

Opening of the production site Tiexi. Contents.



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1. Opening of the production site Tiexi. (brief version)

The BMW Group takes a further step in consistently extending its global production strategy by opening the new vehicle plant Tiexi in Shenyang together with its partner, Brilliance China Automotive Holdings Ltd. The Tiexi plant will start out by producing the compact Sports Activity Vehicle BMW X1 for the Chinese car market; soon, however, the new BMW 3 Series Sedan Long Wheelbase will also roll off the assembly line. The site is located in the west of Shenyang, a city in the Chinese province of Liaoning. It has been allocated for an annual production capacity of up to 100,000 vehicles. This means that the total production volume for BMW vehicles in China will be doubled from the numbers currently covered by the Dadong plant in North-East Shenyang. Current planning already allows for the option to expand capacities at both plants to up to 300,000 units annually. The present expansion of production capacities is geared toward meeting the continuously rising demand for premium vehicles of the BMW brand in the growing Chinese market. The joint venture BMW Brilliance Automotive has invested a total of 1 billion euros into building the new Tiexi plant and expanding the existing Dadong plant (completed in late 2011).

The opening of the Tiexi plant and the expansion of production capacities will entail the creation of over 2,000 new jobs in the years to come, in addition to the about 8,000 jobs that have previously been created in Shenyang. In addition, the location stands to benefit from the close cooperation with universities concerning the training of specialist workers as well as with local suppliers. The BMW Group and Brilliance China Automotive Holdings Ltd. have furthermore started to produce four-cylinder powertrains at a new engine plant in Shenyang. Investment in the construction of the new site amounted to approx. 50 million euros. The engine plant, which has a workforce of 600 associates, provides powertrains to both the Dadong and Tiexi vehicle plants to be fitted in the BMW vehicles produced at the two sites.



Strengthening the global production network.

The new Tiexi plant is an important step in further strengthening the BMW Group's global production network, which at present comprises production sites in 14 different countries. The decision to establish a second plant in China is rooted in the 'production follows the market' principle that the BMW Group applies to achieve a balanced ratio between demand and production capacities in the regions Europe, America and Asia.

Further capacity increases in all regions of the BMW Group's global production network are planned to meet the rising demand. At present, investment in the BMW Group's German plants, which beat the magic mark of one million units produced for the first time in 2011, amounts to two billion euros, earmarked for the modernization and expansion of production facilities. In reaction to the continuing rise in demand on the American continent in 2012, production capacities at BMW's Spartanburg plant will be stepped up to about 350,000 units annually by 2014. And in China, a market with a particularly dynamic sales growth of presently 36.6 percent over the first quarter of 2012, the opening of the Tiexi plant makes a significant contribution to optimizing the global balance between production and market.

State-of-the-art production technology guarantees quality made by BMW.

All production processes at the Tiexi plant comply with the BMW Group's ambitious, globally valid standards with regard to quality, safety, and sustainability. The experiences gained within the BMW Group's global production network were applied both in planning and building the site as well as in establishing suitable production processes and technologies. Furthermore, the new plant was able to form partnerships with and draw on the vast launch expertise of the BMW plants in Leipzig and Munich, respectively.

A particularly high level of quality and efficiency is achieved thanks to the consistent implementation of the BMW Group's value-added production system. Another strong point of the Tiexi plant is its great flexibility. Premises



of about 220,000 square meters are home to the pressing plant, body-in-white, assembly, logistics, and administration, all located in one building ('single roof concept'). Highly qualified associates, camera-monitored laser welding procedures and an automation level of 96 percent ensure that maximum quality is reached in the body-in-white. Latest findings in the areas of safety, ergonomics, quality assurance and efficiency optimization were applied when designing the assembly.

Production at the Tiexi plants sets new standards for sustainability.

The new Tiexi plant does not only set new standards in terms of the quality of the vehicles produced, but also in terms of sustainability. State-of-the-art production methods, developed from experiences gained in the BMW Group's global network, allow for particularly resource-friendly production. When it comes to energy and water consumption, the amount of waste and wastewater as well as solvent emissions, the Tiexi plant is the most sustainable vehicle production site in China. And within the BMW Group's global production network, the new location ranks among the company's most sustainable plants.

