Condition Monitoring
Technology and Systems | Field Services | Academy
Consulting Advisory Services | In-time Monitoring & Diagnostics
Pragma is an engineering company that specialises in the delivery of enterprise asset management solutions to asset intensive industries. Since our establishment in 1990, we have developed software tools and asset management practices, packaged to deliver best in class solutions in various industries, balancing asset performance, cost and risk.

Pragma has built a global footprint with regional offices and partner representation in Africa, Europe, Australia and Latin America. Our head office and development centre is in South Africa and Pragma Africa, the entity delivering services on the African continent, has a level 1 BBBEE rating. We have partnerships with various companies to extend our service offering into more continents. One such investment partner, the Reatile Group, is specifically focused on our global expansion in the Oil and Gas industry.

We understand that the core objective for our clients is to deliver their value proposition through consistent product and service delivery. Reliable high performing assets supported by sound asset management practices are key elements to achieve this, but often rank too low on a business’s list of priorities. This is where Pragma can add value. We take care of our clients’ assets while they focus all their attention on their core business objectives. Our engineers and consultants actively support our clients’ asset management strategies, based on the clients’ needs and guided by our asset management road map.

Pragma is a privately owned company with more than 580 employees. We pride ourselves on having a highly engaged workforce, with a single focus to deliver well engineered asset management solutions for asset intensive enterprises – giving our clients peace of mind that their assets are being looked after 24/7.

The Asset Care Service

Our Asset Care Service is based on a partnership model that is geared to yield results and ensure the delivery of mutually agreed day-to-day maintenance activities. We do this in support of your organisational goals.

Facilities Management

We bring Facilities Management to life with one system and a set of engineered business processes informed by best practices and industry compliance requirements.

Consulting / Projects

We have a large group of ISO 55000 certified engineers who are able to assist you in implementing the latest thinking in asset management.

Tools and Technology

We have developed On Key, a best of breed EAM system. We do however deliver our services within a variety of reputable ERP environments.

Specialised Training

We offer courses designed for the entire organisation, according to strategic, tactical and operational categories. Our courses can be customised to include client-specific case studies and work scenarios and are offered through various platforms. Our Corporate training solutions include comprehensive consulting to clarify roles, identify competencies and develop learning pathways, listing the required role-specific training in a logical and prioritised sequence.
Intelligent condition monitoring solutions
driving sustained plant integrity

Innovation never felt so right!

Pragma
a Pragma company
Martec is an engineering company specialising in turnkey Condition Monitoring (CM) solutions for asset-intensive industries and high-energy usage clients, focused on improving plant integrity. Our solutions are a combination of class-leading CM products sourced from across the globe, expert technical analysis field services and the provision of advisory and academy training services.

In operation since 2006, we began as a supplier of both locally and globally manufactured Condition Monitoring technologies. The early business was focussed on product sales and offering training to clients to manage their own reliability programmes. As the market matured and warmed to condition monitoring as a solution, our range expanded to offer condition assessment services. The need for these specialised services grew with tighter local economic controls and ageing infrastructure. Our service teams now offer assessments, in-time monitoring, and advice on how to keep critical plant in operation, without losing valuable production time or experiencing financial losses.

As Martec grew as a business we realised that plant integrity could be more sustainably achieved for our clients by incorporating asset and maintenance management best practices. To achieve this, we partnered with Pragma, an engineering company specialising in the delivery of enterprise asset management solutions. This collaboration has enhanced our offering to our clients, and we have become the industry leaders in providing custom solutions covering all the bases of asset care and reliability.

Martec is excited about the future opportunities that Industry 4.0 will open for us and our clients, as we embark on this journey of connected intelligence and machine learning. While production control technologies have been around for a while, industry has only scratched the surface of using in-time cutting edge monitoring and analytics technology to improve plant reliability and integrity. We believe there is a vast untapped potential for improving plant integrity by using real or near-real-time condition monitoring data to provide sophisticated predictive analysis solutions for plant integrity solutions.

Our aim is to partner with our clients to offer class leading equipment integrity solutions which include Technology and Systems, Field Services, Advisory Services, Academy and In-time Monitoring and Diagnostics.

We strive is to Engineer intelligent condition monitoring solutions which enable in-time monitoring and diagnostic services. Supporting reliability improvement initiatives designed to drive sustained plant integrity.

Our offer to clients is based around five key service areas to ensure our clients have the best of all worlds and can confidently make decisions on the status of their plant integrity.
In-Time Monitoring Solutions

Our in-time monitoring systems are designed to improve electrical and mechanical plant integrity and extend asset life whilst minimising the overall maintenance costs with a reduced demand for skilled resources. This is generally achieved by using intelligent electronic devices (IED) or sensors connected to state-of-the-art communication systems (Dashboard).

Martec have the skills set and resources to monitor the assets for our the clients or raise alarms via either SMS /message, when the asset has exceeded predefined warning or alarm limits.

The benefits to our client is to have their assets monitored in a predictive maintenance environment where the earliest possible detection of developing defects is combined with monitoring, diagnostics, prognostics, control and communication.

Technology and Systems

Martec is a supplier of world-class condition monitoring products and sensor technology, which can either be integrated into an IoT platform. Or used as stand-alone devices. We source only the best condition monitoring technology and have exclusive distributorship agreements with our principals and ensure that can offer the right advise, after-sale service and training.

