DCMI

Dynamical Car Manufacturing Interface

zenon®

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Test the ties that bind you (Schiller – "The Bell")

Quality is decisive for a competitive advantage in a highly contested market. A premium automotive brand is primarily defined by the quality of its cars. Premium car manufacturers therefore place particular emphasis on production quality, which greatly characterizes the image of its brand. To bring about optimum production quality in automotive production, COPA-DATA developed the Dynamical Car Manufacturing Interface (DCMI) based on its zenon SCADA technology. The development of the DCMI was supported by the German Federal Ministry for the Economy and Technology.

Supported by:

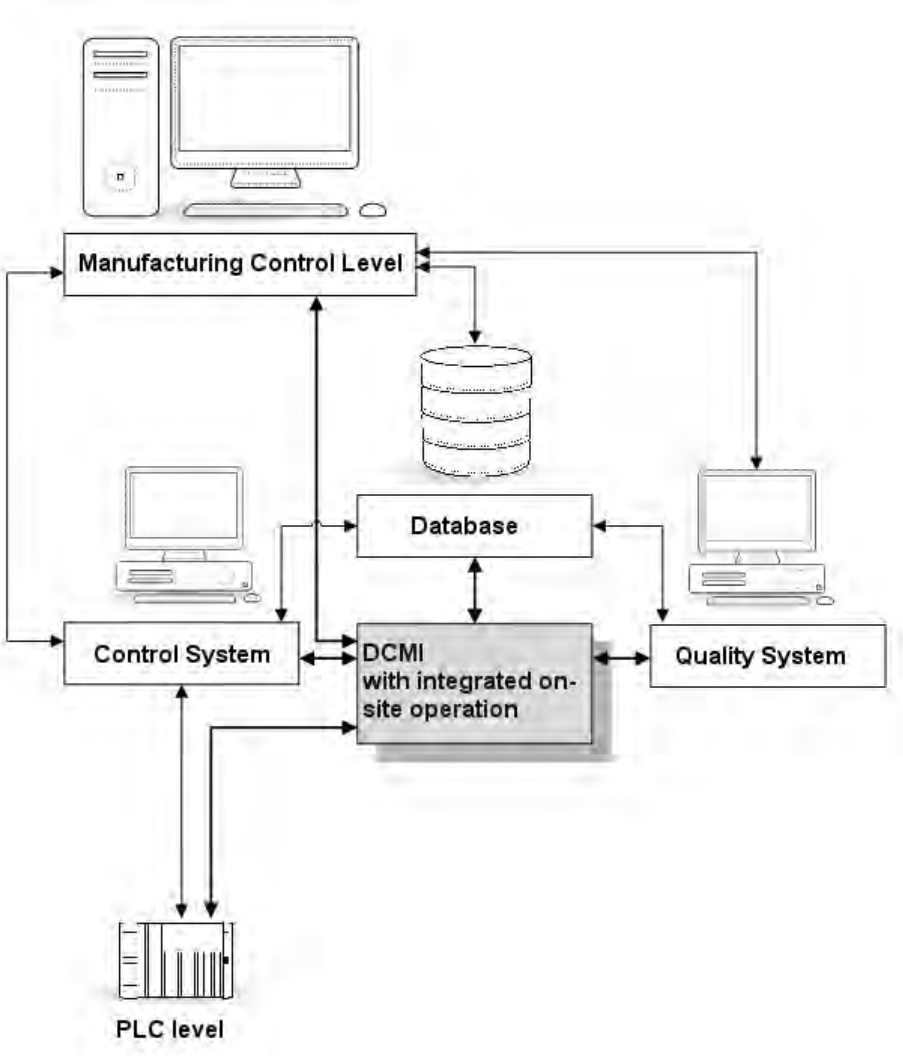
The German Federal Ministry for the Economy and Technology