Environmental aspects were considered already when planning the building. The 'single roof concept' that houses the body-in-white, assembly and logistics lowers space requirements and facilitates energy-saving air-conditioning. The production facilities are set up around the central building, which serves as the main entrance and houses all central functions, such as offices, social services, archives and storage spaces. The specific architecture, which offers an open view of and clear guidance around the premises, furthers communications as well as productive cooperation across functions. Another central element of the single roof concept is the conveyor line which transports car bodies on their way from the paint shop to assembly directly through the central building.

BMW Group on track to success in China.

Since 2003, the BMW Group has operated the Dadong plant in Shenyang together with their joint-venture partner, Brilliance China Automotive Holdings Ltd. At present, the site produces the BMW 5 Series Sedan Long Wheelbase



for the Chinese market. Naturally, Chinese customers are also offered all other models of the BMW, MINI and Rolls-Royce brands produced for the global market. In 2011, BMW Group sales in China reached a new all-time high of 233,630 units. In the first three months of 2012, sales increased significantly again. A total of 80,128 vehicles sold accorded to a rise of 36.6 percent compared to the same period last year.



2. Production and market in global balance.

The Tiexi plant and the engine plant of the joint venture BMW Brilliance Automotive raise the total count of the BMW Group's production network to ten vehicle and four engine plants. Other sites in the company's global network include two plants and one CKD production site for motorcycles, six component plants, six CKD plants and one contract manufacturing. In other words: The BMW Group produces – under own responsibility, together with joint-venture partners or through outsourcing – in 14 countries on four continents.

At the BMW Group's German production sites alone, over one million vehicles were produced in 2011. At present, additional investments are being made in Germany. In the US, the production capacity of the Spartanburg site will be expanded to about 350,000 units annually by 2014. In the UK, further investment has been earmarked for the preparation of the MINI Production Triangle, which includes the locations in Oxford, Hams Hall and Swindon, for the production of the next-generation MINI. Capacities in South Africa are being stepped up as well.

When creating additional production capacities, the company bases the considerations regarding its China commitment once more on the development of the global automotive markets. In the recent past, the BMW Group has raised production volumes at existing plants in Europe as well as in Northern America and Asia, reflecting the global growth in sales. As laid out in the growth strategy Number ONE, the BMW Group aims to achieve global sales of two million vehicles annually by 2016. The underlying principle for planning production capacities – 'Production follows the market' – is geared toward ensuring the balanced development of demand and local production in the most important sales regions worldwide in the medium and the long term.



New record sales, doubling of production capacities.

In the Chinese car market, the BMW Group reached record vehicle sales of 233,630 units in 2011. In the first quarter of 2012, Chinese demand for the BMW Group's premium vehicles again increased significantly. The continuously high growth in sales is now matched by an equally considerable expansion of production capacities in Shenyang that is manifested in the opening the Tiexi plant. The new site is presently allocated for the production of up to 100,000 cars annually, an amount that doubles the production volume of BMW automobiles for the Chinese market so far delivered by the Dadong site. However, the plant's structure and design allows for an allocation of 200,000 units. So consequently, the two sites combined could deliver up to 300,000 units a year as early as in 2014.

Moreover, the BMW Group and its partner, Brilliance China Automotive Holdings Ltd., have commissioned a new engine plant in Shenyang that is going to produce four-cylinder powertrains. The construction of this new production site entailed an investment of approx. 50 million euros. Complementing the main plant in Munich, this new site is the second production location for the new 2.0-liter powertrains with BMW TwinPower Turbo technology. The engine plant, which provides employment for about 600 people, delivers drive units to both vehicle production sites, Dadong and Tiexi, to be fitted in the BMW vehicles made there.

The opening of the Tiexi plant plus the conditions established at the site to increase capacities further are a manifestation of the BMW Group's great trust in a continuously positive development of the premium automobile market in China. Together with its partner, Brilliance China Automotive Holdings Ltd., the BMW Group has invested approx. one billion euros in the Tiexi plant and the expansion of capacities in Dadong.

Creating new jobs and giving a fresh impetus to the location Shenyang.

The expansion of automotive production at Shenyang by the new Tiexi site entails the creation of about 2,000 new jobs in addition to the 8,000 jobs



previously generated. Consequently, the total headcount of people producing BMW vehicles and BMW engines in Shenyang is about to rise to over 10,000.

A complex qualification procedure was devised to train the future workforce of the Tiexi plant and familiarize them with the production processes developed by the BMW Group. The majority of these specific training sessions took place at the plant in Dadong which has been implementing the BMW Group's global standards with regard to quality, safety and sustainability for many years. In addition, Chinese associates were also trained at the German plants Munich and Leipzig, employees from the new engine plant were trained in the existing engine plants in Munich, Hams Hall (UK) and Steyr (Austria).

