

A long-exposure photograph of a car driving through a tunnel, creating a sense of motion and speed. The scene is bathed in a monochromatic blue light. The car's side mirror is visible on the right side of the frame.

PLUS

the MES for OEMs

About abat

abat was founded in 1998 and is an international SAP service provider and product supplier. The focus is on the automotive and discrete production sectors as well as logistics. The company provides advice in all IT service management phases – starting with the alignment of IT with the business processes on to development through to the implementation and maintenance of standard solutions. With regard to controlling production processes in production, the experts developed the PLUS software based on SAP.

abat's clients include Audi, BMW, Daimler and Volkswagen, ThyssenKrupp Materials International, Deutsche Post Worldnet DHL and other companies. In Germany, abat is represented at locations in Bremen, Munich, St. Ingbert, Walldorf and Wolfsburg. The company has branches in the USA, Mexico and Belarus for better on-site support. abat is a development partner of SAP SE in the SAP Partner Edge Program for Application Development.



Table of contents

Automotive industry: Global challenges – one solution	Page 4
PLUS – our answer to your challenges	Page 5 - 7
PLUS – the MES for OEMs	Page 8 - 9
Zoom: PLUS from the management perspective	Page 10 - 11
Zoom: PLUS from the specialist perspective	Page 12 - 13
Zoom: PLUS from the IT perspective	Page 14 - 15

Automotive industry: Global challenges – one solution

The automotive industry on the way to Production 4.0

The automotive industry has been in a leading technological position since the industrial revolution. With regard to Industry 4.0, it is once again taking a leading role: Globally organised and networked unlike almost any other sector, the manufacturers produce products in almost any number of varieties and large quantities. They are also forced to produce extremely complex products in ever shorter innovation cycles.

In order to remain competitive in this demanding and yet extremely ambitious sector, manufacturers and suppliers critically review their (own) processes along the entire value-added chain – permanently looking for optimisation and saving potentials. For example, they are setting trends in production and they are gradually converting their production sites into smart factories as part of the fourth industrial revolution.

Management and IT department work hand in hand. They know that innovative, competitive production across national and company boundaries can give a competitive edge. The preconditions for intelligent concepts, such as networked and self-learning production units, are harmonised and standardised IT systems, which are based on integrative data models. Only on this basis can continuous processes be modelled.

The prerequisites for continuous processes are simultaneous standardisation and flexibilisation not only of business software, but also of production software. As important data for controlling the overall process is created in the production process itself, directly where the products are produced. The data from all participating companies is only compatible, and the flow of information is only consistent, in a standardised and harmonised scenario. Such a scenario offers new potentials for integrative processes, both within the company and across company boundaries.

The automotive industry has already managed a consistent flow of information across system boundaries, because the ERP software from SAP is largely used as a logistics component in the system network as standard in this industry. With PLUS, the production control system from abat, the integration of the customer order process through to production will be deepened with the result of the integrated and efficient controlling of the production process.



PLUS: our answer to your challenges

Production 4.0 in a global context – the DNA of a vehicle

Decentralized and globally distributed production is a well-known scenario among manufacturers and suppliers. The development of global value chains results in new problems in terms of controlling and challenges in terms of management. The production process itself is divided into several individual steps, which are housed in various locations, often with companies that are entirely independent of one another. Production sites on different continents deliver just-in-time components, which create a vehicle with a customized configuration following final assembly. Cyber-physical systems – the Internet of things – support these decentralized processes.

OEMs can react quickly to a change in demand and new requirements on the market by using smart factories, as the networked production units can permanently reconfigure themselves. In addition, they facilitate the production of a number of different varieties as the workpiece itself tells the robot how it needs to be processed – for example using an RFID chip. This makes vehicle manufacturers more productive, more flexible and more efficient. Networked and self-organizing systems – that is the big draw of production 4.0 for OEMs.

However, with all the intelligence of the systems, the quality of these data-controlled processes – indeed their feasibility – depends on the ability to solve the challenge of standardisation versus individualisation of the processes. Smart factories require information systems, which can react with a high degree of flexibility to the various process requirements, while they must simultaneously enable a high degree of standardisation.

It is just here that abat has positioned itself with the standardised MES system PLUS. It offers a full and standardised pool of functions to cover all factory-specific and station-specific processes over the entire production process – from structural work to delivery. Thanks to the complete networking in the respective production site and across production sites, there is a unique opportunity to realise complete quality, process, parts and deadline documentation. In addition, the system covers all vehicle-specific information, as each vehicle only develops its unmistakable DNA within the scope of the process of its creation – data, which describe it individually. All production steps, processes, the parts installed and their history are documented seamlessly. Thanks to the integrated system, the production of each individual car can be precisely, flexibly and securely controlled in real time and the DNA can be used to generate new, highly valuable information and derive new business models.

