



CLEAN OIL  
BRIGHT IDEAS

### CJC™ Application Study

Application Study  
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#### CUSTOMER

Energyworks Valladolid - Iberdrola, Spain.  
Cogeneration, combined cycle power plant inside Michelin tire factory.

#### SYSTEM

**System:** Gas turbine GE-LM6000  
Generator bearings and gearbox  
**Lube oil:** AGIP OTE 32  
**Oil reservoir:** 8,000 L

#### PROBLEM

The oil analysis report showed an MPC value of  $\Delta E$  42 indicating high varnish potential. An increased MPC value means a risk of varnish deposits falling out on system components. The oil degradation also shortens the oil life. The critical value for MPC is  $\Delta E$  15 in this application.

#### SOLUTION

We decided to install the CJC™ Varnish Removal Unit, VRU with CJC™ Varnish Removal inserts, VRi to remove varnish and lower the MPC value to below 15. The CJC™ VRU draws the oil from the bottom of the reservoir, filters out varnish and returns the clean oil to the top.

#### RESULTS

At the start up of the CJC™ VRU, the oil sample showed an ISO code 17/15/12 and an MPC value of 42. After two weeks of filtration the analysis results are the following: **ISO code 16/14/11 and an MPC value of 8**. These results are optimum for the turbine performance and oil maintenance.

#### BENEFITS

Using the CJC™ VRU the customer will increase the reliability of the turbine and reduce the maintenance cost related to valves, bearings, coolers, system flushing and oil changes. Looking only at the oil and handling costs, the customer had a **direct saving of approx. € 20,000 (€ 2.08 per Liter)**. The Return On Investment is therefore very short.

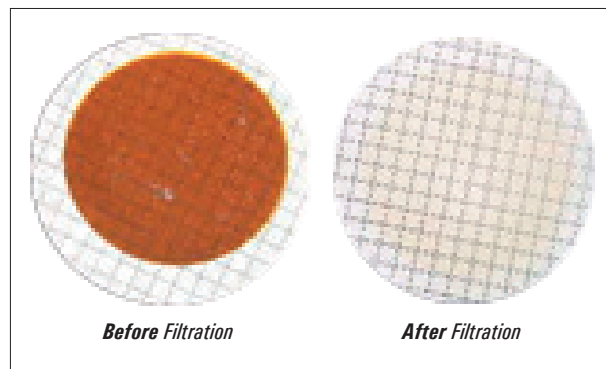
#### CONCLUSIONS

With the CJC™ VRU the turbine now runs at optimum performance meaning less maintenance, less scheduled outages and no oil related turbine trips.



The CJC™ Varnish Removal Unit, VRU installed at Energyworks Valladolid, Iberdrola, Spain

#### MEMBRANE PATCHES (MPC)



#### RESULT

	Before Filtration, June 4, 2012	After Filtration, June 18, 2012
ISO Code	17/15/12	16/14/12
MPC value ( $\Delta E$ )	42	8