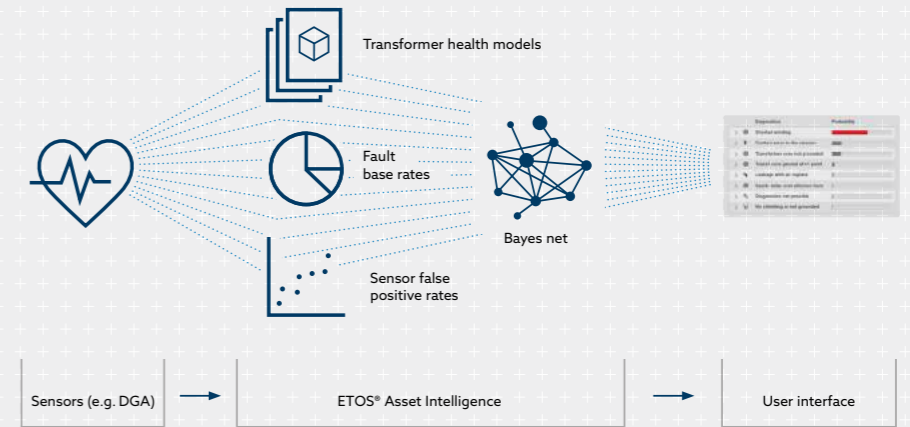




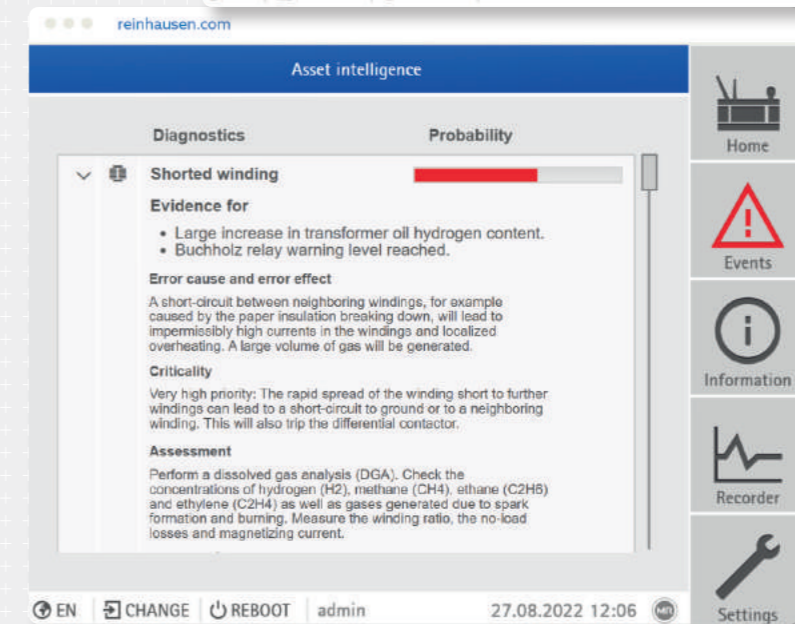
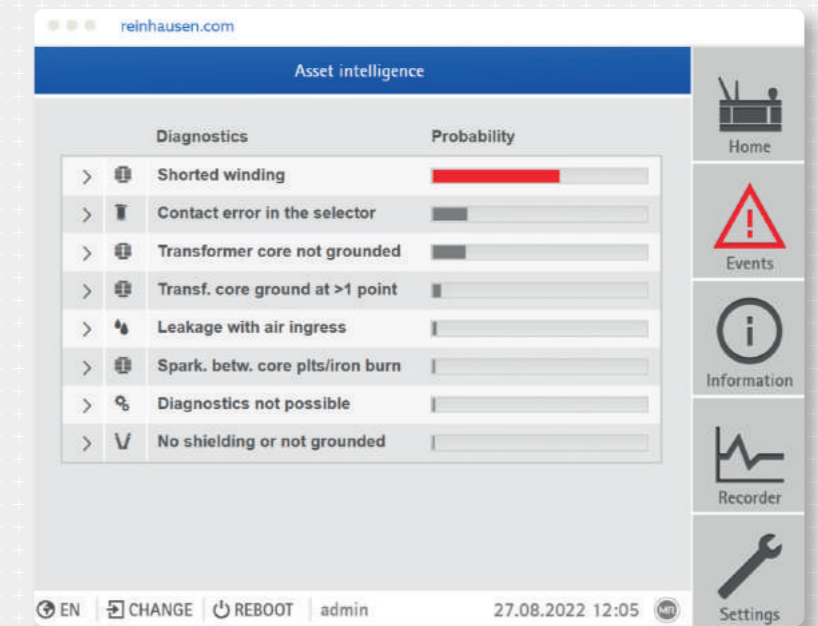
NEW MONITORING SOLUTIONS



