ENHANCED AVAILABILITY FOR GAS ANALYZERS

SOFTWARE-BASED PREDICTIVE MAINTENANCE TO MINIMIZE REACTIVE SERVICING

As instruments that routinely interact with physical matter, gas analyzers contain parts that will require repair or replacement due to wear, ageing or contamination after a certain length of use. Not addressing such issues will eventually lead to a reactive service event and thus a period during which the instrument cannot perform gas analysis, with potentially serious consequences: unexpected downtime may mean that, for example, exhaust gas emissions from combustion cannot be measured according to regulations, or gas feeds to industrial processes are not tracked, potentially limiting the output of the production line. Maintenance and repairs that are left too late can impair productivity, disrupt sched- ules and cause stress among staff. Regular or occasional visual inspections will only give a partial picture of an instrument's health status.

Predictive maintenance to maximize gas analyzer availability

Such issues can be minimized with a short regular checkup, for example by using SITRANS AID IQ, the new software solution for predictive maintenance of Siemens gas analyzers. It reads the instrument's internal diagnosis data to detect early signs of deterioration, then makes predictions based on statistical data and expert algorithms, giving tech- nicians the time to deal with an issue while the instrument is still fully functional. Depending on the location, detailed identification of an issue,

on-site service and spare part maintenance can require one or even two weeks. Using SITRANS AID IQ can reduce the mean time to repair by up to 90%. This minimizes downtime, ensures that mea- surement can resume much sooner, and increases overall confidence in the process.

Aside from instrument availability, software-based predictive maintenance also helps to optimize workflows. Technicians usually have a diverse spectrum of instruments to manage, so a lot of specific knowledge about the various technologies is necessary to command each instrument. Being able to monitor several gas analyzers centrally from the convenience of a display screen saves precious time on visual instrument inspections and, when the gas analyzers are accessed remotely, on distances to walk within the facility. Checking the instruments' status once a day, which usually takes only a few minutes, can save more than 20% of the time spent on preventive maintenance, freeing up valuable time to focus on other important activities. Moreover, the convenience of having a user-friendly software tool makes it much easier for new personnel to learn how to manage an existing installation of gas analyzers because less knowledge of hardware details is needed.

The monitored gas analyzer parameters to minimize reactive servicing

The SITRANS AID IQ software is capable of detect- ing most of the issues that Siemens gas analyzers may encounter over time by monitoring detector sensitivity, light source intensity, measurement chamber contamination, chopper frequency and other parameters. A typical example of what it tracks is ageing of the light source in Siemens NDIR analyzers (ULTRAMAT 6 and 7). When the intensity of the light reaches a critical range,

Fig. 1: Health status of different analyzers at a glance without any effort to evaluate where an action is required.

signifying this will likely affect performance in the near future, the software alerts the user in good time that repair or replacement is becoming necessary, leaving enough time to take action. Without this information, the problem would either go unnoticed until the instrument has stopped measuring or a light source would be replaced too soon. Other examples of issues that the software tool detects are aging of the electronics board, optical path impairment of the ULTRAMAT 6 and 7 analyzers caused by contamination or leakage, and diminished sensitivity of the microflow sensor in Siemens oxygen analyzers (OXYMAT 6 and 7). All in all, SITRANS AID IQ identifies 75% of the reasons why an analyzer has to be sent to a repair center. In other words, it helps to avoid most of the unforeseen maintenance events that occur, and thus the sudden and unexpected need for technical staff to intervene.

Technical architecture and interface

The SITRANS AID IQ software supports a growing range of Siemens gas analyzers and is perfectly suited to optimize the operability even of older installations. Its V1.0 release is compatible with SIPROCESS GA700, OXYMAT 6/61/64, ULTRAMAT 6, OXYMAT/ULTRAMAT 6 and ULTRAMAT 23. Apart

from the robust, low-maintenance Siemens SIMATIC S7-1500 controller to run the software and a communication module, no extra hardware is required. The controller uses Modbus TCP and/or ELAN to read the data of up to ten gas analyzers that are connected by either ethernet or, option- ally, by wireless or remote access via a router.

Setting up and expanding a network is straight- forward thanks to the standard interfaces and plug & play installation. Further controllers can be integrated to monitor additional instruments. It is also possible to integrate the controller into an existing analyzer system, provided there is enough space. The SITRANS AID IQ software can be operated from any laptop or from an optional Siemens HMI touch panel without the need to install software.

The Overview window of the SITRANS AID IQ soft- ware lists all connected gas analyzers, revealing each instrument's bus address, hardware and soft- ware revisions, as well as – most importantly – its health status according to the NAMUR NE 107 standard, reported as either "normal", "check func- tion", "maintenance required", "out of specifica- tion" or "failure" (Fig. 1):

