

lower non-quality costs



Wind power: Return on Energy

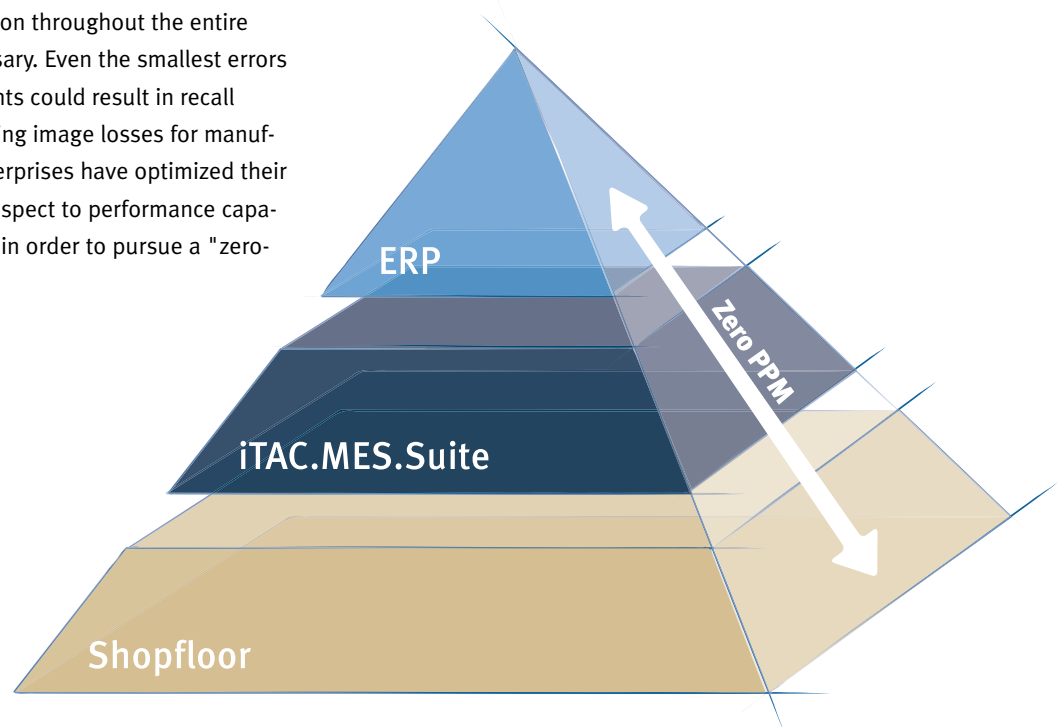
active Traceability - lower non-quality costs

For years, electronic, mechatronic and highly complex mechanical components and systems have driven innovation in the manufacturing industry. As they increase in variety and power, the use of these sensitive high-performance components brings with it an increased risk of failure. At the same time, the manufacturing industry is confronted with a significant increase in the quality standards demanded by the market combined with high cost pressures - factors which affect all steps of the production chain.

In order to not only meet the growing requirements, but to ideally be able to use them as a competitive advantage, the quality of the individual products must be continuously improved. The high quality standards of the individual components already achieved is not sufficient. Rather, the implementation of zero-fault production throughout the entire value creation process is necessary. Even the smallest errors in the highly complex components could result in recall actions which contribute to lasting image losses for manufacturers or suppliers. Many enterprises have optimized their business processes and, with respect to performance capability, aligned them with quality in order to pursue a "zero-

fault philosophy". The successes are clearly visible, though the goal remains distant. After all, zero-fault production can only be realized through a continuous improvement process and a sustainable increase in quality through failure avoidance.

Faults, and the risks associated with them, are multifaceted due to the fact that the complexity of both electronic and mechanical components increases continuously. As a result, the complexity of the production processes also increases considerably. These too, must be not only appropriately mastered but also transparent.



This requires software systems which link the production and ERP/PPS functions in order to better manage the entire value creation process in its full complexity.

Future with quality

iTAC Software AG is an important partner for managing these risks and for enabling zero-fault production providing an extensive service and product portfolio for this purpose. iTAC's Manufacturing Execution System (iTAC.MES.Suite) utilizes **active traceability** to ensure that quality problems in the production processes can be detected in real time, that their causes can be analyzed and that containment measures in a continuous improvement process can be evaluated systematically and in quasi real-time. iTAC's integrated solution supports enterprises in replacing a disparate and often inadequate patchwork of isolated software applications.