The kinds of technology on offer and deployed though the Southern African region are:

- Vibration analysis
- Ultrasound detection
- Infra-red thermal imaging
- Dissolved Gas Analysis (DGA)
- Partial discharge analysis
- Partial arcing detection
- SF6 gas analysis
- Tan delta capacitance
- Phase angle analysis
- Fibre-optic distributed temperature or flow sensing

For more information go to www.martec.co.za

Field Services

The Martec field service teams are available for emergency breakdowns if required however we wish to prevent this from happening with predictive condition monitoring solutions which includes expert technical analysis services with diagnostic tools.

We offer a reliability service through an outsourced model to ensure our clients plant is always running optimally without catastrophic failures. This peace of mind is essential to the lives of reliability engineers and maintenance personnel who have to ensure a plant runs 24/7.

Our turn-key service offering is fully customisable and begins with an assessment while the plant is in normal service, without interrupting production or supply. After the assessment is completed a comprehensive report details asset health diagnosis and recommendations for corrective action.
Condition Monitoring Academy

Together with Pragma we offer specialised training in condition monitoring throughout the year provided by technology experts of international stature in their particular fields.

These courses include:

- **Fundamentals of Condition Monitoring** – covering a holistic and multi-disciplinary overview of condition monitoring techniques available on the market today
- **Ultrasound Inspector Level 1 and Level 2** - accredited by ASNT (American Society for Non-destructive testing)
- **ISO CAT 1 Ultrasound Inspector** - Internationally recognized ultrasound certification training
- **Power Transformer Condition Management** - a two-day course for introduction and a four-day course for intensive training. Both courses are validated for CPD points from SAAMA (South African Asset Management Association)
- **Transformer Oil Sampling** – conducted on the clients’ site
- **Destructive Electrical Discharge** - covering the detection, consequences and prevention of DED in electrical networks
- **SDT Underground Tank Tightness Testing** - theory and practical specifically for the Petrochemical sector

Advisory Services

Our team of engineers provide a holistic condition monitoring strategy which begins with an independent need’s assessment report. This report forms the basis of a CMIP (Condition Monitoring Improvement Planning) investigation.

The CMIP assessment provides the asset owner with a roadmap for improving plant integrity as benchmarked against industry standards such as ISO 55000. As well as recommendations for improvements in plant integrity and asset performance.

Other services can be employed separately or part of a CMIP investigation:

- Failure investigation
- Root cause analysis
- Witnessing factory acceptance tests
- Design reviews
Field Services

**Electrical and Mechanical Condition Monitoring Services**

We offer both electrical and mechanical service packages which are fully customisable and begins with an assessment while the plant is in normal service without interrupting production or electricity supply. All data collected is analysed by laboratory technicians and reviewed by engineers before a final report is compiled and submitted to the client.

- The benefits of utilising our outsourced electrical and mechanical services are:
  - Peace of mind that your critical plant runs 24/7 without interruption
  - Quality control from an independent source
  - An independent assessment from a condition monitoring professional
  - Quantified performance improvement opportunities and potential savings
  - Benchmarking to international norms and standards
  - Recommended improvement interventions as part of a maintenance strategy
- The following critical electrical plant can be assessed:
  - Switchgear
  - MV and LV cables
  - Transformers
  - Bushings
  - Reactors
  - Insulators
  - Drives
  - Motors
  - Generators

The following mechanical equipment can be assessed:

- Fans
- Mills
- Hydraulic systems
- Turbines
- Gearboxes

**Energy Optimisation**

Plants with compressed air, vacuum, steam and production gases are at risk of leaks causing a significant loss of energy on a network. Even utilised by automotive manufacturers to check for air leaks on door seals on new vehicles coming off the assembly line.

Our team offers an air leak audit on your critical plant. A report details the number of leaks and calculates your losses in energy consumption. Eliminating these leaks can prevent unnecessary wastage as well as improve the asset life and quality and speed of production lines.
Martec is the sole distributor of SDT Ultrasound Systems in Sub-Saharan Africa. SDT Ultrasonic Detectors are the most versatile tools for Reliability Engineers, Condition Monitoring Specialists and Technicians.

SDT Ultrasound Systems detect, measure, capture and analyse high frequency sound signals generated by turbulence and friction impacting on mechanical and electrical assets at the earliest stage of defect.

**SDT340**

The SDT340 is the newest in the range with a cloud connected monitoring solution. Designed to trend and analyse asset health by viewing the ultrasound and vibration time signal and spectrum directly on the SDT340’s colour display. Accessories are available such as contact sensors, vibration sensors and ultrasonic transmitters. You can manage the results with the UAS4.0 software.

**UAS4.0**

This software is a scalable, mult-technology, multi-platform application that allows you access data from your desktop, server or in the cloud. Available in four versions to suite your budget and needs.

The SDT range combines:
- Ultrasound
- Temperature
- Vibration
- Speed (RPM)
- ATEX Certified

Key benefits
- Covers electrical and mechanical applications
- Combines multiple technologies in one hand held unit
- A software suite is available for database management, analysis, trending and survey management
- Full training and support is provided by Martec

Applications
- Mechanical
- Electrical
- Lubrication
- Underground fuel tank tightness testing
- Valves
- Compressed air and steam leak detection
- Leak detection
LUBExpert®

One of the biggest factors in bearing failure is over greasing and not under-greasing as is commonly thought. The LUBExpert® is an on-board lubrication and greasing assistant using ultrasound technology. Designed with clever algorithms which guide maintenance technicians to apply the correct dose of grease to the bearings.

SDT Checker Range

A range of entry level hand held ultrasound solutions which make ultrasound technology available to everyone. The right tool, as the first defense against breakdown. The Checkers identify & defect early, allowing for deeper analysis with an SDT270/340.

