

# Capability Statement



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## Introduction

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Our world has become a massive, interconnected and complex network of people and products flowing across the globe.

Every company's goals, in one way or another, strive towards absolute safety, higher efficiencies and improved productivity. This in turn places increasing demands not only on the enterprise physical assets but also on its people.

At the same time, infrastructure is ageing and the capital required to renew it in its entirety is not always readily available.

The modern management of the organisation's assets goes well beyond what traditionally was understood as "maintenance". The operators and maintainers of these assets often feel they are pulled in opposite directions as current demands require that improved asset management strategies are devised while at the same time budgets are restricted and asset-specific knowledge is continually being lost.

TxMonitor<sup>®</sup> products and services have been specifically designed to fill that knowledge gap and relieve some of these tensions while using the latest technology to enable our clients to establish effective communication bridges across various areas of their businesses.

Our business thinking starts with our client's business goals in mind, where we help them to achieve:

- Extended Asset Life
- Reduced Maintenance Costs
- Reduced Business Risks
- Optimal Allocation of Maintenance Resources
- Increased Asset Reliability and Availability
- Informed Knowledge-based Decisions via our Independent and Expert Technical Advice
- Centralised Management of Condition-defining Asset Data using our Purpose-built Web Accessible Asset Management Platform
- Optimal Economic Performance of Assets

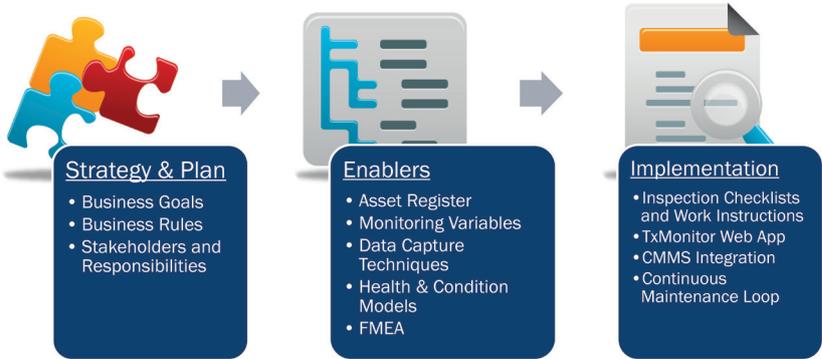
This document outlines the products and services that we place at the disposal of businesses to ease workloads, and assist our clients in achieving their business goals.

# Transformer Management Strategies

With an in-depth knowledge of the various functional demands and failure modes that can arise in different operating environments, TxMonitor® can validate, extend or develop Primary, Secondary or Tertiary Maintenance strategies that support the overall Asset Management framework of your organisation.

Our strategies are developed following recognised Reliability Centred Maintenance (RCM) principles and consistently address and mitigate risks in alignment with the overall business goals.

We place great emphasis in our endeavours to produce documents that seamlessly integrate into existing document systems, providing users with a familiar “look and feel”.