Selecting a gas analyzer listed here gives access to further information. The Identifier window states all the instrument's
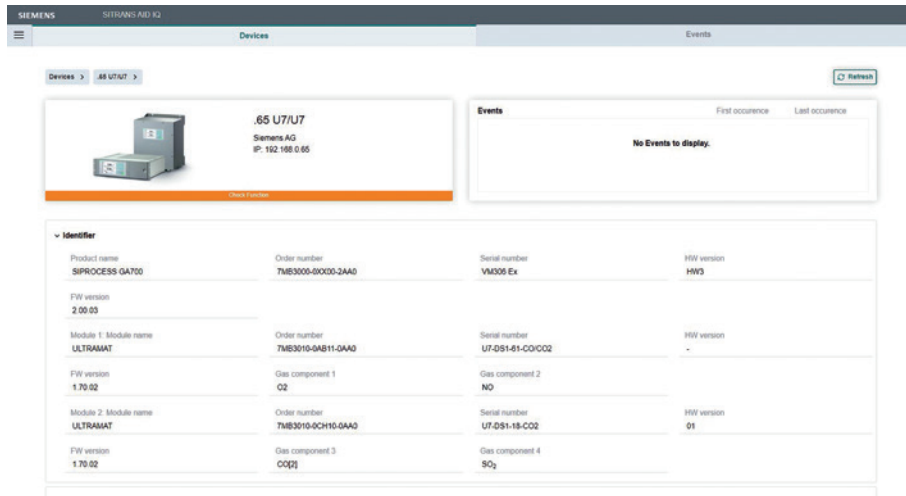
Fig. 2: Fast identification of relevant device information for service in case of need.
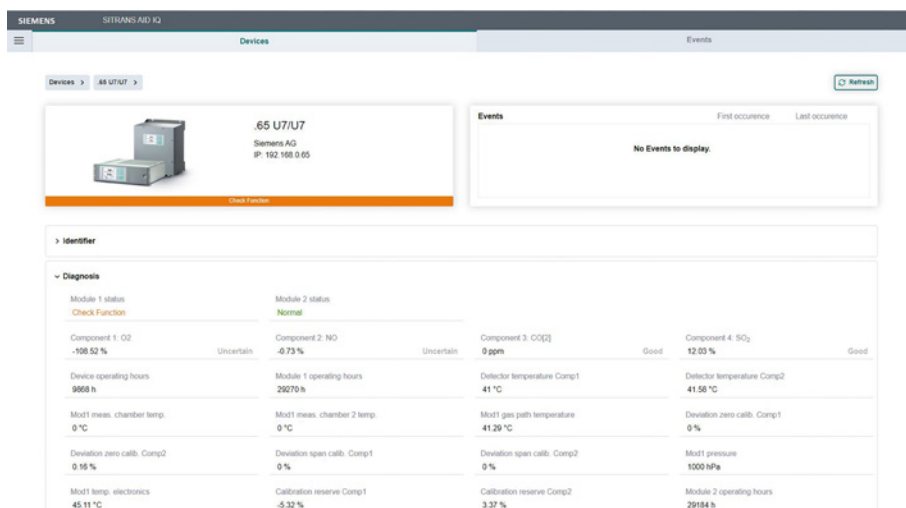

Fig. 3: AID IQ shows helpful diagnostic data to evaluate health status with one click.
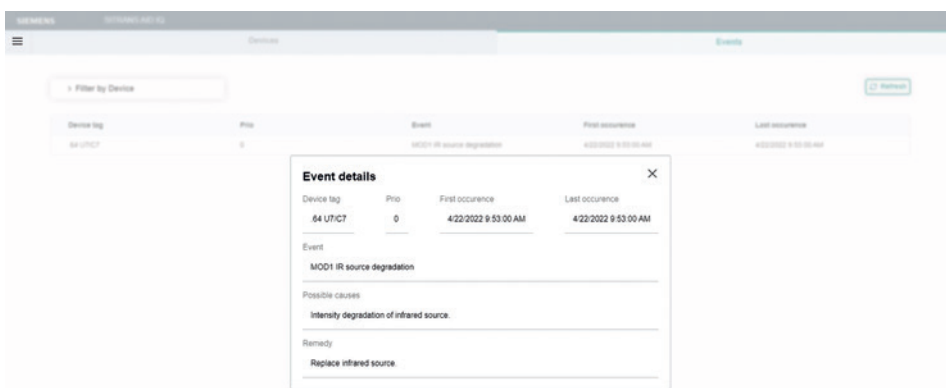

Fig. 4: The Event Details View shows all relevant information to identify an issue and to initiate next steps.

identification data and gas components for faster access when servicing is needed. It also shows open events and gives device information (Fig. 2).

The Setup window indicates the instrument's measuring ranges and calibration setpoints, while the Diagnose window displays the para- meters that are monitored to assess the instrument's status and to analyze anomalies, as well as their current values. The parameters tracked include the current gas measurement value, instrument oper- ating hours, board temperature, chopper frequency, pressure and other relevant device-specific values, depending on the technology (Fig. 3).

Finally, the Event view displays the conclusions and suggestions SITRANS AID IQ provides the user, including the events that have occurred, predic- tive maintenance information in case of an event, the description of the problem as well as the sug- gested solution (Fig. 4). With this information, the user can immediately either fix an occurring issue in-house or contact product support for assistance:

Added value for existing gas analyzer installations

Gas analyzers are designed and manufactured for a long lifetime of reliable service in industry.

However, over time, instrument servicing will become inevitable. With its specific manufacturer and service provider expertise, Siemens is best placed to analyze the behavior of its own gas analyzers and offer the fastest route to remedying an issue. The SITRANS AID IQ software adds a new level of intelligence to customers' existing base of Siemens gas analyzers, particularly older ones. The easy-to-use software increases instrument availability, reduces the mean time to repair, and saves valuable time spent on visual preventive maintenance. If several gas analyzers are con- nected to the software-hosting controller, the annual cost per analyzer over a ten-year period reaches only a fraction of the costs that a single reactive service event would cause.

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