrarily changed after calibration. In addition, the Temperature Adjustment Function on the Measurement Computers has already been modified so that it requires permission from the quality assurance departments to use it, and its usage history is recorded. These technical measures can be regarded as effective measures to eliminate direct opportunities for the Misconduct.

However, as long as there is room for manual operation in the overall process of measuring the performance of the Marine Engines, it is impossible to completely eliminate the opportunity to tamper with actual measured values through the unauthorized alteration of measuring instruments, as is what occurred in the Misconduct. Therefore, even if it is difficult to completely eliminate manual procedures, it is important to proceed with the automation of the testing and inspection processes as much as possible and to keep as much data as possible in logs that can be verified at a later date.

5.3 Strengthening of Checks-and-Balances between Sections

As stated in **4.2(2) above**, it was structurally difficult for the assembly section or inspection section to perform their checks-and-balances functions on the Marine Engine Departments and the design section, the core section of the Marine Engine Departments, and such structural problems are believed to have existed as the background of allowing the Misconduct to continue.

In this respect, as stated in **2.2(1) above**, the assembly section and the inspection section are currently established under the Production Coordinate Division and the Quality Assurance Division, respectively, which are directly controlled by the Energy Solution & Marine Engineering Company. Compared to the previous structure in which the assembly section and the inspection section were established alongside the Marine Engine Department in the former Machinery Division, it can be recognized that the new structure is expected to ensure a certain level of checks-and-balances.

However, a kind of community has been formed over many years within the workplace at the Kobe Works centering on the design section and involving the individuals in charge in the assembly section and inspection section. No matter how the organizational structure is changed, the relationship of such community cannot be changed in a short period of time. In fact, as stated in **4.2(2) and 4.2(3) above**, given that, even after the organizational structure was changed, the assembly section and the inspection section did not voluntarily make any report about the Misconduct until this case was discovered, it is believed that the negative influences from the past have continued after such structural change.

Therefore, it is important to re-instill in the executives and employees (i) the awareness of the basic principles of the organizational design in which each of the sections carries out its own work for which it is responsible by sharing the common purpose that is to aim for perfection as a company and KHI as a whole so that checks-and-balances between the sections designed under the current organizational structure appropriately function, and (ii) the significance of the checks-and-balances between the sections which enable the prevention of the risk of unauthorized actions such as the Misconduct by ensuring that each section exercises checks-and-balances with each other on equal grounds.

5.4 Strengthening of Personnel Rotation

As stated in **4.2(7) above**, it is believed that the low personnel turnover and the unchanging environment in the Marine Engine Business facilitated the formation of a kind of community, which prevented the discovery of the Misconduct and allowed it to continue for a long time.

Therefore, whether within the design section, the assembly section, or the inspection section, personnel rotation must be strengthened so that individuals with an outside perspective can join the group on a regular basis, and so that individuals are not only imbued with the way of thinking circulating within a small group, while also taking into account the high level of technical expertise.

5.5 Strengthening of Quality Audits

As stated in **4.2(2) and 4.2(3) above**, the inspection section of KHI was in a situation where it was structurally difficult to perform its checks-and-balances functions on the design section, and the quality assurance departments as a whole did not conduct any quality audits with the objective of discovering any individual misconduct. In addition, as was the case with the quality assurance departments, the audit departments did not conduct any internal audits with the objective of discovering any individual misconduct.

Because quality-related misconduct such as the Misconduct are usually covered up by those involved, the following procedures must be taken in order to actively detect individual misconduct: select a sample based on a risk-based approach; extract data on performance testing; check the measurement methods for actual measured values, including the settings of measuring instruments; and check whether the actual measured values are consistent with the descriptions in the inspection reports.

Technical and specialized knowledge and independence from the audited sections are also required to actually implement such procedures, so there are various possible methods to implement such procedures based on whether it would be better for the quality assurance sections at the company or group level to implement them, whether it would be better for the audit sections to implement them, or whether it would be better for both sections to implement them jointly. However, rather than measures to reduce the risk of misconduct in general, the only way to actively search for quality-related misconduct that is covered up by the pertinent parties is to adopt quality audits of this kind. Further, recognition within the company of the existence of such a function for detecting misconduct will also act as a deterrent.