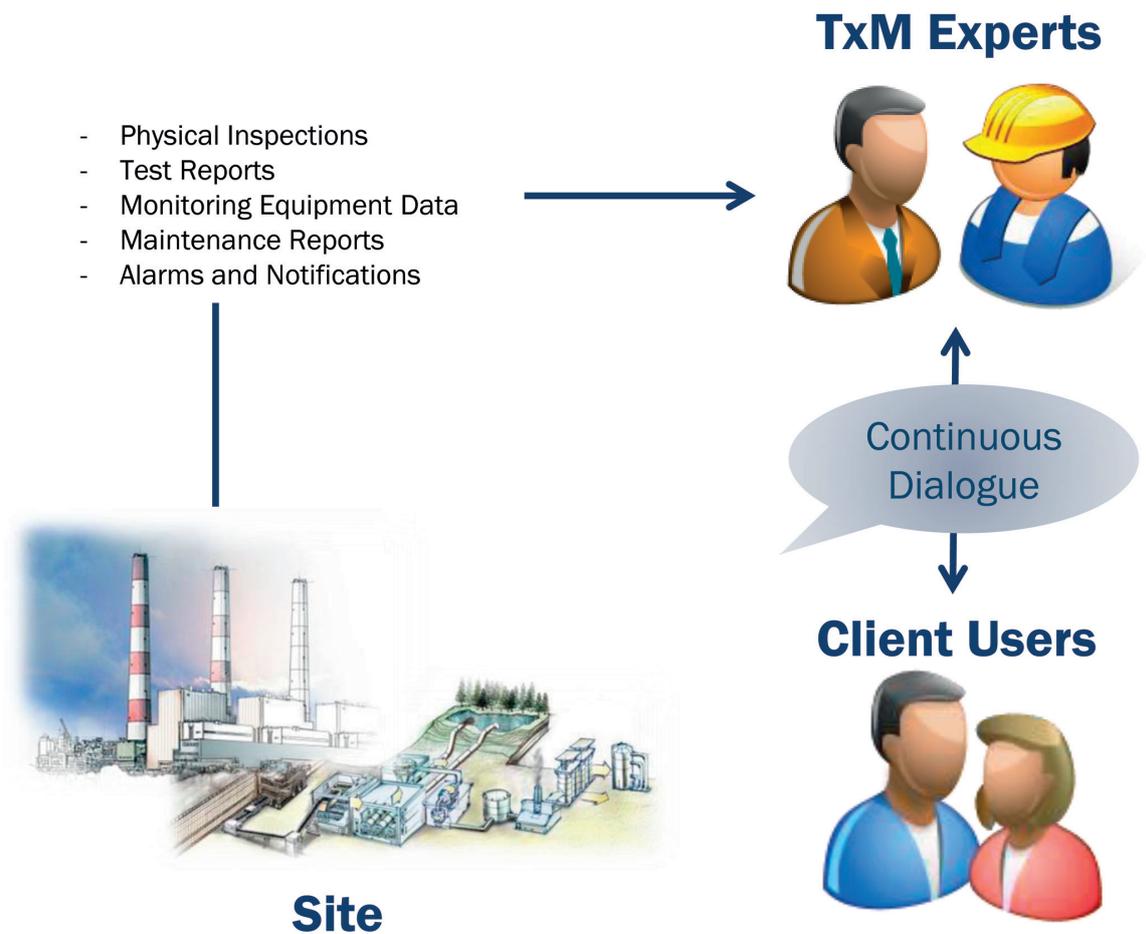


## The TxMonitor® Asset Management Web Platform

As a support platform to all of the TxMonitor® services, we have developed a specialised, state-of-the-art Asset Management application that can be accessed through any web-browser.

Not only does this platform provide a centralised information repository specifically designed to hold transformer data but it also leverages the power of aggregation to provide its users with statistical analysis benchmarking capabilities against the data of the entire asset population currently held in the database.

This platform has been designed to provide relevant, up-to-date information as required, starting with a summary dashboard and allowing the user to drill down to a variety of levels of detail, including individual asset life cycle history.



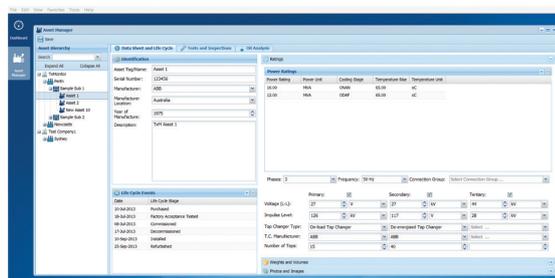
The structure of this platform has been devised in a way that can allow easy development of a number of “plug-in” modules to satisfy specific customer requirements. These requirements may include custom ranking rules or data import/export modules to support your existing Computerised Maintenance Management System (CMMS).

This system is not designed to replace existing CMMS but rather to extend its capabilities with asset specific business rules and algorithms to fulfil the function that the PAS-55 Asset Management Specification (soon to become ISO-55000) refers to as “knowledge enablers”.

