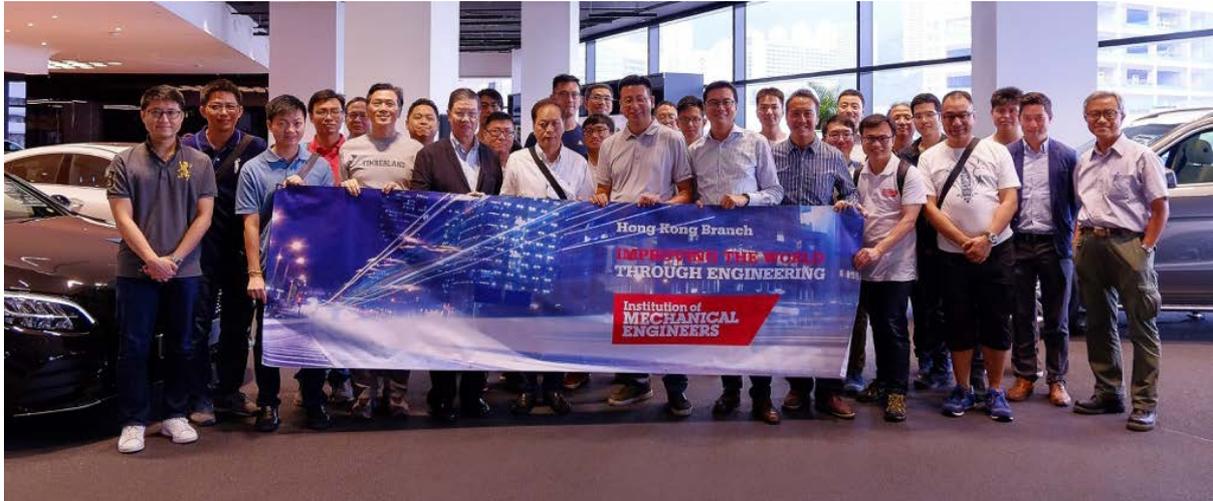


INSTITUTION OF MECHANICAL ENGINEERS HONG KONG BRANCH  
TECHNICAL VISIT TO MERCEDES-BENZ BRAND CENTRE ON 8/9/2018



*Members of Institution of Mechanical Engineers visited Mercedes-Benz Brand Centre on 8/9/2018*

Tathong Channel is the eastern gateway of the famous Victoria Harbour of Hong Kong, which sets Hong Kong Island apart from the south of the Kowloon peninsula. The first town at the eastern edge of the Hong Kong Island coast approaches from Tathong Channel is Chai Wan, a combined residential and warehousing area. By the Cargo Handling Basin towards Tathong Channel sees three (3) warehouses, and the one at the end by the praya differentiates itself from the other two (2) with its trendy façade and the well-known Mercedes-Benz (MB) star rotating on the podium towards the sea. The former Chivas Godwin has been transformed into the iconic Mercedes-Benz Brand Centre.

The brand new automotive engineering facility was open to some privileged members of Institution of Mechanical Engineers (IMechE) on 8/9/2018 for looking at some modern MB cars available for sale in Hong Kong, appreciation of the latest automotive technologies incorporated in these cars and the top class customer services to be provided by Zung Fu Company Limited (Zung Fu).

### **Quality Interface with Engineering**

As the MB sole official dealer in Hong Kong, Macau and south China, Zung Fu, a subsidiary of the Jardine Motors Group of Jardine Matheson Group, acquired the nine (9) storey Chivas Godwin in 2015 to centralise its sales and aftersales operations in Hong Kong. The 441,000 square feet floor area in Mercedes-Benz Brand Centre accommodates a 24 car showroom, the largest in the territory, on the ground and first floor, mechanical workshop with 84 service bays and paint booths from the second to the fourth floor, as well as parts store, offices and staff wellness facilities.

Supporting the MB vehicle sales and aftersales in Hong Kong is Zung Fu's 300-plus sales and sales support personnel and 600 staff members for aftersales including technicians and engineers. In Macau and south China, Zung Fu employs about 50 and over 3,000 people respectively, achieving the sales of 36,000 cars in 2017. Zung Fu is the second largest MB vehicle dealer globally.

Mercedes-Benz Brand Centre in Chai Wan serves the MB owners principally on Hong Kong Island, while the other MB service centre in the Kowloon peninsula takes care of those on the northern side of Victoria Harbour. The interior design of Mercedes-Benz Brand Centre follows the MB corporate requirements in positioning the car showroom and repair workshop, a place of quality and premium services.

### **The Electrified Boost**

The industry-wide trend of the internal combustion engine (ICE) has been down-sizing. The same engine power output rating can be delivered with one grade of displacement lower than its preceding generation with the aid of air compressor to increase the amount of air and therefore oxygen in the combustion chamber. The air compressor is often referred to as either turbo-charger or super-charger. The former air compressor type is driven by the ICE exhaust, while the latter type by the direct shaft power of ICE.

A disadvantage of turbo-charger is that at low ICE speed, the ICE exhaust is insufficient to power the turbo-charger, resulting in the ICE power output no different to a naturally aspirated equivalence. This is particular the case when the vehicle is turtling in traffic, and the full power of ICE is leashed.

