MUSASHI Sustainability Report 2016





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Period Covered

This report covers the activities in FY2014 (April 2014 to March 2015)

Organization

Information in this report refers to all consolidated organizations. We primarily report on Musashi Seimitsu Industry Co.,Ltd. for activities in Japan.

Referred Guidelines

"Sustainability Reporting Guidelines, ver.4 (G4)," Global Reporting Initiative

"Guidelines on Environmental Report," Ministry of Environment, Government of Japan

CEO Message



Creating the Musashi Brand trusted by people around the world

Here I express my deepest sympathies over the victims and damages of the earthquake in Kumamoto. I would also like to pay my deepest respect to those who are involved in the reconstruction activities in the affected areas. All of Musashi's employees are wishing for their safety and for a rapid recovery and reconstruction.

Based on the Musashi Group's corporate mission of "exploring and developing our original Monozukuri[※] and thereby contributing to the global society by providing trusted and attractive products," we are committed to developing our global business.

Although the global automotive market is expected to expand in the long term, our current business environment is changing rapidly due to shrinkage of several market, such as Japan, etc., changes in automotive designs to meet environmental requirements including electric vehicles and strong competition for market share among expanding suppliers. At the same time, major corporations and their supply chains are being expected to help solve various social problems. Contributing to solve such social problems is now a necessary pre-requisite for corporate growth and development.

As a base of the global business, we are developing a detailed corporate governance system of internal control and compliance, global human resources, and co-operative relationships with suppliers. To realize a sustainable global society, our stakeholders require us to develop and supply products which will contribute to the prevention of global warming and to reduce our own environmental impact. We are focused on both our "products" and "processes" to achieve this.



In order to have a better presence in the global market, in May 2016 we agreed to acquire 100% of the shares of Hay Holding GmbH, located in Germany. This will further strengthen our business by expanding the range of powertrain function and improving the development capabilities that we can offer, as well as allowing us to combine our technologies, and strengthen our relationships with major vehicle manufacturers and suppliers around Europe.

We are undertaking various activities which are contributing towards the development of a sustainable global society. This report, has been issued to inform our global stakeholders about these activities and to give the reader a fully understanding of the Musashi Group's activities in this regard.

> June 2016 Musashi Seimitsu Industry Co.,Ltd. President & CEO Hiroshi Otsuka

*Committing pride, passion and craftmanship to the whole process of creating products of excellence, which fully satisfy our customers' expectations.



Company Profile

【 Company Profile 】				Y2014 Fin	ancial R	lesult]		(Milli	on Yen)
Company Name Musashi Seimitsu Industry Co.,Ltd.						Consolida	ated	Non-con	solidated
Headquarters	39-5, Daizen, Ueta-Cho, Toyohashi, Aichi			Net Sales			164,397		46,105
Founded	April 1938			inary Incon	ne*		11,449		4,437
Established	January 22, 1944	, 1944 Net Income 6,809		Net Income 6,809			2,769		
Capita	2,973 million yen		Conformed with					h Japan GAAP	
Employee	Group: 12,664 (As c Japan: 1,208 (As c	Net (billio	Sales n yen)			Consolida Non-cons	ated Net S solidated M	ales Net Sales	
Principal businesses	Manufacturing and Sales Equipment	of Transportation	160 140						
Japan	Head Office / Ueta Plant Akemi Plant #1 Akemi Plant #2 Horai Plant Suzuka Plant	(Toyohashi, Aichi) (Toyohashi, Aichi) (Toyohashi, Aichi) (Shinshiro, Aichi) (Suzuka, Mie)	120 100 80 60 40 20						
Affiliated Companies	J a p a n : Kyushu Musas etc. (2 affiliate Overseas : EU, Asia etc. (1	shi Seimitsu Co.,Ltd. s) 8 affiliates)	- 0	Year ended March 31, 2011	Year ended March 31, 2012	Year ended March 31, 2013	Year ended March 31, 2014	Year ended March 31, 2015	Year ended March 31, 2016

Musashi Philosophy

Musashi Philosophy consists of 3 elements:

"Sprit of Foundation", "Corporate Mission" and "Guidance for Conduct"

[Sprit of Foundation]

Shitsujitsu-Goken (Simple and Sturdy)

[Corporate Mission]

We will continue to explore and develop our

original Monozukuri and thereby contribute to

the global society by providing trusted and

attractive products.

Shisei-Ikkan (Consistent Sincerity)

[Guidance for Conduct]

The "Musashi Spirit"

- 1. Customer first
- 2. Integrity
- 3. Resourcefulness
- 4. Hard work
- 5. Cooperation for the common goal
- 6. Remember our rights and responsibilities



Product Line UP

"The integrated production system" from forging to assembly enables Musashi group to provide competitive products.

Parts for Automobiles

Differential Assembly



The differential gear assembly distributes all of the engine power coming through the input shaft, between output shafts driving the left and right wheels, whilst allowing the wheels to rotate at different speeds where necessary.

The gears for a typical small car of around one ton will fit in the palm of the hand; they therefore need to be extremely strong and hard wearing.

Camshafts / Transmission Gears



These components are used in the power-train for functions such as opening and closing the engine valves and transferring the power from engine to wheels, whilst adjusting the rotational speed. These parts are critical to the vehicle's overall performance, fuel efficiency, noise and vibration levels and therefore require machining to micron-level tolerances.

Parts for Motorcycles

Gear Assembly





The transmission gears transfer power from the engine to the rear wheel whilst at the same time matching the rotational speed of the engine with the road speed of the bike.

The gears need to be manufactured to the highest level of precision in order to avoid any impact on the vehicle's acceleration, fuel efficiency, noise or vibration levels.

