



## **Press kit BMW Plant Munich**

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## **1. The BMW Plant. A passion for technology**

The BMW Plant Munich is the third element in the complete BMW Welt experience. As the main BMW Group plant, the BMW Plant Munich combines the highest level of engineering expertise and innovation with its employees' passion for the brand and the company. Located in the north of Munich, directly next to the Group headquarters, the BMW Museum and the BMW Welt, it builds more than 900 BMW 3 Series models (Touring and Sedan) and engines per day – four and eight-cylinder petrol engines, six-cylinder diesel engines, high-performance engines for BMW M models, as well as 12-cylinder engines. Each of the six generations of the BMW 3 Series has been built at this location steeped in tradition.

The main plant within the city of Munich is the heart of the BMW Group. Vehicles and engines have been produced at this location since 1922. The BMW Plant Munich's multi-layered infrastructure, which has developed in parallel with the urban residential area that surrounds it, is reflected in its sophisticated plant facilities and innovative production processes. The smooth interaction between production, logistics, transport and administration in such a confined area is one of the most impressive achievements in modern automobile construction worldwide.

The BMW Plant Munich employs a workforce of around 9,000 people from more than 50 countries, including more than 700 apprentices. The BMW Plant Munich houses all automobile production technologies – press shop, body shop, paint shop, engine production and assembly, as well as a tool shop, production of equipment and seats, and a laboratory – in an area of 500,000 m<sup>2</sup>. It belongs to the BMW Group's global production network of 29 sites in 14 countries, and, as part of the BMW Welt, also serves as a "window on the world of BMW production". Individual tours provide a unique and authentic insight into automobile production today.

The BMW Plant Munich is the "lead plant" for production of the current BMW 3 Series, and serves as an internal competence centre. Process and technology know-how, and the experience that comes from almost 90 years of automobile construction, are transferred from here to the BMW Group's other production locations.

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## **1.1 Premium production for premium products**

The same standards of quality, safety and careful use of resources apply to all BMW plants within the BMW Group's international production network. Innovative production technologies and highly skilled employees at all locations produce premium cars "made by BMW", comprising more than 10,000 parts and components. The same principle applies at the BMW Plant Munich.

Flexible production is geared towards customer benefits: innovative production at the BMW Plant Munich allows individual customer specifications to be implemented quickly and flexibly, according to schedule. The processes this entails are extremely complex and require highly flexible structures – BMW is expert in both of these areas.

At the BMW Plant Munich, it is possible to follow the complete process from steel plate to finished vehicle. The plant houses all of the technologies for automobile production under one roof. A plant tour through the facilities, including press shop, body shop, paint shop, engine production, production of equipment and seats and assembly, is therefore quite an experience.

### **The press shop**

The press shop produces more than 130,000 body parts a day out of approximately 600 tonnes of different kinds of steel plate. This is where employee experience meets state-of-the-art technology. Together with the body shop, the press shop implements groundbreaking design concepts, which lay the foundations for optimum driving and crash behaviour. Every BMW car body is made up of many hundreds of individual parts and components produced in the press shop from the most advanced new steel alloys and aluminium. Synthetic materials and carbon fibre may also be used, depending on the model.

Most body parts start out as so-called "coils" – rolls of high-quality, zinc-plated steel sheets or deep-drawing sheet metal. Approximately 20 different types of steel are used in sheet thicknesses varying from 0.7 to 2.2 millimetres. These coils comprise

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up to 3.5 kilometres of steel plate and weigh up to 30 tonnes. The steel sheets acquire their final form in several stages as they proceed along the press lines. The heart of the press shop is the new high-speed servo press with a total force of up to 9,000 tonnes. With a length of 85.9 metres, width of 22 metres, height of 11.5 metres and depth below ground of 5 metres, its dimensions are just as impressive as its strength. This pressing machine is one of the most advanced in the world. With a throughput of 600 tonnes of steel per day, the machine could produce enough steel to build the Eiffel Tower in Paris in just 12 days. The new production infrastructure also guarantees optimum material flows and usage of space.

**The body shop**

The parts and components made in the press shop are joined together in the body shop using optimised welding and riveting technologies. Robots in four halls perform highly complex production steps with utmost precision, applying the welding spots with supreme accuracy down to a tenth of a millimetre. Besides the various welding techniques, the body shop also uses other joining methods, such as glue. This seals the vehicle and provides superior body strength, optimising vehicle handling and absorbing maximum energy in the event of a collision.

All processes in the body shop are almost fully automated, with several advantages. Robots are able to perform welding operations at a constant speed with replicable results without fatigue. With up to 6,000 welding spots per vehicle, that is an important quality and safety factor. It also means that employees are now able to avoid the previously inevitable physical strain of handling equipment such as heavy welding gear. The high level of automation allows different body derivatives – such as variants of the 3 Series Sedan and 3 Series Touring (rear-wheel drive, four-wheel drive, hybrid, all with or without sunroof) – to be built on the same production line.