Another lasting effect to foster the economic development in the Shenyang region is the BMW Group's collaboration with regional suppliers and production partners. The close cooperation, which includes locating suppliers and service providers right on the plant premises, has a major share in optimizing the quality level and ensuring maximum efficiency in production. Chinese suppliers were also involved in the development and setup of production facilities at the Tiexi plant. This close collaboration with the Chinese partners allowed the BMW Group to consider regional particularities while at the same time ensuring compliance with the BMW Group's stringent quality standards.

Production of BMW vehicles in China: A success story since 2003.

The opening of the Tiexi plant is the most recent milestone in a success story that began almost ten years ago when the BMW Group and Brilliance China Automotive Holdings Ltd. launched their joint venture. Later that same year, production of BMW 3 Series vehicles for the Chinese market was initiated in Shenyang. 2006 saw the start of production for the first model specifically developed for the Chinese automobile market. The first generation of the BMW 5 Series Sedan Long Version was produced until 2010 when it was replaced by the current model. Shortly, the BMW Group will launch a second model specifically designed to meet the demands of Chinese customers: the new BMW 3 Series Sedan Long Version, to be produced at the new Tiexi plant. Workers at the new plant will furthermore produce BMW X1 vehicles for



the Chinese market. The key aspect all these models have in common: They have been devised in the BMW Group's development unit in Munich and are produced in China in line with the BMW Group's globally mandatory standards with regard to quality, safety, and sustainability.

Proof of the high quality of the vehicles made in Shenyang is the excellent results they repeatedly achieve in the J. D. Power Report on customer satisfaction in the Chinese car market. And in the Initial Quality Study (IQS), carried out by the renowned US market research company J. D. Power and Associates, the BMW 5 Series Long Version ranked first in 2010, the BMW 3 Series in 2011.



3. Quality made by BMW.

As part of their joint venture, the BMW Group and Brilliance China Automotive Holdings Ltd. have run the production of BMW cars in Shenyang since 2003. All operations comply with the BMW Group's mandatory global standards with regard to quality, safety, and sustainability. From the very beginning, the new Tiexi plant has been designed as a member of the BMW Group's global production network. This is why the joint venture was able to draw on considerable experience and expertise from around the globe when planning and erecting the plant. Furthermore, all areas of vehicle production at the site apply state-of-the-art production processes that ensure the implementation of the value-added production system developed by the BMW Group.

The Tiexi plant is situated in the west of the City of Shenyang, a location that offers ideal conditions for establishing vehicle production on top global level both with regard to the use of space, traffic connections and energy provision on the one hand and the proximity to the existing Dadong plant on the other. The new production site has been designed in such a way that the anticipated capacity extension from initially 100,000 to up to 200,000 units annually can be carried out without interrupting daily operations. From the outset, the Tiexi plant also offers maximum model flexibility in production. While the initial scopes are limited to the BMW X1 and, in the near future, the BMW 3 Series Sedan Long Version, further models can be integrated in the production process if demand arises.

Single roof concept: Compact, flexible, energy-efficient.

Plant Tiexi has been planned and built in keeping with the single roof concept, which places production facilities around a central building. This plant setup offers great flexibility for additional expansions at a later point. Further advantages are the low space demand, the optimization of energy efficiency thanks to the minimization of outer walls, and the promotion of communications and productive cooperation across functions, thanks to an open view of and clear guidance around the premises. The uniform



structure of the building ensures that, despite the multi-level architecture, the central building is oriented towards the body-in-white and assembly as far as the formal and structural setup is concerned. All in all, the building combines a very clear structure with maximum design quality and a harmonious appearance.

The central building serves as the main entrance and houses all central functions with offices as well as areas for social services, archives and storage. These include offices of the research and development departments, the management and the works council, health services and plant security as well as the staff restaurant and cafeteria, training facilities, a library and a gym, visitor services and a forum. Starting at the central building, a 'skywalk' that runs on a height of five meters leads staff through the body-in-white and further on to the logistics and assembly hall. Another central element of the single roof concept is the conveyor line which transports car bodies on their way from the paint shop to assembly directly through the central building.

Press shop and body-in-white: Precise, productive, efficient.

