

## CASE STUDY

### PILOT PROJECT INSTALLED AT DEWA POWER PLANT, JEBEL ALI, UAE JANUARY 21<sup>ST</sup>, 2018

**We believe in a healthy, reliable and well-maintained network. The goal is to optimize the performance of the transformer, extend its life, protect the environment, and create a safe and efficient work place.**

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#### **Moisture in the transformer is the enemy.**

The effect of moisture on insulation aging is well explained in various published papers and documented along with the damaging effect on insulation strength and partial discharge initiation level. It has also been shown that at high temperatures, the residual moisture in winding insulation can trigger the release of free gas bubbles, thus creating an immediate threat to the dielectric integrity of the insulation structure.

***Moisture will decrease dielectric strength, accelerate cellulose aging and cause the emission of gaseous bubbles at high temperatures.***

Maintenance managers and engineers are aware that a healthy transformer translates to increased efficiency, safe working environments and better bottom lines.

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#### **Where does moisture come from?**

Moisture accumulates in the transformer over the years of its operation. There are typically three sources of moisture for a transformer:

- 1) New transformers are meant to carry some moisture in the paper insulation as completely dry paper is too brittle and is not mechanically strong.
  - 2) Free breathing transformers will add some moisture from the atmosphere through the conservator and through the breather.
  - 3) Moisture creation inside the transformer paper insulation during normal operating conditions. This is a never ending cycle, one that cannot be stopped. As the paper is subjected to heat and starts to degrade, the cellulose chain breaks apart to form water which is then dissolved into the oil. As the paper degrades further, more moisture is created and further degrades the paper creating moisture and so on.
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Point number 3 is of major concern and is the focus of **DryTrans**.

#### **What are Continuous On-Line Moisture Management Systems?**

*Continuous Online Moisture Management Systems* for Oil filled transformers are a crucial necessity of any maintenance department.

It is now accepted, that no matter the oil filtration efforts, the transformer will never be rid of moisture. Once we accept this reality we are left with the only option, manage moisture effectively. If we cannot remove all the moisture from a transformer, we must manage its presence and not allow it to affect the reliability of the transformer.

This will require the use of an online moisture management system that is permanently affixed to the transformer and continually filters the moisture from the oil. Over 98% of moisture in a transformer is held within the solid insulation, and the oil acts as the medium to get to this moisture. Over time as the management system continues its operation and removes the moisture from the oil, the moisture from the solid insulation migrates to the oil and the process continues. It is absolutely imperative that the moisture be managed from an early stage to keep the transformer as healthy as possible and extend its operational life.

# REPORT

## ASSET DETAILS:

TRN Ratings:	TR5 Specification:
TRN Name: BLT13-6290 T MVA Ratings: 890kVA Voltage: 11kV/150v Make: FRIEM Year of Manufacture: 1992	Model: TR5 Voltage: 230 VAC Make: DryTrans Year of Manufacture: 2017 Serial No:TR5-001

## SELECTION CRITERIA:

AVACO has installed a pilot unit model TR5 continuous online moisture management system on BLT13-6290 T, Reactor Transformer. The TR5 has been continuously in operation since January 21<sup>st</sup> 2018.

The transformer has been selected based on the following criteria:

1. It is a critical transformer.
2. Manufactured in 1992, 25 Years Old.
3. Since it is a small and Critical Transformer, it will be difficult to use Offline Dehydration system

## OBSERVED AND RECORDED DATA:

Date	Moisture at Inlet of DryTrans TR5	Moisture at Outlet of DryTrans TR5 - DEWA Lab Result	Alarm status with date and time	Remark or Comments
21 <sup>st</sup> January 2018	6 PPM	3 PPM	No Alarms	Working Fine
5 <sup>th</sup> February 2018	3 PPM	2 PPM	No Alarms	Working Fine

## CONCLUSIONS:

It has been observed, from the inlet moisture level, that the TR5 has reduced the transformer moisture level by 50 % to acceptable levels proving that the TR5 is capable of reducing moisture levels in as little as 3 weeks.

The moisture readings at the outlet confirms that the DryTrans TR5 is working satisfactorily to reduce moisture concentration of the transformer oil and since it is a slow process, there is a better chance to get at the moisture in the solid insulation, which will in turn improve the health and life of the transformer.

## NOTES:

DEWA has conducted their own oil testing at their own facility and is satisfied that the TR5 is perfectly suited for their smaller rating transformers. As part of their efforts DEWA has decided to extend the pilot period to another two months to observe further moisture reduction.

## RECOGNITION:

AVACO is very thankful to Dewa Jebel Ali Power Station Engineers and Staff for showing interest in the DryTrans TR5 product. We will be delighted to work with you on future projects as well.

## REPORT

### PICTURES:



Fig 1.1 DryTrans TR5 Installation at Dewa Power Plant, Jebel Ali, UAE