Consolidation and harmonisation for international growth: SAP as standard

High-grade, customized products, the utmost quality and an excellent price/performance ratio: Purchasers of cars these days are extremely demanding. In addition, innovation cycles follow one another in shorter and shorter intervals and OEMs must immediately react to customer requirements. The vehicles are produced at a growing number of sites – spread all over the globe. And the number of suppliers integrated in the production of individual models is growing.

Supply chain networks – veritable works of art these days – are becoming increasingly complex. Customer orders are at the heart of it all. They trigger the entire production process. This requires stable, integrated processes and uniform structures, which can be analysed and controlled centrally.

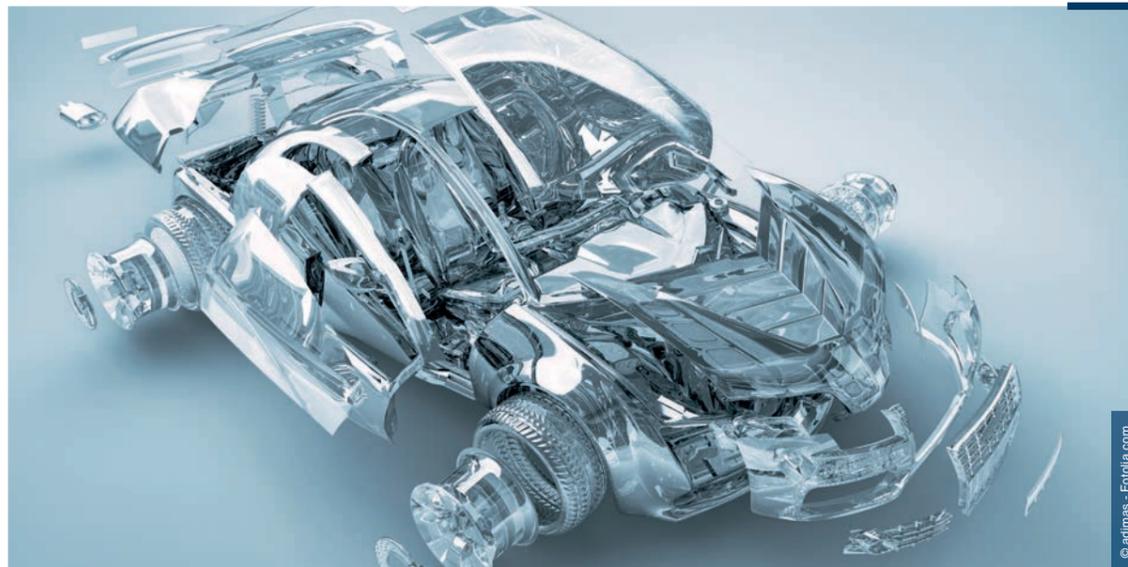
Old systems with established structures are not suitable for this. Instead, uniform programs rolled out across the globe are becoming increasingly prominent. The PLUS production control and management system, which is based on SAP technology and is fully integrated in SAP ERP, is a unique standard production control system that is both standardised and customisable. The software solution manages all order and process data and uses this to control suppliers, the car body and the flow of materials. As the software is based on the SAP NetWeaver technology platform, PLUS can easily be integrated into existing system landscapes.

Cross-location quality assurance due to Inline Quality Management

A vehicle consists of approximately 6,000 individual parts and the OEM must be able to rely on the fact that each individual part was faultlessly produced. It is not only the work of suppliers, but the entire production process that determines the quality of the car.

With the MES system PLUS, manufacturers are on the path to zero-defect production. If all vehicle information is recorded in real time, defective parts or installation defects are immediately noticed and can be promptly remedied. Thus, manufacturers avoid expensive and brand-damaging product recalls.

The production management and control system PLUS with integrated quality management drastically increases the reaction speed in case of faults and quality defects. In this case, the Inline Quality Management continuously and sustainably records all errors from all trades along the entire production process, controls post-processes and documents all safety-relevant developments.