Planetary Assembly



The Planetary Assembly is used to match the rotational speed of the road wheels with that of the engine. This is essential for ensuring the driving performance, to ensure the best acceleration and the best fuel consumption possible.

We provide low noise and light weight gears for such applications, and we have an ongoing program to further develop our technology in this area.

Ball Joint Assembly



The ball-joints provide the linkage between the suspension, chassis, steering and tires. They play a major role in maintaining the stability of the vehicle, whilst at the same time absorbing the various vibrations and impacts generated by the road conditions. In order to fulfill these critical functions, the ball joints need to be extremely wear resistant, light-weight and of highly durability.

Camshaft / other products



In order to provide optimum fuel efficiency and also withstand the extremely high rotational speeds of up to 10,000rpm which are encountered such applications, the components must be manufactured to a high level of precision and durability.



Special Feature: Creating the Musashi Brand Trusted by People around the World

Product Development Contributing to Less Environmental Impact of Mobility

While global climate change and air pollution in new developing countries are becoming more critical, social demands for environmental performance of automobiles/motorcycles are getting severe every year. Future regulations regarding fuel consumption and CO₂ emission, no matter in developed or

newly developing countries, are expected to be made more strict. Responding to strengthened regulations, we are developing products contributing to less environmental impact of mobility to meet our stakeholders' request.

Product Development

Lightweight Differential (MS Diff) Series

The lightweight diff assembly (MS Diff) with self-developed bevel gears achieves 10% or lighter than the conventional, which reduces vehicle weight and improves fuel economy. In FY2015, the MS Diff Series covering torque bands from compact to large vehicles were completed. Ready for providing our global customers with compact, lightweight, and low-cost diff assembly, we are developing for mass production application.

Response to Electrically Driven Specs (Research of Electric Units)

To reduce environmental impact while using a car, we are promoting the research of unique electric units for hybrid/ electric cars and for electric personal mobility. Also, we are studying electric unit control models by simulating with CAE^{%1} and rapid prototyping.^{%2} Analyzing required performances based on ISO26262,^{%3} we are promoting the development of units to ease our customers.



Development of MS Differential Assembly Series

Environment for Research and Development

Strengthened Foundation for Simulation Evaluation of Developing Products

We are evaluating developing products with an active use of CAE simulations. This helps to shorten a developing period and to reduce energy and resources spent for prototyping and testing significantly.

■ NVH^{※4} Analysis and Simulation Technology

In a semi-soundless room, we are establishing technology to specify causes of vibration and noise of motorcycle transmissions by testing with an actual unit as well as CAE. We are also promoting the research of forecasting results without using an actual unit to the similar level and the installation of test equipment.



CAE Simulation



Test in a Semi-soundless Room



Analysis of Vibration and Noise of Motorcycle Transmissions

*1 An abbreviation for Computer Aided Engineering. Use a computer to design products and pre-study manufacturing and process design (simulation and numerical vale analysis).

- A prototyping method for product development. Its purpose is rapid prototyping for making simple prototypes to confirm shapes.
 International safety specs subject to electrical and electronical hardware / software installed in automobiles.
- 3. An abbreviation for Noise, Vibration, and Harshness. Specify causes of car noise and vibration impacting on comfort. Noise indicates external sound including road noise. Vibration comes
- from an engine. Harshness indicates a feeling of rattling and chattering from road dents and bumps. Eliminating these is expected to improve automobile comfort.



Expansion of Production Sites and Establishment of Global Platform

Taking environmental changes - including shrinking of the Japan market, acceleration of environmental regulations, and automotive mechanical change - as a chance, we are focusing on expanding the global production system and new orders. In FY2015, our new plant started its operation in China, the world biggest market. Our subsidiary in Mexico, located in North America where cars are selling well, became subject to consolidation.

We are establishing a globally-common platform in various fields including management, manufacturing and HR to make

an optimal judgment. We will maximize the total power of Group by integrating management information, business flows, and administration/evaluation methods globally.

We have agreed with the Gores Group for acquiring all shares of Hay Holding GmbH, a shareholding firm of Hay Group companies. This strengthens the Group business foundation expecting 9 production sites in Europe, 16 in Asia and 5 in America. The global supply system will improve our presence in the global market to become a real global company with high competitiveness.



Musashi Group Global Development

Diversity and Globalization of Human Resources

The Group is taking various activities for the global optimal operation using wisdom and action of the associates in the world. One of the activities is the Global Leadership Conference (GLC) attended by next generation leader candidates. The GLC focused on a lively discussion of issues common to the Group from various perspectives. Working groups by function have been formed beyond borders for solving problems common to the Group.

Small-group kaizen activities are encouraged in worksites all

over the world. The World Convention is held once a year and representative teams come over to Japan to present their excellent kaizen activities. In the 11th World Convention held in 2015, 14 teams from 11 countries gave a presentation in English and the team from India won the award. Not only sharing kaizen know-how between attendees, but also exchanging with global associates, the Group becomes more cohesive to improve the competing power.

Discussion in Global Leadership Conference

Award Ceremony, 2015 QC Circle Convention

Concept and System of Corporate Governance

Musashi Corporate Governance

The Group considers full corporate governance as one of the critical elements for management.

In October 2015, to clarify the policy for our activities and to improve our corporate value, the "Basic Policy for Musashi Corporate Governance" was defined according to each principle specified in the "Corporate Governance Code" issued by the Tokyo Stock Exchange.

We will strive to improve the corporate value by fulfilling corporate governance more to respond to our stakeholders both inside and outside Japan.

Corporate Governance System

As the amendment of the articles of association resolved by the 88th general shareholders' meeting on June 23rd 2015, the Company has now committees including audit instead of a board of statutory auditors.

This enhances the function of auditing and supervising duties of Directors. Also an involvement of outside Directors in decision making improves the transparency and soundness of management.

