

Ru DSA – 6

**Water Based Organic solution for removal of water scales
(Specially for Power House)**

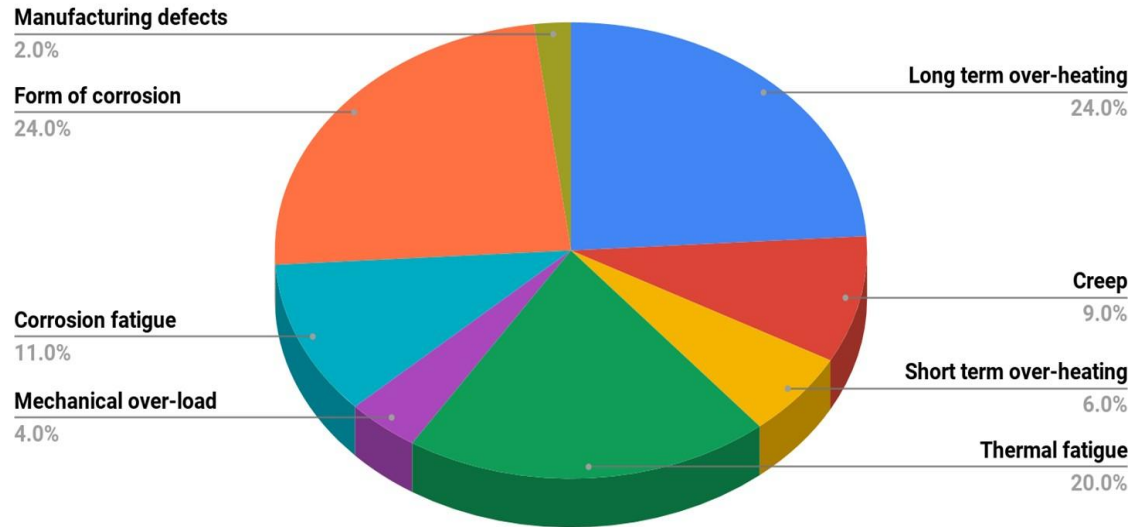


**Manufacturers of state-of-art industrial
cleaners**

Unexpected tube failure causing shutdowns of Boiler

- **Scales are a major problem** in equipments and sub-assemblies
- **Unexpected tube failure** causing unexpected shutdown
- **4% to 5%** availability/production loss
- **Affected equipments** - GTR coolers, vacuum cooler pumps, heat exchangers, condensers, turbine auxiliaries, pipelines of boilers, water tanks, radiators, water jackets etc.

Boiler tubes damage reasons



Impact of water impurities on boiler tubes

Main sources of water into boiler

1. *Surface water* - River water, lake water etc.
2. *Sea water* - Most impure water
3. *Underground water* - Shallow and deep springs and wells

Cause

Types of impurities in the above sources

1. *Physical Impurities*: Clay, sand oil globules, vegetable and animal matter
2. *Chemical Impurities*
 - a. Dissolved Inorganic salts: Ca, Mg, Cl, SO₄- etc.
 - b. Dissolved Gases: CO₂, O₂, N₂, Oxides of nitrogen.
1. *Biological impurities*: micro organisms like bacteria, fungi etc.



Effect

Impact of these impurities on boiler tubes

1. Formation of scales and sludges
2. Boiler corrosion
3. Caustic embrittlement
4. Priming and foaming

Disadvantages of scale

Scale: Hard, adherent coating due to presence of salts like $\text{Mg}(\text{HCO}_3)_2$, $\text{Mg}(\text{OH})_2$, $\text{Ca}(\text{HCO}_3)_2$, CaSO_4 .

The scale formation in boilers, poses two main problems:

1. *Wastage of fuel:* Scales are poor conductors (almost insulators) of heat and result in a low heat transfer rates
1. *Overheating of the boiler:* To maintain steady heat supply to water, greater heat energy has to be supplied. This results in over-heating of the boiler and also increased fuel Consumption.

The extent of fuel wastage depends on the thickness and nature of the scale. In a typical case for 0.62 mm thickness of scale ***approx 15% fuel will be wasted***

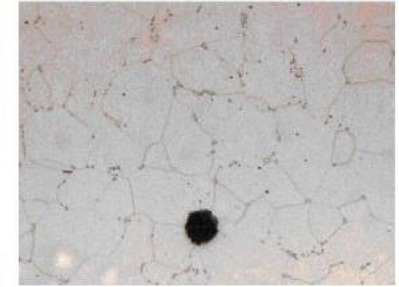
Long and short term overheating contributes to ~33% failure cases

1. Long-term overheating (24-25%)

- Localised prolonged exposure to high temperature
- Scale formation
- Causes longitudinal ruptures with multiple cracks on the tubes
- Structural degradation - carbide coarsening, spheroidization & graphitisation



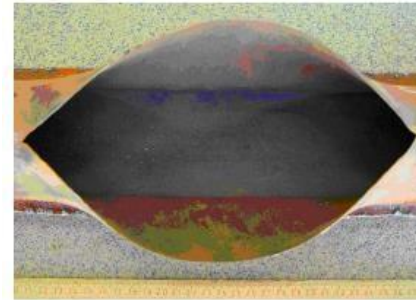
Tube showing localized bulging at hot side (right)



