Welcome & Thanks For Attending Our Webinar

Dave Doerhoff - National Sales Manager
Power Generation
GLOBAL LEADER IN HEAT TRACE PRODUCTS SINCE 1962
- Part of the $8 Billion Marmon Group of Companies which is owned by Berkshire Hathaway, $144 Billion

- Over 50 years history as the world leader in the design & manufacture of pre-insulated tubing and small bore piping

- Pre-insulated tubing and pipe are our only business
Many First’s In Our History...

- First to manufacture tubing bundle
- First patents on pre-insulated & traced tubing bundle
- First to produce a field cut CEM bundle
- First Class 1, Div 1 tubing bundle
- First Class 1, Div 2 tubing bundle with power wires
Certifications & Approvals

- Approved by
  - Factory Mutual
  - ATEX

- Certifications
  - CE
  - ISO 9001/2008
  - Gost-R

Modules:

- **Pre-insulated tubing**
  - Steam transfer lines
  - Condensate return lines

- **Pre-insulated pipe**
  - Steam transfer lines
  - Hot process lines

- **Steam Traced Tubing**
  - Process analyzers
  - DP Cells

- **Jacketed Tubing**
  - Instrument lines
  - Hydraulic lines

- **Electric Traced Tubing**
  - Process analyzers
  - CEM’s
Design Conditions

- **Freeze Protection** of
  - Instrument lines
  - Sampling lines

- **Temperature Maintenance** of
  - Small bore transport lines
  - Sampling lines

- **Personal Protection**
  - Meet OSHA requirement for 140°F max jacket surface temperature
Advantages of Pre-Insulated

- Lower Installed Cost
  - By reducing waste
  - By eliminating intermediate fittings
  - Labor savings

- Pre-Engineered System
  - Has more efficient heat transfer
  - Has consistent thermal characteristics

- Improved Scheduling
  - By reducing craft interference

- Maintenance Free
  - No seams to break down
Our Focus...Power Generation

Coal

Energy From Waste

Combined Cycle
Our Focus...Power Generation
Coal
CEMS
Energy From Waste
CEMS
Cement Plants

CEMS
Combined Cycle Plants

Boiler Sample Lines, Process Bundles & CEMS

- Boiler feed water sampling & analysis from the HRSG
- Instrument & chemical injection lines
- CEMS analysis from stack

Unitherm
Tubing Bundle Experts Since 1962
Construction & Materials

Tubing

Standard

Sizes
- Tubing 1/8” through 3”
- Pipe 3” through 24”

Materials
- Carbon Steel
- 304 & 304L wld & smls
- 316 & 316L wld & smls
- 316L BPE
- Copper
- Fluoropolymer
- Polypropylene
- Teflon

Specialty

Sizes
- 4mm to 12mm Metric

Materials
- 316H
- Incoloy
- Hastelloy
- Monel
- Low carbon steel
Multi-tube bundles are offered in two configurations

- Parallel or Flat-Pack – 2 to 3 traced tubes are run parallel before taping & extrusion. In order to get proper heat transfer this design limits the number of tubes to 2 or 3 depending on size and temperature. Manufacturers claim the design offers easier installation. This is only true for single plane bends. Multi-plane bends require twisting of the bundle to prevent kinking of inside tube.

- Cabled – 2 to 6 tubes are cabled around the heater or the heater is cabled around the tubes depending on design. Cabling allows for better heat transfer and eliminates the need for special bending on multi-plane installations.
Heater

- **MI or mineral insulated** – good to 1,100° exposure requires controller

- **SR or self regulating** – good to 250°F direct contact or 1,100° exposure with buffering
  - **Low Temp**
  - **Hi Temp**

- **CPD or constraint power density** – good to 400°F requires a controller and is used for temperature maintenance in CEMS application
Fibrous Glass Insulation

- Industry requirement - less than 100 ppm of water soluble chlorides
- Dekoron Unitherm requirement – less than 30 ppm of water soluble chlorides
Aerogel Insulation

- Aerogel's are an amorphous (non-crystalline) silica with 97% of particles larger than 45mm
  - Only the pores are nano-scale (~0.01 mm)
  - Aerogel particles are much larger
- Amorphous silica has been studied by OSHA, EPA, and the OECD, concluding:
  - “Demonstrated lack of toxicity.”
  - “Is not expected to pose a carcinogenic risk.”
  - “Silica’s are inert when ingested, and unlikely to be absorbed through the skin.”
  - “No concerns for human health.”
Insulation

Wrapping of aluminum Mylar over Cabled tubes and heater

Wrapping of Aerogel over Mylar
Construction & Materials

Outer Jacket

- PVC – low cost, easy to install.
- DSJM – Flexible vinyl compound for applications requiring increased flexibility & is halogen free
- TPU – Tends to grab during installation but offers the tightest bend radius & is halogen free.
- TPE – Thermoplastic elastomer for higher temp applications
- FRPE – Flame retardant polyethylene for maximum durability, chemical resistance, and sub terrain applications & is halogen free
Construction & Materials

End Prep
Stack Tuff

Portable CEMS product

- Heavy Duty construction
- Aircraft cable for easy hanging
- Plug-N-Play connections
Gravity Fed Sample lines operating above 400°F

- The sample temperature within a gravity fed tubing bundle will cool rapidly making expansion only a concern for the first 50’. An additional 1’ should be added for the first 50’ of run, thereafter no additional bundle is required for expansion.

Pressurized bundle operating above 400°F

- The tubing bundle requires an additional 1’ of length for every 100’ of run. This may be accomplished by installing an expansion loop at the midpoint of each run or serpentine the bundle in the cable tray or strut to take up the additional footage. In either case the method of attachment must allow for movement while still anchoring the bundle to the cable tray or strut.
## Bend Radius

<table>
<thead>
<tr>
<th>Temperature</th>
<th>½” Single Tube</th>
<th>½” Dual Tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>250°F</td>
<td>10”</td>
<td>12”</td>
</tr>
<tr>
<td>700°F</td>
<td>14”</td>
<td>16”</td>
</tr>
<tr>
<td>1100°F</td>
<td>18”</td>
<td>20”</td>
</tr>
</tbody>
</table>
Continuous Emission Monitoring

- Stack Gas Monitoring
  - Nitrogen Oxides (NOx)
  - Mercury
  - Sulfur Oxides (SOx)
  - Carbon Dioxide
  - Carbon Monoxide
  - Hydrogen Chloride (HCl)
  - Methane
Questions?

Thank You!