At the Tiexi plant, sophisticated production processes are combined with state-of-the-art technology. The pressing plant, for instance, is equipped with innovative facilities that allow for both an increase in productivity and a reduction in energy demand. The new high-speed servo presses offer a total pressing power of over 10,000 tons and a top speed of 17 passes per minute. Compared with conventional pressing systems, the production time per unit as well as floor space requirements at the plant are reduced by about two thirds. At the same time, energy consumption is reduced by 40 percent per work step and noise emissions have fallen from 92 to 80 dB.

The high-speed servo pressing technology was introduced as a first at BMW. Following the implementation of this new technology at the press shops in Leipzig, Regensburg and Munich, the same technology is now being set up at the Tiexi pressing plant, complementing BMW's global press shop network. The high degree of standardization provides ideal conditions for mutual short-term and flexible support within the growing global pressing plant network.



The application of 350 production robots of the latest generation ensures an automation level of 96 percent in the body-in-white. Just like at the BMW plants in Munich, Regensburg and Rosslyn (South Africa), state-of-the-art production methods are applied in Tiexi, which include camera-monitored laser welding technology as well as gluing robots for the particularly precise, swift and low-heat joining of car body parts.

Vehicle assembly: Flexible and quality-driven.

With its one-line production facility on one building level, latest conveyor belt technology in a finger system and state-of-the-art quality assurance facilities, the Tiexi plant sets new standards worldwide also in terms of modern vehicle assembly. The assembly facilities have been developed taking the most recent safety-technology related and ergonomic findings into consideration. Depending on the specific work step, the height and inclination of the vehicles fixed to the operator travel conveyors can be adapted to allow the worker to assemble the vehicle in an ergonomically favorable and upright position as well as to facilitate reach of certain sections and components.

The integration of suppliers' operations right on the plant premises ensures short supply lines and just-in-sequence assembly. So this is another key element of particularly efficient and flexible production. Furthermore, the vehicle assembly concept offers scope for the flexible extension of the capacities at the Tiexi plant. As the site has a modular setup, the current level in production of 15 units hourly can be increased on demand.

The paint shop: State-of-the-art and sustainable.

Another special highlight of the Tiexi plant is the state-of-the-art painting procedure, to be applied from 2013 on. At present, the coloring and surface sealing processes for the bodies-in-white made at the plant are carried out at the paint shop of the Dadong plant while on the Tiexi premises, preparations are under way for the opening of the automotive industry's most sustainable paint shop worldwide. This outstanding status of the new facility is due to, among other things, the Integrated Paint Process developed at the BMW Group's Oxford plant. The procedure is unrivalled in more than one way: Firstly, it reduces energy consumption, carbon emissions and solvent



emissions considerably; secondly, it increases productivity by about 40 percent. And thirdly, it renders the primer coating that used to be required unnecessary as it can now be replaced by two newly developed base coats that are applied one after the other in a wet-on-wet process. While the first base coat assumes the protective effect of the primer, the second ensures the visual characteristics with regard to color, effect, and depth. When the two base coats are covered with clear coat, all visual and functional requirements are met. Doing without the application and curing of the primer also reduces the processing time per vehicle.

Moreover, the new facility will be equipped with a cathodic dip-paint coat facility whose precisely defined turning and rolling movements ensure that the paint is distributed evenly on the electrostatically charged car body. The IPP lines work with a combination of dry separation and air circulation. Consequently, both wastewater and energy applied to heat the air are reduced significantly.

Integration into the global production network thanks to standardized processes, communal facilities and knowledge transfer from partner plants.

The Tiexi vehicle plant sets new standards for the production of premium automobiles in China and in the BMW Group's production network. Combining state-of-the-art technologies in a particularly concerted manner, the site achieves an outstanding level also in terms of sustainability. At the same time, quality and efficiency of production are optimized thanks to the strategic knowledge transfer from other plants.

For the production of the models BMW X1 and BMW 3 Series Sedan Long Version, communal facilities are used like those at other BMW Group production sites. On top of that, the 'Best Fit Technology', which involves standardized procedures, guarantees a production level that meets the requirements that also apply at the other BMW Group vehicle plants.

A complex qualification procedure was devised to train the future workforce of the Tiexi plant and familiarize them with the production processes developed by the BMW Group. The majority of these specific training sessions took



place at the BMW plant in Dadong which has been implementing the BMW Group's global standards with regard to quality, safety and sustainability for many years. Preparation of the start of production in Tiexi was supervised by specialists from German sister plants. The expertise of the BMW plant in Leipzig, where the BMW X1 is produced, and of the BMW plant in Munich, where the new BMW 3 Series Sedan rolls off the assembly line, has played a crucial role in ensuring that the production of these two models at the Tiexi plant will meet BMW's quality and efficiency standards right from the start.



