

**Question:** “What are the emerging requirements for asset performance management systems? What are the preferred hardware and software architectures? Are the planned benefits already recognizable regarding cost reduction for operation and maintenance and increase of reliability?”

**Answer:** Asset Performance Management Systems Requirements: Circuit Breaker Monitoring features, hardware and architecture

-From the specifications we have had access to, we defined a minimum set of required features that cover the minimum needs to compute a Circuit Breaker Health index, hence enabling Asset Performance management. Although those features all have a “standard” version, we encourage Asset Performance Management teams to request advanced monitoring for each of them:

- Gas Monitoring
- Operation timings monitoring
- Electrical Wear monitoring
- Mechanical Drive monitoring
- Control circuit monitoring
- Temperature measurement

Added to those features, customer specifications mention IEC61850 ed.2 full compatibility, as well as cybersecurity features, not only embedded in software, but also in hardware.

-Hardware specifications requesting for Asset Performance Management systems specify the need for the integration of monitoring features on Circuit Breakers during its manufacturing. A solution is monitoring with integrated data processing, which is based on the following principles:

- Sensors dedicated to the monitoring system are integrated in the Circuit Breaker during manufacturing
- Local intelligence collects sensor data and computes monitoring information to ensure quality, reliability, readability and security (gas thresholds for example). Latest FPGA enhancements enable local intelligence to get more computational power, more storage, AI and machine learning capabilities, and make them Digital Twin-ready
- Information can be accessed both locally and remotely (IEC61850), data is always accessible on the monitoring device
- One single wire connects to the protection and control room, across which transits all the information and enables redundancy, as opposed to a solution with conventional sensors and 1 sensor per cable