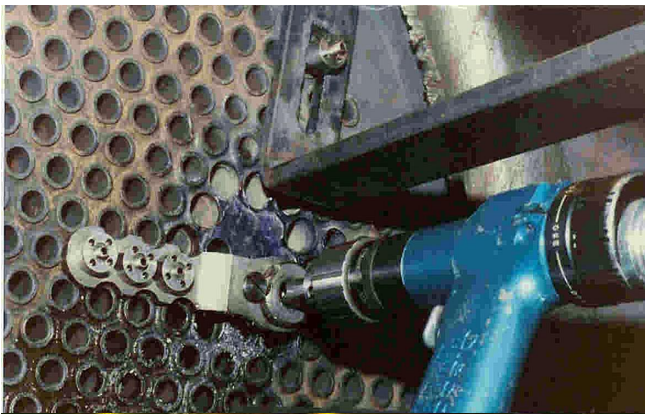


Feedwater Heater Operations and Maintenance



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Feedwater Heater Operations and Maintenance

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General Description of Closed Feedwater Heater Design

- **Basic Overview**
- **Feedwater Heater Internals and Functions**
- **Heat Transfer Relationships**
- **Standards and Guidelines**

Operational Guidelines

- **Basic Overview**
- **Systems Approach**
- **Maximize Operator Flexibility**
- **On-line Performance Monitoring**
- **Cyclic, Abnormal and Overload Operation**
- **Performance Testing – Heat Balances**
- **Performance Modeling**

Significant Patterns of Failure & Understanding Key Problems

- **Level Control**

- **Tube Vibration**
- **Flow Acceleration Corrosion**
- **Water Chemistry & Corrosion**
- **Steam Impingement**
- **Principal Areas of Susceptibility**

Corrective Maintenance Practices

- **Tube Plugging**
 - **Principal Problems**
 - **Outage Conditions**
 - **Plug Types – Pros and Cons**
- **Tube Slewing**
 - **Concepts and Types**
 - **Cautions and Limitations**
- **Tube Sheet repairs**
 - **Causes of Damage**
 - **Inspections and Tests to Assess Conditions**
 - **Establish Boundary and Stabilization Where Necessary**
 - **Repair Approach Based on Actual Conditions**
- **Maintenance Documents and Data Recording**
 - **Importance**
 - **Design Data Needed and Sample Forms**
 - **Recording Maintenance Data**

Lifecycle Management

- **Feedwater Heater Inspection and Testing**
 - **Visual Inspections**
 - **Leak Location determination**
 - **Individual Tube HydroTesting**
 - **Pneumatic Testing**
 - **Failed Tube Sampling**
- **Non Destructive Examination Techniques**
 - **Eddy Current Testing**
 - **Ultrasonic Inspection**

- **Other NDE**

Specification Guidelines for Replacement

- **Review of Specification for Replacement**
- **Key Limiting Criteria in Design**
- **General Features**
- **Materials of Construction**
- **QA/QC Inspections and Requirements**
- **Information Exchange - Vendor/Customer**

Case Studies