Now that it has been discovered that the Misconduct has taken place in KHI, following the incidents of inappropriate conduct in quality tests at its subsidiary KTE, KHI must consider strengthening its quality audits to the extent possible.

5.6 Strengthening of Compliance Department

As stated in **4.2(5) above**, one of the factors that allowed the Misconduct to continue was that when the issue was raised by the inspection section around 2015, the person who was concurrently serving as the person in charge at the compliance department, despite having received the report of the Misconduct, failed to report thereon or share the details of the issue within the compliance departments.

Under the system of the compliance departments at that time, all staff other than the department head had responsibilities in other departments, but under the current system, full-time individuals in charge are assigned in the compliance departments, which is directly controlled by the Energy Solution & Marine Engineering Company. Therefore, it can be regarded that the organizational structure and independence of the compliance department have been strengthened.

It is realistically difficult to expect the individuals in charge in the compliance departments to be familiar with all the quality issues of the products in the internal company, so it is also realistically difficult to expect the compliance departments to play an active role in discovering quality issues. However, there is a possibility that the individuals in charge may, even passively, come across information that could serve as a lead to discovering quality issues, as in the case of the issue being reported by the inspection section around 2015.

Within the compliance departments, it is necessary for the individuals in charge to be more sensitive in terms of whether information could constitute a compliance issue upon coming across it. Even if the technical and specialized knowledge of each of individual in charge is limited, if they work together by combining their knowledge, it will be easier to detect a potential problem. Therefore, any information obtained through consultations and other occasions should be appropriately shared within the compliance departments rather than having only the individual in charge dealing with such information, and it is necessary to ensure a system in which the compliance departments as a whole, rather than only an individual in charge, can consider and deal with the information.

5.7 Further Enhancement of Whistleblowing System

Even though the Misconduct was carried out by the employees in certain limited sections, the total number of individuals who were involved in or aware of the Misconduct is considerable as it continued for several decades. However, no reports of the Misconduct were made by employees using the whistleblowing system KHI had established. The individuals in charge in the assembly section and the inspection section raised the issues, but these were the result of consultations with superiors in accordance with their reporting line.

With respect to KHI's whistleblowing system, the "Compliance Report and Consultation System Rules" specify relevant rules, including the preservation of confidentiality and the prohibition of any disadvantageous treatment of whistleblowers, so it can be regarded that the system is at a standard level. Nevertheless, it is presumed that the reason why pertinent individuals involved in the Misconduct did not use the whistleblowing system is because they were hesitant to report the issues that their kind of community faced in relation to the Marine Engine Business to those outside of their groups. However, because there were always individuals who had doubts or concerns about the Misconduct, if the whistleblowing system had been more widely used, there is a possibility that reports about the Misconduct would have been made earlier.

Therefore, it is important to continuously check whether the use of the whistleblowing system is not causing anxiety among potential whistleblowers, as well as to take measures such as making KHI's employees aware of the system and encouraging them to actively use it, in order to make the whistleblowing system more accessible.

5.8 Reforms in Awareness

As stated in **4. above**, it could be seen as the background of the Misconduct that employees at KHI had a perception that they were unable to achieve the specification values on account of the limits of being a licensee as well as a perception that if they could get through the Official Trials, the Misconduct would not be discovered, which therefore led to employees prioritizing delivery deadlines and profit and, by thinking it was acceptable to give customers the Results of Shop Trials that contained false statements, lacking an awareness of integrity towards customers.

However, integrity towards customers, such as not providing them with false information, adhering to the specification values set out in contracts, and explaining to customers and discussing solutions when issues arise, should be a fundamental premise for business continuity. Much of the instances of misconduct began with small deceptions, which led to a gradual decrease in normative consciousness, and eventually those involved became involved in more serious misconduct. When misconduct continues, the impact of it being discovered balloons, so those involved therefore feel that it is too late for them to speak up. The Misconduct followed the same pattern. Therefore, it is extremely important to prevent minor deceptions from occurring before they become a major issue. For that purpose, it is necessary to instill in executives and employees a way of thinking and behavior that they can use with integrity to the customers as a standard when facing a challenging situation.