4. State-of-the-art technology for sustainable production.

With the Tiexi plant, the BMW Group and its joint venture partner, Brilliance China Automotive Holdings Ltd., are opening the most sustainable vehicle production site in China and one of the most sustainable automotive plants worldwide. Over five dozen resource-conserving production measures have been applied to optimize the consumption values for energy and water as well as the amounts of waste for disposal, process wastewater, and solvent emissions.

“We are delighted to set a new benchmark in resource-efficient production with the new Tiexi plant,” comments Frank-Peter Arndt, BMW Group’s Board Member responsible for Production. “This accomplishment is based on the best-practice approaches of the BMW Group production network. Measures that were tested at other sites over many years and refitted there with great effort have been integrated in the planning for the Tiexi plant from the very beginning. Obviously, the greenfield setup facilitated ideal implementation.” Tiexi is among the most sustainable plants within the BMW Group production network.

The ecological sustainability measures are not only applied in the four technologies – pressing plant, body-in-white, assembly and paint shop – but also in logistics, the IT center and facility planning. To ensure sustainable energy provision as well, it is anticipated to supply the plant with wind power.

Ecological sustainability in production.

The place identified as the major lever in resource conservation in production is the paint shop. Compared with the pressing plant, the body-in-white and the assembly, it consumes and generates, respectively, the greatest amounts of energy (41% of total plant consumption), water (35%), process wastewater (100%), and solvent emissions (100%). In Tiexi, the joint venture is presently building the world’s most sustainable, ‘green’ paint shop that reduces these values significantly.



The improvements are achieved, among other things, through the application of the Integrated Paint Process (IPP) developed at plant Oxford. In painting the car body, this process helps to reduce emissions and energy consumption considerably by rendering unnecessary the formerly required primer coating. The process step of applying and curing the primer is completely omitted, while the primer function is transferred to one of two newly developed base coat layers. In wet-on-wet application, the first base coat assumes the protective effect of the primer while the second coat ensures the visual characteristics with regard to color, effect, and depth. As before, the base coat is covered with a clear coat. This ensures that the new IPP technology meets the same, stringent requirements with regard to looks and functional protection of the paint as former paint processes.

The IPP technology reduces energy consumption and carbon emissions by 14 percent each and solvent emissions by three percent compared with the previous process. In addition, the faster processing time improves productivity by 40 percent.

Further improvements are made thanks to the dry separation in the coating line (already applied at the Regensburg, Leipzig, and Spartanburg plants), which entails a significant reduction in energy and water consumption. Replacing the previously used water curtain, a sand-clay filter is applied to bond the spray paint mist. As 90 percent of the process air can be recycled, there is no further need for the highly energy-consuming air conditioning procedure either.

When applying the corrosion protection, the so-called RoDip procedure reduces use of water, chemicals, and energy. While usually the car body is dragged lengthwise through a basin filled with the corrosion protection solution, RoDip uses a short, deeper basin in which the car body is dipped and moved vertically in a full circle. The basin's volume is much lower which saves both water and chemicals. Energy savings are achieved thanks to the lower pump performance required for the smaller basin. Another benefit: Thanks to the rotation process, the corrosion protection solution reaches better into the gaps and joints of the car body. RoDip has been in use at BMW for about ten years.



Other sustainability measures applied in the production process comprise high-speed servo presses at the pressing plant, replacing conventional hydraulic presses (44% less energy per pass; applied for the first time at the plants in Leipzig, Regensburg, and Munich); recycling of almost all the water used in assembly for cleaning car bodies and running leakage tests (90% wastewater recycling; standard in the BMW Group production network); a lighting system with variable lux levels (30% reduction in energy consumption; applied for the first time in Tiexi); and optimized robot control system in the body-in-white (25% reduction in energy consumption; applied for the first time at the plants in Munich, Regensburg, Leipzig, and Rosslyn).

Ecological sustainability in logistics.

The plant has also managed to optimize carbon emissions in logistics. By setting up container storage directly on the premises and by establishing a rail connection between the seaport and the plant, numerous transports – and particularly truck traffic – can be avoided. Tiexi marks a first that this best-case planning could be implemented. As part of their rail strategy, the BMW Group plans to shift transport volumes to train traffic as a preference for all locations. Another step to minimize transports is the allocation of space to volume suppliers directly on the premises, a tried-and-tested standard at several other BMW Group plants.