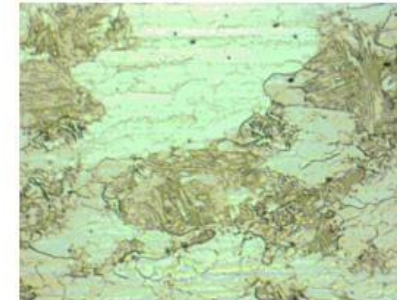
Microstructure at hot side showing full carbide spheroidization and a graphite nodule, x400

1. Short-term overheating (6-8%)

- Process adherence gaps - more than requisite fuel addition
- Hardening occurs via rapid quenching by the flow of steam and water released by the burst
- Results in thin-lipped fish-mouth rupture



Fish-mouth rupture



Microstructure at rupture, showing partial transformation, x500

Effect of long term overheating of boiler

1. **Wall thinning of tube:** On the fireside of tube the wall thinning is taking place because of erosion and chipping due to flying of foreign matter in flue gas. As the thinning is taking place it reduces the critical hoop stress of pipe
1. **Creep formation on exterior wall of tube:** In the water side of tube the scale acts as a thermal barrier and there will be low heat transfer from flue gas to water inside the tube, As a result the temperature of tube increases. As the temperature increases the strength of tube will reduce which result in creep formation on exterior wall of tube. Hence it reduces the lifespan of tube.

Removal of scale to enhance boiler life and efficiency



Reduction of Scale: By applying external or internal treatment, the hardness of water can be reduced

Removal of scale: Once the scale formed in side the tube it can be removed by organic acid or by inorganic acid.

The inorganic acids are effective in removing the scale but it also reacts with parent metal and corrosion takes place.

The organic acid manufactured by Ruchem India is very effective on scale but also does not have any reaction on any parent metal (steel, plastic, rubber etc)

Case example: GRT cooler with high scale accumulation



Transformation GRT cooler
CSTPS Chandrapur



Scales inside the GRT
Cooler (heat exchanger)
before treatment

Case example: Solution provided 1/4

Ru DSA-6 - Water based, organic descaling agent unreactive with any metal, rubber, PVC or the like



Step 1: Circulating Ru DSA- 6 into the cooler

Case example: Solution provided 2/4

Step 2: Scales accumulated after treatment with Ru DSA- 6



Case example: Solution provided 3/4

Result: Post treatment with Ru DSA- 6, cooler is scale-free



Before



After

Case example: Solution provided 4/4

Result: Post treatment with Ru DSA- 6, cooler is scale-free



Before



After

Scale free equipments are more efficient

- Increases life of the equipment
- Saves considerable time and valuable manpower
- Reduces fuel consumption
- Increases output
- Keeps the working area clean

Performance Certification



CHANDRAPUR SUPER THERMAL POWER STATION
MAHARASHTRA STATE POWER GENERATION COMPANY LIMITED
Urjanagar, Chandrapur - 442 404.
Tel: 07172 - 220155 to 220159 Fax: 07172 - 220203
Email: cegenchandrapur@mahagenco.in

CHN/TM-II/PerfCert/

No 00205

Date:- **20 OCT 2014**

PERFORMANCE CERTIFICATE

TO WHOMSOEVER IT MAY CONCERN

This is to certify that, M/s. Saikirshna Associate, Chandrapur has carried out the following works against orders mentioned successfully & satisfactorily;

Sl. No.	Description	PO Number	Amount
1	Work of chemical of vacuum pump cooler by descaling agent DSA 6 U#5,6&7	CHN/ TM II./184/001153dtd30/07/2012	Rs.2,98,069/-

Actual Parameter (dtd 9/9/14) of Unit No.7

SNO	Description	Temperature	Difference	Remark
1	DM Inlet temperature	40 Deg C	10 Deg C	Before AOH June/July2014 of Unit7 DM water temperature maintaining at higher side more than 50 deg C & it is difficult to touch the overflow DM water. Now after cleaning of cooler in AOH, DM water overflow can be sensed easily.(i.e Temp - 40-45 deg C).This shows there is improvement in cooler performance.
2	DM Outlet temperature	30 Deg C		
3	ACW inlet temperature	22 Deg C		
4	ACW outlet temperature	32 Deg C		
5	ACW pressure inlet/outlet	3.2/2.0 kg/cm2	1.2 kg/cm2	

This performance certificate is issued as per request of M/s. Saikirshna Associate, Nagpur against their request letter No. SKA/Letter/2014/072 dtd. 14/07/2014.


Chief Engineer
CSTPS, MSPGCL, Chandrapur

To,
M/s. Saikirshna Associate,
Near Purti Bazar,
Jatpura Gate,
Ramala Talao Rd., Chandrapur.

Thank you



NATURAL RUCHEM INDIA

B / 173, K.T. NAGAR, KATOL ROAD,
NAGPUR 440 013, MAHARASHTRA (INDIA)

Website: www.naturalruchemindia.com

OFFICE

PARADISE PLAZA, PLOT NO 11, ABOVE BANK
OF INDIA, KADBI CHOWK, KAMPTEE ROAD
NAGPUR - 440 001, MAHARASHTRA (INDIA)

Cell : +91 89830 39111, 93260 49226

Email : amit@naturalruchemindia.com