Underground Tank Leak Detection

Specifically designed for the Petrochemical sector this device performs acoustic testing of underground tanks and associated pipework in the petrochemical sector. Where environmental hazards and loss of revenue can be experienced by the fuel retailer. It is used in conjunction with the SDT270/340.

- The equipment is rugged and ATEX certified
- Includes data management software for detailed tamper proof reporting
- Full training is provided by Martec to equip the operator and contractor

The full range of SDT Ultrasound Solutions

Peace of mind with a Lifetime Warranty on SDT Products, register your SDT unit and calibrate annually to enjoy this benefit
Martec together with Dynamic Ratings is dedicated to providing maintenance, control, and communication solutions for effective in-time monitoring solutions.

**B100 Series**

**Electronic Temperature Monitor**

The reliable and cost-effective B100 Electronic Temperature Monitor (ETM) provides exceptional measurement accuracy, asset control and secure communications for your transformer.

While gauges have been the default cooling control device for decades, their lenses can become unreadable and the needles often stick, causing inaccurate measurements and preventing proper cooling control.

**C50 Series**

**A Configurable Transformer Monitor**

The C50 Series provides continuous monitoring of operational and performance data to provide early and accurate indication of change in an asset’s operating conditions. The C50 transformer monitor can detect changes in oil temperature, windings, OLTC, insulation, bushing health, and cooling systems. The C50 is capable of cooling and voltage control.

C50 configurable technology is easy to use, it enables clients to configure a system for their unique application. It is able to rapidly present data alarms via a web dashboard or graphical user interface allowing for quick access and visualisation of collected data.

Unlike gauges, the B100 stores the long term history of temperature data and alarm activations in real time or for download later.
**E-Series**

**Engineered to Order Solution**

E-Series provides comprehensive monitoring, control and communications. It is scalable and ideal for retrofit or monitoring upgrades as well as new transformer applications.

The multi-port module allows up to eight feature specific modules to increase the scope and depth of monitoring.

**Bushing Monitor**

Bushing Sensors are typically applied to bushings on power transformers and high voltage current transformers. The sensors provide both high frequency signal detection for partial discharge detection and low frequency detection for bushing monitoring.

The new bushing health monitor option allows for continuous monitoring of bushings. Providing asset owners with real-time information of bushing capacitance and power factor which can result in early detection of a possible failure.

**Coupling Capacitors**

Coupling Capacitors are a versatile partial discharge sensor commonly used to detect PD in many applications including generators, switchgear, motors, isolated phase bus (IPB). There are three voltage levels on offer: 8, 16, and 28 kV.

**Sensors and Accessories**

Through Martec, Dynamic Ratings offers a wide variety of sensors to monitor the condition of electrical apparatus. They have patented designs, and manufacture a line of sensors to ensure that the highest quality and accuracy requirements are consistently achieved.

These sensors and accessories convert the measured properties into a signal readily used by a transducer or an intelligent device such as a Dynamic Ratings Monitoring System. The sensors are designed to be highly sensitive and accurate to meet the needs of a client’s applications.
Locate power line sparks and corona that cause RFI and TVI

RFI TVI Locators

RFI locators detect partial discharge and arcing that cause interference and, in some cases, damage to electrical and mechanical plant and equipment. RF receivers quickly identify a pole with a discharge. Ultrasonic detectors pinpoint the sparking hardware.

EMI Locator

The EMI Sniffer is used for detecting partial discharge and stray shaft discharge currents in motors and generators.

ARC Reflection Radars

URD Fault Locators: Easy to operate digital T.D.R.s for locating faults in buried primary power cable. Compatible with most “arc reflection” systems as well as enabling you to capture and display thumper generated waveform of fault breakdown.
Martec Field Services provide Frequency System Analyser (FSA) technology as part of the service offering. FSA is a unique, non-destructive on-line electrical system condition assessment process that enables asset owners the ability to evaluate the condition of cable systems, transformers and switchgear.

This service provides a detailed assessment of the condition of each component of the electrical system.

**On-line Expertise**

- Assessment is performed on-line at system voltage, no over-voltage is applied
- FSA assessment does not shorten the remaining life of the cable accessories, or other equipment
- No outages or switching operations are required
- Provides “true” assessment of cable system under operating conditions

Knowing a cable system's weaknesses enables owners, asset managers and reliability engineers to be proactive in identifying and repairing problems before they cause outages.

**Benefits**

Selecting FSA to assess transmission and distribution cable systems, results in these direct benefits:

- Eliminate downtime and potential damage to existing cable systems
- Prioritise capital expenditure by identifying cables for repair, treatment or replacement
- Increase client satisfaction by identifying incipient faults before they become outages
- Assist asset management in justifying increased funding for improved reliability

**How FSA works**

- RF signals emitted by the cable while in service, are detected and relayed by a (A) special sensor that fits over the cable
- A modified (B) analyser reduces noise
- Clean data saved to PC (C)
- Independent specialist will analyse the data
- A comprehensive report with findings and recommendations is presented to the client.
On-line condition assessment of medium and high voltage cables and connected systems

The Techimp brand is known for excellence in the field of innovative diagnostic technologies which are applied to electrical engineering. More than fifteen years of research and field experience has resulted in a complete portfolio of products and services providing clients and partners with the best knowledge based solutions for all electrical assets and smart grid technology.

Martec with Techimp have a complete range of diagnostic tools for any practical application in electrical systems such as sensors and accessories, acquisition units, SCADA and advanced diagnostic software.