Decisions can be made and implemented promptly by delegating authority of some items resolved by the Board of Directors to the Management Committee, etc. to improve the efficiency of management judgment.

Basic Concept of Corporate Governance

Based on "Musashi Philosophy" consisting of "Spirit of Foundation," "Corporate Mission" and "Guidance for Conduct," the Musashi Group develops its business and defines the "Basic Policy for Musashi Corporate Governance" to fulfill corporate governance which is considered as one of the critical elements for management.

Scheme of Corporate Governance

Governance

Concept and System of Compliance

Basic Concept of Compliance

Based on Musashi Philosophy, the Group develops its business globally.

To respond to customers' expectations regarding product safety and quality, we should have mind-set of quality improvement. Similarly, to discharge corporate responsibilities including ethics and compliance, each of us should be aware of society through our daily work and take autonomous action.

To respect culture and customs of various countries and regions and develop global business more at the same time, "Our Compliance" has been defined to specify our daily efforts. Sharing the understanding and practicing it, each of us is working on assuring trust by our customers and society.

Musashi Compliance Guidelines

- 1. We will actively participate in activities that contribute to the well-being of society.
- 2. We will freely and willingly comply with all laws and regulations.
- 3. We will seek ways to protect the environment.
- 4. We will strive to provide a safe and healthy working environment.
- 5. We will abide by all traffic rules and regulations and drive safely.
- 6. We will respect and embrace the uniqueness and differences of each individual.We will respect human rights and will not tolerate forced or child labor, or any form of harassment.
- 7. We will do our utmost to respect and protect each individual's privacy.
- 8. We will pay the utmost attention to the appropriate handling of confidential information including drawings, documents, information and data.
- 9. We will conduct fair and sound transactions. We will not enter into any improper trade agreements or cartels, or abuse any dominant bargaining positions.
- 10. We will reject all contacts with organizations involved in activities in violation of laws or accepted standards of responsible social behavior and safety.

Compliance System

The Company appoints one of the Directors as a Compliance Officer who promotes compliance and sets the Internal Committee chaired by a Compliance Officer which consists of Directors and Executive Officers.

Also Risk Management Officers are appointed to promote risk management activities globally.

The Internal Control Committee receives reports from related sections and committees including a section in charge of promoting and monitoring internal control activities, an internal control section monitoring duties, and the BCP^{*} Committee promoting business continuity management, and discusses global internal control items.

** An abbreviation for Business Continuity Planning. In this planning, companies create a strategy through the recognition of threats and risks facing the company, with an eye to ensure that personnel and assets are protected and able to function in the event of a disaster.

Musashi Group Environmental Management

Environmental Issues Surrounding Musashi Group

In December 2015, the 21st Conference of the Parties (COP21) for the United Nations Framework Convention on Climate Change adopted the Paris Agreement, a new framework of greenhouse gas emissions after 2020. The Paris Agreement is a legally binding international framework since the Kyoto Protocol adopted 18 years ago. The Agreement specifies "holding the increase in the global temperature to well below 2 °C and to pursue efforts to limit the temperature increase to 1.5 °C."

The Kyoto Protocol obliged only the developed countries to reduce green gas emissions; however, the Paris Agreement concluded all countries including developing countries should reduce greenhouse gas emissions too. The Agreement recognised that global warming is now a world-common issue. Under such circumstances, global warming is a critical groupwide issue for developing products globally. Not only saving energy and environmental impact in production processes, but also our stakeholders including customers are requesting and expecting us to develop and supply products contributing to energy consumption and environmental impact while these are in use.

To respond to their requests and expectations and to be a "company trusted by people around the world," our global production sites are working on the reduction of environmental impact including energy and resource saving from "product" and "production" perspectives.

Global Environmental Management Promotion System

Musashi Group is advancing environmental management under the ISO14001 standard. Based on the standard, we have conducted activities, the quantitative grasp of the environmental data, environmental improvement technologies and informationsharing regarding environmental measures.

Various environmental data in each region is shared across the Group each month and its achievement and activities are reviewed at the Global Top Meeting[®] represented by all management. This collection of actual cases of environmental improvement has been published on the company intranet. We also share advance improvement activities in each region

at the Global QC Circle Convention.

Activities of reducing environmental impact are planned and promoted continuously across the Group.

💥 The meeting attended by management of all global sites to share group policies, identify issues for realizing management plans, and discuss action to be taken.

Global Environmental Management Promotion System

External Evaluation

-Highly Evaluated for the 2nd Consecutive Year by DBJ Environmental Ranking

We have achieved the highest rank, "advancing activities of environmental care in particular," in the DBJ Environmental ranking evaluated by The Development Bank of Japan for the second consecutive year. We will continue to develop our environmental activities globally without being complacent.

Highest DBJ Environmental Rank in the 2nd Consecutive Year

Basic Principle

Musashi recognizes that environmental preservation is one of the most important problems as a member of society. We preserve the global environment and enhance mankind's prosperity through its corporate activities for the society and the environment. We set the following guidelines toward achieving the goal to maintain the sprit of innovation.

Basic Policy

Musashi, as a good corporate citizen in global society, strives to achieve environmental management based on the guidelines stated below.

①Not only complying with the international rules and local laws, Musashi establishes the necessary self-imposed standards for meeting social and stake holders requirements.

Waste water, Air, Noise, Odor, Vibration, Waste, Hazardous materials, Soil contamination

②Musashi reduces the environmental load as much as possible in the business area of the organization.

We shall endeavor to continuously maintain and improve our environmental management system.

- ③Musashi ensures the effective use of energy and other resources in our business activities and pursues the appropriate management of chemical substances and reduction of waste.
- (4) Musashi will continue to actively engage with local groups and undertake further environmental conservation projects to protect and preserve our global environment.

