

**1st International Conference on Innovative Materials
in Extreme Conditions**



**PROGRAM
and
BOOK OF ABSTRACTS**

22-23 March 2022

Belgrade, Serbia

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Program and Book of Abstracts of The 1st International Conference on Innovative Materials in Extreme Conditions (IMEC2022) publishes abstracts from the field of material science, physics, chemistry, earth, and computation science on the phenomena arising during the processing and/or exploitation of the innovative materials, which are presented at the international conference on innovative materials in extreme conditions.

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Damage to a tube of output reheater due to gas corrosion

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One of the most responsible elements of modern steam boilers are steam superheaters and reheaters. These heating surfaces are inside the boiler chamber and consist of tubes connected to the inlet and outlet header. Due to the complexity of service conditions, boiler tubes are exposed to processes of gradual degradation, and consequently a decrease in operating performance and reliability.

In the operation of thermal power plants, irreversible metal losses resulting from corrosion can cause tube failure and plant outage. Considering the loss of materials, gas corrosion in the dry gas atmosphere due to the high temperature is of great importance. Gas corrosion can be expressed in the boiler tubing system due to the presence of sulfur compounds in the flue gases. For this reason, it must be borne in mind that the outer surface of a tube of final reheater has different damage mechanisms during operation, and one of them is gas corrosion. Gas corrosion causes material loss and provides a site for crack initiation and propagation, which can compromise the integrity of the pressure vessel.

In this paper, a tube of a final reheater from a 210 MW power plant was tested. The tube was in service 200,000 h at a working temperature of 540 °C and a maximum working pressure of 4.6 MPa. The tube is made of low alloy Cr-Mo-V steel, class 12H1MF (GOST). After long-term service, a rough surface and loss of the material in the form of a crater were observed on the outer surface of the tube as a result of the effect of gas corrosion, together with the change of microstructure due to elevated service temperature. The measured depth of damage to the tube is 120 µm. The presence of gas corrosion on the tube was confirmed and measured by an optical microscope, Figure 1.

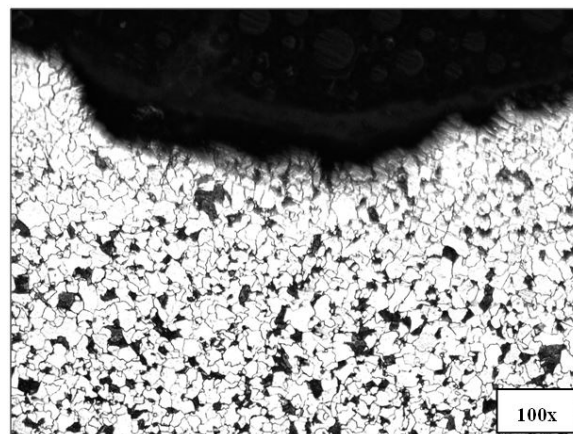


Figure 1. The microstructure of an outer surface of the reheater tube after 200,000 h of service