- Quality control
- Commissioning
- Condition assessment
- Monitoring systems
- Site inspection

What makes Techimp unique?

Enhanced Data Analysis
Patented Techimp T-F map filter technology The fundamental innovation of Techimp PD diagnostic systems consists of the acquisition and processing philosophy. Techimp’s acquisition units are provided with ultra-wide bandwidth acquisition system, which collects PD pulse peak, PD phase and PD pulse waveforms. Per each acquired pulse the acquisition unit automatically calculates its equivalent time and equivalent frequency content, building the so called “T-F map”. The map shows groups of pulse “clusters” characterised by same time and frequency content, i.e. homogenous pulses. An efficient separation of different discharge activities, including noise rejection, can be achieved through pulse shape analysis. It avoids identification to be affected by different phenomena overlapping, as well as noise superposition to real PD phenomena. A comprehensive report with findings and recommendations.

Services
Techimp and Martec offer diagnostic condition assessment services for all electrical MV/HV assets. Clients benefit from the broad experience of the Techimp and Martec service team. Besides on-line and off-line PD spot testing, our engineers perform condition assessment by measurements such as PI (polarisation index), Tan-D, TDR (Time Domain Reflectometry) and insulation resistance. After each test and inspection performed clients receive a comprehensive test report as a basis for further asset management decisions.
Silixa delivers distributed fibre optic monitoring solutions on both new and existing fibre cable installations with the highest levels of accuracy in the industry to improve performance, reduce operational costs and extend the lifespan of any asset.

**Distributed fibre optic monitoring solutions for accurate process flow measurement**

**intelligent Distributed Acoustic Sensor (iDAS™)**

The iDAS, has a novel optoelectronics architecture that allows for digital recording of acoustic fields at every location along a singlemode or multimode optical fibre. With a frequency range of less than 1mHz to over 100kHz and a spatial resolution down to 1 metre. Amplitude, frequency and phase fidelity allows for numerous advanced applications.

- iDAS collects the true acoustic signal – amplitude, frequency and phase – at all points along an optical fibre. This allows the iDAS to determine the speed of sound in the material surrounding the sensing cable hence opening the door to a wide range of applications, such as flow quantification.

**Non-intrusive process metering enabled by Silixa’s iDAS technology**

- Meter flows that are usually not measured
- Enable optimisation improvement, especially for brownfield operations
- Reduce plant water and energy usage
- Increase process efficiency and product recovery

**Industrial process flows are often too numerous to meter effectively using conventional technologies.**

Silixa’s non-intrusive process metering technology enables flow distribution monitoring throughout an entire plant simply by using a single length of fibre optic cable installed on the process pipes.

This metering system measures the speed of turbulent eddies and acoustic energy. It can be installed without disrupting process flow or requiring costly calibration.

**Applications**

- Mining and mine water
- Water treatment
- Process control

**Benefits**

- Easy to retrofit, low opex
- Low capex sensing instrumentation
- No utility requirements at sensing zones
- Enable increased process efficiency and reduced energy usage
- Straightforward monitoring for trends in gas void fraction (GVF) and water in liquid ratio (WLR)
Martec understands your transformers are the most critical assets in your plant. Therefore we bring you the Hydrocal range of DGA monitors to alarm when your transformers are not performing effectively. Martec is a sole distributor of MTE, Metering Test Equipment in Southern Africa. We offer the entire range of 8 modular systems to suit your budget and maintenance objectives.

**HYDROCAL 1004 genX**

The most comprehensive range of online Dissolved Gas Analysis (DGA) monitoring systems for transformers

Other modules in the range:
- HYDROCAL 1001+
- HYDROCAL 1005
- HYDROCAL 1008
- HYDROCAL Offshore

Gasses detected by these modules:
- Hydrogen (H2)
- Carbon Monoxide (CO)
- Methane (CH4)
- Ethylene (C2H4)
- Oxygen (O2)
- Moisture in Oil (H20)
- Carbon Dioxide (CO2)
- Acetylene (C2HC)
- Ethane (C2H6)

Users of the MTE DGA system can attest to the financial and operational value-add of the early detection and diagnosis of incipient faults in transformers.

The HYDROCAL online DGA range combines the best solutions from some technologies based on methods for gas extraction and oil circulation with the use of innovative sensor technology to achieve better performance compared with traditional solutions.

**Why you should invest in this DGA unit for your critical transformers.**

<table>
<thead>
<tr>
<th>Cost effective</th>
<th>No carrier gases are required which saves on shipping costs</th>
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<tbody>
<tr>
<td>Instant monitoring</td>
<td>No calibration is needed</td>
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<td>Consistency</td>
<td>Analysis and monitoring is set up permanently</td>
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<td>Real-time information</td>
<td>Early warning of anomalies</td>
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<td>Time-saving</td>
<td>Quick and easy installation without interruption in operation</td>
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<tr>
<td>Enhanced reliability</td>
<td>Less maintenance and reduced on-site inspections</td>
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<tr>
<td>Modular</td>
<td>With optional extension packages for bushing monitoring or off-shore applications</td>
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Being able to detect a transformer failure before it occurs on a plant is no longer a nice to have, it is a necessity.
OSDB Pro is a two-tier application database that assists transformer fleet owners to track and manage samples taken from operating transformer units. From this condition-based data the application assists in condition assessments and fleet risk management.

