United Dynamics
Advanced Technologies Corporation
2681 Coral Ridge Rd
Brooks, KY 40109

THE INSPECTIONEER POST

Fueling the Minds of Electricity

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The Name Behind The Flame

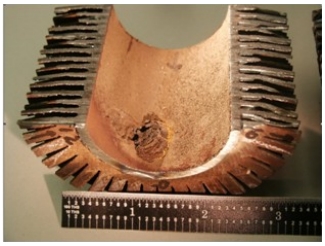
INSIDE THIS ISSUE:

"PHOSPHATE CORROSION" MECHANISM FOUND IN PHOSPHATE TREATED BOILERS

Corrosion by phosphates is an on-going problem in phosphate-treated boilers, especially as pressures have increased. Sodium phosphate is used to buffer boiler water pH. "Congruent control' with phosphates was introduced to prevent the formation of free caustic, but the phosphate compounds have interacted with deposits and corrosion products and precipitated within deposits.

Phosphate corrosion results in localized attack under deposits, producing gouges, grooves or depressions similar to those resulting from caustic. Hideout is associated with increased pH in the boiler water, so high-pH related corrosion may be reported even though the conditions within the deposits may be acidic. Thus, phosphate corrosion is frequently confused with caustic attack. Careful analysis of deposits is needed to confirm that acid phosphate attack has occurred.

Phosphate concentrates in the deposit as the temperature increases, and the pH drops perhaps to the range of 5 to 5.5 depending on the level of concentration. High quality steam forms or steam blanketing occurs due to the heavy deposit build-up. Within a deposit, wick boiling may occur, with water being drawn in at some point and steam vented elsewhere, and with phosphates depositing and concentrating. As temperatures increase in a boiler, the first place to hideout will be within deposits. The temperature increase may be localized where the heat flux is higher, and this is where deposits may already have collected. For this reason, hideout is a localized phenomenon.



Close-up of the ID deposit and pit. 1.2x -This is a HRSG Heat Recovery Steam generator tube example.

Boiler Tube Failure Reduction Program
Streamlining the Process
17th Annual All Users Conference

January 10 – 12, 2012
The Reach Resort*
1435 Simonton Street
Key , West, FL 33040
(866)397-6427

Three full days 8AM — 3:30PM
with speakers to include:

John M. Cavote
&
Jon S. Cavote
United Dynamics "AT" Corporation

Mike Neundorfer
&
Steve Ostanek
Neundorfer Particulate Knowledge

Richard (Dick) Storm
Storm Technologies Inc.

Stephen Storm
Stephen Storm Inc

LOOKING AHEAD

The recognition of proactive reliability practices as a catalyst for improving sustainable life of components is a big step of change for some organizations. The implementation of workable proactive strategies for maintenance and planning practices of utility power generating units provides crucial gains demanded in today's market. The general low tolerance for failure has significantly increased as relating to impact on environmental and human safety and pressure has increased to reduce the number of incidents that occur.

United Dynamics Advanced Technologies Corporation continues to rise to the forefront as the solid solution provider working together with clients to implement best practices of maintenance and planning that employ proven methodologies .These methods have resulted in greater reliability, availability, safety and reduced environmental impact for over thirty (30) years. UDC finds great success through many relationships with leading combustion engineers as well as precipitation and particulate knowledge alliance partners enabling a holistic approach to the bigger picture. This proven approach applied to maintain the fleet of generation units overall is the only answer especially considering the implementation of greater time periods between scheduled outages as a cost reduction strategy.

Don't miss the 17th Annual All Users Conference where you will participate in interactive session as well as network with colleagues and industry experts. This training event will provide valuable take away tools to boost your maintenance and planning programs.

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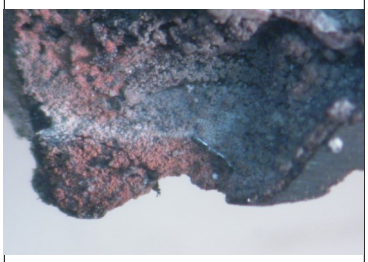

Reddish streaks of hematite may also be present in the deposit.

Written By:
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(President / COO)

Sherri L. Hart
Manager Marketing, Sales Education

United Dynamics Corporation

Our alliance partner Neundorfer Particulate Knowledge is hosting a series of podcasts.

CLEARING THE AIR

The first podcast in the series explores how scenario planning assists managers at electric utilities and industrial plants to make informed decisions about air pollution control compliance.

Each episode features insights from people in the industry, reflecting on successes and lessons learned.

WHAT IS SCENARIO PLANNING?

Scenario planning is a tool for addressing long-term uncertainty and making confident decisions in an uncertain market. It involves the creating of "alternate" stories about what might happen and the most appropriate responses in each case.

Episode 01—The Systems Approach
Mike Neundorfer, founder and CEO of Neundorfer, Inc., explores the difference between *problem-solving* and *opportunity exploration*, using the systems approach.

http://www.neundorfer.com/podcast.aspx

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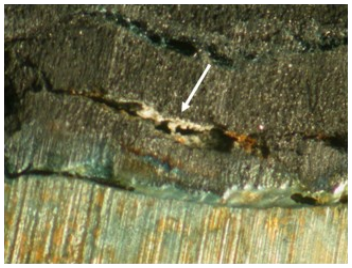
The attack occurs where a deposit or scale has already formed. Chemical conditions within the deposit can be significantly different from the bulk water due to restricted mass transport. Some impurities can concentrate within the deposit. Additionally, the deposit acts as an insulator, resulting in higher temperatures on the waterside surface. Sodium phosphate salts have retrograde solubility, that is, they precipitate from solution as the temperature increases. Higher temperatures within deposits present conditions for precipitation of phosphate salts. Consequently, the phosphates hideout in the deposits. The magnetite in the deposit provides a reactant that is believed to combine with phosphate, producing maricite, a sodium iron phosphate.



Grayish-white deposit with some streaks of red, typical of acid phosphate deposits.

Prevention

1. Maintain equilibrium phosphate control.
2. Chemically clean the waterside to remove deposit build-ups.
3. Reduce flow disruptions in tubes.
4. Reduce burner impingement.