Accordingly, it is necessary for KHI to constantly demonstrate its basic stance and perform actions based thereon such that KHI will not engage in any business that requires it to sacrifice its integrity towards customers, and which shows that KHI will not tolerate any situation in which its response to customers with integrity would cause any adverse impact on its own, including any deterioration in profits and losses, and will report and share its mistakes rather than covering them up and lead to improvement. KHI must further ensure that this awareness is fully instilled in all of its executives and employees.

Also, as stated in **4.3(7) above**, it was seen that there was a tendency at KHI in which employees neglected the importance of the protocols for performance inspections. However, performance inspections are nothing but the processes of actually checking performance according to the protocols accepted by stakeholders, so actually conducting checks according to the established protocols is the basis of performance inspections. If the protocols are not appropriate in light of the actual situation, they should be changed with the understanding of the stakeholders, and if there is a problem in the measuring instruments, the measuring instruments should be updated so that they operate correctly. It is necessary to thoroughly re-ensure that any act in violation of such principles of performance inspections cannot be justified by its purpose or results, and that there are no exceptions.

5.9 Corporate Culture Reforms

As stated in **4.4 above**, within the kind of community formed by the pertinent parties in the Marine Engine Business, a way of thinking became pervasive that the Misconduct was unavoidable, and this way of thinking served as a type of confirmative pressure on employees within this closed community. Therefore, this community, centered within the design section, ended up keeping the issue inside the community.

In order to reform the negative corporate culture described above that formed the underside of the sense of responsibility for the businesses in charge, it is necessary to change the mindset from compartmental optimization to overall optimization. In other words, it is necessary to instill in KHI’s executives and employees the awareness that they do not belong only to the department in which they are currently working, but also to the internal company and also to KHI as a whole, and the highest-level objective is to aim for what is best for KHI as a whole. A way of thinking and behavior in which they consider how the section at which they are currently working should be and how it should relate to other sections under this highest-level objective must be instilled in the executives and employees.

In addition, it is necessary to establish a system that enhances psychological safety so that the employees do not have to keep problems to themselves, and to establish an environment where they can speak up about and share mistakes and other such negative information.

In reforming the corporate culture, it is fundamentally important to increase the quality and quantity of communication on a conscious and continuous basis, both in vertical and horizontal relationships. It is necessary to instill in individual executives and employees the desirable models of the internal company and KHI as a whole through various opportunities, and conversely, it is also necessary for management executives to ask for opinions from individual executives and employees. In particular, if management executives actively listen to the opinions of the younger employees who will lead the future of KHI, this may lead to corporate culture reforms from a new perspective and the enhancement of compliance awareness. Furthermore, it is also important to further develop opportunities for the relevant sections to exchange opinions and information about what they are thinking, the issues they are facing and other matters.

5.10 Clarification of Responsibilities

For misconduct like that in this case that has continued over many years due to organizational factors, it is not appropriate to impose certain internal penalties on each individual employee at the workplace who had no choice but to participate therein. In addition, it was not possible to identify the management personnel in the Machinery Division at that time who had not taken any measures when the issue was raised by the assembly section around 2010, but in any case, these individuals have already retired.

However, if there is no one who takes any responsibility even though such a major quality-related incident such as the Misconduct has continued over many years, it could be construed as KHI admitting that the Misconduct was inevitable, and then KHI may be unable to maintain internal discipline. Further, it is undeniable that the current executives that manage the Marine Engine Business were unable to take thorough measures such as establishing sufficient and effective control over quality-related matters and strengthening a quality-related auditing structure, even after the similar incidents of inappropriate conduct in quality tests were discovered in 2021 at KTE, a subsidiary belonging to the Energy Solution & Marine Engineering Company.

Therefore, it is necessary to clarify the supervising responsibilities of certain executives that manage the Marine Engine Business and impose penalties that are proportional to their responsibilities in order to display an attitude that KHI will never tolerate wrongdoing such as the Misconduct. It is expected that such penalties will be engraved as bitter memories throughout the organization’s psyche and will be the first step toward KHI breaking away from its past mistakes.

End.