Some of the key features:
- Client or area information
- Client/area site data
- Asset data (i.e. transformer and or reactors)
- Sample and results (normalized)
- Components table
- Component limits (colour coded results according to transformer class and oil type)
- Transformer risk assessment using existing data and incorporating network, financial and operational risk
- Extensive reporting
- Extensive analysis tools available

Key benefits
- Know the status of any of your transformers at the click of a button
- Risk assess any transformer asset
- Trend the severity and progression of fault condition
- Manage a fleet of transformers
- Schedule routine and specialised sampling

Transformer Risk analysis:
- OSDB Pro is a truly flexible system
- Enabled to modify the risk attributes by adding or removing items for different class transformers
- Uses the power of the existing data to assess the current condition
- An easy wizard to lead you through the assessment
- Calculates risk on long- and short-term operational parameters
- Uses both asset and condition-based risk elements

Modern analysis can be visualised and used in other reporting (cut and pasted)

Other diagnostic and analysis tools available:
- IEC, Roger’s and Döernenburg ratios
- Key gas
- Gas production per day (hour)
- Graphic DGA analysis (Dr M Duval’s diagrams and Dr N Moodley diagrams)
- Degree of polymerization tracking
- Moisture-in-paper graphical representation
IntelliSAW supplies advanced monitoring solutions for electric power distribution networks. Utilising Surface Acoustic Wave (SAW) technology, passive wireless temperature sensors are installed directly on the conductors in LV and MV equipment. The sensors monitor cable and bus bar connections, bus section, circuit breakers, iso-phase busduct and generator breakers, motor and transformer cable terminations.

Until now there has been no satisfactory solution which readily provides continuous monitoring of temperature within the switchgear without introducing other potential fault conditions such as: arcing, flashover, shorting, lithium battery explosion etc.

SAW technology provides the ideal solution for:
- Real-time, continuous monitoring
- No need to risk flashover by opening cabinets for thermal imaging
- No modifications are required to install IR windows, cameras and fibre optics
- Safety is guaranteed with no batteries needed
- Permanently online with no auxiliary power
- Highly scalable – up to 12 measurement points per cabinet
- Highly economical – monitors all temperatures from a central location

CAM-5

The IntelliSAW Critical Asset Monitoring (CAM) unit provides real-time continuous monitoring of electrical assets by providing vital measurements which are required for predictive condition monitoring of switchgear, circuit breakers and bus-ducts. Sensors detect temperature, partial discharge and humidity and the CAM gives immediate feedback via local HMI or through an industry standard communication interface (Modbus-RTU) for substation SCADA integration.
Martec represents Ofil in Southern Africa by distributing their range of UV cameras, developed over 20 years. Today’s cameras are lighter and more powerful than ever before. Ofil’s DayCor® corona cameras are utilized in over 60 countries by reliability engineers and electrical utilities for the inspection of HV and MV overhead transmission and distribution lines plus substations.

What is corona and why use a camera to detect it?

Corona is triggered by physical defects, contamination, bad design, faulty installation or incorrect materials used on the insulation or towers. Corona is a signal of existing faults which radiate UV. Therefore seeing corona is advantageous for maintenance teams in pinpointing the origins of the defect and reducing inspection times. The use of a corona camera is non-destructive to the infrastructure and does not require over-loading of the system. In many high voltage applications corona is an unwanted side effect as corona discharge constitutes a significant waste of energy for utilities and large power users.

Cameras for use on UAV (unmanned aerial vehicle)

- **ROMHD**
  DayCor® Rom is a 4-axis active gyro stabilized remote airborne inspection system for aerial scanning. Equipped with highly sensitive sensors. The ROM system integrates UV & IR optical sensors with HD video and cameras in a gyro stabilized gimbaled payload. DayCor® ROM is a premium choice for detecting faulty electrical components, fire mapping, oil spill detection and pipeline inspections. Sizes and mounts fit most brands helicopter and UAVs.

- **Microm**
  Daycor® micROMHD is specifically designed for use on UAV or inside minute gimbals. Weighing in at only 900 grams it records HD videos, which pick up fine detail and corona events. In addition, dates, times, GPS coordinates, temperature and humidity (optional) are recorded. The camera is easily integrated into a UAV, the micROMHD is controlled through a set of communication commands using interfaces such as RS232, MAVlink, SBus, CAN Bus and MFIO-PWM.
Motornostix

A South African company providing a broad range of continuous vibration analysis solutions

Martec with Motornostix® provide optimal vibration monitoring solutions to support our clients in managing their plants critical assets and maintenance strategies.

Asset health and performance is monitored with sensors and digital technology supported by specialist services to provide clients with the knowledge they need to maintain and operate their assets optimally.

The solutions offered by Martec and Motornostix are customized to provide a seamless technological mix, for a wide range of critical assets. These solutions are tailored according to the client’s asset types, budget and operational processes. Below is a description of each option ranging from in-house and portable to full service offsite monitoring.

**ID Canary™**

An onsite portable monitoring device the ID Canary™ is an easy to use data trending solution with advanced diagnostic capabilities for in-house use with the option of remote specialist assistance available. Data integrity is guaranteed by integrating ID information with the measurement point. Daily and weekly monitoring by on-site staff has been proven to result in the highest return on investment.

**MXD™**

The MXD™ is a digital smart asset monitoring solution. Measuring the overall condition of critical assets which are monitored using various smart industrial sensors and devices. Data is processed and securely stored to be delivered digitally as visual trends, alerts and status updates across mobile applications and dashboard devices. MXD™ offers a range of smart, end-to-end asset condition monitoring solutions including some of the latest IoT technology. Based on proven real experience in machine health monitoring and digital engineering. The MXD™ is offered as a complete solution with support from selection too implementation and during a long-term service contract which can be arranged through Martec.

