Quality Control in Production with MP85A

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HBM Test and Measurement

High Quality – Quality Control in Production Made Easy

One hundred percent quality assurance has become a routine task that requires completion by suppliers in the automotive industry and in other areas of testing and measuring in production as well. Process controllers and control units are equipped with ever more extensive and smart functions to meet production requirements. This approach was introduced for safety-relevant components many years ago. Today, traceability is indispensable for ensuring compliance with the DIN ISO 9001 standard.

The trend: Centralized process visualization

With fieldbus systems becoming increasingly popular, the continually increasing demands on production speed, and the changing constraints on automation, measuring and analysis systems are required to provide new capabilities.

For instance, there is a trend toward accommodating the entire automation equipment in a control cabinet to enable the visualization of processes to be centrally performed on a control unit. The MP85A and MP85DP amplifier modules are ideal for these applications since they provide powerful algorithms that enable 2-channel processes such as force vs. displacement curves during press-fitting to be analyzed and allow the results to be conveniently visualized.

Fig.1 MP85A process controller in the control cabinet

Flexible choice of transducers

Supplied in a compact housing for industrial use, the MP85A still provides a high degree of innovation. This starts with the signal conditioning itself, since the amplifier can be connected to a wide range of sensors using simple software commands; no special connector modules are required. A 4.8-kHz carrier-frequency amplifier, unaffected by interference, enables the strain-gauge and inductive transducers to be connected. Furthermore,

active transmitters with a ±10-V output, SSI sensors, and incremental encoders can be used to acquire the signals.

Regardless of the type of transmitter, a fast ADC with a high resolution is used to synchronously and parallelly condition, digitally filter, and make available the scaled signals to the system. The signal bandwidth can be up to 1 kHz.

Powerful analysis methods and algorithms for all types of applications

Regardless of whether a press-fit, hysteresis, or torque/angle-of-rotation curve is to be evaluated, the MP85A comes with three methods implemented for performing the task: nine tolerance windows, an envelope curve, or a tolerance band. It is also possible to use relative coordinate systems to adapt to the application as conveniently as possible, compensate for mechanical tolerances, and thus obtain reproducible results. A smart data reduction method is used to limit the acquired curves to a maximum of 4000 triples of values (value X, value Y, and time), since huge amounts of redundant data could otherwise arise, which would result in a loss of performance for the entire system.

System integration

The MP85A can be used as a stand-alone device or can be integrated into an automation environment. This can be achieved via the Ethernet interface in a PC-based system or integrated fieldbus interfaces in a PLC such as CANopen, Profibus-DPV1, or Profinet-RT. The robust and EMC-tested metal housing for industry-standard rail mounting, 24-V excitation voltage, pluggable screw terminals, and the galvanic isolation of the optically isolated control inputs and outputs complete the industrial concept.

