

Power Industry

CASE STUDY

www.tcradvanced.com

Key Facts

Sector	Power Industry
--------	----------------

Category	Investigation of Final Superheater U-bend
----------	---

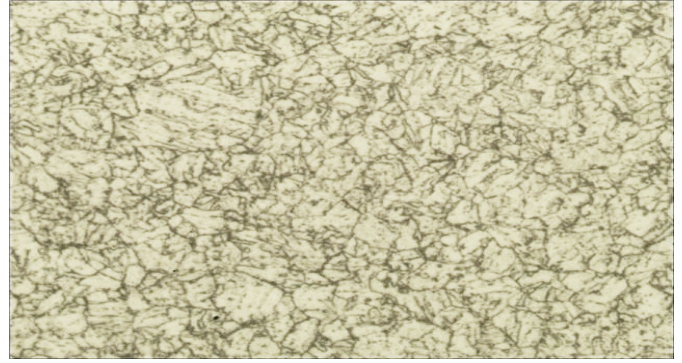
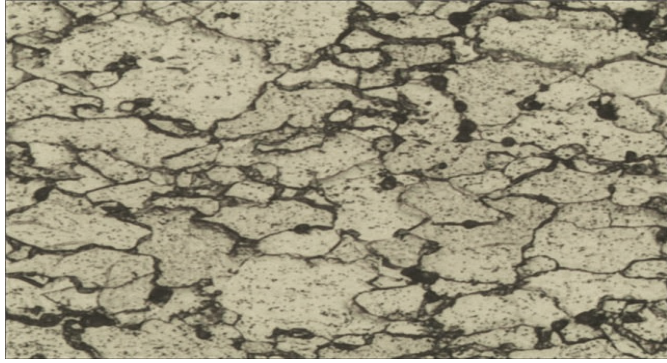
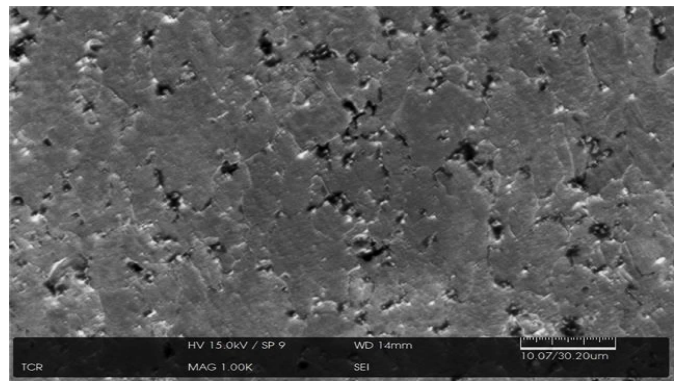
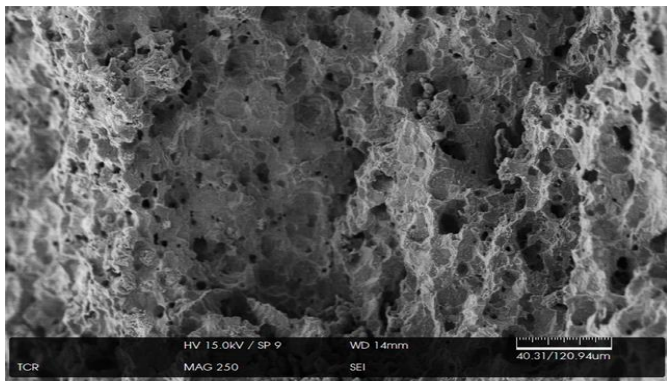
Problem

- Final superheater U bend utility boiler-4 failed during service. The tube was in service for 39,412 hours (approx. 4.5 years).
- MOC of the tube is as per SA213 Grade T91
- The utility boiler-4 was hot boxed as per steam demand. It was noticed that the boiler pressure dropped
- The boiler was pressurized for leak identification, water leakage was observed inside furnace from superheater area



Diagnosis

- The tube failure is because of creep damage due to its long-term exposure to elevated temperature beyond permissible temperature.
- The mode of failure indicates creep damage due to long term temperature excursion
- MOC of the tube meets with the required chemical composition as per standard specifications. However, tensile test results show lower YS and UTS values, indicating in-service degradation.
- Microstructural degradation at failure location is seen in terms of structure comprising of ferrite and carbides. SEM highlights presence of scattered creep voids.
- ID scale thickness is moderately high, which is about 250 microns; it should not be more than 150 microns



Solution/Recommendations

- It is recommended to carry out in-situ metallography and hardness measurement in other adjacent tubes to ascertain their long-term reliability.
- It is recommended to measure the internal oxide scale thickness in all the tubes.
- The tubes may have to be subjected to chemical descaling as per OEM guidelines.
- The high temperature exposure of the tube requires to be deliberated keeping in view the heat transfer conditions and burner combustion/position in consultation with process design experts.

Contact Us

If you are interested to learn more about TCR Advanced,
please send an email to: sohel@tcradvanced.com

Mr. Sohel Vaidya

Business Development Manager