**Machine Health Surveillance™**

MHS™ provides remote online condition monitoring, optimised according to the client’s needs. It is recommended for clients with a number of critical assets. Implementation and support services ensure return on investment and realising the intended benefits.

The machine health data is delivered via software as trends, alerts, spectra and wave forms including diagnostic tools for interpretation. Remote monitoring services by trained professionals report regularly to the asset owner’s dashboard device and software platforms. Various sensors and data processing capabilities are available.
On-line partial discharge (PD) testing and monitoring

**HVPD** are experts in the on-line PD condition monitoring of in-service, medium voltage (MV) and high voltage (HV) networks. The technology supports condition based maintenance asset management programmes, enabling clients to take early preventative maintenance action to avoid unplanned outages.

HVPD supply a comprehensive range of on-line PD test and monitoring equipment for the condition assessment of in-service power cables, switchgear, motors, generators, and transformers rated at 3.3 kV and above. Suitable for MV, HV and EHV assets, PD testing and monitoring technology provides early warning of developing insulation faults. Therefore avoiding costly failures and unplanned outages.

Products in the range identify, locate, monitor and manage assets on the network.

**Product range**

- HVPD PDS Insight™
- HVPD PDS Insight™ 2
- HVPD Kronos® Spot Tester
- HVPD Kronos Lite®
- HVPD Kronos® Permanent
- HVPD Kronos Lite®
- Sensors

HVPD’s range of on-line PD sensors can detect dangerous PD activity in cables (HFCT), rotating HV machines (HVCC or HFCT), switchgear (TEV or AA) and transformers (HFCT, TEV and Bushing Taps).

HVPD’s sensors are available in both portable and permanent versions, and supplied with complete installation kits. Permanent on-line PD sensor installations are now becoming more popular in industries where plant outages are rare (the oil and gas industry, for example) to facilitate periodic on-line PD diagnostic spot testing at any time, without the need for an outage. The installation, calibration and commissioning of sensor installations is always performed by HVPD’s Installation Engineers arranged through Martec.
Predict insulation failures before they occur

**Eaton’s InsulGard™** is a continuous, on-line, medium voltage, predictive maintenance system that has a variety of applications; including switchgear, bus duct, generators and motors.

**How does it work?**

By measuring partial discharge (PD) activity in medium voltage equipment, InsulGard™ provides data on the integrity of the electrical insulation, enabling better decision-making for managing electrical assets and increased safety for plant personnel. Continuous online monitoring detects events which could lead to failure. It also reduces the inaccuracies of offline testing.

**Return on investment**

The average cost of motors, generators and switchgear can range from R100k to many millions, and if a substation is shut down, that loss can be catastrophic.

**InsulGard™ reduces downtime**

InsulGard™ is an economical alternative for maintaining electrical power equipment. By eliminating periodic scheduling of downtime to perform test and time-based maintenance tasks.

The InsulGard™ predictive relay revolutionised predictive maintenance practices by introducing one continuous, online partial discharge (PD) monitoring system designed for the following medium voltage applications:

- Generators
- Switchgear
- Bus duct
- Motors
- Dry-type transformers
- Cable terminations

**Communications and connectivity**

3 Ports are available:

- RS-485
- Ethernet
- USB
EMT is globally recognised as a leading provider of instrumentation, consumables and related services offering a complete range of Oil and SF6 test and measurement equipment to the electricity supply industry. Delivering task specific analysis and handling solutions from the laboratory to the field monitoring the health and longevity of critical assets in high voltage systems and facilitating the effective management of maintenance, operation and planning.

EMT’s ground breaking SF6 technologies include:
- “Zerowaste® Rapide” for ultrafast infra red SF6 analysis. The world’s first 1 minute SF6 analyser is 5x more productive than any alternative SF6 measurement;
- The “Smartfill SF6 Filling and Topping Up System” significantly improves upon SF6 gas handling practices for measurement and control of SF6 inventory and usage with no waste or leakage; Smartfill’s “Continuous SF6 Top Up Manager” offers a unique SF6 live topping up device designed for managing leakage from circuit breakers and other plant 24/7; “SmartWeigh®” provides an integrated weigh scale facility with the traceability of mass flow control in one simple SF6 handling device; and EMT’s “Verify” range of precision SF6 gas verification products set the industry benchmark in quality and stability for proving SF6 analysis during operation.

Features and benefits
- Effective controls on SF6 inventory and usage
- Accurate monitoring and transparency of information
- Improved handling practices and standards
- Compliance with regulation

With over 50 years combined experience delivering high voltage technology to the electric utility market, no-one is more qualified than EMT when it comes to understanding the practical issues and concerns of end users. This is why many of the world’s largest utilities, SF6 asset suppliers, and gas suppliers have chosen EMT for their asset protection needs.

EMT offers a complete range
- Infra-red SF6 Analysis - Zerowaste® and Asserolyz-IR™
- 3 gas analysis - Zerowaste® and Asserolyz-IR™
- Hose vacuum drying - Zerowaste® Moisture Perfect
- SF6 continuous monitoring system - Zerowaste® CMS
- Auto SF6 Pumpback Module - APM
- Oil analysis and handling
- Processing and recovery systems for insulating oils and SF6 gas
- High voltage and medium voltage cable testing and diagnostics
- Thermal imaging systems
- Transformer testing
- Leak detection
- Consulting, seminars and training
- Service, support, repair and recalibration
The LIOS Sensing monitoring solutions from NKT Photonics are based on using passive optical fibres as distributed sensors, whereby we can deliver continuous and accurate monitoring of temperature, strain, acoustic and vibration. The LIOS Sensing systems are not only the safest solution but also the most cost-effective for large scale installations.

