

Bmw and manufacturing process

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The chassis are brought to the paint shop on a completely automated conveyor belt. They are first cleaned and degreased in immersion baths and then coated with a layer of zinc phosphate. After this, four additional layers of paint are applied to protect the automobile from environmental influences and give the surface long-lasting brilliance and luster. To ensure that an automobile retains the customer's desired color throughout its entire life, the paint job consists of many processes and a number of layers. Before the first of four paint layers can be applied, the body-in-white must be prepared in order to obtain a clinically pure surface.

(BMW Group, 2005) Hardly any other detail of a car makes as strong an impression as its color. At the same time, the car's paint protects it and maintains its value. Five layers - four of which are paint - are applied to the car body during the paint process. First, however, the body shell is cleaned. This is followed by application of a layer of zinc phosphate. To do this, the car body is dipped completely into a tank. The zinc phosphate layer, together with the second layer of paint, forms the basis for permanent protection against corrosion.

These layers are followed by application of the so-called filler followed by the finishing coat of paint. These four layers give the car its color. The last layer applied is colorless. The car-body is then sent to assembly after it has been rigorously inspected and found to have no blemishes whatsoever. The BMW Group insists on the strict use of environmentally sound technologies and materials in all of these processes. Take powdered paint, for example.

Powdered clear varnish has been used for many years in the Dingolfing plant

and the Leipzig plant to coat vehicles - a process unique in the automobile industry throughout the world.

This technology is a perfect example for environmentally friendly production procedures: no solvents are needed for the powdered varnish and almost no material is wasted during the painting process. (BMW Group, 2005) After preparation, the chassis is transported on freely movable units through different dipping lines, depending on the type of vehicle, and coated with a layer of zinc phosphate. This is the foundation for secure adherence of the anti-corrosion layer applied in the following cathodic dip bath (CDB).

The CDB paint is heat-fused to the vehicle in driers. After the CDB layer is sanded, the second layer of paint, the so-called " filler", is applied. This is the primer that corrects even the tiniest surface irregularities. (BMW Group, 2005) Only after the filler has been heat-fused and sanded can the customer's choice of color can be applied. High voltage of 70, 000 V between the paint application jets rotating at an extremely high speed and the body ensures smooth and consistent application of the paint and reduces any loss of paint to a minimum.

This procedure guarantees optimum use of the paint material and helps to reduce overspray by another 30 per cent. (BMW Group, 2005) As soon as the painted chassis have left the drier, the layer of transparent paint is applied; this last layer of clear paint greatly increases the chemical and mechanical stability and of the surface and illuminates the color. The BMW Group is the only automobile company in the world to introduce the particularly

environmentally friendly powdered clear paint process in some of its plants. This paint is applied by completely movable robots.

No solvents are needed and no waste water ensues. If too much powder is sprayed, it is recaptured and reused, resulting in a degree of utilization of over 97 per cent. After an additional drying procedure, the finished chassis proceed through specially lighted inspection stations, where experienced paint specialists examine the entire body. Only then are the chassis handed over to the assembly line. (BMW Group, 2005) The experienced and well-trained employees complete the paint chassis. Even every unusual customer request become reality in the course of BMW's individual manufacturing process.

Different equipment, components, country-specific variations and much more lead to an unmistakably individual product. In the first process, the chassis assembly, painted chassis are mounted with all the features and fittings ordered by the customer. Individual assembly units and components such as motors, transmissions, axles, doors or fenders are pre-mounted in separate areas. Heavy components like seats or pre-mounted doors are moved with handling equipment to optimize ergonomic activity at the workplace.

Swinging assembly apparatuses turn the vehicles on the assembly line so that employees do not have to work with their hands above their heads. (BMW Group, 2005) This is where crankcases, camshafts and cylinder heads are processed using computer-controlled machine tools. Employees are largely responsible for monitoring and adjustment tasks. Motor assembly,

however, still requires great mechanical skill. Pistons and bearings are installed and pre-assembled cylinder heads, aggregates, belt drives and wiring harnesses mounted. After the motor is complete and running, it's time for technology again.

The motors are electrically driven on so-called cold testing benches and monitored by numerous sensors that ferret out possible errors. One of the strengths of the BMW Group's vehicles is individuality. (BMW Group, 2005) Every vehicle that rolls off the belt is unique. The number of possible automobile variations is astronomically high: like example, considering only the BMW 7 Series, there are 10 to the 17th power, or 100, 000, 000, 000, 000, 000 variants. To manage this enormous complexity, reliable coordination of parts production processes is vital.

Above all, pre-assembled model-specific components and component groups such as engines, seats or cockpits are sent to the main assembly line in the precise order needed - specialists call this " just-in-sequence". The climax of the entire production process, the so called " wedding", takes place in the final assembly area. Here, the drive unit, consisting of engine, transmission, axels and exhaust system is precisely set on a bolted to the body. The vehicle now stands on its own four wheels. The last parts are mounted and the motor started for the first time.

After passing numerous tests, the new vehicle rolls out the factory. (BMW Group, 2005) The pre-mounted car body is delivered to the end-assembly area " just in sequence", i. e. at the right time and place on the assembly line. The actual climax of the assembly process, the so-called wedding -

when the engine, drive and chassis first meet - can now take place. As soon as the wheels are mounted, the vehicle rolls into the testing area, either under its own power or on a belt. Aided by sophisticated inspection technology, all vehicle functionalities undergoes last testing's here.

In the finishing area, highly qualified employees give the new vehicle any necessary last-minute touches. The new automobile can finally be delivered to the sales department. The BMW Group stands for exceptional mobility; realizing all customer-specific desires and special features in a premium-class automobile is the main task of assembly. After the car body is built and painted, assembly is the third stage of the core manufacture of a car. (BMW Group, 2005) Some 20, 000 parts - made by BMW as well as from external suppliers - go into a BMW 5 Series, for example.

Different engine variants, options and accessories, country-specific variations, and much more lead to an unmistakably individual product. You will hardly ever see two identical models next to each other on the production line. Customers of the BMW Group expect the interior of their automobiles to be comfortable, functional, and individual. The Specialists for interior components fulfill these expectations by using selected materials, innovative manufacturing technology, and the highest quality standards. Driving pleasure is created primarily through an automobile's engine and chassis.

And only components which are finely tuned to each other ensure a car's performance. The tasks of our highly specialized technicians include, assembling engines, front and rear axles, transmission, shafts, brake discs,

axle supports as well as other chassis components. (BMW Group, 2005) In addition to an automobile's heart - its engine - BMW chassis set standards for exceptional driving dynamics. Innovative light-metal solutions such as the aluminum chassis of the BMW 5 Series and 7 Series, for example, are the focus of BMW Group research and development.

Making sure that the right numbers of the right parts are in the right place at the right time - and that these parts meet the required quality standards - is only one of many central tasks mastered daily by BMW logistics specialists. They also oversee product and process targets to make sure these are efficiently achieved. (BMW Group, 2005) Logistics is of essential importance not only for stable production, but also for efficient transportation throughout the network - between customers, dealers, suppliers, and plants around the world.

This is made possible through the "Customer-Oriented Sales and Production Process", or COSP for short. This ensures that customers can change their orders even shortly before their vehicles go into production without affecting the delivery deadline. Premium means exceptional for the customer. This added value becomes tangible through the superior product substance and superior quality of the BMW Group's emotionally appealing automobiles and motorcycles. (BMW Group, 2005)