DEVELOPMENTS IN THE CONTROL OF PACKAGED BOILERS

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Historical Perspective

• Lower energy and operating costs
  Multiple boilers running at reduced loads
  Pneumatic combustion control
  Electromechanical BMS
  High operator attendance
• Today, higher utility costs
  Minimum number of boilers on line
  Running at high, most efficient loads
  Minimize operator attendance required

Combustion Control Strategies

• Single Point Positioning
  One control output, one actuator
• Parallel Positioning
  Two control outputs, two actuators
• Metered, cross limited
  Two control outputs, two actuators
  Fuel and air flow meters for feedback

Oxygen Trim

• Excess O₂ is a measure of excess air
• Ideal excess air varies with firing rate
• Excess air varies with air density
• O₂ trim varies air/fuel ratio for ideal excess air
• Two methods are used: (a) air trim (b) fuel trim

Control Architectures

• Architectures tend to follow the strategies
• Single packaged systems
• Single loop controllers with separate burner management systems
• Programmable logic controllers
• Distributed control systems
• Supervisory systems

Packaged Systems

• Proprietary combined combustion control and burner management systems
• Combustion controls with separate burner management systems using standard control components
• Proprietary combustion controls with separate burner management systems
Proprietary Control Shortfalls

- Non-standard signal transmission ranges
- Spare parts availability
- Lack of ease of software modification
- Inability to integrate standard industrial level instrumentation
- Communication issues with supervisory systems with other in-plant systems

Single Loop Controllers

- All combustion control accomplished in the controllers without external computational devices
- All hardware is the same, applications are defined by software
- Built in operator interface
- Separate burner management system

Programmable Logic Controllers

- All combustion control accomplished in the PLC without external computational devices
- Requires additional operator interface
- Good spare parts availability
- Easy to expand
- Good communications support

Distributed Control Systems

- Similar to PLC architecture
- Integrated database
- Standard redundancy
- Good communications capability
- Relative high cost
- Typically used on boilers installed in a facility using DCS for process control

Supervisory Systems

- Used for trending, remote monitoring, generating logs, and reports
- PCs running application specific software
- Building management systems
- Internet
- Paging

Problem Common to All

- Relatively short product life
  quickly evolving hardware and software competitive market
- Pick hardware from a major controls company
- Use an integrator who knows boiler controls
- Insist on complete documentation