

Production Activities with Environmental Considerations by MACO in Thailand



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As a global company, Mitsubishi Heavy Industries (MHI) Group is engaged in the manufacturing of a wide range of products across the world. For production in countries other than Japan, we also carry out business operations in accordance with our basic environmental policy: “The MHI Group shall undertake all aspects of its business activities with the understanding that it is an integral member of society and will strive to reduce its burden on the environment, contributing to the development of a sustainable society.” Our major overseas production bases have been certified with ISO 14001, the international standard on environmental management and practice production activities with care for the environment under the laws and regulations of the respective countries. Established in 1988 as a joint venture with Mahajak Group Co., Ltd. in Thailand, Mitsubishi Heavy Industries – Mahajak Air Conditioners Co., Ltd. (MACO) was one of the first overseas production bases which took the initiative in such efforts. This report introduces its activities.

1. Introduction

Established in 1988 as a joint venture with Mahajak Group Co., Ltd. in Thailand, MACO is the main factory of MHI Group’s air conditioning business domain and produces and sells both residential and commercial air conditioners. Of our proprietary air conditioner brands, the “Beaver” and “Saison” series for the Japanese market, “Mitsubishi Heavy Duty” series for the ASEAN market including Thailand, and “Mitsubishi Heavy Industry” series for the markets in Europe, Australia and other Asian countries, MACO produced a total of 2.1 million units in 2016. Located in the Lad Krabang Industrial Estate in a suburb of Bangkok, the factory has an area of nearly 110,000 m² with approximately 2,000 full-time employees. It is engaged in all stages of business activities including design, development, procurement, production, sales and after-sales services. Under the circumstances of increasing need for air conditioning systems worldwide and growing demand for residential and commercial air conditioners especially in Asia MACO is steadily expanding its production scale.

Inspired by the MACO’s philosophy of 3C (i.e., Change, Challenge and Continue), MACO is committed to the development of new technologies and innovations. As its corporate social responsibility, MACO has taken on the challenge to not only create high-efficiency products with low environmental impacts, but also realize production processes with higher efficiency, better quality, and greater environmental consciousness.

2. Environmental management

Since its establishment, MACO has undertaken the challenge to bring environmental soundness to its production systems, in accordance with the MHI Group’s basic environmental policy of “The MHI Group shall undertake all aspects of its business activities with the understanding that it is an integral member of society and will strive to reduce its burden on the environment, contributing to the development of a sustainable society.” Environmental activities have been promoted based on ISO 14001, the international standard on environmental management, for which certification was acquired by MACO in 2005, earlier than most of the other

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Group companies. Under ISO 14001, environmental activities are continuously improved by implementing the PDCA cycle (which stands for Plan, Do, Check and Action) in business processes. It also prescribes the requirements covering various aspects such as compliance with environmental regulations and employee education. Therefore, ISO 14001 enables companies to attest that the levels of their practices for environmental conservation, legal compliance, environmental considerations, etc., are internationally acceptable.

This report introduces MACO's ISO 14001-based efforts to conserve the environment from the perspective of production activities. First addressed is acquiring re-certification of ISO 14001 (as per the 2015 revised version), followed by MACO's environmental policy and major environmental facilities, as well as specific environmental objectives and efforts.

3. Acquisition of ISO 14001:2015 certification

ISO 14001 was revised drastically in 2015, and ISO 9001, which sets out the criteria for quality management systems, was also revised in the same year. In 2017, MACO decided to obtain both new versions of ISO 14001:2015 and ISO 9001:2015, which was quite a challenge because it coincided with the construction of a new factory. Despite the overwhelming schedule that entailed, the united company-wide efforts got MACO through a difficult time, and the both ISO 14001 and ISO 9001 certifications were acquired in November 2017.

ISO 14001:2015 requires the incorporation of environmental management as part of business operations and therefore serves as the criteria for a strategic environmental management system on a level closer to corporate executives. To be compliant with this standard, MACO faced new challenges such as restructuring the organization and identifying the situations inside/outside the company that can influence the management system. In response to the need for the assessment of requests from related organizations and risk management, a new management manual on risks and opportunities has been added to the quality management system.

In the new organizational structure, environmental activities are led by the Steering Committee Team for ISO promotion, with a total of 12 members from every department under the leadership of the environmental management representative.

4. MACO's environmental policy

With the electrical power demand increasing every year as a result of its economic growth, Thailand has fallen short of its power supply, requiring the efficient use of electricity. Under such circumstances, MACO has taken on the challenge of energy conservation as a crucial project, through which it can also contribute to the mitigation of global warming. Therefore, the established policy is not just environmental, but also includes energy conservation. **Figure 1** shows the details of the "Environmental and Energy Conservation Policy."

Mitsubishi Heavy Industries – Mahajak air conditioners Co., Ltd. has produced Air Conditioners and Spare Parts to both Domestic and Export Customers. We realized the importance of environmental impacts from our activities, products and services. Therefore, we established Environmental Management & Energy Conservation Policy of the company and wish to:

1. Improve Environmental Management System to comply with ISO 14001 requirements as well as the Energy Conservation as appropriate. This requires energy and environmental conservation as part of the operations of the company.
2. Comply with Environmental Legal, Compliance obligations of the relevant environmental with the company for each interested parties, Energy Conservation and Other Requirements.
3. To protect the environment, prevent air pollution, water pollution, garbage and waste.
4. Set Environmental & Energy Conservation Objectives to prevent pollution, reduce environment impacts to our earth and to promote Energy efficiency and optimization.
5. Review policy and objectives of Environmental and Energy Conservation periodically for continual improvement to be applicable to environmental legal and changing circumstances.
6. Provide necessary support of resources, budget and training staff of the Company to be aware on environmental impact and energy conservation issues.
7. Communicate policy objectives and Environmental & Energy information to all Employees, on behalf of company and public.