Quality from A to Z

In vehicle production, the measures taken to promote quality are present in many elements of the individual production stages. The manufacturing process is continually monitored manually or automatically. Information gained this way is recorded, processed and can lead to changes in production methods if there are quality defects. Short-term measures to increase quality must be made – in the best case scenario by rectifying the cause of the fault in order to avoid faults in series manufacturing that would be laborious to rectify. The data recorded is then archived on a long-term basis in order to meet all guarantee requirements.
Because vehicle components - and complete model ranges - are manufactured throughout several factories, it is essential to use standardized methods and processes. All production stages, recorded data and activities carried out must be identical, regardless of location. Data is saved in central database systems in order to be accessed from different places. This data plays an important role in the optimization of working processes. The systems used can access this data via standardized database interfaces. In addition to the operating and monitoring system, data must frequently be exchanged with control systems or special quality assurance systems.
Clients are installed on-site to process and display quality data. Such quality systems (QC or CAQ) are usually software packages that are optimized for these applications. In addition to saving manufacturing data, master data and orders for subsequent processing need to be administered. Consequently, a mixture of different systems frequently exists: front end for the quality data, visualization for conveyor systems, operating stations for manufacturing and display systems for the output meters. Information from the overlaid manufacturing control system must be integrated into this and processed.

Integration into the infrastructure

Manufacturing structures like this are served by the different levels of data logging, processing and archiving of the various different systems from different manufacturers. Application solutions or bespoke solutions will often be used for the exchange of data between these systems. In order to avoid these interfaces, separate client stations will often be installed for each application. The zenon Dynamical Car Manufacturing Interface (DCMI) fulfills all requirements of this type in a single system.
Under the motto "Impulse for Growth" the German Federal Ministry for the Economy and Technology instigated the "Central SME innovation program". Through it, the German Federal Ministry for the Economy and Technology supports innovative development and technology projects following a resolution passed by the German Bundestag (German Parliament). COPA-DATA impressed them with its "Dynamical Car Manufacturing Interface" project and received a grant.



Because the DCMI is based on a system that covers all automation levels, it offers very versatile application. Due to the large amount of direct drivers available, the data can be logged and archived from the control level (PLC level) directly. Special additional interfaces are not required, because zenon includes all communication drivers for different PLC systems from different hardware manufacturers. Therefore, all functions at the on-site level, or Human Machine Interface (HMI) level, can be directly incorporated. The zenon control systems are also based on this data, which means that additional interfaces are not required.
The DCMI primarily handles data at the manufacturing level (at the Manufacturing Execution System, or MES, level). The data of the quality systems level is also processed (QS). It prepares the display of data and the interaction with the operator on site. Because only one system is used for these different tasks, the amount of hardware and software deployed is minimized. The associated administrative expense of updates or training for such systems is also reduced.