LIOS Sensing provides the full spectrum of sensing technologies. The shorter ranges are based on the proprietary OFDR Raman technology, while the longer ranges and strain sensing technology is based on the spontaneous Brillouin OTDR. The LIOS Sensing B-OTDR is a single ended system, which operates single ended and without any termination and monitor up to 100km. Additionally, the cable fault detection, monitored by acoustic/vibration signals, is based on the Coherent OTDR.

Robust

Unlike many traditional solutions, the LIOS Sensing systems are immune to vibration, electromagnetic noise, dust, cryogenic temperature and moisture. So, no matter the challenge, our robust fibre optic sensor can withstand them. The LIOS Sensing systems are installed worldwide in critical applications abroad all branches. Not only power cables are monitored but also fire detection applications and industrial reactor surveillance.

Reliable

The LIOS Sensing product series was carefully designed to provide a maintenance free product. This design was thoroughly tested targeting reliable performance and accurate monitoring over long distances or large surface areas in industrial environments. Excellent Mean-time-between-failure (MTBF) of more than 40 years, based on the latest statistical field analysis, shows this high reliability.

Monitoring and Real Time Thermal Rating (RTTR)

On-line Distributed Temperature Sensing (DTS) together with RTTR for performant monitoring are key to develop SMART grids and to get maximum power output from land/submarine transmission links. With DTS & RTTR, transmission system operators and utilities can ensure effective, efficient, safe and sustainable supply of T&D energy. Furthermore, ensuring information in all communities today and in the future. Active real-time transmission network management is now possible. TSO’s/utilities can safely run their power cable grids and identify bottlenecks and take countermeasures.

Distribution Underground Network Temperature Monitoring

Underground power cable systems of key distribution feeders are submitted to high electrical, thermal and mechanical stress. This stress can impact load transfer capacity, often limited by hot spots and bottlenecks that can damage power cables, leading to reduced productivity, cable failure and costly downtime. With LIOS EN.SURE for continuous monitoring of power cable infrastructure, productivity is optimized and maintenance cost & downtime are reduced.
Cutsforth Inc. prides itself in providing best practice solutions for current collection systems on large rotating machines.

**Products**

**Removable Brush Holder System**

A solution to the challenges of brush changing on generators under load. This system reduces the chance of forced outages, improves safety, increases reliability, extends collector ring life and reduces routine maintenance costs.

In addition to making on-line brush changes safer and easier, our “pistol grip” holders prevent common brush and ring problems associated with most OEM style carbon holders.

**Replacement Slip Ring Assemblies**

Cutsforth’s slip rings are manufactured using the latest in quality CNC manufacturing and inspection equipment combined with years of industry making Cutsforth the first choice for the replacement of generator collector rings.

**Shaft Grounding Systems**

Cutsforth’s Dual Shaft Grounding System incorporates carbon brushes and copper ropes providing a more effective shaft grounding system than many OEM and after-market designs.

**Services**

**On-line Truing (Slip Ring Grinding)**

When resurfacing slip rings and commutators, downtime is wasted time. Cutsforth’s on-line truing is more cost effective, less time consuming and more accurate. It takes place at operational temperature and speed so rings are ground in reference to the operational center, less material is removed, life expectancy is extended, and brush chatter and vibrations are reduced.

**Spiral Groove Restoration**

The loss of a functional groove on your collector ring can create serious negative selective-action related problems. Cutsforth can return your spiral groove (also called the helical groove) to its optimal condition in a fraction of the time required by traditional methods. Cutsforth’s patented Spiral Groove Restoration service can dramatically increase the life of collector rings and help avoid expensive replacement.
Electro Static Technology provides solutions to the damage caused by currents resulting from unwanted shaft voltages.

AEGIS® Shaft Grounding Rings prevent premature bearing failure caused by capacitive shaft voltages created by Variable Frequency Drives (VFDs) on the shafts of AC and DC machines. They prevent electrical bearing fluting damage by safely diverting harmful shaft voltages and bearing currents to ground. Using proprietary Electron Transport Technology™, the conductive microfibers™ inside the AEGIS® provide the most reliable current diversion technology for shaft grounding with a “path of least resistance” to dramatically extend motor life.

The design of AEGIS® provide reliable shaft grounding for power turbines and generators, large AC motors, large DC motors, traction motors, all sizes of VFD motors and wind turbine generators. They divert harmful shaft voltages to ground and extend bearing life. Install AEGIS® on the DE and insulate the bearing on the opposite end (NDE) for best results. Large motors and generators often have much higher induced shaft voltages and bearing currents. The six circumferential rows of conductive microfiber provide the extra protection for these high current applications.

Key benefits

- Good for life of bearings
- Easy bracket installation
- Maintenance free
- Nothing to wear out
- Contamination proof
- Effective at any RPM

Applications

- Motors up to and including 75 kW - Low Voltage
- Motors Greater than 75kW
- Motors where both bearings are insulated
- Motors with cylindrical roller, babbitt or sleeve bearings
- Vertical solid shaft and hollow shaft motors
- DC motors
Boiler tube failures are the leading cause of downtime for steam power plants, recovery mills and process plants also face similar challenges. Mistras has recognised the issue and developed a series of products for early detection.

