

Ligament Cracking of 2¼Cr-1Mo (SA-335 P22)

Purpose

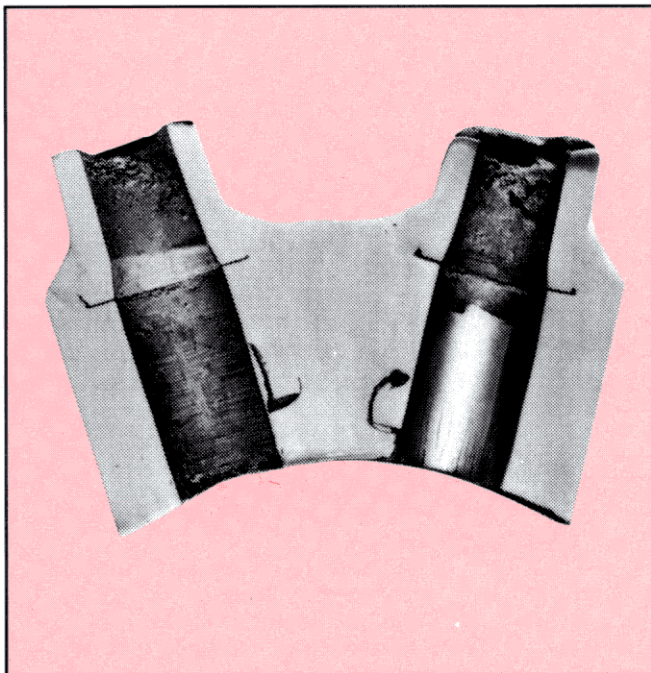
Advise customers to inspect superheater and reheater outlet headers made of 2¼Cr-1Mo(SA-335 P22) material.

Problem

Plant Service Bulletin PSB 1 (issued in 1983) called attention to Croloy 1¼ material superheater and reheater outlet header problems. Investigative work since that time has revealed that similar problems may exist with Croloy 2¼ material headers.

Recent inspections of 2¼Cr-1Mo(SA-335 P22) superheater outlet headers have revealed cracking in the ligaments between the tube bore holes. Although the cracking discovered is most severe in units operating at steam temperatures of 1050F or above, it may also occur on headers operating at lower temperatures (above 975F) for longer time periods (20 years). The cracking originates on the inner surfaces of the header and eventually propagates through the wall.

Pressure and thermal stresses combine to cause maximum stress levels at the tube bore ligament area. Particularly damaging are those stresses associated with boiler load changes, and/or start-up cycles, or other sources of temperature fluctuation.



Note cracking on the inner surfaces.

These stresses may initiate and propagate cracks due to either fatigue, or a combination of creep and fatigue.

Recommendations

All units having 2¼ Cr-1Mo superheater and reheater outlet headers operating for 15 years or longer should be inspected. Those units operating at steam temperatures of 1050F or above should be inspected first, with other units at lower operating temperatures having a lower priority for scheduling inspections.

Header inspections should be performed to evaluate the extent of possible cracking. These inspections should include the following examinations:

1. Dimensional Examinations

Measurements at selected locations should be performed and compared to obtain a percentage increase in the diameter from the original. An increase of more than 1% may indicate significant damage.

2. Dye Penetrant/Mag Particle

Check for any external cracking.

3. Replicas

Replicas should be taken from selected critical locations.

4. Header Tube Bore Hole Inspections

Internal inspection should be conducted to evaluate damage. Investigations to date have shown that extensive cracks may be present on the inner surface of the header even though external examinations may not reveal any damage or appreciable swelling. Selected tube stubs from the highest stressed areas should be cut to provide access to the header. The bore of the tube holes and inside surface of the header should be cleaned of the internal oxide scale and inspected using special fiber optics. A fluorescent dye-penetrant examination is recommended.

Support

Contact Babcock & Wilcox Field Service Engineering should you have any questions or require assistance concerning the inspections.

Engineering and Inspection personnel can be scheduled to provide any of the above inspection services.

For more information...

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