If you require further information or would like to “test drive” this application, please contact us for a demonstration account.

- Condition Assessment
- Risk and Priority Ranking

## TxMONITOR Web App



- Individual Asset and Fleet Views
- Encrypted Password Access
- Detailed History

Asset Register

Condition Status



CMMS

IBM maximo

SAP PRONTO Software

## Expert Technical Consulting

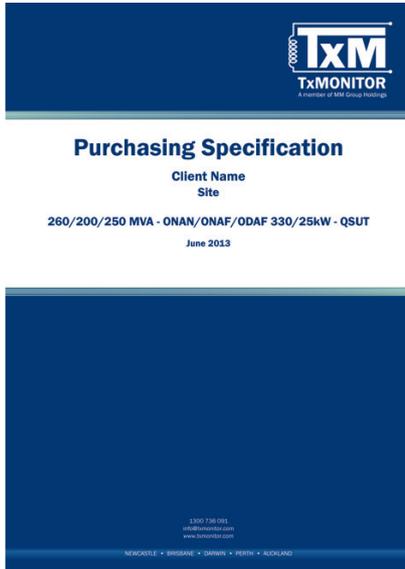
In business it is not always achievable to have in-house resident experts for every class of asset on site. Specialist technical knowledge can be a scarce commodity and there are times when in depth technical knowledge and expertise is required to solve specific challenges.

TxMonitor<sup>®</sup> offers a wide variety of expert technical consulting services. Situations where you might require the services of our technical experts include:

- Processing of incoming data and information about your assets and turn it into knowledge that drives concrete maintenance actions.
- Root Cause Analysis (RCA) of failure events.
- Post-mortem and Forensic Investigations.
- Factory and Commissioning Test Witnessing.
- Representation of your organisation's interests when interacting with Manufacturing or Repair facilities.



## Specification Development



Whether organisations need to select and purchase a new transformer or repair and refurbish an existing one, the best way to ensure that the asset has the functional characteristics that the business requires is to write them down.

Documented specifications allow the adequate conveyance of asset requirements and characteristics to all stakeholders involved in the management of that asset, from manufacturers and suppliers to operators and maintainers.

In addition, a specification enforces the standardisation of product features that fill specific business needs and may not be included in the manufacturer's regular offering or required by any technical standard.

At TxMonitor<sup>®</sup>, we have a wealth of experience in Designing, Manufacturing, Installing, Repairing, Rewinding and Disposing of Power Transformers available to end users. This ensures business requirements are captured while incorporating the most current industry best practices.

Tailor made specifications can be developed for:

- Tendering and Purchasing
- Repair
- Refurbishment and Rewinding
- Major Maintenance Works
- Disposal etc.

# On-site Tests and Inspections

Whether assessing or diagnosing the condition of a particular transformer it is important to gather objective quality data. It is important that this data can be transformed into valuable knowledge that will aid in the determination of the transformer's overall condition.

This data can be acquired in various ways, ranging from on-line monitoring devices to tests and inspections performed in the field.

The quality and accuracy of the diagnosis is only as good as the quality and accuracy of the incoming data. Reliable, repetitive and reproducible tests are necessary to consistently judge and establish the condition, and most importantly, the trending behaviour of that condition throughout the life of the asset.

TxMonitor<sup>®</sup> work with data coming from diverse third party sources, however, we also offer field testing and inspection services. These services are performed with the appropriate equipment, by competent personnel to ensure testing meets the "three R's" criteria:

- Reliable
- Repetitive
- Reproducible

**Inspection and Test Certificate**  
Certificate No: 7000-ITC001 | Date: 22-Apr-13 | Client: CLIENT NAME

**Dissolved Gas Analysis**  
Transformer Description: TX\_001 - GEC - 375/400/450/500 [MVA] - ONAN/ONAF/ODAF - 50\_Hz - 3\_Phases - 300\_KV / 21\_KV / 415 V - YN40

