

Mitsubishi Turbocharger and Engine Europe B.V. Expanding Mitsubishi Turbo from Europe to the world



Mitsubishi Turbocharger and Engine Europe B.V.

Mitsubishi Turbocharger and Engine Europe B.V. (hereafter MTEE) is a wholly-owned subsidiary of Mitsubishi Heavy Industries Engine & Turbocharger, Ltd. (hereafter MHIET). Established in Europe, MTEE is engaged in the manufacture, design, and development of Mitsubishi turbochargers and serves as the point of contact with European automobile manufacturers as the largest base for turbo charger production for MHIET.

1. Introduction

Environmental regulations for vehicles are mainly intended for the reduction of CO₂ emissions, and the trend toward the enhancement of such regulations has been accelerating globally in recent years. In particular, European environmental regulations precede those of the other regions, and turbochargers have been adopted for European diesel engines as a solution for environmental regulations for quite some time.

A turbocharger consists of a turbine that receives exhaust gas from the engine and a compressor that is connected coaxially with the turbine. The turbine collects exhaust gas energy and then the compressor driven by the collected energy boosts the air into the engine. In this way, a turbocharger contributes to the reduction of exhaust gas emissions. In Europe, turbochargers have attracted attention as a method for reducing CO₂ emissions using small-sized gasoline engines (reduction of engine displacement without degradation of engine power output) in recent years, and the demand for turbochargers is expected to grow further in the future.

With such a background, MHIET has pursued the enhancement of the development ability of MTEE, which was the manufacturing and design base of MHIET in Europe, and has established a structure by which the demands of European customers can be swiftly met as its second development base.

2. Chronology of MTEE

MTEE is located in the Netherlands, roughly at the center of Europe (**Figure 1**). The number of plants was expanded to five in 2009 and the company was renamed to the current Mitsubishi Turbocharger and Engine Europe B.V., with "turbocharger" included in the name. The chronology of the company is as follows:

- 1980 MHI Samofa Diesel B.V. was established.
- 1988 Renamed MHI Equipment Europe B.V. (MEE)
- 1989 Relocated to Almere
- 1991 Production of turbochargers of MHIET started in Europe

The Netherlands has long served as the gateway to Europe due to its geographical location. The country has the Port of Rotterdam, the largest in Europe, and Amsterdam Airport Schiphol, a major hub airport for logistics by air in Europe. Located on the European continent, the Netherlands is also suitable for land transportation. For these reasons, MTEE can receive parts stably from around the world and can also supply finished products swiftly to customers.

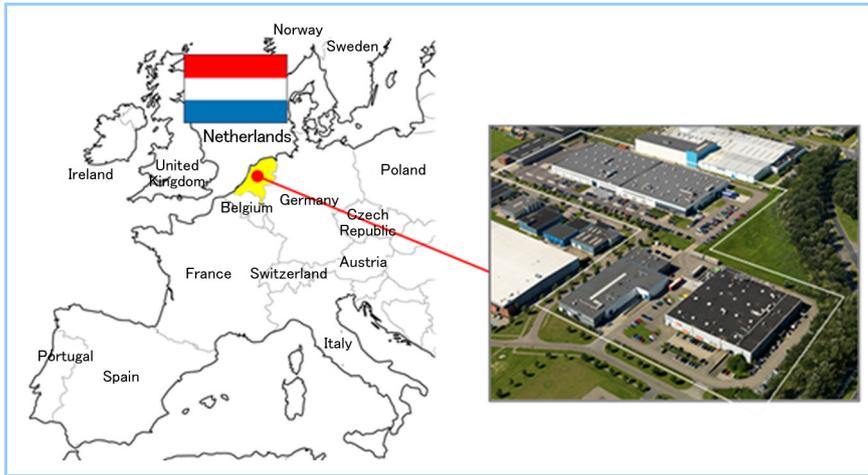


Figure 1 MTEE locations

3. Products of MTEE

MHIET has a broad lineup of automobile turbochargers, and MTEE produces a significant number of products for both gasoline and diesel engines.

Figure 2 shows one of the most conventional turbochargers. This turbocharger, which is characterized by its low cost, small size, and light weight, is adopted by many small-displacement gasoline and diesel engines today, and not only handles environmental regulations but also contributes to the enhancement of general vehicle user satisfaction due to the improvement of engine power output and drivability. For higher-displacement engines with four or more cylinders and high-performance gasoline engines, technologies such as a twin scroll turbocharger (**Figure 3**) or a twin turbocharger that uses two conventional small turbochargers are adopted. These technologies provide a significant amount of torque even to a low engine speed range. For high-performance diesel engines, a variable geometry (VG) turbocharger (**Figure 4**) is also a choice. The VG turbocharger controls the variable nozzle located in the upstream of the turbine rotor blade to realize the characteristics of both small and large turbochargers and enable the enhancement of the engine torque in a low engine speed range and the engine power output in a high engine speed range. The demand for diesel engines in the European market is still highest, and therefore MTEE put many VG turbochargers on the market. In recent years, VG turbochargers for gasoline engines have also attracted attention and demand is expected to expand significantly in the future.