We ensure that all individuals working in or for our organization are fully aware of these environmental policies and maintain harmonious ties with local communities.

We establish objectives and targets based on this policy and formulate an environmental action plan to achieve these objectives and targets, which we implement, evaluate and revise.

Also, we ensure that all individuals working in or for our organization are fully aware of these environmental policies by posting and disclosing such policies to the general public.

May 1, 2006

Initiatives in Power Train Business

PT (Power Train) Products and Functions

PT Business develops and manufactures camshafts which control the timing of opening and closing intake/exhaust valves of an engine; transmission gears which convert and transmit engine revolutions to optimal driving revolutions; planetary assembly gears which convert high-speed engine revolutions to revolutions suitable for driving; and differential assembly gears which receive engine torque on the input shaft and allocate it to two output shafts (on the right and left wheels) with an applicable difference in revolutions.

The lightweight diff assembly (MS Diff) with self-developed bevel gears achieves 10% or lighter than the conventional, which reduces vehicle weight and improves fuel economy. In FY2015, the MS Diff Series covering torque bands from compact to large vehicles were completed. Ready for providing our global customers with compact, lightweight, and low-cost diff assembly, we are developing for mass production application.

Concept of Production Engineering Development in PT Business

In the machining area, establishing an optimal process design for supplying self-brand products including MS diff globally, we are developing mass production and production engineering to receive orders by unit such as highly value-added differential assembly and planetary assembly gears.

To establish the global supply system for differential gears,

we are focusing on process design with local features and the usage of local equipment. For planetary assembly gears, we have started world-wide mass production by applying special surface treatment locally.

We will promote the reduction of environmental impact on production processes through global production engineering.

Highly-Efficient Heat Treatment

In PT business, we keep working on efficiency and energy saving in the 'heat treatment process' to create characteristics necessary for automotive parts by heating metal. The heat treatment process requires large amounts of energy. A vast impact on energy and CO₂ saving is expected by improving it.

In FY2015, we improved the quantity that one jig can hold by eliminating a gap and reviewing the layout. We also reviewed the stacking height to increase the quantity per heat treatment by 30% or more. This saved 47 ton of annual CO_2 emissions.

Initiatives in Linkage & Suspension Business

Environment-Global

L&S Products and Functions

L&S business covers ball joints, important security parts^{*} requiring high reliability, which are used in the joint between the tire and the vehicle. The ball joint works as a joint while steering or tire movement according to dents and bumps on the road and contributes to smooth steering and comfort driving. Through the integrated process from design to evaluation, we are providing our customers with an optimal shape and size for lighter vehicles and better driving comfort.

Suspension Arm Assembly

Suspension Ball Joints

Concept of Production Engineering Development in L&S Business

The optimal shape design with highly-precise simulation realizes compact and lightweight and improves fuel economy performance with weight lighter than conventional models.

Local material resources are used actively and CO₂ emissions generated by logistics can be reduced to protect environment.

Compact and Lightweight Ball Joints

Our highly-precise simulation and design know-how was applied to mass-produced ball joints in FY2015. Simulating optimizes the size and thickness to realize lightweight yet assuring the strength equivalent to our conventional products. The internal mechanism of ball joints achieved compactness

with our unique design know-how by securing the durability. This achieved the weight about 20% lighter than the conventional. Lightweight improves the fuel economy and compactness contributes to a freer layout of the built-up vehicle.

*Defects of the applicable parts may malfunction the basic car performance including "Drive, " "Turn," and "Stop" and cause a significant disaster including fire.

Initiatives in Motorcycle Business

Motorcycle Products and Functions

Transmission gears, camshafts and other drive parts for motorcycles, general-purpose engines, and ATV are manufactured and supplied to customers in the world. Utilizing the accumulated design and machining technology for the world-share No.1 production volume, we are promoting the development of new products for scooters and motorcycles for the new developing countries – the largest market, to receive orders by responding to environmental regulations, recently growing as a critical issue.

Transmission Gear Assembly

Concept of Production Engineering Development in Motorcycle Business

Like automobiles, we are promoting a more advanced efficient integrated production engineering and the development of product/production engineering to receive orders of higher value-added modules.

The new developing countries, where motorcycles are widely used, address air pollution caused by emissions. Not only a further cost reduction of existing parts, but also the demand of a better function and performance of lightweight and highprecision parts is increased to respond to emission and fuel economy regulations which are expected to be more strict. To meet the need, we are reducing cost by minimizing and concentrating machining processes with precision forging technology by optimizing and improving value-added products by optimizing machining methods and part geometries from a new point of view.

Highly-Efficient Production Line for Motorcycle Camshafts

We are establishing a production line for a considerable improvement in the production efficiency of camshafts for small/middle-size motorcycles. Great effect can be expected, including stable quality, cost reduction, more production capability, and energy saving. In FY2015, using the best camshaft line existing in the Group as a model, processes have been concentrated and automated by applying new machines and methods. MAP-VN, a plant in Vietnam, achieved to introduce a new line requiring machines and operators less than an existing line. Currently, we are preparing for mass production start. (Mass production is to be started in FY2016.)

Initiatives in Forging Engineering Development

Environment-Global

Forging Technology - Supporting the Integrated Production System

One of our Group strengths is an "integrated production system" from forging and cutting through to assembly. The first process is "forging" which is a cornerstone of an optimal production system by taking a challenge of complex gear precision forging and by eliminating complex and fine machining processes later. In Global T-Forge (Musashi Forging workshop), we exchange our opinions on forging methods and problem solving periodically with forging engineers across the world to equalize the high forging technology level as well as to keep innovating forging technology.

* Forging experts from various sites and divisions get together to share and discuss deeply about latest technology, struggles, and development cases.

