

# Mitsubishi Turbocharger Production Base for Chinese Market



Shanghai MHI Turbocharger Co., Ltd.

*Shanghai MHI Turbocharger Co., Ltd. (SMTC) was jointly established by Mitsubishi Heavy Industries Engine & Turbocharger, Ltd. (MHIET) and Shanghai Diesel Engine Co., Ltd. (Shanghai Diesel). Founded in Shanghai, SMTC produces/sells turbochargers and provides technical support to not only Chinese domestic car manufacturers, but also those from Japan, the United States and Europe that operate in China.*

## 1. Introduction

With worldwide active implementation of measures to reduce CO<sub>2</sub> emissions, each country has introduced policies and regulations that encourage its people to start using environmentally less harmful cars such as electric vehicles (EVs), hybrid vehicles (HVs) and fuel cell vehicles (FCVs), while deciding that the sale of gasoline cars will be prohibited from around 2030.

China is responsible for the world's highest CO<sub>2</sub> emissions and is expected to take a leadership role on the global stage in this matter. On September 22, 2020, at the United Nations General Assembly, Chinese President Xi Jinping announced, "We aim to have CO<sub>2</sub> emissions peak before 2030 and achieve carbon neutrality before 2060." In the following October one month after this announcement, the China Society of Automotive Engineers released the "Energy Saving and New Energy Vehicle Technology Roadmap 2.0". Therefore, in line with this technology roadmap, SMTC's suggestions to Chinese domestic car manufacturers are currently focused on new technologies for HVs and FCV air compressors.

## 2. Overview of SMTC

Located in Shanghai, China, SMTC is about 30-minute drive to the west from Hongqiao International Airport. Shanghai is well known as the financial and commercial hub of China and many automobile-related manufacturers are based in the city and its neighboring areas. In addition to its convenient flight network from Hongqiao Airport to the other cities in China, the city of Shanghai is also home to the Port of Shanghai, which is one of the biggest trading ports in the world and serves as the hub of domestic and international logistics. Thanks to such circumstances, SMTC therefore has geographical advantages that allow us to build a strong connection with major car manufacturers and suppliers not only in Shanghai, but also in other regions in China (**Figure 1**).

SMTC produces and sells turbochargers. Initially, our products targeted only motor vehicles for commercial use. However, passenger cars later started to be manufactured in China and demand for turbochargers for these cars increased markedly. Since 2011, most of our products have been used for passenger cars.

SMTC is a joint venture between the three companies of "MHIET", "Shanghai Diesel" and "Sumitomo Corporation," with an equity ratio of 56.3:40.0:3.7. MHIET thus holds more than half of the stake in SMTC.

The history of SMTC is summarized below.

<Company milestones>

2004 January : Foundation of SMTC

2004-2010	: Production of diesel engine turbochargers for commercial motor vehicles
From 2011 onward	: Production of gasoline engine turbochargers for passenger cars, which soon became the company's main product
2014	: Record-breaking annual sales of 1 million units
2016	: Record-breaking annual sales of 2 million units.
2017	: Record-breaking annual sales of 3 million units

We are currently capable of producing 4 million units per year. Furthermore, from the perspective of technological enhancement, a stand-alone test bench, which was introduced in 2019, has since been used to improve our verification capability at the stage of development. We are thus strengthening our production, sales and technical support systems for Chinese domestic car manufacturers, as well as for those from Japan, the United States and Europe operating in China.

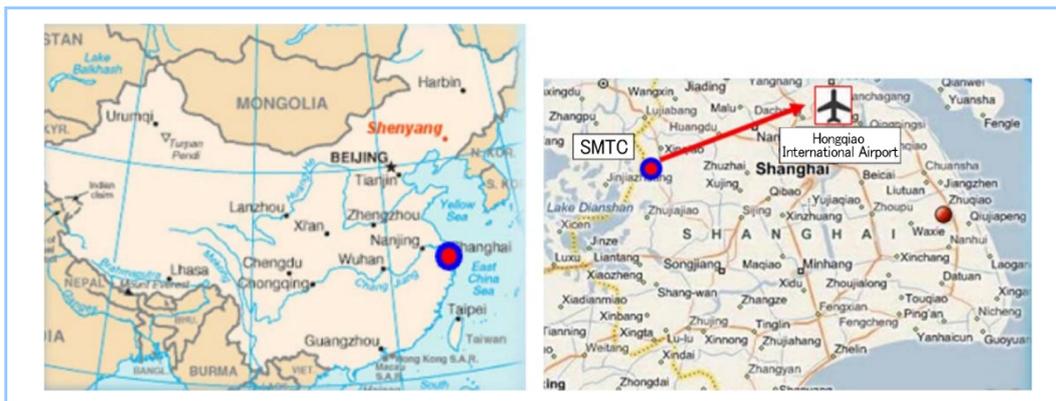


Figure 1 Location of SMTC

### 3. Production and supply chain

As mentioned earlier, SMTC produces turbochargers for Chinese domestic car manufacturers, as well as for those from Japan, the United States and Europe. Given such distinctive customer backgrounds, we are facing a unique situation in terms of production technology.