No	Sampling Date	Laboratory	Lab ID	Report No.	Report Date	Notes
1	07-Aug-12	EXAMPRE LAB	290789	91544	9/04/2013	
2	14-Sep-12	EXAMPRE LAB	299311	91544	9/04/2013	
3	27-Feb-13	EXAMPRE LAB	299306	91544	9/04/2013	
4	26-Mar-13	EXAMPRE LAB	299300	91544	9/04/2013	
5	18-Apr-13	TXMONITOR	7021-8101	N/A	22/04/2013	In-situ (Transport)
6	18-Apr-13	TXMONITOR	7021-8102	N/A	22/04/2013	In-situ (Transport)
7						
8						
9						
10						

**Gas Concentrations [PPM]**

No	Hydrogen	Methane	Ethylene	Ethane	Acetylene	Carbon Monoxide	Carbon Dioxide	Oxygen	Nitrogen	FCG
	H <sub>2</sub>	CH <sub>4</sub>	C <sub>2</sub> H <sub>2</sub>	C <sub>2</sub> H <sub>4</sub>	C <sub>2</sub> H <sub>6</sub>	CO	CO <sub>2</sub>	O <sub>2</sub>	N <sub>2</sub>	FCG
1	25	96	87	53	0	176	1920	2250	23200	497.0
2	33	118	104	62	0	187	2330	1480	26400	509.0
3	42	127	110	70	2	204	2600	2240	23200	555.0
4	36	126	109	70	0	185	2470	2370	24300	524.0
5	22	114	75	47	0.5	155	2281			433.5
6	27	122	78	47	0	172	2429			464.0
7										0.0
8										0.0
9										0.0
10										0.0

**Gas Ratios**

Ratio	Value
R1 CH <sub>4</sub> /H <sub>2</sub>	3.409
R2 C <sub>2</sub> H <sub>2</sub> /CH <sub>4</sub>	0.598
R3 C <sub>2</sub> H <sub>4</sub> /C <sub>2</sub> H <sub>6</sub>	1.119
R4 C <sub>2</sub> H <sub>2</sub> /C <sub>2</sub> H <sub>4</sub>	0.007
R5 O <sub>2</sub> /CO <sub>2</sub>	0.006

**Inspection and Test Certificate**  
Certificate No: 7000-ITC001 | Date: 22-Apr-13 | Client: CLIENT NAME

**Dissolved Gas Analysis**  
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**Duval's Triangle Analysis**

No	Zone	Duval's Diagnosis
1	1T2	Thermal fault, 300 <T< 700 °C
2	2T2	Thermal fault, 300 <T< 700 °C
3	3T2	Thermal fault, 300 <T< 700 °C
4	4T2	Thermal fault, 300 <T< 700 °C
5	5T2	Thermal fault, 300 <T< 700 °C
6	6T2	Thermal fault, 300 <T< 700 °C
7	7	
8	8	
9	9	
10	10	

**IEEE Dissolved Gas Interpretation Guidelines (C57-104)**

Sample to analyze: No: 5, Date: 18/Apr/13 Laboratory: TXMONITOR Lab ID: 7021-8101

Condition Classification: Selected Sample: 2 | Previous Sample: 3 |

Recommended Sampling Period: Quarterly

Recommended Action: Exercise caution. Analyze each individual gas. Determine relation to load.

**Diagnosis based on Gas Ratios**  
Total combustible gases are less than 500 ppm which renders this analysis less significant.

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In addition to conducting tests and inspections, TxMonitor<sup>®</sup> liaise with clients on the most suitable and adequate scope to achieve the outcomes necessary to make appropriate determinations. Testing is only valuable if the data gathered can be utilised in trending, determinations or recommendations.

TxMonitor<sup>®</sup>'s testing and inspection capabilities include but are not limited to the following:

- Turns Ratio and Polarity
- Insulation Resistance
- Insulation Power Factor (Tan-Delta)
- Winding Resistance
- Excitation Current
- Sweep Frequency Response Analysis (SFRA)
- In-situ Oil Sampling and instant Dissolved Gas Analysis, Break-down Strength and Power Factor

Data collected during tests and inspections is reported using our internally developed document system aimed at organising the information in logical groups. This helps provide opportune commentary and recommendations in plain English to enable businesses to make an informed decision and turn this knowledge into actionable Asset Management tasks.



