GENERAL PRESENTATION

# Engineering solutions for electrical systems

**Diagnostics • Power Quality • Data, measurements & monitoring • Product development**

Studio PQM supports companies, technical managers, maintenance teams and manufacturers in analysing electrical issues, using data and developing technical solutions.

**Data, measurements and technical expertise to support sound, verifiable decisions.**

A TECHNICAL PROCESS

| | | |
|---|---|---|
| 1 | **PROBLEM** | Symptom, requirement or behaviour to be understood |
| 2 | **DATA** | Measurements, logs, reports, diagrams and available information |
| 3 | **DECISION** | Diagnosis, intervention criteria and verification |
| 4 | **DEVELOPMENT** | Design, fine-tuning and behaviour in operation |

**We start with the problem, before choosing the solution.**

# AREAS OF EXPERTISE

Studio PQM's activities are integrated when a problem requires different perspectives: diagnostics, measurements, monitoring and technical development.

01

### ELECTRICAL ISSUE DIAGNOSTICS

Machine stops, resets, recurring faults and abnormal behaviour.

02

### POWER QUALITY ANALYSIS

Harmonics, unbalance, flicker, voltage dips, overvoltages and other power quality phenomena.

03

### MEASUREMENT REVIEW

Technical review of reports, recordings and existing data to guide further analysis and corrective actions.

04

### ENERGY USE AND MONITORING

Load profiles, energy use, key electrical parameters and support for monitoring systems.

05

### PRODUCT DEVELOPMENT

Design, verification and fine-tuning of equipment and solutions for electrical systems.

06

### MEASUREMENT SYSTEMS

Measurement architecture, instrument selection, data acquisition and management.

# THE METHOD

From the right data to useful decisions. Measurements are used when they help distinguish cause, effect and events occurring at the same time.

| | | |
|---|---|---|
| 1 | **Frame the problem** | Symptoms, recurrence, consequences and operating conditions. |
| 2 | **Review what is already available** | Logs, measurements, reports, diagrams, photos and available records. |
| 3 | **Define the useful measurement** | Only when it answers a specific technical question. |
| 4 | **Correlate events and process** | Relate electrical data to system and process behaviour. |
| 5 | **Guide and verify** | Support the technical decision and verify its effects. |

**TYPICAL OUTPUTS**

- measurement plan
- data analysis
- technical report
- cause hypotheses
- intervention criteria
- before/after verification

**Guiding principle: first assess what is already available, then measure only what is needed.**

# DIAGNOSTICS AND POWER QUALITY

The symptom shows where the problem appears. Measurement helps determine whether the cause is at the same point or elsewhere.

**SYMPTOM**

- resets and trips
- process stoppages
- alarms with no obvious cause
- recurring faults

**CHECKS**

- voltage dips and short interruptions
- harmonics and unbalance
- electrical transients
- load–system interactions

**EVIDENCE**

- waveforms and trends
- time correlation
- comparison between sections
- before/after data

**DECISION**

- **Separate cause from effect.**
- **Define the appropriate technical next step.**
- **Verify the effectiveness of the intervention.**

**The failed component may be the victim, not the cause.**

**Further reading: “Electrical Diagnostics and Power Quality” brochure**

# DATA, MEASUREMENTS AND MONITORING

A new measurement campaign is not always required. The first step is to understand what information already exists and whether it answers the technical question.

1

## AVAILABLE DATA

**Reports • logs • recordings • existing measurements**

Review existing information critically and identify anomalies, limitations and missing data.

2

## MEASUREMENT AND MONITORING

**Load profiles • energy use • voltages • electrical parameters**

Define parameters and acquisition times according to the problem, avoiding unnecessary measurements.

3

## MEASUREMENT SYSTEMS

**Architecture • instruments • acquisition • data management**

Organise measurements that remain useful over time and are aligned with technical and operational objectives.

**Data becomes valuable when it answers the right technical question.**

# PRODUCT DEVELOPMENT

Technical support for the design, verification and fine-tuning of equipment and solutions for electrical systems.

1 **DEFINE**

**Technical and application requirements**

System and product constraints

2 **DESIGN**

**Architecture and sizing**

Standard or tailored solutions

3 **VERIFY**

**Analysis, simulations and testing**

Prototype testing and fine-tuning

4 **VALIDATE IN OPERATION**

**Integration into the electrical system**

Measurements and behaviour in operation

**FROM TECHNICAL REQUIREMENTS TO REAL EQUIPMENT BEHAVIOUR IN THE ELECTRICAL SYSTEM**

Product development combines design, verification and knowledge of real application conditions.

# REAL CASES: FROM DATA TO DECISION

Concise examples of completed work; full case studies are available for relevant follow-up.

SECTION COMPARISON

## Two electrical sections, two different issues

TDD 10% / 22%

**EVIDENCE** Simultaneous measurements showed different current distortion levels and events originating from the supply network.

**DECISION** Separate interventions on the internal system from the management of supply events.

SHORT-DURATION EVENT

## Regular average values, real anomaly

≈ 1 cycle

**EVIDENCE** Waveforms revealed a transient lasting about one cycle, not identifiable from RMS trends alone.

**DECISION** Correlate the event waveform with machine behaviour.

INFRASTRUCTURE

## Harmonics and power factor correction

THD I ≈ 40–60%

**EVIDENCE** The measurement campaign identified high current distortion and interaction with the existing power factor correction system.

**DECISION** Intervention defined and sized using actual system data.

**Case studies on the website and PDF case study sheets provide the next level of detail.**

# HOW TO START

The first step is to describe the problem clearly. Before selecting instruments or solutions, define what information is needed to support the technical decision.

1 **Describe the symptom**

What happens, when, how often, and with what consequences.

2 **Share what is already available**

Logs, measurements, reports, diagrams, photographs, alarms and operating conditions.

3 **Define the useful next step**

Data analysis, a measurement campaign or targeted technical support.

**WORKING PRINCIPLES**

- INDEPENDENCE
- PROPORTIONALITY
- COORDINATION
- VERIFICATION

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