The result is a probability estimate for all known transformer problems with the most likely problems being displayed to the customer, along with a list of reasons for the findings. This allows the specialist to interpret the diagnostic results in a simplified way.

The following example serves as an illustration: The Buchholz relay has tripped and the hydrogen level is greatly increased. Otherwise, there are no further limit violations. ETOS® Asset Intelligence provides the following findings:

In the central field device (ETOS®), all sensors present on the power transformer are integrated and considered together.



PART 2



NEW TECHNOLOGIES CAN HELP COMPENSATE FOR THE LOSS OF PERSONNEL KNOWLEDGE AND THE INCREASED DEMANDS ON OPERATING EQUIPMENT

In the last article (March Issue), we described the use and integration of typical sensors with more analysis and inside-view and will now expand the collection and further analysis by edge devices and central solutions.

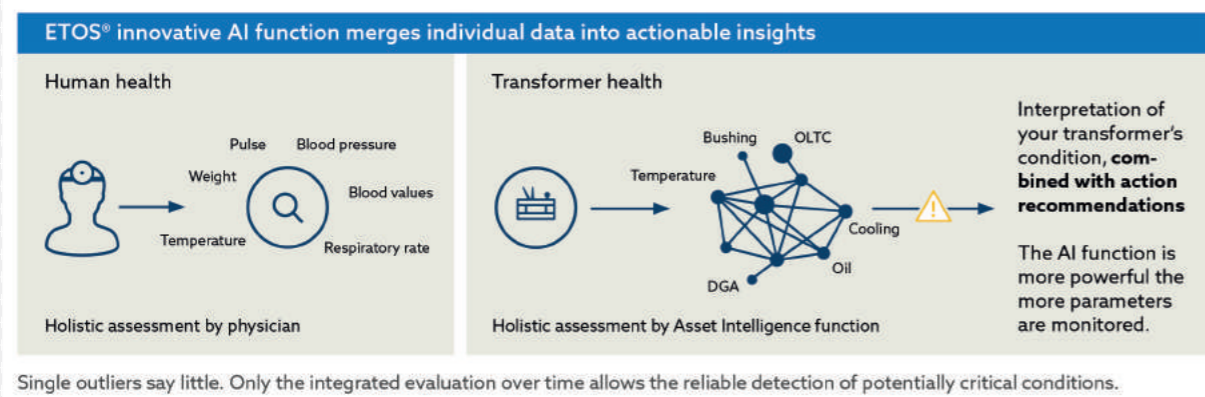
Intelligent maintenance of power transformers through ETOS® Asset Intelligence

Monitoring and sensor systems, such as DGA systems, are often installed on power transformers for early fault detection. These can detect operating states and send corresponding messages when limit values are exceeded. However, the mere attachment of various sensors has two decisive disadvantages.

Firstly, the sensors generate a lot of data and messages which are not centrally monitored and evaluated, and multiple events per transformer cannot be easily monitored and interpreted. Secondly, sensor values are not used to comprehensively assess a problem. For example, if temperature, partial discharge and DGA sensors are all capable of detecting winding faults, their statements are not compared with each other. Thus, contradictory statements can occur, and a simple diagnosis is not possible.

Like a human doctor who can diagnose through holistic assessment, Asset Intelligence for power transformers provides a guide to minimize risk and take corrective action quickly.

Due to the accurate fault description, the operator knows how to correctly classify the fault, assess its criticality, and initiate the next steps. Qualified fault diagnoses are provided based on the probability of the most common transformer failures as well as the actual measurements and results. The more sensor readings available in the process, the more powerful Asset Intelligence is. Like a human doctor who can diagnose through holistic assessment, Asset Intelligence for power transformers provides a guide to minimize risk and take corrective action quickly.



Single outliers say little. Only the integrated evaluation over time allows the reliable detection of potentially critical conditions.