Basic Concept of Less Environmental Impact in Forging Engineering

Main Improvement Points in Forging Engineering

- Process Design by Accumulated Forging Technology
- Formability Verification Through Simulation Technology
- Challenge to a Highly-Efficient Forging

In the forging area, "load reduction" and "fewer processes" after forging are constantly required. We have been taking a challenge of saving machining to achieve both the reduction of environmental load and the improvement of productivity by reducing processes and allowance whether production is new or existing.

Elimination of a Process by Changing Pre-Molding Shape

Taking the opportunities raised in Global T-Forge with Manufacturing Division, we exchanged opinions, repeated simulation tests, and estimated "machining defects" and "die load" to bring an optimal method – shape change in molding into reality. This eliminated burrs (excess steel generated peripherally), so a "trimming process" is no longer required and the material volume is reduced. This resulted in annual saving of CO_2 emissions by 22ton.

Actual Environmental Load and Reduction Initiatives in Production Sites

Our production sites in the world have been continuously promoting environmental load reduction such as saving energy and conserving resources to contribute to the development of a sustainable society and planet.

Greenhouse Emissions^{*} (1,000ton-CO₂)

Water Consumption (1,000ton)

% Calculation protocol of Greenhouse gases refer mainly to WRI/WBCSD (2004), The Greenhouse Gas Protocol (Revised Edition)" for Scope1 and Scope2. Scope2 is calculated using for 2010 electric power emission factor from International Energy Agency (2013), "CO₂ Emissions From Fuel Combustion Highlights 2013".

Update to Energy Saving Transformers (Akemi No.1 Plant)

From a preventative maintenance perspective, 25 year-old transformers are being updated gradually to meet the top runner system. In FY2015, transformers in the extra-high station and No.3 plant were updated to reduce 9 ton of CO_2 in a year.

ed to reduce

Concentrated Finish Processes (KMS, Kyushu, Japan)

4 finish processes have been concentrated into 3 processes. This reduced machining time by 30% or more, eliminated machines for one process, improved tool life, and reduced annual CO_2 by 19ton.

Auto Control System of Compressors (Horai Plant)

Waste Emissions (ton)

An auto control system was introduced to control 5 compressors by saving power if not in operation. These used to be operated manually. This activity achieved an annual CO_2 saving of 10ton.

Reduction of Cold Forging Press CT (MAP-CH, China)

Conventionally, parts were picked manually in cold press gear molding. Now parts are picked automatically and pneumatically by adding an air hose on a die. This reduced machining time significantly. 134 ton of CO_2 is expected to be reduced annually.

Environment-Global

MUSASHi

Energy Saving with Forging Method (MAP-IN, Indonesia)

Changing forging die design and reviewing a machining method resulted in a longer tool life in forging die and lathing process. This also reduced die/tool cost significantly as well as CO₂

Environmental Education for Employees (MAP-TH, Thailand)

MAP-TH implement various educational activities for its employees to understand the importance of 5S (seiri, seiton, seiketsu, seisou, shitsuke) and the meaning of separating waste.

LED Lighting (MAP-ID, India)

975 ordinary lights, 40 lights on high ceilings and 5 floodlights were replaced with LED lights to achieve an annual CO₂ reduction of 43ton.

Reduction of Standby Electricity (MAP-VN, Vietnam) MAP-VN worked on reducing standby

electricity while not in operation. Electric circuits have been changed to stop motors if not in operation 5 minutes or longer. This resulted in an annual CO₂ saving of 13 ton.

A/C Automatic Control System (MAP-MI, USA)

A web-based automatic control system was introduced for a/c units and exhaust fans. The temperature and pressure of each device is controlled and adjusted automatically with sensor to reduce gas and electricity consumption and to save 412ton of CO₂ annually.

Paper Free Work (MAP-CA, Canada)

MAP-CA is now working without paper. In FY2015, web-based control systems have been introduced for quality assurance, pay roll, and human resources to save 6ton of paper.

Waste Liquid Treatment System (MDA, Brazil)

MDA Maintenance group built treatment facilities of plant waste liquid. Waste liquid is purified with chemicals and filters, and discharged into sewers after water quality test. An annual waste liquid of 600m³ can be purified to reduce waste.

Power Monitoring System in Forging Line (MSB, Brazil)

MSB introduced a power monitoring system in a hot forging line to improve energy control in production. An annual CO₂ emission of 7ton is expected to be reduced by utilizing the system and by taking energy control countermeasures. This environmental initiative was highly valued; the environmental award FY2015 was provided by our main customer.

LED Lighting (MAP-MX, Mexico)

Ordinary lights in the assembly room, the manufacturing area have been replaced with LED lights. This reduced 28ton of CO₂ in total annually.

Initiatives on Environmental Management in Japan

Current Status of Environmental Issues and Future Challenges

"Climate change and energy issues" are a key for global environmental conservation and various initiatives have been taken mainly in production areas.

With the expansion of our businesses on a global scale, the efficiency is much required in the domestic business. From environmental perspectives, cutting-edge activities of the reduction of environmental impact including energy conservation, saving resources and pollution prevention are expected to be taken as well as developing these in the world.

Remaining as a frontrunner of environmental activities for all production sites, we will step up Musashi's global environmental activities.

Environmental Management Organization

To establish a company-level environmental management, Musashi has formed the Central Environment Committee to orchestrate a group-wide response to the environmental issues. Also, an audit has been conducted twice by an external certification body and by an internal audit section since the acquisition of ISO 14001 certification in August 1998. In FY2015, the 4th external audit was taken in August 2015, and the 5th external audit in February 2016. None of the items were identified as non-conformity and the certification was maintained.

We take advice provided by an external audit as an opportunity for improvement and reflect it in our activities.