Furthermore, the plant will do without any forklifts; assembly lines are supplied by tugger trains taking the shortest route possible. To minimize waste, Tiexi will be the first plant in the production network to use 100% reusable packaging for local scopes.

Ecological sustainability at the IT center.

Thanks to the implementation of numerous measures, energy consumption and carbon emissions of the IT center have been reduced considerably. It is the demand-driven cooling and energy provision, virtualized server hardware and the use of fiber-glass network connections (LWL) instead of copper cabling (lower energy consumption and carbon emissions) in particular that reduce energy demand and, consequently, minimize carbon emissions.



Ecological sustainability in facility planning.

First and foremost, the plant sets new standards in **facility planning**. The concepts for the buildings have all been evaluated in Munich and then applied internationally. Thanks to facility planning activities, the Tiexi plant saves in energy consumption and heating as well as in carbon emissions and water consumption.

Applying as a first a **single roof concept**, Tiexi combines assembly, body-in-white and logistics under one, 220,000 square meter large roof. This architectural setup perfectly meets the requirements of the harsh climatic conditions at the Chinese location in Shenyang, where temperatures range from -35 to +40 degrees Celsius. The minimalist outer shell of the building facilitates climate control in the interior while the white color of the roof minimizes heating up through the sun. Windows have been preferably and strategically positioned towards the north. The central building control system allows for the implementation of a plant-wide energy management that controls both the demand-driven lighting with maximum use of daylight and air-conditioning and ventilation of all areas according to their requirements in the most resource-efficient manner. Skylights and façade openings, which are controlled dependent on weather conditions, allow for a cool-down at night as well as a back flow of air. The sunscreen with fixed blinds, which is placed in front of these openings, serves as a second façade.

As far as **electrical engineering** is concerned, the new plant improves efficiency via a combination of light management and natural lighting (applied for the first time at the Regensburg plant); the application of high-efficiency electric motors (sustainability standard in planning throughout the BMW Group network); and frequency converters in the ventilation devices (also a sustainability standard in planning).

As for the **plant's energy supply**, Tiexi is the first site to make use of a ground water heat pump. For cooling purposes, it utilizes a ground collector



and the aquifer to transfer the summer heat from the central building into the ground to store it there (applied for the first time at the subsidiary in Berlin).

Regarding **ventilating and air-conditioning systems**, the plant makes the most relevant energy savings in ventilation, the number one lever to preserve resources in facility planning. An intelligent system reduces air exchange rates in the body-in-white and in assembly (standard in the BMW Group network), optimizes ventilation, and allows for hybrid ventilation via skylights (implemented for the first time in Tiexi). If required, rotary air-to-air heat exchangers keep the waste heat from the technologies inside the building (applied for the first time at the Regensburg plant).

Numerous technologies are being used to cool the building. They account for savings of 1,454 MWh_{el}/a (or 7 kWh/unit). Within a temperature range between -30 °C and 12 °C cooling required for the building is generated by cooling towers. Also there are plans for cooling by means of ground water (1,000,000 m³/a). The procedure is currently awaiting approval. The first application of ground water-based cooling was established at the FIZ Projekthaus in Munich. In addition to that a free cooling of water provision is used at the Tiexi plant. When the outside temperature sinks below 12° C, mechanical cooling turns off, and the outside temperature cools the cooling water at the IT center.

Sustainability measures in the area of **mechanical systems** include the use of long-distance heating (applied, among others, at the Munich plant and the Munich-based Research and Innovation Center FIZ); a natural ventilation system; low-temperature heating systems that are preset to lower flow temperatures and make the generation of thermal heat more efficient; high-temperature cooling systems (all applied for the first time at the Leipzig plant); a heat exchange system for warm water supply (applied at the Dingolfing and Munich plants).

Utility engineering makes use of the BMW Group standards such as compressors for heat recovery or heat recovery from building and process



waste heat. When additional heat is required in the building, the waste heat from the welding robots is fed into the ventilation units to cover the heating load.