Defects detected
- Boiler leaks
- Feedwater heater leaks and operational anomalies
- Stuck sootblowers
- Sootblower effectiveness
- Boiler pluggage and slagging
- Leaking valves and external issues
- Damaging vibration

Key benefits
- Detect leaks earlier than traditional methods
- Locate area of leak before unit comes offline
- Trend the severity and progression of the leak with real time data
- Manage market exposure and risk
- Scheduled maintenance versus a forced outage

Metalborne waveguides
- Detects leak noise that travels through the boiler gases and fused metal pathways
- Detects tube leaks on waterwalls that are both internal and external to the furnace
- Can be located almost anywhere on the boiler, NOT limited to existing boiler opening
- Sensitivity equals or surpasses the airborne waveguides
- Acoustic collection area is larger, providing greater sensitivity
- Easy to install
- Do not need to be cleaned or purged with air, reducing system maintenance
EA Technology began in 1966 providing asset management solutions to owners and operators of electrical assets.

In South Africa Martec distributes their Partial Discharge range of hand held products.

UltraTEV Detector²

UltraTEV Detector² with an audio enhancement enables you to hear if there is a potential PD in the asset.

Features

- Ultrasonic sensor detects surface Partial Discharge (PD) activity beyond audible range
- Transient Earth Voltage (TEV) sensor detects internal PD activity
- Both sensors are pre-set to indicate when PD activity is above acceptable thresholds
- Audio output allows effective discrimination between surface PD and noise

UltraTEV Plus²

The UltraTEV Plus² is the latest innovation being introduced to the award winning UltraTEV™ range. This easy to use instrument incorporates additional sensing capabilities and real time advanced analytical features enabling you to distinguish between true PD, noise and other interference.

Features

- Provides numerical and audible ultrasonic readings for classification of PD
- Provides numerical and audible TEV readings for interpretation of PD
- Wi-Fi connectivity allows survey results to be easily synchronised with asset management systems
- Phase resolved and waveform displays allow more reliable and conclusive decisions to be made based on measured PD
- Menu-driven, backlit colour touchscreen and keyboard (can be used wearing gloves)
- Portable & rugged
- Compatible with all UltraTEV Plus+ accessories
- Long-life, rechargeable internal Lithium-Ion (Li-Ion) battery
Electric test equipment and measuring instruments for substations and transformers.

Martec is a distributor of Megger portable electrical test equipment for transformers. Designed to improve efficiency and extend the life of electrical assets.

**IDAX 300**

Intelligent Electronic Device

Providing accurate and reliable condition assessment of insulation in transformers, the IDAX system maximises the outcome of maintenance activities allowing for load and service life optimisation.

**Key Features**

- Fast and accurate complete moisture assessment in power transformers
- Automated analysis of moisture content, oil conductivity, tan delta at 20°C reference temperature
- True frequency domain measurement for highest interference rejection
- Used in the field use for more than 15 years
- Simple and fast, transformer moisture and oil assessment in about 20 minutes

**FRAX 101**

Sweep Frequency Response Analyser

The measurement is easy to perform and captures the unique fingerprint of the transformer. The measurement is compared to a reference fingerprint, giving a direct answer if the mechanical parts of the transformer have changed. Deviations indicate geometrical and/or electrical changes within the transformer.

**Key Features**

- Smallest and most rugged FRA instrument in the industry
- Fulfills all international standards for SFRA measurements
- Highest dynamic range and accuracy in the industry
- Wireless communication and battery operated
- Advanced analysis and decision support built into the software
- Imports data from other FRA test sets

**TRAX**

Transformer and Substation test set

Providing a multi-functional solution for transformer testing. Adding several common substation testing functionalities therefore replacing numerous testing devices, which is convenient for the technician. Applications range from power transformers to instrument transformers, circuit breakers, relays and other substation components.

- Replaces need for multiple test sets
- User-friendly interface reduces training and testing time
- Portable and compact system components for easy shipping
- State of the art measurement methods for advanced diagnostic testing
Fluke is the world leader in the manufacture, distribution and service of electronic test tools and software. From industrial electronic installation, maintenance and service, to precision measurement and quality control, Fluke tools help keep business and industry around the globe up and running.

**Product Range**

- Battery analysers
- Calibration instruments
- Clamp meters
- Digital multimeters
- Earth ground testers
- Electrical testers
- Installation testers
- Insulation testers
- Power quality tools
- Portable oscilloscopes
- Process calibration
- Radiation safety
- Thermal imaging
- Thermometers
- IR/Contact
- Vibration testers
- Wireless testers
- Laser level meters

**Applications**

- Energy efficiency
- Electrical
- Mechanical

**Advantages of Fluke Technology**

- **Fluke Connect**: an integrated system of condition monitoring, wireless test tools and asset management software.
- **Fluke Thermal Imaging**: accurate and precise problem locator helps you troubleshoot where you need to.
- **Fluke Multimeter**: multiple measurements combined for fast, accurate work.
- **Fluke clamp meter**: for cramped workspaces, simple to use, gimmick-free.
- **Fluke ground and earth tester**: protects against electrocution, fire and other hazards.
- **Fluke installation tester**: for reliable connections, to help ensure safety and meet electrical codes, engineering standards and local standards.
- **Fluke insulation tester**: designed to be safe, simple to use and gimmick-free.
Intelligent condition monitoring solutions driving sustained plant integrity

Innovation never felt so right!
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<tr>
<td>Treur Close</td>
<td>+27 21 943 3900 (Cape Town)</td>
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<tr>
<td>Houer Road</td>
<td>+27 86 502 0634</td>
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| **Website** | www.martec.co.za |