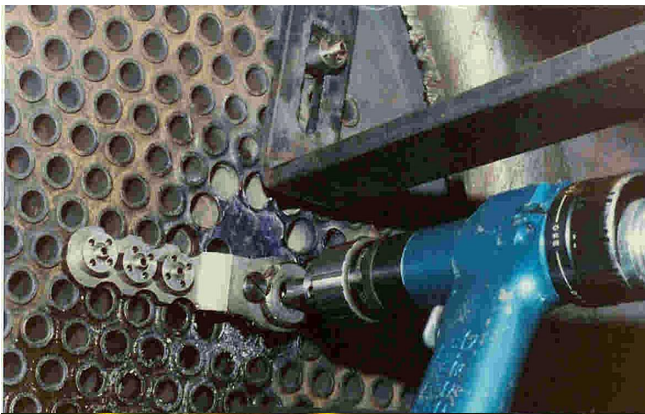


# Feedwater Heater Operations and Maintenance



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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 Sleaving**
  - **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**