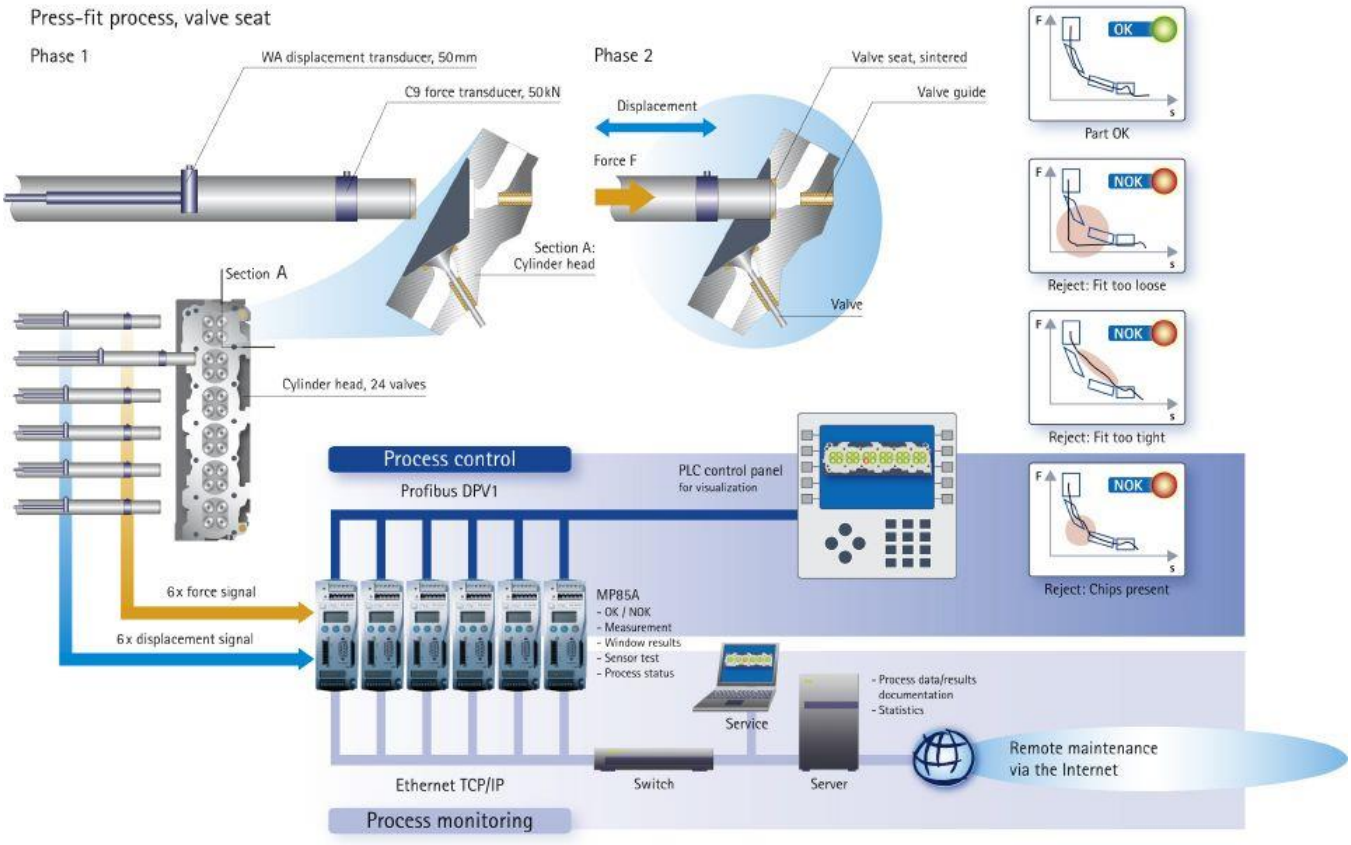

Fig.2 MP85A system integration via PC and fieldbus interfaces

Convenient configuration

The MP85A offers a menu-driven configuration. Only a few settings are required to start up the system. The first step is to select the transducer type and set the parameters for signal conditioning (input characteristic, filter, zero point, etc.). Once the amplifier is ready for measurement, the “Analysis Criteria” menu can be selected. Here, a distinction has to be made between analysis using a tolerance window or using an envelope curve. An analysis using an envelope curve enables up to ten reference curves to be measured and the tolerance band to be adapted to their arithmetic mean.

When using tolerance windows, a special feature is that an individual decision can be made as to which sides of the window are to be monitored or how the curve is to progress through the window. This function is necessary, for instance, to evaluate the hysteresis curves that occur during the testing of coil springs.

The settings for up to 32 different types of workpieces can be saved to the MP85A’s parameter sets (or any number to your PC). The third software operating mode is called “Measure & Visualize ”: It enables a display screen to be created that visualizes the current curve, the instantaneous values, statistics, and/or the results of the last measurement.

Connection to SPC software

The requirement for state-of-the-art “statistical process control” (SPC) can easily be met using the MP85A. The data is saved to a multimedia card or via the interface directly to the PC. The resulting files can be conveniently evaluated and processed using Q-stat, the popular SPC program, or Microsoft Excel. Alongside the results, information such as process numbers, date/time, and active parameter sets are saved to ensure full traceability. The INDUSTRYmonitor PC software enables up to 12 MP85A to be operated.

