Advanced Grid Monitoring

By CT LAB

Today – I want to talk about:

- Digital Twins and some of its applications
- Need for robust data acquisition systems and real-time monitoring mechanisms.
- CT LAB’s VECTO System and its re-designed measurement platforms
- Other Key Functionalities

Digital Twins **The Number One Network Management Tool to have**

New to the Distribution Industry in General

Digital Twin Applications - In the field of Power Quality

- Scenario Testing

  Allow operators to test various scenarios to see how changes might affect performance and power quality without risking the actual grid.

- System Optimization
  - Enable the optimization of power systems to reduce losses and improve overall power quality.
- Compliance Studies
  - Assist with IPP Emission Apportioning and setting of compliance limits
- Load Management
  - By analysing data from digital twins, operators can better manage load distribution to maintain consistent power quality

- Network Planning
  - Simulate network expansions or modifications to ensure that power quality standards are met in future developments.
- Harmonic Analysis
  - They can simulate harmonic distortions and help in designing solutions to mitigate them, thus improving power quality.
- Early Fault Detection
  - Help in early detection of faults in the power network, preventing disturbances in power quality

THE Machine Learning & AI Enabler …

Robust Data Acquisition Systems are Needed

Precise and up-to-date Data

To accurately mirror real-world conditions.

Actual Breaker Status

Provides real-time information and operational state of the system.

Without these critical data inputs, the efficiency of digital twins in decision-making processes and operational efficiencies may be significantly compromised, highlighting the need for robust data acquisition systems and real-time monitoring mechanisms.

About CT LAB

Recently re-developed all our technology

- Better meet current market needs.
- Provide more powerful Edge Computing Platforms
- More Adaptable
- Improved Reliability
- Longevity
- Provide better return on investment

FM637314

VECTO System

Advanced, distributed, time synchronised multifunction monitoring & control system for electrical networks

Fleet of remotely installed time synchronised measurement devices

- VECTO Transient
- VECTO 3.4
- VECTO PQ Node

Permanently connected to VECTO Grid OS

a central Big Data hosting platform

VECTO Transient

Multifunction 5.0MHz Sampling PQ Based Transient Recorder

Investigate high frequency events like arc-forming in vacuum circuit breakers

VECTO 3 - 4th Edition

Multifunction 1.5MHz Sampling PQ Based Measurement Platform

Completely Re-Designed

- Low Power & Fanless
- 500kHz Analog Bandwidth
- 2 x More Edge Processing Power
- Programmable Measurement Range (More Resolution)
  - Voltage Inputs
  - Current Sensor Inputs
- Sync to within <10ns
- Fiber Support via SFP cage

VECTO PQ Node

(Expect Q3 2025)

1.5MHz Sampling Classic Ed3.1 Class-A PQ Monitoring Device

- **The most affordable 3-phase ED3.1 Class-A PQ Analyser currently available on the market.**
- Designed to operate closer to the edge of network
- Forms the base of a new digital disturbance recorder specifically designed for the distribution market

Other Key Functional Areas

- Synchronised Phasor Measurement Unit (PMU)
- Synchronised Waveform Measurement Unit (WMU)
- Synchronised Oscillation Phasor Measurement Unit (oPMU)
- Power Quality instrument (PQI)
- IEC61850
  - MMS
  - Sampled Values
  - Goose
  - File Transfer

VECTO GRID OS

Main Functionality

- Measurement Campaigns
- Matching of Events into Incidents
- Fleet Management
  - IP Based Comms Setup
  - Device Configuration
  - Device Operational Status
  - Device Telemetry
  - Real-Time Viewer
  - Ticketing System
- Secure IP Based Data Collection
- Automated CPF Statistic Values
  - 99%, 95%, Min/Max CPF values
- Data Visualisation
  - Dashboards
  - Event Browser
  - Trend Browser
  - Automated Report Generator

Key VECTO Grid OS Installations:

- Eskom - NTCSA
- Eskom – DX
- Ausnet – Australia
- CT LAB – South Africa
- CT LAB - Australia

The theme of this year's AEDU is:

Ensuring the Long-Term Viability of Namibia's Electricity Distribution through Adaptability & Innovation

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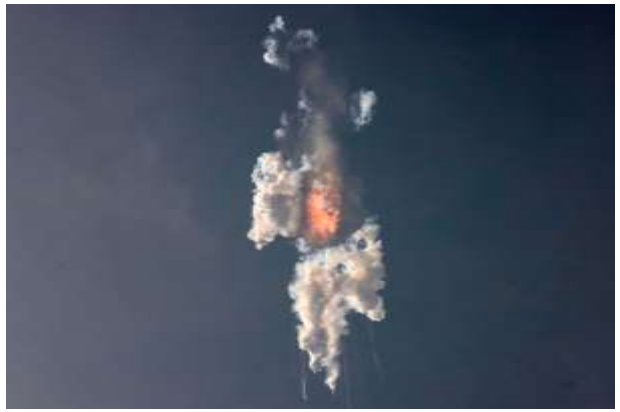
CT LAB's VECTO System offers the Namibian market unparallelled

- Value
- Functionality
- Adaptability
- Through innovation

VECTO System

- Is locally developed and supported
- Is on the forefront of international Grid Monitoring technology

Like Elon Musk, in pursuit of excellence we have made mistakes, BUT



VECTO System

Like him:

We have persevered

and we have succeeded

in building something

Exceptional!