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22 January 2016

BMW Brilliance Automotive opens new engine plant in China

Background information / facts and figures

1. The Joint Venture BMW Brilliance Automotive Holdings Limited

- The BMW Brilliance Automotive joint venture, **founded in 2003**, is responsible for the production and marketing of BMW automobiles in China, as well as local development tasks.
- BBA is continuing its investment in the Chinese market. In 2015 the Joint Venture invested **one billion Euros in production facilities in Shenyang**. This investment includes the new engine plant as well as the other production facilities.
- The joint venture currently employs more than **16,000 people**. A total of around **2,000 BBA employees** will work at the new engine plant over the long term.
- In 2014, the BMW Group and Brilliance China Automotive Holdings Limited agreed to extend the BMW Brilliance Automotive **joint venture agreement** four years before the end of the current contract – with the aim of strengthening the existing successful cooperation. The contract has been extended for **another ten years, namely from 2018 to 2028**.
- In **2015**, the BMW Group sold a total of **463,736 BMW and MINI** in Mainland China (**+1.7%**).

2. The BBA production location Shenyang

- BMW automobiles have been produced in Shenyang since 2003. The site is operated as part of a joint venture with Brilliance China Automotive Holdings Limited and produces BMW vehicles exclusively for the Chinese market.

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- BBA has produced **more than one million vehicles** since 2003. Annual production capacity currently stands at up to 300,000 units. More than two thirds of the BMW brand's total sales volumes in China are produced by BBA.
- The vehicles currently built in China are the **BMW 3 Series Sedan Long Wheelbase version**, the **BMW 3 Series Sedan**, the **BMW 5 Series Sedan Long Wheelbase version** and the **BMW 5 Series Sedan Plug-in-Hybrid**, as well as the **BMW X1** for the Chinese market.
- In addition to the newly-opened engine plant, the Shenyang production location also comprises the **vehicle plant in Dadong** in north-eastern Shenyang, which builds the BMW 5 Series Long-Wheelbase version, and the **Tiexi vehicle plant** in the west of Shenyang in the province of Liaoning, which went into production in 2012.
- The **plant in Tiexi** sets the **benchmark for sustainable, resource-efficient production**. The plant builds the BMW X1, the BMW 3 Series Long-Wheelbase version, the BMW 3 Series Sedan and ZINORO vehicles.
- Over the coming years, the BMW Group will **increase the number of locally-produced models from the current three to six**. The additional models will be an entry-level model below the BMW 3 Series, a compact car for the whole family and a China-specific variant of the BMW X3. One of these cars is the new BMW 2 Series Active Tourer. Introduction to the market will be in the first quarter of 2016.

3. The new BBA engine plant

- A total of around 2,000 BBA employees will work at the new engine plant over the long term.

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- The new engine plant will produce **turbo-charged three and four-cylinder petrol units** of BMW's latest Efficient Dynamics engine family for the local market.
- Common to all units is their in-line configuration. The core engine comprises cylinders with an individual displacement of 500 cc. This means the new three-cylinder engine has a displacement of 1.5 litres and the four-cylinder engine 2.0 litres.
- The annual capacity of the engine plant is tied to that of the two automobile plants, with up to **300,000 units per year**.
- The **entire value chain** is housed under one roof, including foundry, machining, assembly and logistics. This arrangement saves space, logistic costs and reduces the through-put time, optimises value streams and allows the building to be run in an energy-efficient manner.

4. Facility & technology highlights

4.1. Modular engine production

- The new **modular engine production** builds on the engine expertise of the various BMW Group engine plants: Both the setup and the ramp-up of the production lines took place synchronously at the European engine plants in Munich, Hams Hall and Steyr in 2013. The three plants each optimised their own launch, coordinated best-practice solutions throughout the entire network and installed mostly identical production facilities – despite differences in combustion technology. In preparation for the start of production, the engine plant in Shenyang followed suit.
- Each of the engine plants serves as a competence centre within the global production network: Engine Plant Munich bundles the expertise on petrol engines as well as high-end engines. Plant Steyr serves as the centre of

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competence for diesel engines. Plant Hams Hall produces the award winning BMW i8 three-cylinder engines in addition to other petrol units.

- Plant Shenyang serves as the BMW Group's **first engine competence centre in China** with the complete engine production process – from foundry to final engine assembly – realized in one location.
- The engines have a **standard design**, a high percentage of **identical parts** and a **uniform process** for manufacture. Thanks to construction commonality within a combustion type, the proportion of shared components has increased to as much as 60%, while design commonality between petrol and diesel engines is approximately 40%.
- **Further advantages of the modular system:** Optimum value streams and synergies can be realised in production within the international network. There is an increased joint understanding of quality due to the identical production and process standards. Thanks to the standardised production system, the engine plant can respond very quickly and flexibly to changes in customer demand and market developments.