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### **The paint shop**

Brilliant colours, reliable corrosion protection and a touch of class – the paint shop is where every model realises its full splendour. The focus throughout the entire painting process is on environmentally friendly methods, such as the use of water-based paint and cutting-edge methods of application.

After pretreatment, in which the car body is first thoroughly degreased and treated with an alkaline detergent in a dip bath, a layer of zinc phosphate is applied to the body in a further dip bath. This forms a consistent base coat for the subsequent four layers of paint and protects the body from corrosion beneath the paint. The first actual layer of paint is then applied in the subsequent cathodic dip bath. The car body is negatively charged (cathode) on copper tracks around the edge of the bath and then fully submerged in paint. The positively charged paint particles are attracted by the negatively charged body, causing the paint to adhere instantly to the body surface. An innovative rotational dip process ensures optimum paint distribution.

Filler is then applied: the filler protects the previously applied cathodic dip coating against light, levels out any unevenness to within thousandths of a millimetre, forms a good foundation for the top coat and provides additional sheen. What is more, it achieves all of this with a coating only 30 thousandths of a millimetre thick.

The vehicle then acquires the customer's chosen colour as it passes along the top coat line. High-speed rotary drum atomisers – also called bells – apply the base coat in matte and metallic finishes. Air directs paint particles which do not stick to the car body downwards for collection in flowing water. These paint particles are washed out in the lower part of the paint shop and the water cycled back.

A final hard, durable coat of clear varnish is applied to give the car body protection and sheen, before it is stored in the fully automated high-bay warehouse, where it will stay until retrieved for assembly in the scheduled order.

### **Engine production**

Engines have been an integral part of BMW and its core competence for decades. The engine is an important factor in BMW's legendary "sheer driving pleasure" and

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combines exceptional driving performance with low fuel consumption and CO<sub>2</sub> emissions.

Optimum running smoothness and driving pleasure are the result of the most demanding production technologies. More than 1,100 employees at the BMW Plant Munich build the full range of BMW Group engines – from the straight-four engine to high-performance power units for the current BMW M model range, to the V12 for Rolls-Royce and BMW vehicles.

All BMW engines incorporate parts and components crafted and machined to within a thousandth of a millimetre. Before being fitted into the vehicle, each engine goes through specific test cycles, such as a cold test, which allows 100 per cent verification of all functions within a very short time, without using any fuel. After this, the complete engines are delivered to the assembly line of the relevant assembly plant in exactly the right order.

### **Assembly**

Every BMW is different, simply because customers have their own personal preferences. The customer ultimately decides what his or her dream car should look like. In the assembly process, BMW builds each customer's car according to their wishes at exactly the time specified. This allows the customer to change his or her order up to just six days prior to the start of assembly, when internal suppliers and external partners are notified which parts are needed for the vehicle.

Once the paint process is complete, the body proceeds to the high-bay warehouse for storage. The warehouse holds between 200 and 400 car bodies on average. Four days before the start of assembly, the assembly facility receives the customer order and the sequence of assembly is fixed. The logistics system then automatically calls in the necessary materials from the suppliers. Assembly retrieves the finished body for the customer order from the high-bay warehouse and inscribes the chassis number, thereby assigning the vehicle to that customer. From now on it is his or her vehicle – and made-to-order production, with a wide range of different variants, can begin.

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The swivelling conveyor belt turns the body, allowing employees to work on the under-floor of the vehicle in an optimum position for perfect ergonomics. The fuel tank and fuel and brake lines are fitted in this process, for example. The next step is “interior construction” which fits the vehicle with carpet, roof lining, cockpit, control units, seats, doors and glass.

The “wedding” joins the power train to the car body – and marks the start of the last stage of production: final assembly. Wheel housings are fitted and wheels mounted; the car is filled with the necessary fluids and other items, and wheel alignment adjusted. This final assembly process ends on the dynamometer, where numerous systems are tested once again under regular driving conditions.

The entire assembly process is defined by an innovative production strategy: individual parts are fitted together in separate assembly areas to form a larger component (e.g. cockpit, front-end, doors, drive unit) and delivered to the main assembly line in the correct order (just-in-sequence). This ensures maximum flexibility for the main assembly line.

**Employees as guarantee of success**

The most important factor in the success of the BMW Plant Munich is its people. The dedication of its employees, their sense of responsibility, their identification with the company and, above all, their immense know-how, make a decisive contribution towards the success of the company. Each and every employee plays an important part in the complex production network and is ultimately responsible for the high level of product quality. A strong sense of responsibility, constant monitoring of personal work quality and willingness to train for new tasks shape the corporate culture practised by all the company’s employees.