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“We have used PLUS worldwide in the production control for all Mercedes-Benz cars for more than 15 years. As a result, we have increased flexibility, created stability and increased efficiency in production.” – Johann Hess, responsible for IT in Daimler AG vehicle production plants

The key quality data is recorded at each station in the production process and compared with the predefined standard. Modern measuring techniques help to uncover even the smallest deviations from the required level of quality. An individual control plan can be used in PLUS for each vehicle type. Quality gates structure the quality management and ensure its sustainability. Each job including quality data can be monitored in real time via the production cockpit in the control station. All job and process data is fully documented in PLUS.

Looking ahead into the future: Further optimize and automate processes and products with predictive analytics

More and more business opportunities arise from the Internet of Things, e.g. flexible, highly available processes through networked systems, faster response to critical situations, optimally controllable manufacturing processes. The associated potentialisation of the data volume represents a challenge and opportunity for IT solutions: Not only the production facilities, but also the vehicles themselves become sources of data. The more the OEMs succeed in selecting and evaluating this data, the more it changes into different forms: Instead of reacting, they make operational decisions based on very precise predictions about future events and requirements. The vehicle manufacturer becomes a predictive business.

For example, unscheduled downtimes in production can be avoided, since the predictive maintenance predicts and automatically initiates necessary repair or maintenance work in good time. Data from the digital vehicle files, combined with information from the car itself, supports the service: The workshop can make contact with the customer and excel as a proactive service provider, even before damage occurs. This impacts brand image among other things.

Several other scenarios are currently emerging – from product development, which appropriately predicts and anticipates the wishes of customers, through to quality management in real time. This not only improves the company, but also makes it more efficient. Mass decisions can be automated in this way.

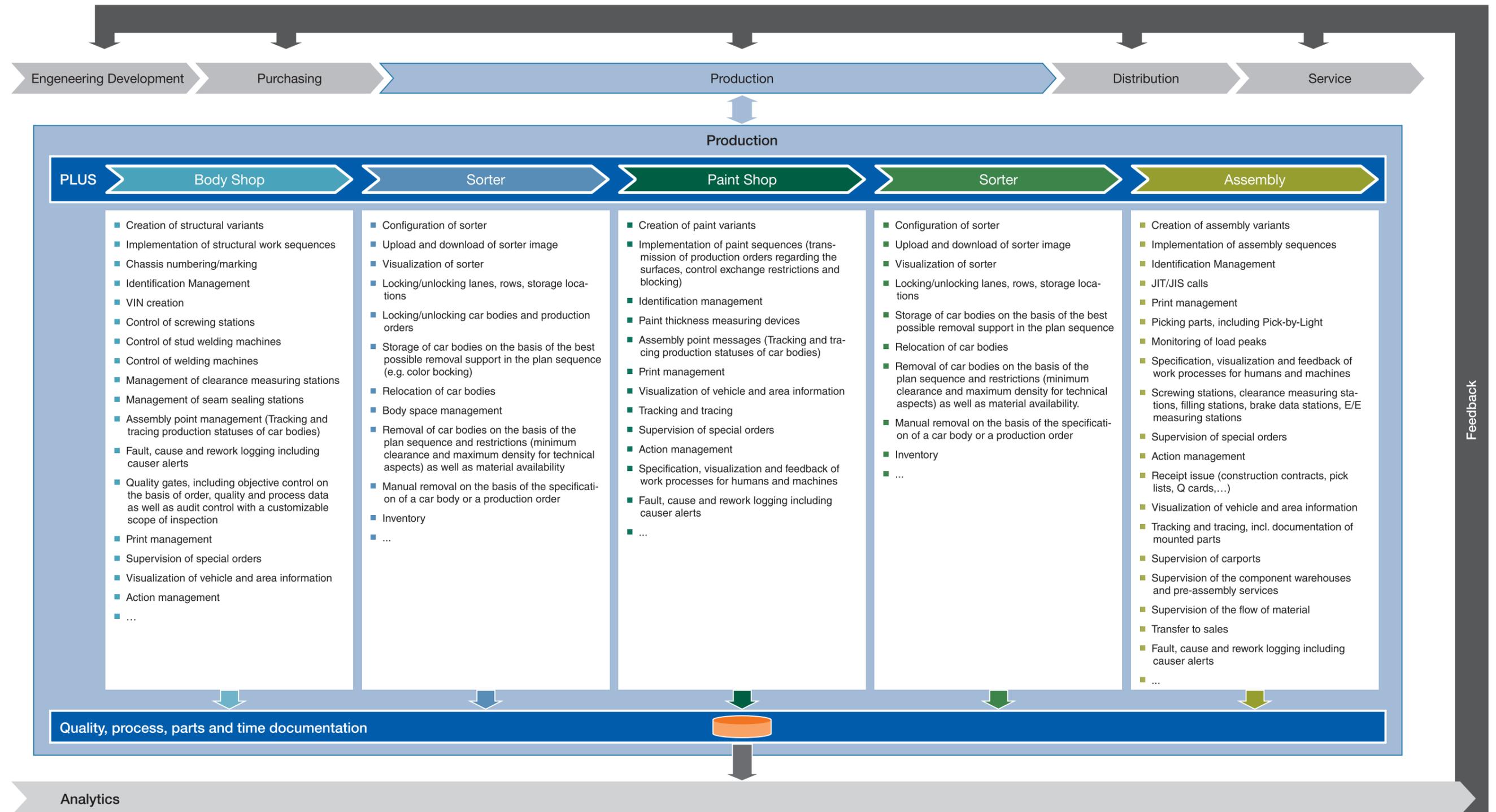
PLUS establishes a basis for predictive analytics, since it provides consistent, complete vehicle and production data in a standard format and at a high quality level. On the basis of the vehicle DNA generated by PLUS, operational decision-making is not only faster and more cost-effective, but it is also based on realistic grounds.