4.2. Light metal foundry

- Uses **high-strength cast aluminium alloy** which is utilised in the aircraft industry.
- The light metal foundry adapted the production of sand cores, replacing traditional organic binders with particularly **eco-friendly inorganic binders** that produce **close to no emissions** and enable best-operator working conditions at core making and casting machines. A **reduction of 98% in emissions of combustion residues** can be achieved.
- The BMW Group was the first automobile manufacturer worldwide to use this **eco-friendly binder system** completely in series production. After a successful implementation in its foundry in Landshut in 2009, this state-of-

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the-art environmentally-friendly technology has now been adopted in China. The foundry in Shenyang is the **first one in China** using this system.

- **90% of the sand** used for casting can be **recycled** to reduce waste to a minimum. In 2009, the BMW Group became the first to use this state-of-the-art, eco-friendly technology completely in series production of castings worldwide. The regeneration process for inorganic used sands was developed by the BMW Group.
- The BBA light metal foundry is divided into three production areas: Core Shop, Casting/Raw Part Treatment and Raw Part Machining.
- BMW's latest **low-pressure die-casting technology** is installed. There are two casting lines with 12 casting units in total.
- Liquid aluminium alloy is filled from the oven below the casting mould into the mould at a pressure of 0.35 bars. A **shuttle system** (lower level) for the crucible-holding furnaces allows fast and safe filling at the casting units. The temperature of the molten aluminium alloy is 760°C.
- Thanks to the in-house smelter, aluminium can be delivered in solid state. Furthermore, residue can be re-melted and recycled.
- Improving and accelerating the solidification of the liquid aluminium that is heated to around 760°C during casting increases the component strength. This lightweight and strength potential allows a higher combustion pressure and power density and therefore results in energy-saving and fuel-efficient engines.
- In 2013, the BMW Group's alloy foundry in Landshut introduced an innovative, sustainable technique called **wire arc spraying** ("Lichtbogendrahtspritzen", or LDS) in the production of die-cast aluminium in crankcases – a world first in large-scale series production.
- The innovative technology is of particular customer value as it **reduces fuel consumption and prolongs the service life of the engine**. LDS is

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used to apply a thin coat, just 0.33 millimetres thick, of an iron-based material. The iron alloy is introduced into the process as wire, which is melted by light arcs and fired at the surfaces in liquid form at a very high speed.

- LDS technology offers a number of **major advantages**. One is the capacity to reduce the degree of friction and thus improve fuel consumption. Other benefits include the fact that it offers optimum durability, as well as very good heat transfer into the crankcase. Cylinders coated using this technology are also extremely robust both thermally and mechanically.

5. Brief facts about the automobile production plants

BMW Brilliance Automotive Plant Tiexi	
Start of construction	June 2010
Official opening	May 2012
Products	BMW X1, BMW 3 Series Sedan (Long Wheelbase and Standard Wheelbase versions), ZINORO E1

BMW Brilliance Automotive Plant Dadong	
Official opening	May 2004 Dadong Plant was the first BBA plant in China. Its 250,000th BMW car rolled off the production line in May 2011.
Products	BMW 5 Series Li (Long Wheelbase version)

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6. History of BMW Group in China

1994	BMW AG representative office established in Beijing
2003	Establishment of “BMW Brilliance Automotive, BBA”, the joint venture between BMW Group and Brilliance China Automotive Holdings Ltd. Construction of BBA plant in Dadong (Shenyang) begins. Start of production of BMW 3 Series for Chinese market in Shenyang.
2004	BBA plant Dadong opens.
2005	Establishment of BMW China Automotive Trading Ltd. in Beijing to market imported BMW and MINI automobiles. Technical Department opens. Start of R&D in Chinese market at Beijing location.
2006	Market launch of BMW 5 Series Long Wheelbase version developed for Chinese customers and built at the Dadong plant. International Purchasing Office opens in Beijing.
2007	Opening of three BMW parts distribution centres (Shanghai, Beijing, Foshan).
2009	Construction of second plant in Tiexi (Shenyang) announced.
2010	Market launch of second generation of BMW 5 Series Long Wheelbase version. Construction of Tiexi plant begins. Establishment of BMW Automotive Finance (China) Co. Ltd.
2012	Start of production of BMW X1 at the plant Tiexi Start of production of 2.0 litre four-cylinder petrol engines at an engine production facility between Tiexi and Dadong (March) Opening of the Design Studio in Shanghai (late April) Official opening of Tiexi plant: Production of BMW X1 and BMW 3 Series Long Wheelbase version begins (late May) Market launch of BMW 3 Series Long Wheelbase (late July)
2013	The sixth-generation BMW 3 Series sedan rolled out at Tiexi Plant. With this, BBA's product range expands to four models 10 th anniversary of BBA



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	Opening of BMW Brand Experience Centre and MINI Brand Experience Centre in Shanghai Launch of ZINORO brand and the first product, ZINORO 1E Opening of BBA R&D Centre
2014	Launch of BMW i3 & i8 (Sept. 2014) 16 July 2014: The BMW Group confirms the extension of its joint venture partnership with Brilliance Auto in Mainland China up to 2028. With this extension, BMW further intensifies its involvement in China by increasing local production capacity, doubling its range of locally-produced models to six and producing state-of-the-art-engines in China.
2015	BBA one millionth car produced A total of 463,736 BMW and MINIs were sold in Mainland China (+1.7% compared to 2014).
2016	Opening of new BBA engine plant (January 2016)

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