CLEAN OIL
BRIGHT IDEAS

Tap Changer Oil
Transformer Tap Changer, Iron Ore Mine

CJC™ Application Study

Application Study written by:

Adrian Lane
IQ Oil Filtration
South Africa
and
Rias Rabie
Crushpro
South Africa

in cooperation with

Mr. Lorenz von Czapiewski
Kumba Iron Ore's
Sishen Mine
South Africa

KUMBA IRON ORE

2009

CUSTOMER

Kumba Iron Ore's Sishen Mine
Northern Cape, South Africa
Kumba Iron Ore is the fourth largest producer of sea-borne iron ore in the world today exporting 73% of it's 32 mt mined per year.

THE SYSTEM

20 MVA Transformer Tap Changers
Oil volume: 840 L
Oil type: Tap changer oil

THE PROBLEM

Thousands of tap changes per year result in millions of fine carbon particles being introduced in the oil. Leaving them unchecked can result in flash over or unexpected failure. Oil degradation products, such as oxidation formed in the oil reduce the effectiveness of the tap changer. Condensation due to continuous temperature fluctuation gradually increases the water content in the tap changer.

THE SELECTED SOLUTION

CJC™ Fine Filter HDU 27/27 PV with **CJC™ Filter Insert BNK 27/27**, flow rate 120 L/h, designed to remove particles, water and oxidation products.

THE TEST

Comparison of tap changers on Transformer 1 and Transformer 8 at Kumba Iron Ore's Sishen Mine has been carried out:

Transformer 1 was serviced and filled with new oil in February 2009, the tap changer was only put onto automatic mode at the end of March 2009. **No filter was installed at any stage.**

Transformer 8 was serviced and filled with new oil on 2 Dec. 2008, at which point the CJC™ Fine Filter was installed. The tap changer ran on automatic since the service was completed.

On 18th May 2009 oil samples were taken from both transformers.

THE RESULT

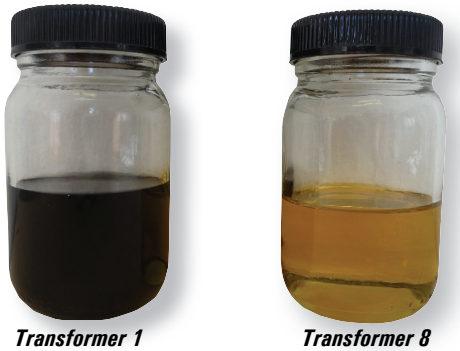
New oil in **Transformer 8** (with CJC™ Filter) was recorded to 138,300 4 μm particles (ISO 18/15/12), this cleanliness level was improved to 42,700 (16/15/13) over the 5 months following, in fact leaving the tap changer cleaner than at the start of the test.

Comparatively **Transformer 1** (without CJC™ Filter) in only six weeks showed a contamination level of 7,657,200 of 4 μm particles and larger (ISO 23/23/21).

Interestingly, the reduction in particles from 7,657,200 to 42,700 equates to a **difference of particle contamination of 99,5%!** - See photographic comparison of the Transformer 1 and Transformer 8 samples in bottles.

The Transformer Tap Changer at Kumba Iron Ore's Sishen Mine with the CJC™ Fine Filter HDU 27/27 PV installed

OIL SAMPLES



Transformer 1 without CJC™ Filter *running 6 weeks*

Transformer 8 with CJC™ Filter *running 5 months*

THE RESULT

	Transformer 1 without CJC™ Filter	Transformer 8 with CJC™ Filter after 5 months
ISO Code	23/23/21 *)	16/15/13 *)
Particles > 4 μm	7,657,200	42,700
Particles > 6 μm	5,650,500	18,100
Particles > 14 μm	116,900	4,500

**) ISO Class 4406/1999, per 100 ml - Oil Samples taken by Oilwatch, Capetown*

Kumba Iron Ore's Sishen Mine has now purchased CJC™ Filters for the remaining 12 off 20 MVA transformer tap changers.

ASIN5119-UK
Mining
Misc. Mining Equipment
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C.C.JENSEN A/S
Løvholmen 13 • DK-5700 Svendborg • Denmark
Phone: +45 6321 2014 • Fax: +45 6222 4615
filter@cjc.dk • www.cjc.dk