Environmental Management Organization

Environmental Laws/Regulations and Risk Management

To ensure the compliance of environmental laws and regulations, we conduct a periodic check of the measurement of regulatory values, the notification to government, and the status of equipment.

For any equipment which may impact significantly on environment, possible accidents are anticipated. We are prepared for emergency by defining procedures and contact routes, and conducting/reviewing periodic training programs and drills. Our business partners also participate in such drills.

MUSASHi

Environment-Japan

We ascertain the annual environmental load generated by all stages of our business activities: from raw material procurement to production, transportation, distribution, use and disposal. The data is used to set target for reduction of CO₂ and waste.

Environmental Accounting

We introduced environmental accounting to collect data on our environmental conservation costs. "Investment" is the investment for tangible fixed assets in FY2015, "Expense" is the expense for environmental measures in FY2015.

Fiscal 2015 INPUT & OUTPUT (materials, energy flow)

<	N	P	U	Т	>

rials						
18,255	ton					
36	ton					
13	ton					
Secondary Materials						
442	ke					
/						
44,721	MWh					
303	ke					
1.5	ke					
488	ton					
361	1,000Nm ³					
urces						
91,410	m³					
44,436	m³					
46.974	m³					
	rials 18,255 36 13 aterials 442 442 442 442 442 442 442 44					

< Production >	
Forging	
Machining	
Heat Treatment	
	ľ
Finishing	
Assembling	

< OUTPUT >

Byproducts							
Metals	8,388	ton					
Used Oils	131	ke					
Others (Paper etc.)	96	ton					
Industrial Waste D	Disposal						
Waste Disposal	1,329	ton					
Direct Landfill	0	ton					
Environmental Impact Substance							
GHG Emission ^{※2}	25,135	ton					
Total Water Discharge	38,108	m³					
BOD(biochemical oxygen demand)	172	kg					
COD(chemical oxygen demand)	385	kg					
Nitrogen	522	kg					
Phosphorus	81	kg					
PRTR Substances	4,084	kg					
NOx	212	kg					
SOx	25	kg					

対象期間:2015年4月1日~2016年3月31日

※1 Excluding supplier processed parts.
※2 The subjects of CO₂ emissions have been those under the Energy Saving Act. Accordingly, the actual emission factor in the "CO₂ Emission Factors of Each Electricity Utility" publicized by the Ministry of the Environment of Japan in November 2015 was used.

Fiscal 2015 Environmental Accounting

			(mi	llion yen)
	Cost Classification	Main Initiatives	Investment	Expenses
(1)	Costs within the Business Area		6.7	88.6
	(1)-1 Pollution Prevention	air pollution, water pollution, soil pollution etc.	2.2	26.7
Break down	(1)-2 Global Environmental Preservation	heat treatment process integration, compressor update etc.	4.5	3.1
	(1)-3 Circulation of Resources	waste treatment, recycling costs etc.	0.0	58.9
(2)	Upstream and Downstream Costs		0.0	0.0
(3)	Management Activity Costs	ISO regular inspection, environmental education, environmental labor costs etc.	0.0	73.9
(4)	Research and Development Costs	development products that conserve energy and resources (size and weight reduction)	11.0	131.6
(5)	Social Activity Costs	community clean-up activities, Musashi woodland project etc.	0.0	3.5
(6)	Costs for Environmental Damage		0.0	0.0
(7)	Other Costs		0.0	0.0
		Total	17.7	297.7

Environmental Goals and Achievements

We cleared targets and improved for environmental impacts in each category below in 2015.

FY2015 environmental goals and achievements

			F۱	FY2016		
Category	Environmental Activity	Control Items	Target	Result	Achieve ment	Target
Global Warming	Green-House Gas Reduction	CO2 Emissions per Unit (CO2ton / million yen)	2% Reduction (baseline:2013)	1.6% Reduction		3% Reduction (baseline:2013)
Countermeasures /Energy Saving	Reduction of Transportation- Related CO ₂ Emissions	CO2 per Unit (CO2ton / million yen)	2% Reduction (baseline:2013)	53.6% Reduction	Ø	3% Reduction (baseline:2013)
	Water Consumption Reduction	Water Consumption (m ³)	7% Reduction (baseline:2008)	11.0% Reduction	Ø	8% Reduction (baseline:2008)
Resource Saving	Industrial Waste Reduction	Waste Volume per Unit (ton / million yen)	5% Reduction (baseline:2011)	5.4% Reduction	0	6% Reduction (baseline:2011)
	Promotion of the Recycling of Waste	Landfill Rate (%)	Landfill Rate 0%	0%	0	Maintain Landfill Rate 0%
Environmental Load- Reducing	Reductions in Emissions of Chemical Substances	PRTR ^{[※]-Listed Substances (ton)}	80% Reduction (baseline:2000)	92.4% Reduction	O	80% Reduction (baseline:2000

<Target achieved> \odot : 105% or higher, \bigcirc : 95% to 105%, \triangle : 80% to 95%, imes : 80% or lower

XA PRTR (Pollutant Release and Transfer Register) is a national or regional database of information on the environmental release and off-site transfer of potentially hazardous chemical substances from industrial and other facilities.

Reduction of GHG Emissions

In FY2015, CO₂ emissions have reduced by 23% from 2013 due to CO₂ emission reduction initiatives at production level as well as the decrease in domestic production. The CO₂ consumption rate, an expression of energy efficiency was reduced by 1.6% from the FY2013 level, close to our target of reduction by 2.0%.

In the years ahead, we will strive to reinforce energy reduction by improving processes and production efficiency as well as by introducing energy saving equipment.

