Moisture Care: Smart protection for transformer health

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The hidden threat of moisture

Moisture is one of the most underestimated threats to transformers' reliability. Its impact is profound, accelerating insulation degradation, reducing dielectric strength, and increasing the risk of catastrophic failure. In the world of power distribution, where reliability and safety are crucial, effective moisture management is not a luxury—it is a necessity.

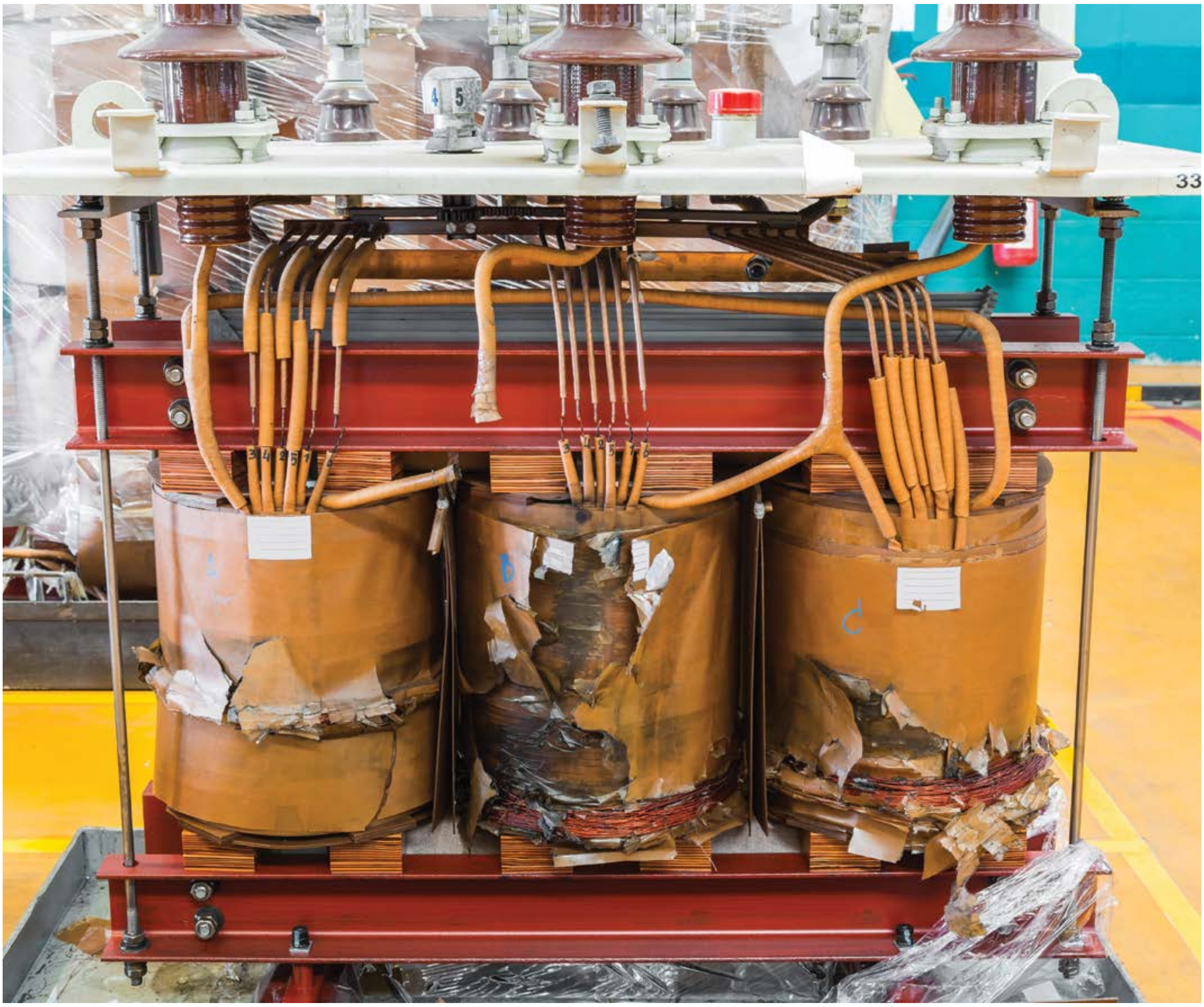
COMEM's Moisture Care provides a comprehensive and intelligent approach to moisture prevention and diagnostics. As part of **MeDICA**, our monitoring ecosystem for transformer diagnostics with integrated customer services and analytics, it combines advanced sensors, real-time monitoring, and expert consulting to help transformer endusers control and prevent moisture presence in the transformers.

Understanding the problem: Moisture in transformers

Moisture can enter transformers through multiple pathways: breathers in poor condition, faulty seals, faulty rubber bag, water-cooled heat exchanger failures, or even during installation or maintenance. Once inside, it comprises both oil and paper insulation.

