Improve reliability and safety design of MV equipment through asset performance management

#DigitalEvolution
#InnovationDay
#EcoStruxure
<table>
<thead>
<tr>
<th></th>
<th>Market Trends, Drivers &amp; IoT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>MV Switchgear &amp; Connectivity</td>
</tr>
<tr>
<td>3</td>
<td>Advisory and Analytic Services</td>
</tr>
<tr>
<td>4</td>
<td>Q&amp;A</td>
</tr>
</tbody>
</table>
The Cost of Power Failure

Financial impact for 1 hr production shutdown per application

<table>
<thead>
<tr>
<th>Application</th>
<th>Loss(*) in €</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health establishment</td>
<td>Human lives...</td>
</tr>
<tr>
<td>Stock market transactions</td>
<td>6,500,000</td>
</tr>
<tr>
<td>Credit card sales</td>
<td>2,600,000</td>
</tr>
<tr>
<td>Petrochemical</td>
<td>100,000</td>
</tr>
<tr>
<td>Plane ticket booking system</td>
<td>90,000</td>
</tr>
<tr>
<td>Mobile phone network</td>
<td>40,000</td>
</tr>
<tr>
<td>Automobile</td>
<td>30,000</td>
</tr>
<tr>
<td>Pharmaceutical</td>
<td>30,000</td>
</tr>
<tr>
<td>Food processing</td>
<td>20,000</td>
</tr>
<tr>
<td>Cement</td>
<td>15,000</td>
</tr>
</tbody>
</table>

Source: Contingency Planning Research & Schneider Electric
… the impact of failure in the electrical distribution can be tremendous

59%

Of Total Business Interruption losses reported is due to fires & explosion

Source: Allianz Claims 2015 Dashboard

1st

Cause of fire in industrial sites: electrical equipment failure (22% of fires)

Source: FM global

56%

Of all electrical fires are due to lack of proper maintenance

Source: Factory Mutual Insurance Group
Main causes of equipment failures in medium voltage

**Faulty connections**
- 25% failure occurrence**
- Caused by:
  - Loose connections
  - Contaminated surfaces
- Current solution:
  - Power connections tightening
  - Thermographic Inspection

**Harsh environment impact***
- 20% failure occurrence**
- Condensation, temperature differences and extremes, pollution
- On-site Inspection

**Circuit breaker’s health**
- Operating mechanism
- Excessive contact wear
- LV auxiliary failure
- Diagnostic tools

* Applicable to Air insulated technology
** Source HartfordSteam Boiler insurance

Need from power shutdown
Main customer pain points on current maintenance techniques

On-site examination
- Require power shutdown
- Time consuming

Static data
- Limited view
- Increase in failure risks

Periodic inspection
- Not according to existing conditions
- Result in extra costs
What if your MV Equipment could **speak** about its health anywhere, anytime?

What if it could get an **early alarm** about its **condition** before it fails, preventing a shutdown?
Addressing IoT demands within the 3 layers of EcoStruxure Power

EcoStruxure™ Power Architecture: Open │ Scalable │ Flexible │ Secure │ Future-ready

Help turn data into actionable plans thanks to expert services

Get visibility to your electrical distribution by measuring, collecting, aggregating and communicating data

Help take informed decisions to secure uptime & operational efficiency thanks to real-time control platforms
Introducing Connected MV equipment

The new MV & LV IoT connected features enable to increase power uptime and safety by providing outstanding visibility of equipment’s health, in real-time.

A foundational part of EcoStruxure
Connected equipment benefits for our customers

Efficient asset management
Allowing to reduce downtime and optimise maintenance costs.

24/7 connectivity
Real-time data for effective decision making, anywhere, anytime

Increased safety
For people and equipment

Introducing the new sensing capabilities for an efficient asset management on 24/7 basis and increased safety
Thermal monitoring and forget about faulty connections...

Easergy TH110 self-powered wireless temperature sensors fitted on cable connections and measure temperature 24/7

Benefits:

- **Increase service continuity**: Detect hot-spots at early stage and prevent from downtime (25% failures)
- **Optimise maintenance costs**: Provide the right maintenance activity at the right time
Environmental monitoring
To avoid equipment fast aging...

Easergy CL110 wireless sensors fitted inside switchgear measure humidity, ambient temperature and cold point temperature. This provides key information to calculate condensation level.

Benefits

- **Prevent from fast aging**: by detecting at early stage high levels of condensation and pollution
- **Increase service continuity**: prevent from outage on advanced corona effects (20% failures)
Circuit breaker monitoring
Advise when CB requires maintenance

Intelligent device to provide real time monitoring of circuit breaker health

- Operating time performance
- Mechanical aging
- Circuit breaker contact aging
- Motor spring charging performance

Benefits

- Optimize maintenance costs: Accurately plan circuit breaker maintenance
One complete and simple architecture

Substation Monitoring Device

- Treatment unit (PLC)
- GSM modem (optional)
- Zigbee Concentrator
- Wifi emitter (optional)
- Local HMI
- Protection relay(s) with CB monitoring
- Wireless Thermal Sensors
- COLLECT
- ANALYZE
Connected Equipment to EcoStruxure
A scalable architecture to your application and need!

