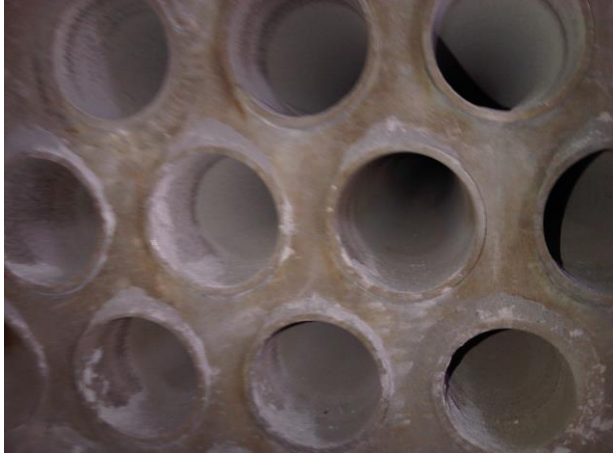


COST BENEFIT ANALYSIS: THE SAPEC SYSTEM

SAPEC was introduced on to the boilers at Food & Beverage plant after the plant had experienced fouling problems on the boilers at the site. The fouling which is illustrated below was up to 4mm thick in places and was extremely hard and difficult to remove. Many of the tubes were blocked in the reversal chamber. The plant has now been operating successfully with SAPEC for almost a year and the boiler fouling has been dramatically reduced as is illustrated by the photographs below

BEFORE SAPEC WAS INTRODUCED

BOILER 2 AFTER 6 MONTHS OPERATION WITH SAPEC 26/02/09



Hard scale up to 4mm thick

No Hard Scale, just a light dust



Reversal Chamber No SAPEC

Reversal Chamber with SAPEC

The following table represents the effect of soot and scale on the heat transfer surfaces and the estimated impact on fuel consumption.

THE EFFECT OF SOOT/SCALE DEPOSIT ON HEAT TRANSFER COEFFICIENTS

Thickness	1mm	2mm	3mm
Reduction in Heat transfer Coefficient	10%	25%	45%
Estimated Increased fuel consumption	2.5%	4.5%	8.5%

Given the reduction in fouling in the boilers and the photographic evidence it is entirely reasonable to suggest that the fouling has been reduced by a minimum of 2mm This equates to a saving of over 4.5 % the costs of not treating the boilers will **lead to an increase in coal costs of R108, 000 per month (based on an estimated coal cost of R600 per tonne)**

Because of the fouling problems on the site, the SAPEC system was initially installed on all the boilers. Therefore, it was installed on some boilers that were already well into their operating period, they were not cleaned and already had deposits. This may have initially masked the coal savings. However, all the Sapec boilers have been cleaned

and more importantly they are operating clean for some time. We would therefore expect real savings to show up in this year's coal and steam figures.

BOILER CORROSION

We have recently installed the Sapec system on two sites that had previously suffered bad fireside fouling on the tube ends. As a result, both suffered from corrosion leading to thermal stress fatigue cracks at the tube ends. The corrosion and subsequently the tube cracks were a direct result of the boiler fouling. The cost of the re-tubing ran into hundred thousands of rand.

Sapec not only prevents deposits it also reduces the wear on the boiler tubes that result from abrasive de-scaling techniques. Other benefits include:

REDUCED DOWNTIME

- In the UK and South Africa SAPEC has typically been able to double the boiler operating time between cleans, resulting in reduced downtime and cleaning costs.

EASIER CLEANING

- SAPEC prevents the formation of bonded deposits any remaining deposits are soft and easily removed.
- Reduced cleaning times and costs

There is no doubt that SAPEC reduces boiler fouling. However, it is very difficult to accurately calculate the costs of boiler fouling. However, even if we only allowed for a 1mm reduction in deposition on the heat transfer surfaces this would lead to a fuel saving of 2.5% this would save R60,000 per month. Given the photographic evidence we are clearly dealing with a different order of magnitude, it would be impossible to see a 1mm difference in deposit formation and therefore we can confidently stand by our claim that the use of Sapec will result in savings of 5% and above.

K.R.Hardy 06/05/09