In transformer oil, moisture lowers the breakdown voltage and, when combined with oxygen, accelerates oxidation. This leads to increased acidity and sludge formation, which shortens the oil's lifespan and reduces cooling efficiency, ultimately impacting overall transformer performance.

In paper insulation, the effects are even more critical. Moisture degrades cellulose, weakening the insulation and making it brittle. At elevated temperatures, moisture vaporizes, causing dielectric gaps that can result in partial discharges and flashovers.



These effects are cumulative and often irreversible. Without proper monitoring and intervention, moisture silently erodes transformer integrity, leading to costly repairs, unplanned outages, and safety risks.

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The solution: COMEM's Moisture Care

COMEM's Moisture Care, part of MeDICA, Transformer Monitoring ecosystem, is designed to address moisture at every stage, from prevention to detection and diagnostis. It includes:

- eSDB self-dehydrating breather:

Our self-dehydrating breather actively prevents moisture ingress. In contrast to traditional silica gel breathers, the eSDB regenerates automatically, ensuring continuous protection without the need for manual replenishment. It is engineered to adapt dynamically to varying environmental conditions and transformer load, providing a dependable first line of defence against moisture intrusion.

- eDOC oil diagnostic device:

This cutting-edge, compact sensor delivers real-time monitoring of moisture levels in transformer oil. It continuously gathers and transmits data on both relative saturation and temperature, facilitating predictive maintenance and enabling early detection of moisture-related risks.

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- Consultancy

COMEM's team of experts analyzes and interprets data to provide actionable insights tailored to each transformer's unique operational profile. Comprehensive reports deliver not only moisture trends and risk assessments, but also customized maintenance recommendations aimed at prolonging transformer lifespan and optimizing reliability.

Collectively, these elements form a robust and integrated moisture management system that empowers asset managers to make informed decisions, mitigate risks, and enhance the longevity of transformer assets.

Why moisture management matters

Transformer failures attributable to moisture can lead to substantial financial burdens and operational disruptions.

The consequences include:

- Extensive equipment damage and replacement costs
- Instabilities in the electrical grid leading to customer outages
- Safety hazards posing risks to personnel
- Regulatory penalties as well as potential damage to a company's reputation

By strategically investing in comprehensive moisture management, utilities and transformer end-users can achieve:

- Enhanced reliability and uptime
- Significant reductions in maintenance
- Extension of asset life and operational efficiency
- Improved safety standards and regulatory compliance

Moisture Care is not simply a product package; it represents a transformative strategy for innovative asset management.

As transformer fleets age and grid demands increase, the ability to detect issues early and respond proactively becomes a strategic advantage

COMEM's Moisture Care intelligently transforms moisture from a latent threat into a quantifiable and manageable risk

Why digital monitoring matters

In today's energy landscape, digital monitoring is no longer optional; it is essential. As transformer fleets age and grid demands increase, the ability to detect issues early and respond proactively becomes a strategic advantage.

Here's why digital monitoring is critical:

- **Real-time insights**
  Traditional maintenance relies on periodic inspections, which can miss emerging issues. Digital sensors like **eDOC** provide continuous data, allowing operators to spot trends and anomalies before they escalate.
- **Predictive maintenance**
  With historical data and trend analysis, asset managers can forecast when a transformer is likely to experience moisture-related degradation. This enables timely interventions, reducing emergency repairs and downtime.
- **Remote accessibility**
  Digital systems allow monitoring from centralized control rooms or even mobile devices. This is especially valuable for remote or hard-to-access installations, improving safety and operational efficiency.
- **Data-driven decisions**
  Monitoring systems generate actionable data that supports strategic planning. Whether it's scheduling oil treatment, replacing breathers, or prioritizing asset upgrades, decisions are backed by evidence—not guesswork.
- **Integration with Asset management platforms**
  Moisture Care's digital components can be integrated into broader asset management systems, enabling holistic oversight of transformer health alongside other parameters like temperature, load, and gas levels.

Digital monitoring transforms moisture management from a reactive task into a proactive strategy. It empowers teams to move from "fixing problems" to "preventing failures."

Transforming risk into resilience

Moisture may often remain invisible, but its impacts on transformer health are tangible and substantial.

COMEM's Moisture Care intelligently transforms moisture from a latent threat into a quantifiable and manageable risk. By leveraging advanced breather technologies, real-time diagnostic tools, and expert guidance, organizations can effectively protect their transformers, optimize operational performance, and engage in proactive maintenance planning.

In an environment where every minute of operational service time is crucial, **Moisture Care** provides indispensable peace of mind.

Contact us and get support from our experts: medica@comem.com.