Failure avoidance and defect detection with active traceability

With the iTAC.MES.Suite, iTAC offers an intelligent and standardized MES solution with a focus on **active traceability** for discrete manufacturing. The iTAC.MES.Suite offers a portfolio that addresses quality improvement and failure avoidance designed for production-

based enterprises. Among the requirements addressed by iTAC's solution you will find:

- Classic traceability according to VDA 5005
- **Active traceability** with bi-directional plant interfacing
- Active process interlocking on the basis of process specifications, master data and much more.
- Paperless production (paperless repair)
- Online monitoring of manufacturing processes (online process monitoring)
- Part Average Analysis (PAA)
- Quality analyses (SPC-V, SPC-A)
- Online message system (Alert Management System)
- "24/7 system functionality" with support provided through a "System Management Environment"
- Specific standards from the automobile manufacturers VW, Audi, BMW, DC etc.
- Support in the mapping of FDA-conformant production processes
- ISO TS 16949



From traceability to active traceability

Traceability down to the smallest detail



With the iTAC.MES.Suite, products can be tracked continuously on an individual-item or container basis in real time – from the material components to the packaged product, as well as from the supplier all the way to the customer.

By interlocking the individual process and work steps, the iTAC.MES.Suite minimizes the production of faulty products. A check is performed in each production step to determine whether the components specified by product development were installed and whether the process parameters defined for production were adhered to. In the event of failures in a component or unit in the production process, the respective unit is no longer processed but is instead directed to a defined escalation path (analysis-repair-retest or rejection of the unit). In this way, faulty states in the production process can be detected and rectified early and in real-time.

The functional foundation of the iTAC.MES.Suite is "**active traceability**". This differs significantly from the conventional traceability method (passive traceability, e.g. VDA5005), which serves only to document production processes and installed material lots.

Within the iTAC.MES.Suite, **active traceability** has both technological as well as technical / functional characteristics. Technologically, the iTAC.MES.Suite facilitates bi-directional and, thus, direct communication of the MES system with the production equipment. The bi-directional communication with production equipment is ensured by means of a number of standardized software functions (API - Service Adapters), which are integrated in the distributed control systems, inspection systems and PLCs. In addition to this API-based software functionality for system integration, the iTAC.MES.Suite offers a system architecture which ensures the "24/7 operation" necessary for modern production facilities. These include, in addition to system reliability, other functions, such as FailOver or dynamic LoadBalancing. The architecture of the iTAC.MES.Suite also enables scalability of the system, thereby enabling dynamic extensions (e.g. through the integration of additional production equipment) which are both cost-effective and reliable. The technical / functional characteristics of the iTAC.MES.Suite utilize the base functionalities of the API - Service Adapter. Using standardized functions, these enable system integration, e.g. making product-dependent default parameters available to the production process, verifying units and materials prior to installation and performing a variety of other functions for implementing zero-fault production.

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Selected main functions of an "active closed-loop traceability" scenario

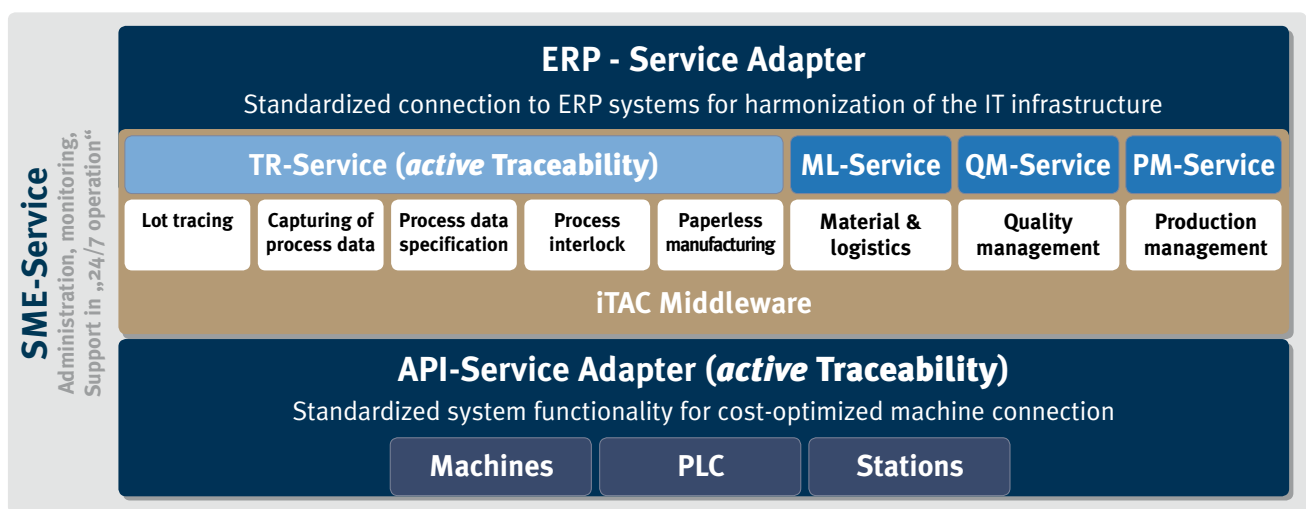
Standardized interfaces to ERP/PPS systems for exchanging static product data, e.g. material master data, bills of material (BOMs), work plans and movement data such as material lots, production orders, order confirmations of material consumption.