PLUS: the MES for OEMs

Your PLUS

PLUS simply offers more: Automotive know-how, SAP integration and more than 30 modules, which you can select and combine depending on your requirements. PLUS stands for Production Management and Control System (Produktions-Leit- und Steuerungssystem) – and these are the benefits of our MES systems in a nutshell: With PLUS, you control, monitor and document the entire production process step by step. PLUS is an internationally unique standard production control system, which allows the complete control of automotive production.

Build-to-order - Manufacturing



Zoom: PLUS from a management perspective

There are very few other industries in which the speed of innovation is as high as it is in automobile construction. Innovation cycle follows innovation cycle. The idea is to incorporate new markets such as India and directly take advantage of the location-specific benefits of every region in the world. Products are being produced in more and more sites around the world. The number of suppliers involved is growing constantly.

With the PLUS production control and management system, manufacturers have been able to maintain an overview of the supply chain even in highly differentiated production structures and achieve production that is both efficient and cost-saving. Companies use the SAP-based MES system to harmonise and standardise their IT landscape across factory and country borders. They are creating uniform structures, which can be analysed and controlled from a central location.

The software's modular, customisable and configurable design adapts to the requirements of your company and, according to a benchmark study, covers all functional requirements of OEMs in a single MES system. It is the central instrument used for order management.

Production 4.0 offers the utmost flexibility, meaning that the variety of models required from a sales and marketing perspective can be realised with the fewest possible parts in an optimal manner in

"With PLUS, we have access to the complete production history of a vehicle at any time."

– **Dr. Wolfgang Grottke, CIO of Qoros Auto Co. Ltd.**

"Qoros stands for modern design and high quality at a good price. We establish the conditions for this through competitive production with PLUS." – **Gert Hildebrand, Head of Design Qoros Auto Co. Ltd.**

"PLUS complements the existing SAP portfolio very well. The control system is perfectly suited for complex productions with high volumes and levels of variation."

– **Holger Masser, Goba Head of Industry, Business Unit Automotive SAP SE**

"Solutions such as the production management and control system PLUS document every stage of production. Thus, the entire production process can be traced, right up to the bolt torque settings. On the basis of this data, forecasts can be made concerning the wear and tear of individual parts in comparison with, for example, vehicle usage information." – **Peter Grendel, abat executive board**



terms of costs. On the other hand, PLUS, with its highly differentiated monitoring functions and integrated quality management, offers an extremely robust production environment. OEMs produce customisable products on a massive scale and are simultaneously approaching the target of zero-error production, i.e. mass customization in the best sense – that is exactly what PLUS makes possible.

Management can use PLUS to get an overview of the entire production process. The broad spectrum of control and monitoring functions is grouped around

- central order management
- complete systems control
- consistent car body and material flow control

The MES system solution manages all order and process data and uses this to control suppliers, the car body and the flow of materials, as well as buffering. In doing so, the central order management enables the sales team to make accurate statements on delivery deadlines at all times. The management team can control the entire order logistics from production to dispatch. Within the framework of demand-oriented production, it manages materials and inventories in a streamlined manner.