Employees ensure the transfer of know-how between plants as part of an intelligent network. Their commitment is what enables a new plant or new model to ramp up on schedule with the usual high standard of quality from the very beginning.

More than 300 work-time models, consistent profit sharing, opportunities to work abroad, cooperation with colleges and universities, an extensive vocational and

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continuing education programme and the largest percentage of female employees in the automotive industry are just some of the elements that contribute to sustainable human resources. The BMW Group human resources policy also includes additional options such as flexitime, part-time employment, job-sharing, teleworking and sabbaticals.

## **1.2 History of the BMW Plant Munich**

The origins of BMW production go all the way back to the year 1917. BMW's main plant has been based in Munich-Milbertshofen, in the north of the city, since 1922. Situated next to the Olympic Park and in the immediate vicinity of the Group headquarters, the BMW Plant Munich is located in the middle of the city. Originally, the plant built only aircraft engines and motorcycles: Its 100,000th motorcycle rolled off the production line here back in 1938.

Automobile production did not get underway in Munich until 1951 with the launch of the BMW 501. The first BMW Isetta was built just four years later, securing additional jobs at the site. The first model in BMW's new range, the BMW 1500, entered production in mid-1962. This sporty four-door mid-range sedan laid the foundation for BMW's success in the market. A number of production stages were transferred from Milbertshofen to the town of Dingolfing in the late 1960s, with motorcycle production moving to Berlin in 1969 to relieve the BMW Plant Munich. The BMW 3 Series, to this day the BMW brand's most successful model series, entered production at the Munich plant in 1975. Numerous innovations in control and production technology were introduced at the Milbertshofen plant for the first time – such as the world's first fully automated production of the underbody assembly in the body shop. The 1980s were characterised by on-going expansion and enlargement of BMW's production network, with new plants in Steyr, Regensburg and Wackersdorf all going on-stream. After the foundry was moved to Landshut and BMW's Research and Innovation Centre completed in the north of Munich, the main plant concentrated on the production of automobiles and engines from the mid-1980s on.

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One of the key decisions taken in the 1990s was to build all of the BMW Group's large, high-performance engines at BMW Plant Munich. BMW and its neighbours attach great significance to the environmental friendliness of its production in the heart of the city. In 1994, BMW established a neighbourhood forum, with the BMW Plant Munich even earning the City of Munich Environmental Award in 2003.

### **The new BMW plant tour**

The tour through BMW's main plant offers an exciting insight into all areas of automobile production. The experts guiding the tour focus on the guests' specific information needs. Since the BMW Welt opened, visitors – including many customers collecting their cars – have been able to discover the plant along the new production mile, which leads through a total of 12 production halls and all areas of production, ranging from press shop to assembly. In this way, visitors can witness the manufacture of the current BMW 3 Series Sedan and the BMW 3 Series Touring at first hand.

### **Current production**

The current BMW 3 Series Sedan has been in production at the BMW Plant Munich since autumn 2011 and the BMW 3 Series Touring since mid-2012. The latter is manufactured exclusively at the BMW Plant Munich for sales worldwide in a wide range of variants, such as right- and left-hand drive. The BMW Plant Munich functions as the lead plant for the ramp-up of the new BMW 3 Series. All regions worldwide are supplied directly from the main plant for a synchronised market launch. The BMW Plant Munich also defined the assembly sequence and process modules for production of the BMW 3 Series throughout the production network. The ramp-up of the sixth generation of the BMW 3 Series marks the beginning of a new era for the BMW Plant Munich. Investment has been channelled into areas such as innovative production systems and state-of-the-art manufacturing technologies as part of a long-term strategy to strengthen the competitiveness and future viability of the plant and secure some 9,000 jobs in the Bavarian capital. In



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this way, the BMW Group is fulfilling its special social commitment to its headquarters.

New manufacturing structures were created in all areas of production to ensure the highest possible level of precision and efficiency. For instance, a new large press is among the equipment used in production of the sixth-generation BMW 3 Series. With 17 strokes per minute, the system is one of the most advanced in the world. The new production infrastructure guarantees optimal material flows and economy of space. Standardised product and process modules also contribute to high productivity and versatility. Thanks to these innovative manufacturing processes and technologies, the BMW Plant Munich is setting cutting-edge standards for sustainable and environmentally compatible automobile production.

In the process of manufacturing the new BMW 3 Series, BMW has achieved virtually residual-waste-free production, reducing waste, wastewater and emissions almost to zero and noise and vibrations to a minimum. The BMW Plant Munich also attaches considerable importance to harmonious coexistence with the community. Protecting inhabitants from production-related noise by reducing noise emissions, the use of innovative silencers, fans and soundproofing and optimising transport logistics is a priority, for example. State-of-the-art filter systems and regenerative afterburning of exhaust air also prevent odour emissions from the paint shop.

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