Figure 2 Conventional waste gate turbocharger



Figure 3 Twin scroll turbocharger



Figure 4 VG turbocharger

4. Manufacture and supply chain

Turbochargers are customized according to customer requests and their final assembly is carried out on an exclusive line for each product. MTEE has been proceeding with the automation of turbocharger assembly lines, utilizing extensive experience gained over many years, and has halved the number of operators in comparison with that in its startup era. (Figure 5)

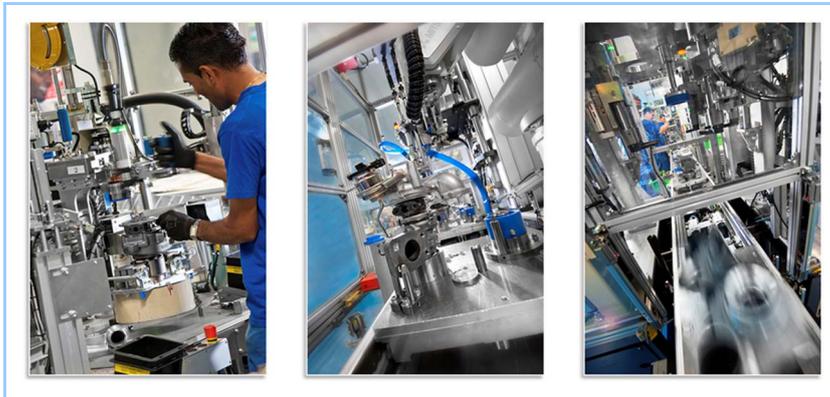


Figure 5 Turbocharger assembly line

MTEE procures parts from suppliers around the world through the supply chain connecting to other MHIET bases. The supply chain mainly controls the quality management of suppliers in Europe and the delivery of parts from Europe to the bases. In addition, turbochargers designed by MTEE are produced by Mitsubishi turbocharger bases all over the world including Mitsubishi Turbocharger Asia Co., Ltd. (MTA) in Thailand, Shanghai MHI Turbocharger Co., Ltd. (SMTC) in China, and Mitsubishi Turbocharger and Engine America, Inc. (MTEA) in North America (Figure 6) in response to the expansion of global production of users. MTEE also plays an important role in the control of such global production.

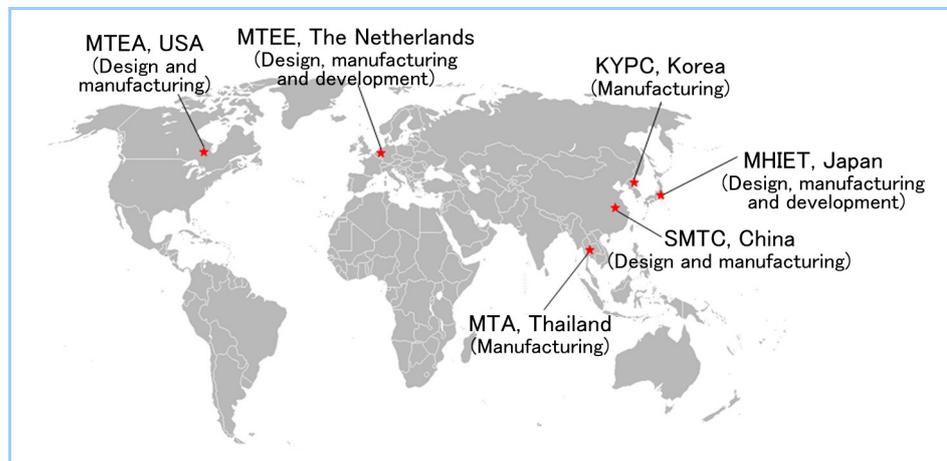


Figure 6 Global bases of Mitsubishi turbochargers

5. MTEE's technological abilities and functions

MTEE designs the mass production of turbochargers according to requests of customers based on core technologies developed by MHIET in Japan. Many leading auto manufacturers around the world are concentrated in Europe and to respond to technological requests from such top-tier manufacturers, MTEE has worked on the enhancement of its technological abilities by setting up the design department in 2003 and the development department in 2013, which are mostly concentrated in Europe. In particular, MTEE serves as the contact point to receive new requests from customers and is contributing to winning new projects through cooperation with MHIET.

The development department focuses on CAE (computer aided engineering) for the establishment of accurate engine performance simulation systems and for the support of product development. Furthermore, the department has facilities for evaluations of turbochargers on

engines and facilities to do complete evaluations of turbochargers without engines. These facilities will be expanded in the next two years in order to satisfy customer demands for sophisticated development with reduced lead-time.

MTEE conducts varied joint research in Europe including in the Netherlands with globally-prestigious universities and research institutions. Through these activities, MTEE can acquire capable students, and also strives to upgrade its technological abilities by helping its employees acquire Ph. D, thus cultivating highly specialized engineers. In this way, the company is making efforts for the enhancement of technological abilities. Furthermore, the Dutch generally have a good command of German and French, as well as English. Communicating with employees of German and French automobile manufacturers using their mother language contributes to the improvement of customer satisfaction.

6. Future expansion

The turbocharger industry faces increasingly fierce competition as demand for turbochargers is increasing on a global scale. For our sustainable development despite this situation, MTEE will continue to make efforts for enhancing turbocharger technologies and the customer satisfaction level, and is willing to assist with the processes to provide the world with a clean environment.