**STANDARD**
- On-site T° display with mobile device only (switchgear level)
- Asset Management
- 24/7 connectivity
- Increased Safety

**INTERMEDIATE**
- On-site T° display with local HMI (switchboard level)
- Analyses and Alarming
- 24/7 connectivity

**ADVANCED**
- Remote T° information to Scada & Cloud Services
- Analyses and Alarming
- Increased Safety
Advisory and Analytic Services

Nik Gresshoff – Head of Service Marketing
EcoStruxure Asset Advisor for Electrical Distribution… a digital journey

CONNECT
Capture critical data at every level, from sensor to cloud

ANALYZE
Convert data into meaningful information

TAKE ACTIONS
... and optimize your operations and assets utilization
EcoStruxure Asset Advisor for Electrical Distribution
Cloud based monitoring of your critical assets with 2 levels of services for Large Buildings & Critical Facilities

**Preventive services**

- to anticipate maintenance and manage day to day operations through smart alarming

- Web dashboard & Mobile Apps
- Live Data & Smart Alarming
- 24/7 Service Bureau

**Predictive services**

- to manage your critical assets performance and safety

- Condition Based Services & Predictive Analytics
- Expert Service Bureau
- Customized Insights

Schneider Electric cloud
CUSTOMER DASHBOARD
## CUSTOMER DASHBOARD

### Select counters for Shop DP-1

<table>
<thead>
<tr>
<th>Active energy</th>
<th>Active power</th>
<th>Ambient humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>Apparent energy</td>
<td>Apparent power</td>
</tr>
<tr>
<td>Battery level</td>
<td>Circuit breaker closed</td>
<td>Corrosive gas level</td>
</tr>
<tr>
<td>Current phase A</td>
<td>Current phase B</td>
<td>Current phase C</td>
</tr>
<tr>
<td>Dust level</td>
<td>Electrical wearing</td>
<td>Electrical wearing neutral</td>
</tr>
<tr>
<td>Electrical wearing phase A</td>
<td>Electrical wearing phase B</td>
<td>Electrical wearing phase C</td>
</tr>
<tr>
<td>Frequency</td>
<td>Instantaneous protection li pick-up value</td>
<td>Long time protection - Pick up value</td>
</tr>
<tr>
<td>Number of SDE trips (Measured)</td>
<td>Number of trips measured</td>
<td>OpNb Measured Non Resettable</td>
</tr>
<tr>
<td>Power factor</td>
<td>Rack In Out Nb Measured Non Resettable</td>
<td>Racked out</td>
</tr>
<tr>
<td>Reactive Power</td>
<td>Salty atmospheres level</td>
<td>Reactive energy</td>
</tr>
<tr>
<td>Short time protection pick up value</td>
<td>Test position counter</td>
<td>Short time protection - Time delay</td>
</tr>
<tr>
<td>Voltage A - B</td>
<td>Voltage A - N</td>
<td>Voltage B - C</td>
</tr>
<tr>
<td>Voltage B - N</td>
<td>Voltage C - A</td>
<td>Voltage C - N</td>
</tr>
</tbody>
</table>

[Validate]
CUSTOMER DASHBOARD

Asset: J04 - SPPA Incomer n°2
Position: Cable 1

Environment
- Ambient humidity: 73.32%
- Ambient temperature: 30.0°C

Current
- Current phase A (A)
- Current phase B (A)
- Current phase C (A)

Temperature Discrepancy
- Delta temperature cable: 0.7°C

Busbar
- Cable 1
- Delta temperature: 0.19°C
- Phase A: 31.29°C
- Phase B: 31.29°C
- Phase C: 31.1°C

Cable 2
- Connection Downstream
- Connection Upstream
• Poor maintenance can create major negative impacts on businesses and safety

• MV connectivity enhances visibility, uptime and safety

• IoT-enabled architecture for power distribution is the key to improve efficiency and optimisation

• Data analytics adds value over the lifecycle of an asset

Key Takeaways
Roundtable Discussion

Steven Trainer
Marketing Manager
Medium Voltage

Nik Gresshoff
Head of Service Marketing
Discussion Points

- What are your **greatest painpoints** with current maintenance routines?
  - What impact does this have on your business?

- What is your **biggest hurdle** to adopting digitally connected electrical assets?

- What **digital solutions** (products or services) do you currently use, or would like to use, to maintain your process or assets?

- What **benefits do you foresee** for your business if you adopted digitally connected electrical assets?

- What features/benefits would you like to see in **future iterations** of our products/services?
Join the conversation

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