Masahiko Sasakura
President

Figure 1 MACO's Environmental and Energy Conservation Policy

In MACO, while being responsible for compliance with this policy, all the employees are committed to society by continuously promoting environmental protection and improvement. MACO is also committed to applying the requirements prescribed by the ISO 14001 international standard to its business management system. People concerned both inside and outside the company can read the policy on MACO's website..

5. MACO's environmental facilities

MACO specializes in the air conditioner manufacturing processes, ranging from the production of metal parts, plastic parts and control devices to coating and final assembly. To reduce the environmental impact, the factory is equipped with a variety of environmental facilities. The following are some major facilities.

(1) Wastewater treatment

The wastewater treatment plant, which was upgraded in 2016, is used to conduct the membrane and chemical treatments of wastewater from the production process and control the wastewater quality as required by laws. Sewage from the factory cafeteria and toilets is biologically treated. This wastewater is then sent to the central wastewater treatment system of the Lad Krabang Industrial Estate (**Figure 2**).



Figure 2 Wastewater treatment plant

(2) Exhaust gas treatment

Pollutants in the exhaust gas, which is produced in the soldering process, are removed through the activated carbon filters installed on the exhaust air ducts. Thus, having satisfied the regulatory criteria, the exhaust gas is released to the outside (**Figure 3**).

(3) Recovery of refrigerants

In recent years, although alternative refrigerants that are effective for the protection of the ozone layer are used in air conditioners, these have the problem of having a high global warming potential. To contribute to the mitigation of global warming, MACO has installed a refrigerant recovery machine to prevent the leakage of alternative refrigerants (**Figure 4**).



Figure 3 Activated carbon filters



Figure 4 Refrigerant recovery machine

6. Environmental objectives and activities for reduced environmental impact

In line with the aforementioned PDCA cycle for environmental management, MACO promotes environmental activities. In stage P (i.e., plan) of the PDCA cycle, the following five objectives were set for this purpose in 2017.

1. Increase the Electrical consumption efficiency to 5% against the year 2016
2. Increase the LPG consumption efficiency to 5% against the year 2016
3. Increase the Acetylene gas consumption efficiency to 5% against the year 2016
4. Reduce the amount of Scrap to 10% against the year 2016
5. Keep the amount of paper usage as the average used from 2014 – 2016

In addition to meeting these annual objectives, MACO especially focuses on activities for natural resource conservation in the medium and long term, and uses 3R (i.e., Reduce, Reuse and Recycle) as its guidelines to promote the reduction of waste plastic and the amount of water used, etc. Introduced below are some of these activities.

(1) Promotion of energy conservation and CO₂ reduction activities

To improve the power usage efficiency by 5%, the lights in the factory ceilings were replaced with LEDs (thus reducing their power consumption from 400 watts to 85 watts). With regard to the plastic injection molding machine used to produce plastic parts, the hydraulic type was replaced with an electric type, whereby the power consumption has been decreased to nearly 65%. Activities for energy conservation in the production process have thus been promoted.

(2) Resource conservation activities

The cooling water used in the welding process is filtered before being reused in the piping process, which has enabled the monthly water usage to be cut by 16 kiloliters. For paper usage, MACO is proceeding with planned activities for reduced paper consumption including the use of recycled paper.

(3) Activities for reduction of waste

With the reduction objective of 10% in the amount of scrap, MACO has undertaken activities to reduce the amounts of scrap and waste in the production process, for example, by facilitating the recycling of plastics in the plastic injection molding process.

(4) Activities to improve the undercoating process prior to coating

There had been a treatment problem about how to remove zinc that was contained in wastewater from the cleaning process prior to coating. Zinc in the wastewater came from zinc phosphate in the coating pretreatment that was performed to stabilize the paint layer. To reduce the wastewater treatment load and prevent the escape of zinc, a newly-developed nano-ceramic coating process was introduced as a pretreatment process in September 2017, replacing the conventional zinc phosphate pretreatment. Since then, no zinc has been incorporated into wastewater. With this new pretreatment process, different types of chemicals can be used in wastewater treatment, which has nearly halved the maintenance cost. This improvement was positively assessed in the ISO 14001 review.

As stated so far, MACO has successfully implemented the PDCA cycle for reducing the burden on the environment and promotes various activities for improvement, thus dedicating its efforts to manage the factory with the minimum environmental impact.

7. Conclusion

Through environmental management in accordance with the obtained ISO 14001:2015 certification, MACO will always produce air conditioners with less burden on the environment while lending its ear to society regarding what is required. By applying the MHI Group's superior technologies, MACO will continue to offer high-efficiency air conditioners with lower energy consumption and lower levels of CO₂ emissions, thereby satisfying the increasing need for air conditioning systems and the growing demand for residential and commercial air conditioners worldwide and contribute to the mitigation of global warming at the same time.