## Oil Lab

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Oil sampling and analysis can be a very powerful tool in diagnosing and assessing the condition of your asset. The TxMonitor<sup>®</sup> Oil Lab is equipped with state-of-the-art testing instruments and highly qualified chemists and can provide a large processing capacity with robust accuracy suitable to meet the most stringent demand.

All testing is performed in accordance with NATA's Accreditation Requirements. The Oil Lab is accredited for compliance with ISO/IEC 17025. *Accreditation Number: 19309.*

We are able to perform a diverse range of tests including:

- Dissolved Gas Analysis by Gas Chromatography
- Moisture in Oil
- Oil Power Factor / Dissipation Factor
- Dielectric Strength
- Acid Neutralization Number
- Interfacial Tension
- Colour / Visual Condition
- PCB Content
- Furanic Compounds (2-furfural)





Oil sampling to internationally accepted standards, such as ASTM D923, ASTM D3613, IEC 60475, IEC 60567, AS 1767.2.3 to name a few, is as important as the test itself to obtain meaningful and consistent results.

As a standard for TxMonitor<sup>®</sup>'s Oil Lab, samples are taken with serial numbered matched syringes specifically designed for Dielectric Liquid Sampling.

This provides the consistency and accuracy needed to properly diagnose any incipient problem inside a given unit.

With the service provided by our Oil Lab you will also receive a login to our online database which can be accessed from any computer with an Internet connection where your results can be viewed.

TxMonitor<sup>®</sup> offers a complete solution, as we will take care of sampling, testing, analysing and providing a final assessment.

## Specialised Training Courses

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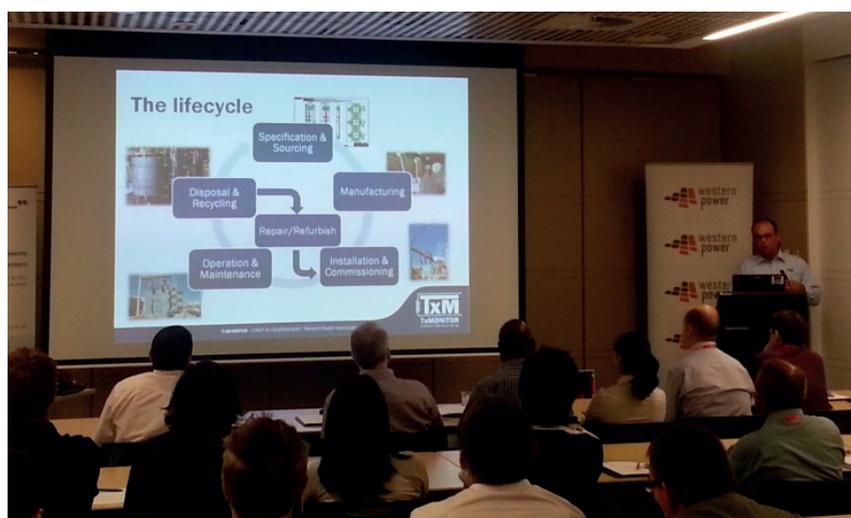
Adequately trained personnel, with sufficient knowledge on the assets they have to look after, enables the efficient and effective execution of operation and maintenance plans.

TxMonitor<sup>®</sup> offers a comprehensive syllabus on transformer knowledge, ranging from design and specifications to field operations and maintenance.

This syllabus is contained in logically arranged modules which give our clients the flexibility to tailor the breadth and depth of the content of the course to the intended audience.

The syllabus includes, but is not limited to the following:

- Electromagnetism History
- Basic Electromagnetism Concepts
- Basic Ideal Transformer Concepts
- Real Transformer Concepts
- Power Transformer Installation and Commissioning Process
- Operation and Maintenance
- Field experiences





# Global Support



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