



HART Communication Protocol Offers Great Opportunities for Predictive Maintenance

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The digitization of manufacturing is strongly promoted in the industry. Only in this way will it be possible for plant operators to meet current megatrends in the process industry. Those who successfully digitize processes will also be able to survive in the face of global competition in the long term. A good example of this is the opportunities offered by the digitization of field devices. The recorded diagnostic data can be used for predictive maintenance. It increases system availability and thus saves costs – this strengthens the operator's competitiveness. Using a practical example, the article shows how the HART communication protocol can be used with regard to predictive maintenance.

The digitization of field devices offers plant operators a huge potential to reduce operating costs while increasing productivity. As “eyes and ears”, the field devices collect a lot of valuable data directly at the machines and plants. However, a glance at the reality of the process industry shows that a large part of the available data remains unused. Measuring transducers installed today can do considerably more than just transmit measured values via a 4...20-mA signal. Diagnostic data even remains unused for the majority (85%) of HART-capable devices present in process-es. Field devices that use the HART protocol are becoming increasingly important in the digitization of process engineering manufacturing. This offers good starting points for use in predictive maintenance. The key here is to know what the current “state of health” of a particular device is.

With over 40 million field devices installed and support from leading instrument suppliers, the HART communication protocol is the most widely used digital communication technology in the process industry. Although the HART signal has been primarily used for parametrization so far, it can also enable continuous device monitoring and diagnosis as well as providing multivariable process information with the corresponding tools. If this data is collected and converted into usable information, it provides considerable added value over the complete plant lifecycle – from planning and installation through to operation and maintenance.¹ Another factor is that this data is theoretically relatively easy to access. This makes seamless integration into IIoT solutions possible, potentially via the HART protocol and gateway solutions.² HART technology means that corresponding field devices have huge potential where the vertical networking of plants and the transition to intelligent factories and Industry 4.0 are concerned.

Predictive maintenance thanks to diagnostic data from field devices

The HIMA HART solution sets new standards in the acquisition of diagnostic data from field devices in safety circuits. Plant operators can make the diagnostic data acquired with field devices easily and safely usable for the asset management system. Extended trend information enables meaningful predictive maintenance to the safety systems in the process industry. The analysis of data from the field devices provides decisive information for the operation and maintenance of the plant. Targeted repairs can be planned at an early stage, misuse can be prevented, and defined maintenance intervals can be extended.

1 Suzanne Gill, Control Engineering Europe, HART holds its own in the race to Industry 4.0, 4. September 2018, <https://www.controlengurope.com/article/139367/HART-holds-its-own-in-the-race-to-Industry-4-0.aspx>

2 Dr. Jörg Kempf, Process, Exklusiv-Interview zur Namur-Hauptsitzung: Endress+Hauser-CEO Matthias Altendorf: „Das IIoT wird greifbarer“, 17. September 2018, <https://www.process.vogel.de/endresshauser-ceo-matthias-altendorf-das-iiot-wird-greifbarer-a-756111>



Figure 1: HIMax HART module X-HART 32 01.

Plant operators can integrate the solution into existing infrastructure without incurring huge costs. They benefit from low engineering costs, shorter commissioning times, and reduced maintenance costs due to optimized work instructions and maintenance plans. The HART solution also offers support functions for NAMUR NE106 with more flexible test intervals; the automatic repeat test means that test intervals can be extended, thereby reducing maintenance costs and increasing availability.

Practical example: Joint HART solutions from HIMA and Endress+Hauser

Metrology specialists Endress+Hauser and HIMA developed joint solutions for safe HART communication and diagnosis of instrumentation within the framework of the Open Integration partner program. This combines the HIMA HART solution with the E+H diagnostic technology called Heartbeat. Here are opportunities for predictive maintenance: With the joint solution it is possible to use the monitoring function of the Heartbeat technology in flow meters and read diagnostic data in the SIL loop. This function provides the HBSI (Heartbeat Sensor Integrity) value with which corrosion and deposits can be detected, among other things. In addition to the test result (passed or not passed), the devices test supplies all the diagnostic values necessary for meaningful trend monitoring. These can then be processed further and used for predictive maintenance.

There are now various analytical models available for a detailed evaluation of the parameters so that clear progression curves and trend statements on the state of health of the device can be derived in the respective application. For a specific adaptation for this application, it is even possible to display to the nearest millimeter the thickness of a coating formed in a measuring tube. Any necessary plant purging processes can be initiated in this way.³

Conclusion

Diagnostic data from field devices offers plant operators great advantages in the field of predictive maintenance, provided that these can be made usable. The HART communication protocol – as the most widely used digital communication technology in the process industry – is the suitable starting point here. The HIMA HART Solution sets new standards for the acquisition of diagnostic data from field devices used in safety circuits. With the data obtained, it is possible to derive clear progress curves and trend statements on the health status of the device in question. This facilitates anticipatory maintenance: By avoiding downtimes, system operators are able to effectively save costs.

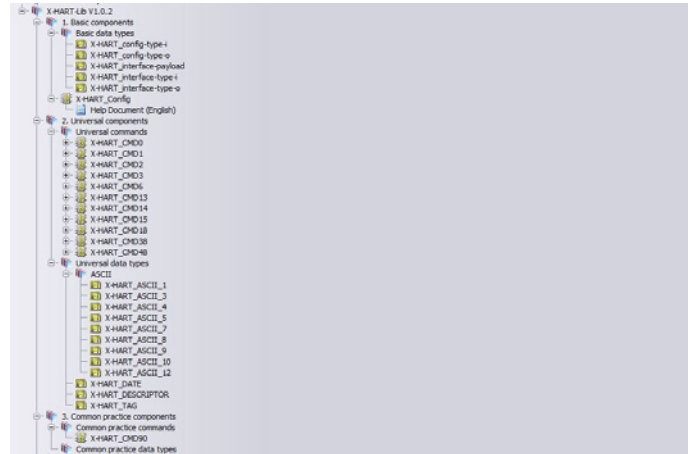


Figure 2: HIMax HART software package.



³ Sabine Mühlenkamp, Intelligenter Türöffner – Diagnose für PLT-Sicherheitseinrichtungen, Process Ausgabe 9-2018, S. 34 ff.

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