

**OIL  
FILTRATION  
SYSTEMS®**

A CLARK-RELIANCE COMPANY

September 28, 2016  
Location: Southern Australia

## CASE STUDY

# Solar Titan 250 Gearbox Failure of Large Gas Turbine Generator

## Problem:

At a large Paper Mill in Southern Australia, there was severe contamination of metal fines in a Solar Titan 250 Gearbox of a large Gas Turbine Generator. After the failure of the gearbox, the turbine generator continued to operate for several hours until finally being shut down. This allowed for debris from the mechanical failure to contaminate the entire lube oil system.

Due to time and access constraints, the cooler and other circuit components could not be isolated and flushed separately. Before the turbine generator could be put back into service with a new gearbox, the entire lube oil system needed to be completely free from contamination.

## Solution:

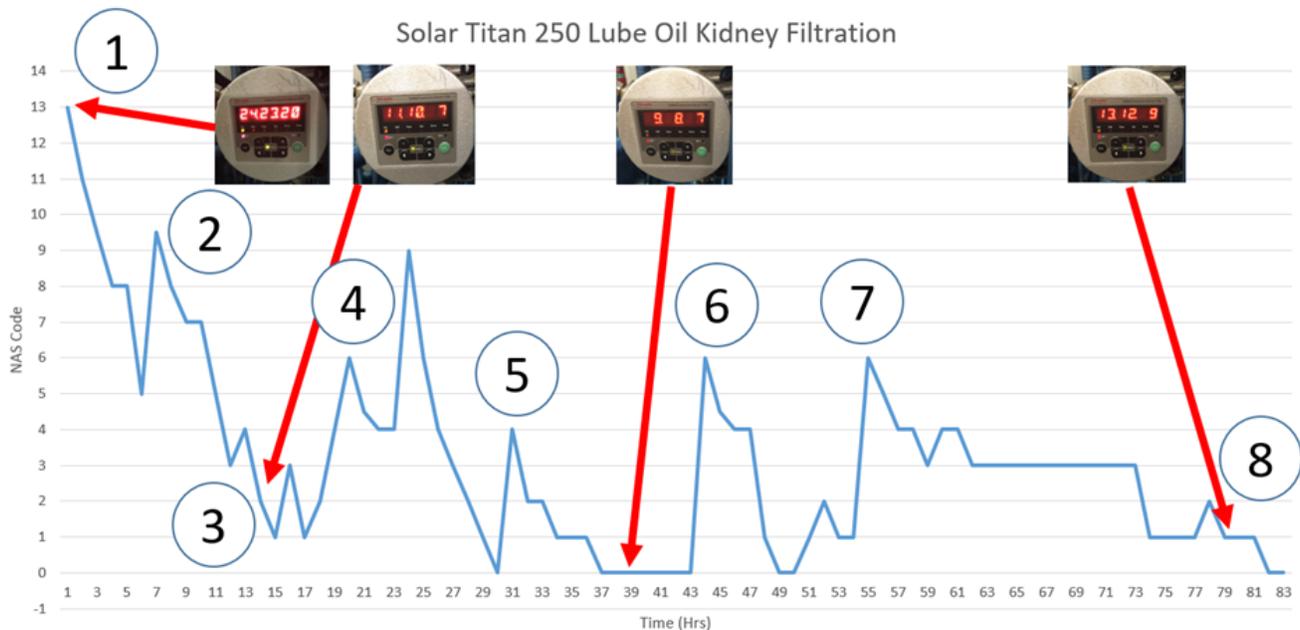
A small transfer pump equipped with a 3-Micron filter element was placed on the gearbox to pump the lube oil into the main tank. A 50 GPM Vacuum Dehydration Oil Purification System (VDOPS) from Oil Filtration Systems®, equipped with a high efficiency 5-Micron Beta $>1000$  filter element, was placed on the main tank to re-circulate the oil for 48 hours, dropping the particle count from ISO 24/23/20 to ISO 9/8/7. A “flush” of the lube oil piping was then performed, dislodging more debris and returning it to the reservoir, resulting in a spike of particle counts in the oil. The VDOPS continued to re-circulate on the main tank for another 24-hours, and ultimately achieved a final particle count of ISO 10/9/8 (or NAS Class 0), far exceeding the required cleanliness specification of ISO 16/14/11 (NAS 5).



**Representative 50 GPM VDOPS**

## Results:

The starting particulate content in the oil was ISO 24/23/20 (NAS 12). After a few days of recirculation, the particulate contamination dropped significantly to ISO 10/9/8 (NAS 0), which is over **4000x cleaner** than where it started.



1. Unit Start -ISO 4406: 24/23/20 (NAS 13)
2. Onboard Tank Emptied Into Reservoir
3. Kidney Filtration Achieved ISO 4406: 11/10/7 (~NAS 1) in 15 hours
4. Lube Oil Tank Pump Started
5. Flow Pat Direction Changed
6. Filtration Stopped Overnight -Cold Start and Settled Contaminant Spike
7. Turbine Start
8. Turbine Operational -ISO 4406: 10/9/8 at Disconnect (NAS 0)

## Conclusion:

By implementing a Vacuum Dehydration Oil Purification System (VDOPS) from Oil Filtration Systems®, and by maintaining the oil of a large Gas Turbine Generator at or below ISO 16/14/11 (NAS Class 5) Cleanliness Level, operators at this large Paper Mill did everything possible to ensure optimal reliability and operation/performance of the Turbine Generator, while minimizing down-time and costly repairs.