As car manufacturers from Japan, the United States and Europe are typically engaged in projects related to the turbochargers that the MHIET group companies produce outside China, they want us to apply the same production processes as their respective production bases in the MHI group. In this case, it becomes important for SMTC to work closely with these production bases to share production technology. On the other hand, Chinese domestic car manufacturers tend to cherry-pick the best possible production processes of turbochargers whether they are ours or those of another company. In fact, SMTC has often been asked to apply the production processes of MHIET's competitors. In this case, MHIET is faced by the challenge of flexibly applying production technology to an extent that we never experienced before at the production process design stage. As a result, we have naturally picked up the habit of designing the production process from multiple perspectives, which has also improved the technical capabilities of our local staff. To realize a desired manufacturing process, production facilities have to be procured locally and in fact, the introduction of facilities made in China has been encouraged. This also helps to reduce facility introduction costs (Figure 2).

“Universal platformization” is underway for projects of major customers. In relation to this, the MHIET group is developing its global supply chain. In this supply chain model, the supplier with the lowest price at any location will be exclusively in charge of producing as many items as needed and then the produced items can be supplied to any MHIET production base in the world. This is relevant when large cast parts constituting a turbocharger, such as turbine housings and compressor covers, need to be procured. For new project inquiries, therefore, the importance of Chinese suppliers with high competitiveness is increasing.

For example, the most expensive of all the turbine parts is the stainless turbine housing. Of its total procurement costs of all the MHIET production bases across the world, Europe accounted

for 22%, Japan for 47% and China for 12% in 2020. In 2024, however, these percentages will be expected to change to: 31% for Europe, 3% for Japan and 38% for China. SMTC is expected to serve as a core production base for further strengthening the global supply chain.



**Figure 2** Locally-procured turbocharger assembly line

## **4. Energy Saving and New Energy Vehicles Technology Roadmap 2.0**

According to the Energy Saving and New Energy Vehicles Technology Roadmap 2.0<sup>1)</sup> released by the China Society of Automotive Engineers, gasoline cars that still make up the majority of the cars currently in use will be replaced by new energy vehicles<sup>(1)</sup> or energy-saving vehicles<sup>(2)</sup> and CO<sub>2</sub> emissions will be reduced by more than 20% by 2035 from the peak level expected around 2028. The following five goals are specifically set:

<sup>(1)</sup> New energy vehicles: electric vehicles (EVs), plug-in hybrid vehicles (PHVs) and fuel cell vehicles (FCVs)

<sup>(2)</sup> Energy-saving vehicles: hybrid vehicles (HVs) and range extender EVs (REVs)

1. New energy vehicles will account for more than 50% of total sales.
2. EVs will account for more than 95% of total sales of new energy vehicles.
3. The number of owned FCVs will total about 1 million.
4. Commercial vehicles will be switched to hydrogen-powered.
5. All passenger cars that are powered only by an internal combustion engine (ICE) will be replaced by HVs.

The market share, target fuel consumption, performance criteria, etc., are specified every five years from 2025.

2025 : New energy vehicles will account for about 20% of total sales and energy-saving vehicles for 40% or more. The number of owned FCVs will total about 100,000.

2030 : New energy vehicles will account for about 40% of total sales and energy-saving vehicles for 42% or more.

2035 : New energy vehicles will account for about 50% of total sales and energy-saving vehicles for the remaining 50%. The number of owned FCVs will total about 1 million.

In 2019, “a total of 21.44 million passenger cars were sold (new energy vehicles account for 4.7% and energy-saving vehicles (i.e., HVs) for about 1% and the cumulative number of FCVs is 6178)”. This indicates the potential for rapid growth in sales of new energy vehicles (i.e., EVs), as well as HVs and FCVs in the Chinese market.

## **5. Technological proposal to Chinese domestic car manufacturers**

Regarding not only current mainstream ICEs, but also HVs and FCVs expected to grow rapidly in the coming years, SMTC is especially making the following three technological proposals to Chinese domestic car manufacturers.

- For ICEs and HVs : VG turbocharger for gasoline engines (**Figure 3**)
- For HVs : Turbocharger technology for HVs

- For FCVs : Electric turbo compressor for FCVs



Figure 3: Gasoline engine VG turbocharger for Chinese customers

## 6. SMTC technical support system

SMTC supports customers in development and mass production.

### (1) Technical services

We provide training to local engineers and on our regular visits to customers, these engineers take a leading role in proposing new technologies, making new proposals and attending to malfunctions of mass produced products. These efforts allow us to provide Chinese domestic car manufacturers with services that are in accordance with Chinese customs. Furthermore, by taking the geographical advantage of having only a one-hour time difference from Japan, the MHIET engineers from Sagami-hara, Japan, who know the core technologies of Mitsubishi turbochargers, can also visit customers directly in China, providing advanced technical support in a timely manner. For customers from the United States and Europe in China, we work closely with MHIET's overseas bases (MTEE and MTEA). Through the combined use of these resources, we provide quality technical support to our customers.

### (2) Participation in academic conferences and cooperation with universities

Participation in academic conferences and exhibitions in China helps us to promote our products and understand the regulations and market trends in China. We also hold technology exchange meetings with Shanghai Jiao Tong University to exchange views on advanced technologies.

### (3) Test facilities

Being equipped with a stand-alone test bench, we can conduct various necessary tests such as turbocharger performance, durability and functionality assessment (Figure 4).

### (4) Noise assessment

The demand for quietness of cars is increasing every year. The noise made by a turbocharger is assessed using a customer's vehicle and the stand-alone test bench, which allows us to conduct noise analysis and propose effective measures.



Figure 4 Test facility

## 7. Future direction

China, the world's biggest car market, has been tightening environmental regulations on cars. As a means of meeting new standards, expectations for turbochargers and related technologies are increasing.

Under such circumstances, SMTC will continue to help to create and realize a clean

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environment by promoting Mitsubishi turbochargers in China through the provision of fine-tuned support and improved customer satisfaction.