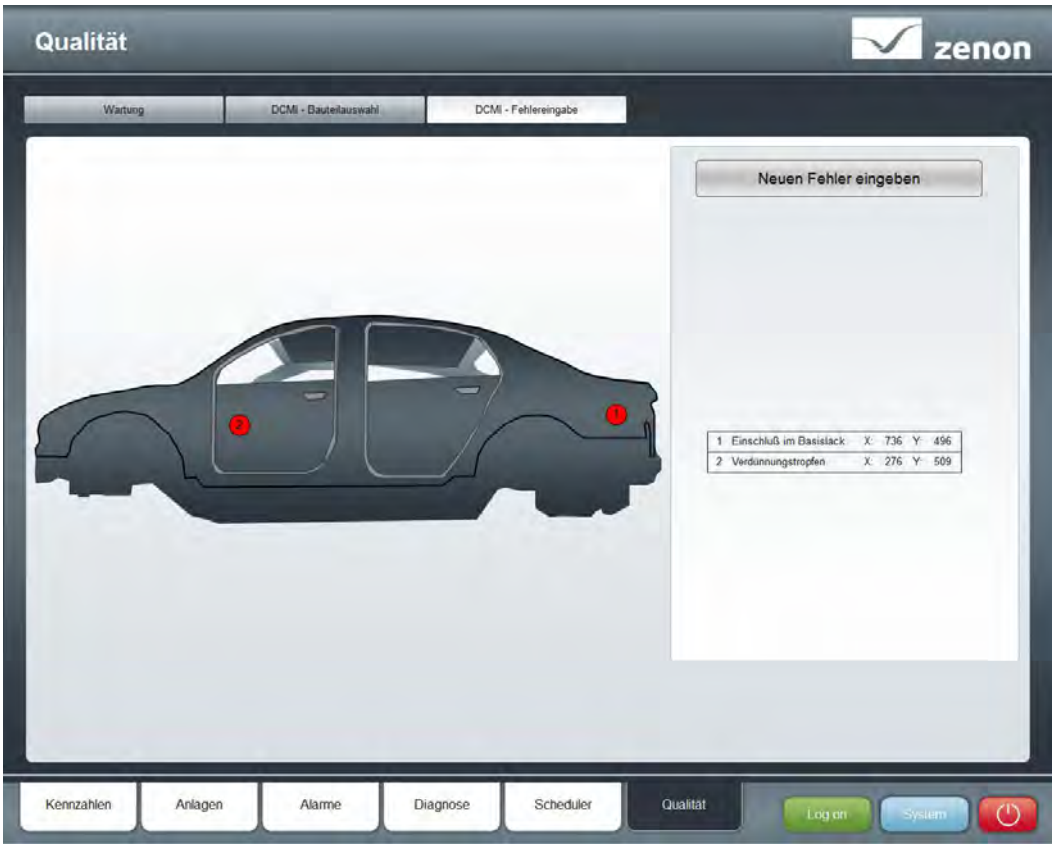
Flexible preparation of data

The processing of quality data is a significant part of the DCMI. After the components or vehicles have been produced they are subjected to quality checking. At this point, central data from the manufacturing level is allocated to the vehicle that is currently being tested. For quality tests that are carried out automatically, this master data is linked to the measured values that have been logged and saved in the quality database. In doing so, it is necessary to process data from different systems.
For the manual logging of data, the corresponding information is displayed to the user on screen. In addition to displaying errors that have already been recorded, the operator is interactively supported when inputting the error. Screen masks with lists for selection optimize the logging of errors and any rectification work that has already been carried out.
The DCMI summarizes logically related data for on-screen display. This might include master data for the current vehicle, automatically recorded measured values, faults entered manually and any work orders relating to their rectification. Information from the control system or the manufacturing system at the respective display location and the logged-on user are optimally filtered and displayed. Thanks to the graphical user guidance, the tester can immediately record faults or problems on-site, which are then immediately available for processing at the central system. As a result of the DCMI's centralized recording, evaluations of production quality can be made at a control room or at remote stations. This also gives users the option to plan rectification work centrally.
A significant characteristic of the Dynamical Car Manufacturing Interface is suggested by its name: it is a flexible interface to the different sources of data. For example, it makes direct communication with control units from the conveyor system possible. The DCMI can, on the basis of this data, automatically "recognize" the vehicle in front of the tester and display the attendant data. This direct interface makes it possible for the user to forward control commands to the conveyor system. Depending on the status of the person logged on to the DCMI, this person may also be able to have the vehicles forwarded to other stations by means of user inputs. It is also possible to forward alarm messages to employees

manually or automatically, by means of SMS or email. It can also be used as a basis for integration into a band-stop concept (Andon).
The connection to the central master data is made via a flexible database interface. Because the structures of this database table frequently grow out of requirements that change or develop over time, the database interface can be configured individually according to the circumstances. The data structures within the DCMI display the data from the connected stations. The master data is compiled by the DCMI into groups that correspond to the data as it is required at the different manufacturing stations. The order data from the manufacturing control system are important information in the master data. The individual data records are identified by means of clear bodyshell IDs. These IDs are used by the DCMI to provide a filtered display to the logging stations. The same bodyshell IDs are used for these records as are used for bodyshell tracing. This way, the data can easily be exchanged between systems.