In perspective, other options result from the consolidated data. The OEM converts to predictive business. Customized vehicle DNA is produced in PLUS over the course of the life cycle. When linked and assessed intelligently, they form the basis of analytical predictions and monitoring and control of production in real time. In doing so, the conversion to data-driven companies also has an effect on the after-sales area. Vehicle data can be used to precisely predict the demand for replacement parts. Thus companies are differentiated by excellent and primarily forward-thinking service. At the same time, they lower their costs as they can calculate their inventory stocks in a shorter space of time.

Zoom: PLUS from the specialist perspective

On the path to perfect production

Manufacturers can use PLUS to control their production in real time based on demand and results. They get an overview of and manage all processes, systems and data on an order. Industry-specific modules enable consistent and complete product and material flow control. They plan their production inventories precisely and execute the supply of workstations with materials and tools and their subsequent removal with the MES system.

Here, SAP integration has again proven itself: The MES system is based on the SAP NetWeaver platform. Therefore, SAP ERP and PLUS access the same master data, where such data is available. Thus, consumption data is exchanged directly and used to control material logistics. In addition, the supply processes can be automated using JIT sequence requests. Production supply thus minimises its safety stocks.

At the start of a production order, the necessary components from the list of parts are transported to the machine and used. This results in a work in process, which, after processing, is either transported to the next machine or to the warehouse. Through the production cockpit, the control centre has an overview of the progress of an order at all times, including quality data, stocks for post-processing and scrap.



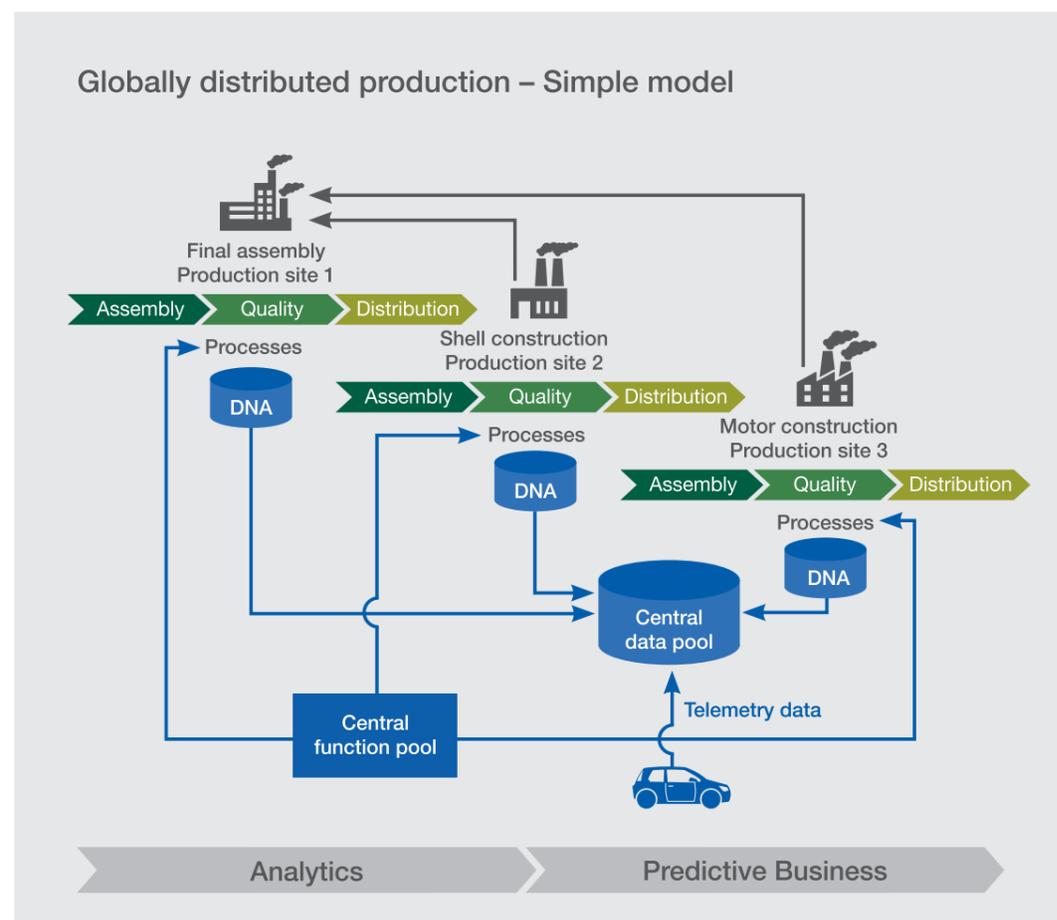
“The engine plant in Peking shows that PLUS is an efficient solution for suppliers. With the MES, you can manage your production process with a streamlined standard solution.” – Rainer Schrapel, Senior Manager Production Control Daimler AG

Producing quality

Prevent instead of rework: complete quality management is integrated in PLUS in real time, which brings the target of zero-error production within reach. From structural work to final assembly, PLUS consistently records all errors that occur at each station. In this way, missing parts can be directly post-processed or rejected in the ongoing process. Action management with an individually defined workflow helps rule out errors. This includes, for example, department-related completeness checks and other individually designed quality controls.