CO2 Emissions and Unit Energy Consumption

(Presented as an index with FY2013 as 100)

Industrial Waste and Unit Waste Emission

(Presented as an index with FY2011 as 100)

Reduction of Industrial Waste

In FY2015, we achieved further reduction of industrial waste by 27% in comparison with the base year of 2011 due to the reduction of internal sludge, the application of water-based coolant and the decrease in domestic production. As for the industrial waste per unit is reduced by 5.4% compared to the FY2011 level. Also, the direct landfill waste remains zero and its recycling rate is over 95 %. We will engage in initiatives to generate less industrial waste internally by using water-based coolant and by reducing sludge with the treatment of wastewater.

Environment-Japan

Reduction of Water Consumption

The water consumption in FY2015 was reduced by 11% compared to the base year of FY2008. We will keep reducing the water consumption by implementing water saving activities; by replacing old pipes for leakage prevention; and by monitoring waste and loss.

Water Consumption

(Presented as an index with FY2008 as 100)

Highly-Efficient Transportation

To reduce CO_2 emissions during shipping, Production Control is focusing on the highly-efficient transportation by working closely with customers and transport companies.

In FY2015, we worked on the improvement of loading efficiency for shipping and the expansion of "pick-up transportation" applied since FY2013 to reduce CO_2 in the entire supplier chain logistics.

This helped to reduce CO_2 emissions generated from transportation by 61% compared to the base year of FY2013. CO_2 unit was also reduced by 54% compared to FY2013.

CO₂ Emissions and Unit during Transport

(Presented as an index with FY2008 as 100)

Musashi Woodland Project

We initiated our "Musashi Woodland Project" in 2009 with the intention of raising awareness of the flora and fauna in woodland areas, along with the potential impact of global warming on such areas. This is an activity participated by Musashi employees and its family members to maintain local woodland areas. Originally planting started in the area owned by Aichi prefecture. Since 2012 our activity place moved to a park located in Toyohashi so that more Musashi employees and its family members can enjoy the nature.

This project is mainly about planning "Japanese black pine trees" which quantity is decreasing year by year due to weevil damage and providing children with nature experience programs. In summer and winter FY2014, 277 people joined the project to plant 7 Japanese black pine trees and 100 rhododendrons.

Quality Assurance Activity

Basic Policy for Quality Assurance Activity

Based on the quality policy of "meeting customer needs accurately, responding to a change flexibly and speedily, and providing top level products in the world to gain customers' trust from Quality, Cost and Delivery perspectives," we focus on the 2020 vision to provide our customers with products which satisfy customer needs and to keep improving our duties. Specifically we are promoting the thorough evaluation before mass production and the flow-out prevention of defects so that our customers can use our products safely. We have started "building a constitution" to promote the settlement and improvement of duties.

Basic Policy for Quality Assurance Activity

From a "customer first" perspective,

change from an approach "by force" to building a "constitution" !!

Development of Quality Management

Establishing quality management according to the ISO/TS16949 requirements, we have a system to provide products which satisfy the quality of customer needs.

All of our production sites are promoting the establishment

of a quality management system to meet the ISO/TS16949 standards. As of March 2016, 10 sites have been certified and 3 more are expected to be certified in FY2016.

Global Improvement in Constitution and Preventative Action

Improvement in Constitution

For stronger Monozukuri, we are working on improving the corporate constitution to level our strengths by examining a quality/production system and process control from a common and objective perspective and by strengthening potential weaknesses.

Preventative Action

We control new model information in all of our production sites and evaluate quality on site based on change point ranking. We make a mass production judgement including the prevention of recurring past defects to provide products satisfied by our customers.

Global MM Circle Activities

The Group has 390 circles (about 3,000 members) working on the improvement for the purpose of creating, expanding, and succeeding small-group activities as well as making a more lively and stronger workplace and corporate constitution. Members present their activities in conventions held by our customers in the various countries and regions. The "MM Circle World Convention" is organized every spring to invite representative circle members from all over the world to Japan. Not only sharing kaizen know-how between attendees, but also exchanging with global associates, the Group becomes more cohesive to improve the competing power.

Basic Concept of Purchasing

We develop our global purchasing activities in the world. Based on compliance and equal and fair business with our business partners in the various countries and regions who provide "products with good quality at low cost," we are aiming for mutual benefit. Specifically, we are developing the QCD structure and activities in ways that provide a safe and healthy working environment, and also minimize our impact on the global environment. We will contribute to finding ways to develop our local and global society in a sustainable way.

Basic Policy for Purchasing

- Stronger governance and compliance
- 2. Stronger structure of Quality, Cost and Delivery
- 3. Compliance with the Green Purchasing Guidelines

For Equal and Fair Business

We provide our business partners with an equal and fair opportunity regardless of their nationality, corporate size or business history, and establish a sound partnership with them to achieve a sustainable society. We also set up an "Open Door" system as a part of a strong and thorough governance and compliance system to allow all stakeholders, including the employees of our business partners, to talk to us or make a suggestion. (All such approaches will be treated fairly, as if by an independent 3rd party, and the applicant will not suffer any disadvantage as a result of making such an application.)

Stronger Cooperation with Our Business Partners

We hold a periodic meeting with our business partners to share the latest information on the business environment and to take action for the changing environment. In the recent meeting we presented the annual "Purchasing Policy" and "Environmental Policy" to keep our business partners informed on our global development of quality, cost, delivery and environment as well as various other activities.

We are focusing on quality improvement activities in particular,

to gain a solid trust and reliability from our customers and users. Under "quality innovation," we are developing and monitoring to achieve a target of zero quality defects.

To grasp and reduce CO_2 emissions throughout the supply chain, we undertake regular visits to our various business partners, in order to inform them about our CO_2 reduction activities and to ensure that we are informed and comply with their latest expectations.