Powerful production software: INDUSTRYmonitor

A completely new .NET technology-based user interface was created to enable the full performance of HBM process monitoring to be utilized. This tool is used to record process data, for visualization and to save data. Alongside the functions and information made available by the process controllers of the FASTpress and EASYswitch series, workpiece designations can also be read via bus interfaces (CAN, Profibus, Profinet, Ethernet) or barcode scanners (USB). This information is displayed and saved to facilitate a clear overview and simple archiving of the acquired process data. Up to 12 process controllers can be operated over the Ethernet network. Cycle times, measured in seconds, can be implemented, with the display and storage of process data occurring in the background. The software can also be used on all target systems on which WindowsXP is installed as the operating system.

The scalability and user administration make INDUSTRYmonitor the ideal multi-purpose tool for process monitoring. The user levels feature the following options:

- **User mode**: In this mode, the machine operator can monitor production and see the status of the machine or system. Saved process curves and results can be checked and printed out.
- **Installer mode:** On this level, the evaluation criteria of the production process can be set up and saved. Up to 1000 measurement programs can be created and administered. In installer mode, measurement curves, results, and monitoring states can be recorded and analyzed.
- **Superuser:** This level is designed for plant engineers and installers for parameterizing process monitoring and measurement chains. It allows for the adaptation to the available production tools and machine parameters.

To avoid incorrect usage or misuse, the software "jumps" back to user mode after a defined period of time.

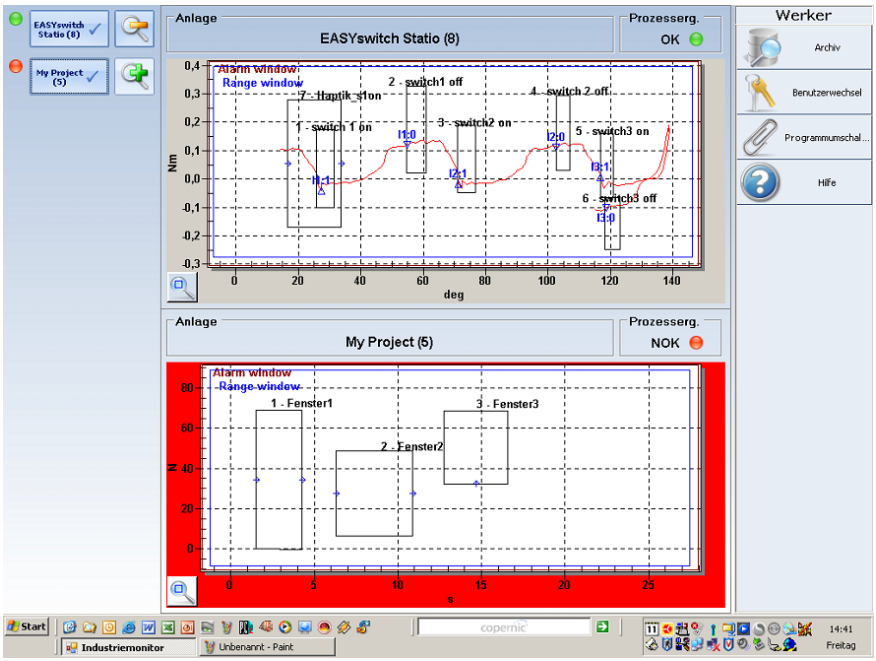

Fig. 3 INDUSTRYmonitor – Process view

Conclusion

The MP85A modules, with their standardized PC and fieldbus interfaces, can easily be integrated into a modern or into an existing production system. Due to the flexible choice of sensors and convenient system configuration using the PC software, the MP85A is the apt choice for all applications that require two mechanical parameters to be correlated. The smart features integrated into the MP85A, which acts as an edge controller, relieve the system control and comply with the state-of-the-art requirements of uninterrupted process control.