Process interlocking for safeguarding a development-conformant production process ("built as designed"), with active state interlocking (pass, fail, scrap) of the products in each individual process step of the production process.

Setup verification and lot tracking for ensuring that only approved materials (with respect to manufacturer, lot, vari-

ants and state) are installed. All materials components are documented together with the produced product.

Document and test-plan management (Manufacturing Data Administration) for supplying production with the necessary data and documents such as, work instructions, design drawings, default parameters (e.g. testing specifications) and other production-relevant information. On the one hand, the administration of the testing specifications for products and testing equipment enables global administration of the data. On the other, it allows these specifications to be used to safeguard the production quality.



Process monitoring with iTAC.MES.Suite

Part Average Analysis (PAA)

Part Average Analysis (PAA) is a procedure for efficiently improving reliability and for preventing failures caused by technical malfunctions in units or components. PAA is used for the early detection of "dormant" failures. The objective of such an analysis is to improve the product quality of new parts by examining the measurement data of the inspected units for anomalies. The parts which are assigned a high failure risk are detected during the course of a subsequent risk assessment. The iTAC.MES.Suite includes a standardized implementation of the Part Average Analysis analysis methods. Current PAA standards specified by the automobile manufacturers Daimler Chrysler and BMW are fulfilled by the basic functions of the iTAC.MES.Suite. Of critical importance here is the online detection of anomalous components. This online detection is ensured by means of a bi-directional coupling of the test systems with the iTAC.MES.Suite.

As a result, it is possible to take immediate preventative action in the production process, i.e. to directly block anomalous parts from further processing, thereby making a fundamental contribution to zero-fault production and failure avoidance. In addition to the detection of such stochastic failures (individual failures) in serial processes, the iTAC.MES.Suite also enables the analysis of systematic failures in production processes. These usually manifest themselves as larger variations of the process parameters or in continuous parameter drifting and, therefore, contribute to a reduction in the process capability – cp, cpk.

Process monitoring in real-time (Online Process Monitoring)

The online process monitor of the iTAC.MES.Suite enables a quasi real-time detection and display of production errors and quality deviations in the production process. The process quality is assessed through the statistical evaluation of attributive failure characteristics. These failure characteristics can be directly passed on by the testing system to the iTAC.MES.Suite with respect to a specific individual item or ascertained on the basis of variable measurement data. The online visualization enables the targeted inspection of the

first pass yield, second pass yield following a repair (first run yield), total yield and other quality-relevant variables. The quality status is displayed by means of "traffic light functions" within a control center display, which enables the simultaneous visualization of multiple processes.

Alarm and message management system (Alert Management System)

The iTAC.MES.Suite Alert Management System supports the "early warning" approach to preventative quality assurance. Failure states which exist at a machine or system level, deviations from process specifications, fault accumulations or other indicators in the production process can be immediately reported via a message system. The message can be sent either via e-mail or by means of an internal messenger system. Thus, enterprises which implement this alarm and message management system also have at their disposal an active security system for immediately reporting failures and anomalies independent of place and time.

Quality analyses (SPC-A and SPC-V)

The standard quality analyses possible with the iTAC.MES.Suite enable a quasi real-time evaluation of the manufacturing and test procedures with respect to their quality status. The quality status is described using the necessary parameters such as first pass yield (FPY), yield, PPM failure rate and other parameters. The principle of TOP-DOWN analysis is supported for ascertaining fault focal points. This facilitates the efficient and targeted examination of deviations in the processes in great detail. Analyses of attributive failure characteristics and variable measured quantities within the framework of statistical process control (SPC-A and SPC-V) are possible both online and at runtime of a production process. The analysis can be carried out over an arbitrary time period with a freely defined level of detail.

The quality analyses available in the iTAC.MES.Suite provide the information necessary for quality management and for the continuous improvement process in quasi real-time, contributing to the realization of zero-fault production one step at a time.



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**DIN ISO 9001:2008
certified by DQS.**

iTAC Software AG is a leading provider of Manufacturing Execution Systems (MES). iTAC develops implements, maintains and provides support for its platform-independent iTAC.MES.Suite in manufacturing companies world-wide.

The iTAC.MES.Suite is built using leading edge technology and its high level of standardization means it can be deployed in many different industry sectors. The functionality of the MES solution enables substantial improvement in process and product quality – supporting the objective of delivering zero-fault production. Focused on traceability (TR-Service), Production Management (PM-Service), Quality Management (QM-Service) and Material-Logistics (ML-Service), the iTAC.MES.Suite boasts a comprehensive portfolio of functions living up to the product philosophy “effective production”.