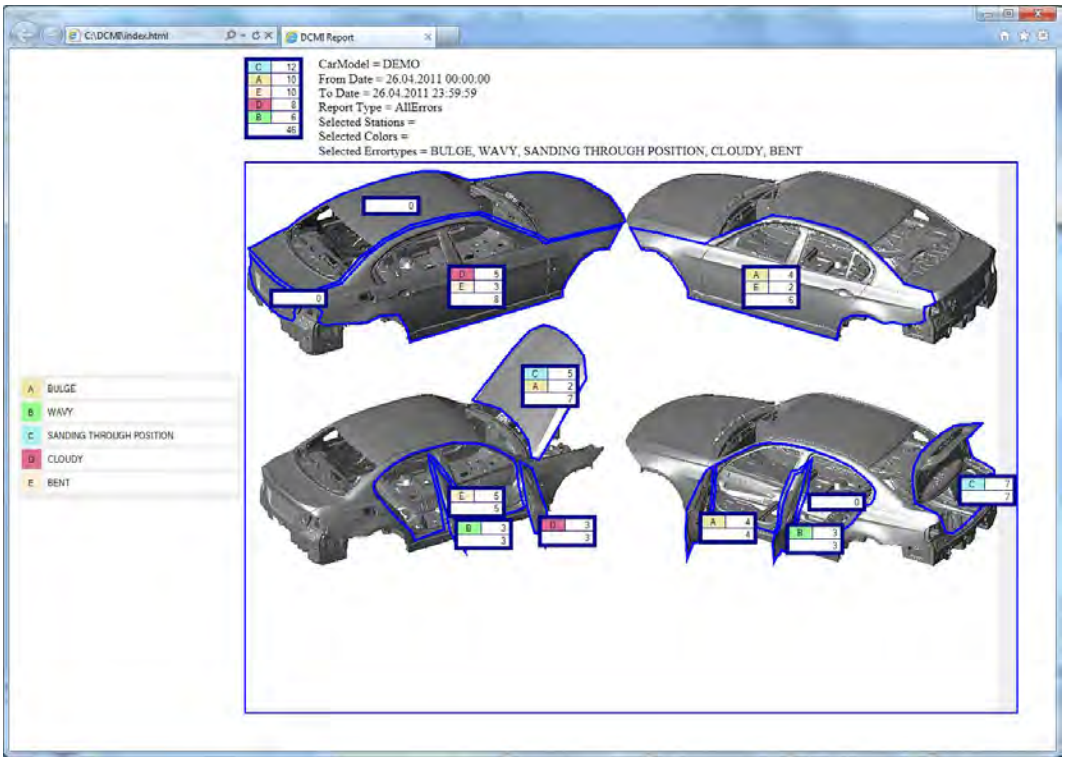
Task-orientated user interface

The user interactively logs faults graphically on site. To do this, an overview screen of the vehicle to be tested with all the required information displayed on screen. The view of the vehicle can be selected as desired, using the screen. The location of the fault is then inputted using on-screen actions, whereby a detailed view can also be displayed for more precise logging. The faults are also saved in their precise position so that these positions can be found again quickly and reliably for subsequent work. In addition to the location of the fault, the types of fault can also be recorded by selecting them from a list. It is also possible to enter user-specific comments. Macros are available for faster recording, which enter pre-defined values into the system when selected. For example, these could be subsequent work that has already been carried out in pre-defined working times. There is a multiple-input to enter more than one fault of the same type: several highlighted faults can be allocated to a certain type of fault or a macro. In addition to the location of the fault being stated precisely, the DCMI also logs location-specific faults, such as the number of grinding or polishing positions on individual components.
After the fault logging is concluded for a vehicle, all data is saved in the database and is available to the adjacent station. When carrying out subsequent work, the factory worker is interactively guided through the individual steps in a similar manner to fault logging. The work that is subsequently carried out on faults is again selected from lists. As part of this process, the working time required and the cost centers to be charged can also be itemized when the work is concluded. Subsequent amendments to individual records in relation to a fault or subsequent work process is possible with appropriate user rights.
The DCMI always provides the vehicle information for monitoring the manufacturing quality or status information of the work steps that have been carried out. In doing so, all available data on a vehicle is displayed on a specific screen display. In addition to the master data, the faults logged and subsequent work are also displayed, together with the respective time stamps. There is also a historical display of the vehicle route from the display of locations where logging took place.



Graphical evaluation of all relevant data

The reporting module of the Dynamical Car Manufacturing Interface (DCMI) offers comprehensive options to evaluate the quality data. Comprehensive filter options for processing this data are present in the system. For example, the displayed data can be selected according to time, vehicle types, logging stations, vehicle colors or types of fault. You can choose to display the reports either on the screen or for publication on the intranet in the form of an HTML file. In addition to user-specific evaluations, the DCMI also offers the option to publish automatically-generated reports in fixed cycles. The different types of faults and their frequencies are displayed in the report views of the individual vehicles or vehicle components. Faults that occur repeatedly are immediately visible, even on several vehicles, using color-coded graphics. The faults are displayed along with their precise location in the detail view. The different displays in the reports are linked, so that the user can easily navigate to their desired display.



DCMI – the quality tool box

The DCMI, with its various modules, is a comprehensive collection of tools to log and record quality-related manufacturing data. Due to the consistent use of standard interfaces and configurable objects, it can be simply and safely integrated into existing infrastructure.