By using ETOS® Asset Intelligence, the power system operator can compensate for the loss of knowledge due to the departure of qualified personnel and make the asset management of power transformers more efficient.

Global view of a transformer fleet for efficient asset management

Enterprise Asset Performance Management/APM

In times where operative costs must be considered and budget principally shrink, we look for alternative ways of evaluating the physical health of our transformer fleets and adjust strategies to ensure a stable operation of the grid. But how to manage these requirements and how to deal with a fleet of transformers that gets older and mostly consists of different suppliers and several variations over the last years.

We believe in a central solution that covers all online and offline data: no matter if they are measured in real-time by sensors or if they have been measured by hand in on-site inspections or while a maintenance. We call this TESSA® APM and offer a comprehensive system that collects data, checks if limit values are exceeded, use powerful artificial intelligence to recognize trends and give recommendations for your asset- and service-management how to act and what to plan.

We believe in a central solution that covers all online and offline data: no matter if they are measured in real-time by sensors or if they have been measured by hand in on-site inspections or while a maintenance.

To meet your specific requirements and to match your needs, the system is adjustable in its integrated functional modules like online-connectivity, oil-analysis, asset intelligence and so on – those will be described shortly. Important is, that the system also has a powerful interface setting that allows to use TESSA® APM in combination with a existing database solution of your company to exchange necessary data instead of have separated systems in parallel. That ensures a "single-point-of-truth" methodology and reduces efforts of the personnel.

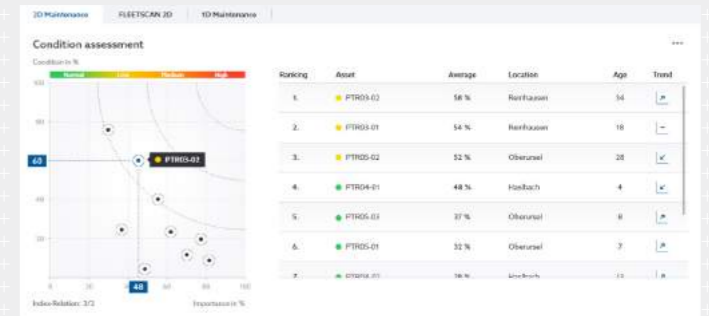




Condition Assessment

Reliable evaluation standards

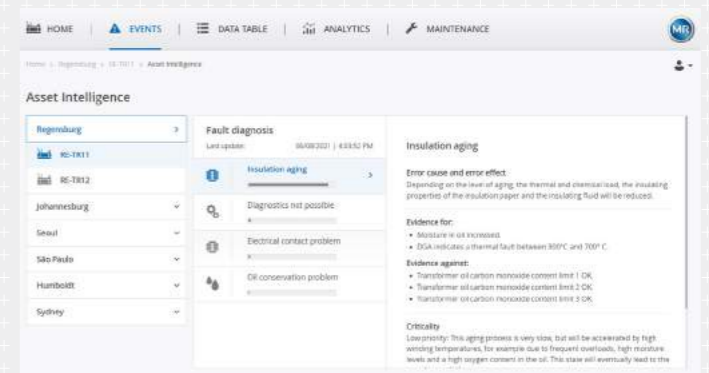
- Combine various data sources (including offline and online data) to gain a clear health index of your transformer
- Configure weighted indices for condition, risks and importance to reflect your asset management philosophy
- Compare to reliable indices defined by MR according to industry standards and expert knowledge



Fleet Monitoring

24/7 online monitoring of success critical assets

- Connect sensors for continuous data transfer or import sensor data manually
- Apply flexible analysis to sensor data
- Detect critical conditions
- Receive automated interpretation of events



Summary

Customer Statements

"We chose MR's system so we could monitor more remotely.

In this way, we save resources and ultimately money.

We also want to understand how components change over time **to better assess service life and necessary maintenance.**"

Customer testimonial from a power plant operator in southern Germany/Switzerland



ETOS®

EMBEDDED TRANSFORMER OPERATING SYSTEM



Tobias Gruber is Automation Portfolio Manager at Maschinenfabrik Reinhausen GmbH, where he has worked for 10 years. He helped develop the current automation systems, i.e., ETOS® for power transformers. He holds MSc. in electrical engineering and is an expert for automation applications responsible for the automation portfolio at MR.