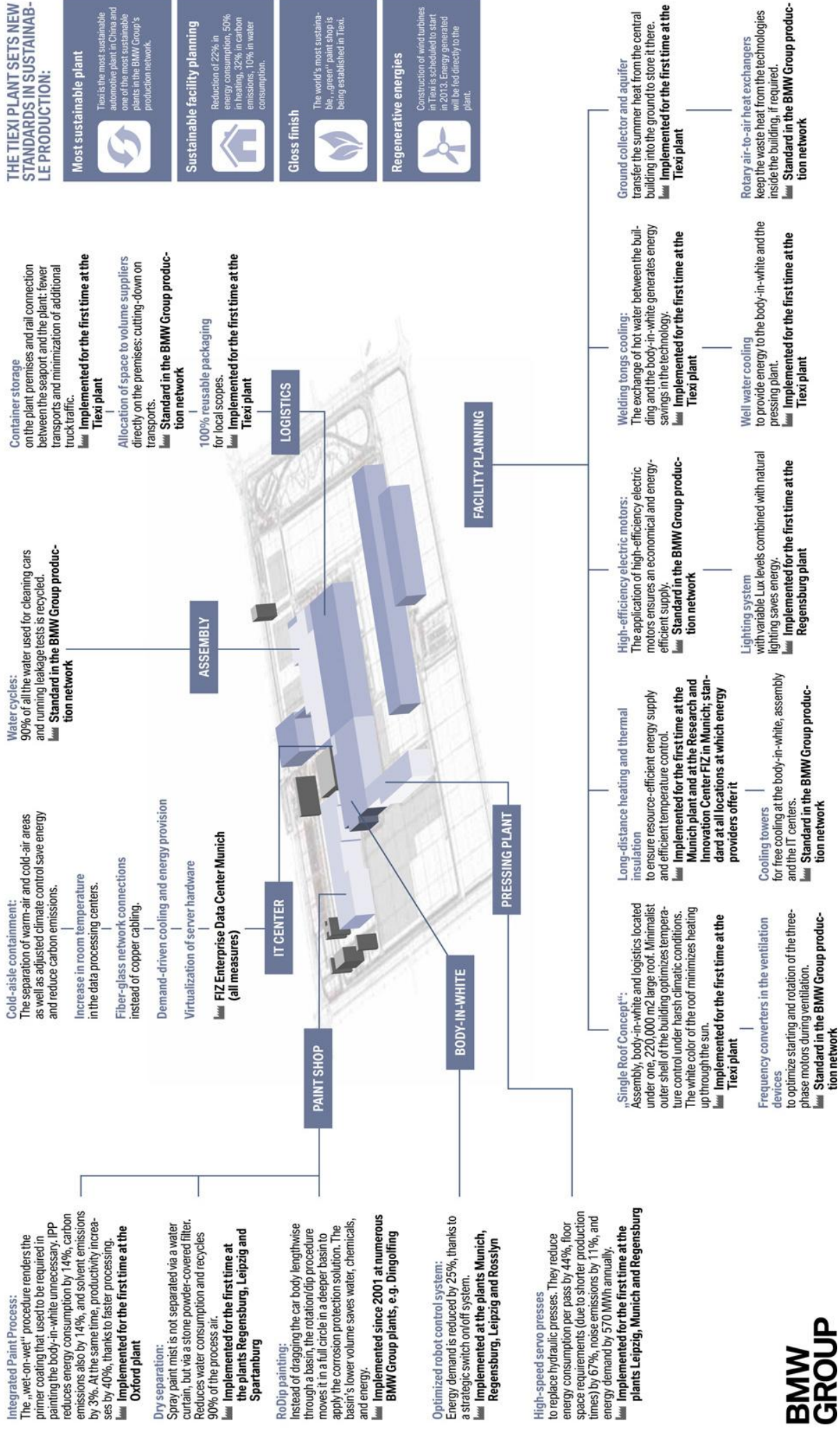
Regenerative energies.

As the BMW Group sees it, sustainable production also involves the supply of energy to the sites. Having evaluated different concepts for Tiexi, wind power turned out to be the most suitable means of local energy generation. A test wind turbine substantiated this result, producing up to six megawatts of energy. The construction of the first wind turbine to provide energy directly to production is scheduled for 2013.



HIGHLIGHTS OF RESOURCE-EFFICIENT PRODUCTION.

THIS IS HOW THE BEST-PRACTICE PRINCIPLE IN THE BMW GROUP'S PRODUCTION NETWORK WORKS: ECOLOGICAL SUSTAINABILITY MEASURES IN TIXI AND WHERE THEY COME FROM.