Environmental Initiatives with Our Business Partners – Issuance of Green Purchasing Guidelines

Not only active environmental conservation, but also the delivery of environmentally friendly products from our business partners can control the environmental burden. Moreover, managing the environmental burden with our business partners can help the quality assurance for environment throughout the supply chain. We issued the "MUSASHi Green Purchasing Guidelines" specifying the purpose of promoting environmental conservation activities.

Labor Practices and Decent Work^{*}

Human Resource Development

Based on the concept of "developing independent individuals as well as standing on the foundation of fairness and trust to bring out the total power," our human resource development allows each of our employees to grow with "free ideas,"

"autonomous action," and "responsibility for outcome." Our employees are provided with various training opportunities according to their position and role in order to deepen their understanding of "Musashi Philosophy" and to bring it to action.

Training System (Overview)

Training by Position

To improve knowledge and capability required by position or title, training programs including orientation, promotion, and management are provided.

Training to support promotion

Global training

Cross-cultural communication and English learning programs are provided for global work as well as self-development.

Engineering / Skill training

Focusing on engineering and skill training essential for a manufacturing company, we are training our employees to be certified.

32 More than the stisfaction under fair and preferable conditions. Specifically, job descriptions, work time, wage and holidays should be obtained without damaging the dignity and health of a worker. Also, the right of a worker including freedom of association, collective bargaining, elimination of employment discrimination, and minimum wage should be assured.

65%

55%

45%

35%

25%

15%

5%

-5%

Social

Support for Flexible Working

Promotion of Paid Holiday Acquisition

Labor and management are working together to ensure a high level of take-up of paid holiday entitlement. A special system for paid "holiday caring" has been set up to allow paid holiday entitlement to be carried over each year and then used for either that individual's own sickness benefit, or for the caring of another family member.

Support Both Work and Family

The rate of child-care leave and return of female employees has been kept high.

We have some programs to support child-care. A "shorter working hour program for child care" is provided for the employees raising school kids. Also a "nursing leave program" has been set up to allow the employees to acquire a holiday for nursing pre-school kids to support child-care.

Re-employment after Retirement

The company sets the retirement age as 60; however, a "re-employment after retirement" system is in place to allow the employees with good health and mentality to work continuously. Both the number and the rate of re-employment are increasing.

Employees can work up to 65 years old in full-time base or 3 days a week. Their skills built in a long-time can be utilized after their retirement.

Paid Holiday Acquisition							
	2011	2012	2013	2014	2015		
Acquisition of paid holidays (%)	68.7	68.5	68.8	78.6	70.5		

Child-care Leave							
	2011	2012	2013	2014	2015		
Female employee child-care leave (%)	100	100	100	100	100		
Return to work after child-care leave (%)	N/A	100	N/A	100	100		

Re-employment after Retirement

Prevention of Industrial Accidents and Safety/Health Activities

To prevent industrial accidents and to improve work environment, the Central Safety/Health Committee, consisted by Officers, is promoting safety and health activities for "safe work environment."

In addition to Safety/Health and Accident Prevention Committees set in each plant, the head office has sub-committees in manufacturing, engineering and administration areas to develop activities according to each level and area, to take countermeasures, and to share information. Union members attend all of the committees to reflect employees' opinions.

Traffic Safety

As an automotive and motorcycle manufacturer, we have been promoting traffic safety activities. In FY2014, we started a "accident prediction training video" session to improve a sense of hazard during driving by predicting hazardous situations. The attendance of all employees completed in FY2015. We also invite kids from 4 local schools to a "traffic safety session for parents and children." We provide them with a learning opportunity to think about traffic safety through a simulation experience of an accident by rushing out or not fastening seatbelts.

Parents and Children Traffic Safety Session

Living with Local Communities

As a global company, we will continue efforts towards social contribution and nature conservation activities tailored to the needs of communities in each region to contribute to the sustainable mutual development of both society and the local community.

Indonesia: Course on Traffic Safety

MAP-IN organizes a course on traffic safety to improve the mind-set on traffic rules as well as to prevent traffic accidents for its local communities. In FY2015 the course was provided in Cikarang and Karawang.

MAP-VN is devoted to supporting the growth of its local communities by donating to its local schools. In FY2015 school supplies including personal computers and scholarship were provided.

India: Course on Traffic Safety

MAP-ID provides a course on traffic safety to improve the mind-set on traffic safety and to prevent accidents. In FY2015, 50 people attended the course in Banipoor, near the plant. This will be provided in Rewari too.

Brazil: Environmental Educational Activities

MSB practices a campaign to improve the employees' mind-set on environment. A message for environmental conservation was distributed together with a plant during the environment week in FY2015.

US: Participation in Food Bank

MAP-MI is participating in the food drive activities by donating food collected by its employees to the local Food Bank. In 2015, this food bank raised a total of 35 ton of food.

Canada: The Earth Day and Clean-up Activities

The employees of MAP-CA join clean-up activities around the plant and environmental experience programs on the Earth Day every year.

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China: Support for "Children in Need"

The MAP-CH volunteer team visits a special school in Zhongshan to provide handicapped children with school and living supplies as well as to interact with them.

Japan (Kyushu): Parent-Child Traffic Safety Course

Cooperating with its local police and customers, KMS and its local companies organize a traffic safety course. Various experience programs are provided to improve the mind-set on the prevention of traffic accidents.

Japan: Sponsorship of HARC-PRO (Motorcycle Sport Promotion)

To promote motorcycle sport, to improve technology, and to involve in society, MSI has been participating in motorcycle races in Japan and other Asian countries since 2009 as a main sponsor of HARC-PRO. An ex-MOTO GP champion joined the team in Suzuka 8 hours in 2015. We are engaged in the promotion of motorcycle racing.

Japan: Musashi Summer Festival

Our summer festival, held in the head office in August, is open to everyone to interact with local communities. The festival attracts more than 1,500 people with various food stalls and events available throughout the day along with a spectacular firework display.

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