The MB solution is the introduction of dual turbo-charging and voltage systems in the power-train. ICE is equipped with two (2) turbo-chargers with one is electric powered for low speed operation. While the ordinary 12 volt (V) power supply is retained to power the low voltage appliances such as the ignition sparks, lighting, audio system and the on-board control computer, a 48 V power system is available to drive the heavy duty rotational devices, such as low speed turbo-charger, cooling fan, water pump, power steering pump and air-conditioning compressor.

The 20 horse-power (14.9 kilowatt) 48 V motor in the low speed turbo-charger operates when the vehicle is at rest and travels slow, tackling the problem with the conventional exhaust driven turbo-charger at low ICE speed operation. In doing so, the low speed turbo-charger is ready to deliver the air compression required to boost the ICE power output upon the acceleration from complete rest up to the engine speed of 3,000 revolutions per minutes (rpm). Once accelerated and the ICE exhaust builds-up with the engine speed raised above 3,000 rpm, the ICE exhaust powers the high speed turbo-charger and further unleashes the energy in the fuel with the higher compression of air and hence the higher air pressure in the combustion chamber.

The dual voltage configuration results in the rotational devices in ICE being driven by electricity and the conventional serpentine belt is eliminated. The penalty of the higher weight due to the 48 V motors is partly offset by the saved energy loss in the serpentine belt. The electrified rotational devices in ICE also lead to a more compact ICE configuration. The generator which can also serve as the starter of the ICE is located between the ICE and the gearbox. It generates 48 V power using the power of the ICE or through transforming dynamic energy into electricity during vehicle braking, and the 48 V power can be saved in the dedicated 48 V lithium ion batteries. Some electricity generated is stepped-down to 12 V for charging-up the 12 V lithium ion batteries.

### **Diagnosis in Fingertips**



An objective of the new base of MB in Hong Kong is for enhancing the customer experience in respect of servicing their MB vehicles. Contrary to the preceding method of checking the vehicle conditions manually, upon the arrival of a MB car at the Service Centre, the MB in-house diagnostic computer is connected to the vehicle and the real-time vehicle data is extracted instantly. The information is transmitted to the customer service team so that

the customer service representative can have the vehicle conditions at once and communicate with the MB car owner regarding the faults identified and the preparations available to him with his minimal waiting time.

The computerised condition monitoring and fault diagnosis is however limited to the vehicle on-board computer and sensors. Mechanical problems such as abnormal vibrations have to be identified by the physical road test. Once admitted, the MB car is fully repaired in the Service Centre until the diagnostic computer detects no fault.

### **Remarks**

MB is a long recognised premium brand for cars in Hong Kong. The higher performance of the MB cars is achieved by, not increasing engine displacement and hence raising emissions whereas, electrifying the turbo-charging function for the low speed operation of a down-sized ICE. The computerised instant fault diagnosis reduces the waiting time of car checks and enhances the experience of the MB owners having their MB cars serviced. Mercedes-Benz Brand Centre, where the top class automotive technologies are demonstrated and the MB vehicles are serviced and repaired in quality and efficiently, is an excellent interface of automotive engineering with the car users.

It is worth noting that for decades, the conventional ICE-powered cars have been equipped with a starter (i.e. a motor which can produce a high torque for starting the engine) and an alternator (generator referred in the past). Although the reversed function of a starter is an alternator and vice versa, they have always been two independent and distinctive components in ICE. MB has optimised the ICE design with the combination of them into a single integrated electrical device.

In addition, the recovery of kinetic energy of a running vehicle through an alternator has appeared to be a design feature only specifically for the electric cars. This design feature has not been incorporated in the conventional ICE-powered cars until only recently, which MB has exhibited. With the intensive research and development on batteries for electric vehicles over the recent years, the production cost of sizable and durable batteries has declined substantially, permitting the conventional ICE-powered cars to join the club of kinetic energy recovery during vehicle braking.



*Mr. Edmund K.H. Leung OBE SBS JP, Past Chairman of IMechE Hong Kong Branch, presented a certificate of appreciation to Mr. Wilson Lam, Director of Zung Fu Commercial Vehicle Division in recognition of his arrangement for the technical visit*

IMechE-HKB thanks Mr. Wilson Lam, Director of Zung Fu Commercial Vehicle Division for his arrangement and hospitality in making the technical visit possible.

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# Mercedes-Benz Brand Centre

The Mercedes-Benz Brand Centre not only is the largest car showroom in Hong Kong, its 36,570 square feet workshop is equipped with the latest car repair technology like the functionality of the XENTRY Diagnosis (Mercedes-Benz diagnostic computer) for the extraction of real time engine data and predictive repair based on fault and measurement. New technologies such as 48 volt electric system to drive the turbo, air-conditioning compressor, starter and alternator, which were powered by either the engine or the exhaust gas, will also be presented.

Photograph is contributed by Mr. Wilson Lam of Zung Fu Co., Ltd. with permission to use copyright reserved



**Time:** 09:30 to 12:30

**Venue:** The Mercedes-Benz Brand Centre, 60 Ka Yip Street, Hong Kong (former Chivas Godwin)

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