Quality gates give structure to the quality management. Finally, the steps that have been taken to remedy and error are tracked. The quality management team can use the production cockpit to view the current status of an order at all times, including quality data, stocks to be post-processed and scraps.

As parts with the same design are frequently used in the automobile industry, quality management should start at a particularly early stage. Often, just a few supplied batches of a component are the source of the error. If they are identified immediately, the error can be resolved at a low cost and without harming the company's reputation. The vehicle DNA recorded in PLUS provides an excellent basis for this.



Zoom: PLUS from the IT perspective

Standardisation produces synergies and increases efficiency: PLUS creates IT landscapes that are free from clutter and easy to maintain. A real „plus“ is integration in the business management software SAP ERP, which is widespread across the automobile industry. Companies with SAP business applications can use this to design their processes consistently without interfaces. In addition, the software has standardised interfaces, meaning that external systems can be connected conveniently. The simple exchange of data facilitates collaboration with all partners within the value chain.

“We need a sustainable solution for our extremely important and critical production environment. As we have worked together with the team successfully for many years, we were confident that the team would meet our very high quality and reliability requirements. We made the right decision, since abat now plays a key role in our global application maintenance strategy.” – **Dr. Michael Gorriz, former CIO of Daimler AG**

“Qoros is a company which heavily draws on SAP solutions in its IT strategy. We were ultimately faced with the question of how to control production. We wanted a Manufacturing Execution System with an optimal connection to SAP. Among other things, Daimler uses the abat solution worldwide. Furthermore, many abat employees come from SAP.” – **Dr. Wolfgang Grottke, CIO Qoros Auto Co. Ltd.**

“As standard software, PLUS enables simple integration and savings of up to 50 percent.” – **Peter Grendel, abat executive board**

“As far as technology is concerned, we now have a unique opportunity to fully and consistently invest in new technology and efficiently get this technology off the ground – without the need for costly integration in an existing and potentially burdening status quo. This not only spares us from interface problems, but we can implement a streamlined solution which is integrated from the outset. An example of this is our Manufacturing Execution System PLUS, which we use continuously to control production from body construction through to final assembly.” – **Alexander Wortberg, Head of Production Qoros Auto Co. Ltd.**



The abat software is also setting benchmarks in terms of stability: MES availability is completely essential in the automobile industry. The PLUS complete solution offers the maximum application availability possible for a commercial IT system according to the current state of the art.

All functions are designed as services (service-oriented architecture) and can be flexibly obtained via a process manager. IT experts also use the process manager to implement and manage the software, as well as for company-specific enhancements. The services of PLUS cover all of the relevant production processes and enable customer orders to be executed seamlessly. The service-oriented architecture is flexible enough to enable the company to react immediately to changes and to implement new requirements quickly and cost-effectively. It is not only processes that can be adapted, but rather new sites can also be incorporated or production can be coordinated across various sites.

PLUS is made up of 30 modules, which manufacturers can select individually and combine. Thanks to the modular design, the software can be implemented particularly quickly. Large companies with an international orientation and several sites benefit from this in particular. The Chinese automobile manufacturer Qoros, for example, introduced central modules, such as car body construction, buffer stock, paint finishing, final assembly and quality control for production control. Thus the standard software covered more than 90 percent of the company's requirements and could go into production quickly.

As PLUS documents the entire vehicle lifecycle in a single file – the DNA of the product – it can anticipate future developments. Starting from bundled information, analytical predictions can be made. They help control production in real time and secure competitive edges. As the amount of electronics in the vehicle is increasing, manufacturers can access a huge, continuously growing volume of data when making their predictions. To convert this flood of data into valuable information, the MES system from abat accesses an in-memory database system. Instead of hard disk drives, in-memory databases use the random access memory of a computer as a data store. Thus they can quickly analyse large quantities of data and make accurate predictions for the automobile industry as a basis for decision-making.

Your PLUS

How does PLUS solve the challenge specifically in your production process? We will be pleased to advise you personally! Contact us right away!



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