5. Fact Sheets.

5.1 Plant Tiexi.

BMW Brilliance Automotive (BBA), Plant Tiexi, Shenyang

Key Facts

Total premises:	2.07 km ²
Length and width:	1.43 km each
Planning period:	18 months
Realization period:	Two years for the body-in-white and the assembly as well as further buildings on the premises. Work on the technologies Forming (pressing plant) and Surface (paint shop) were started at a later point. Production at the pressing plant starts in summer 2012, at the paint shop in 2013.
Products:	BMW X1 BMW 3 Series Long Wheelbase
Capacity:	100,000 units p.a. If required, capacities can be raised to max. 200,000 units annually.
Pressing plant:	High-speed servo pressing technology increases productivity and reduces energy consumption. BMW applied this technology for the first time worldwide at the sites in Leipzig, Regensburg, and Munich.
Body-in-white:	Camera-monitored laser technology for welding and state-of-the-art gluing robots guarantee precise, quick and low-heat joining of body parts.



Paint shop:	The sophisticated Integrated Paint Process (IPP) applied from 2012 on reduces energy consumption as well as carbon and solvent emissions.
Assembly:	One-line production, latest assembly line technology and state-of-the-art quality testing facilities set a new standard.
Logistics:	Container storage area on the premises as well as a rail connection between the plant and the seaport minimize the number of transports necessary and reduce truck traffic.



5.2 Powertrain Shenyang.

BMW Brilliance Ltd. Powertrain Shenyang.

Key Facts:

Size of production hall:	21,000 m ²
Workforce:	approx. 600 associates by mid-2012
Product:	new 2.0-liter four-cylinder petrol engine with BMW TwinPower Turbo technology. Three different performance levels of engines are built for the models produced in Shenyang: e.g. BMW X1 sDrive20i: 135kW/184 hp e.g. BMW 525Li: 160kW/218 hp e.g. BMW 328Li: 180kW/245 hp
Capacity:	200,000 engines p.a.

At present, associates are working in two-shift operations. As production volumes go up, three-shift operations will be run in the future.

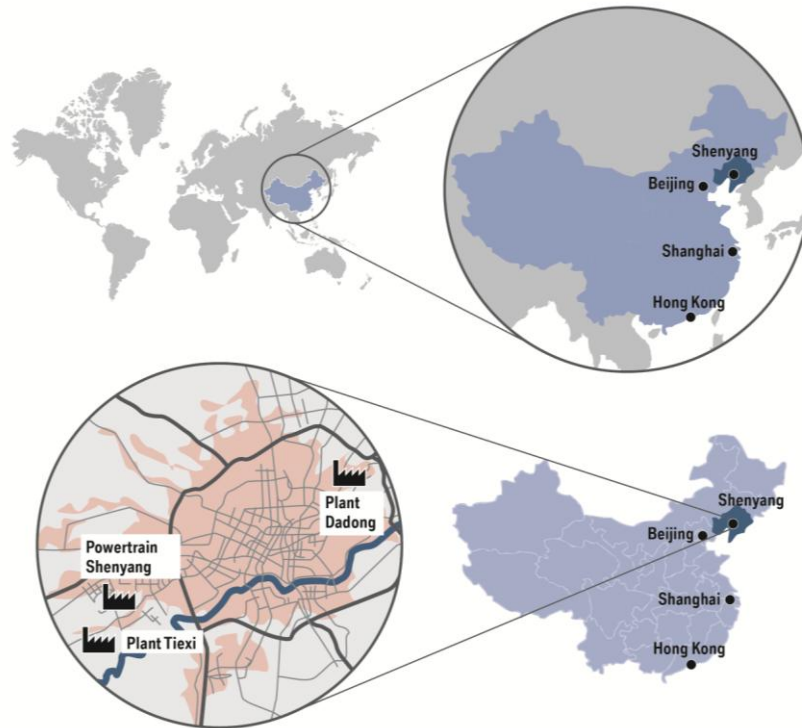
On-the job/further training	The engine plant has its own training center to provide associates with initial on-the-job and further training.
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Associates also receive training at the Munich BMW engine plant, at the Austrian BMW engine plant in Steyr or at the BMW engine plant in Hams Hall, UK.

By establishing the engine plant in Shenyang, the BMW Group has expanded their engine network by a fourth location. Up to now, engines have only been produced in Munich, in Steyr/Austria, and in Hams Hall/UK.



Appendix: city of Shenyang, location of production sites.



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IMPORTANT for TV and online media:

Highlights of the plant opening will be available in near-real-time at

<http://www.press.bmwgroup.com> and

<http://www.thenewsmarket.com>.



