Things to Think About

• Setting up systems for later monitoring during design
• Select measurement equipment
• Calibration
Settling in duct

© 1988 Steven Guffey
Discovering Problems

- Visual inspection important but not adequate since most problems not visible externally
- Needed: quick, convenient indirect indicators of change in system resistance to flow
- Indicators:
  - Q: airflow through hoods
  - SP: static pressure
Measurement Points

Leave space for them!
## Minimum distances from disturbances

<table>
<thead>
<tr>
<th>Condition</th>
<th>Location of Measurement point</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Upstream</td>
</tr>
<tr>
<td>45 tapered hood</td>
<td>2</td>
</tr>
<tr>
<td>Flanged hood</td>
<td>3</td>
</tr>
<tr>
<td>90 radiused elbow</td>
<td>4</td>
</tr>
<tr>
<td>Junction fitting</td>
<td>6</td>
</tr>
<tr>
<td>Damper</td>
<td>6–20</td>
</tr>
</tbody>
</table>
Note Locations for Pitot Traverses

Be sure accessible.

7D from elbows; 15 from dampers.

Can be closer to damper if elbow between.

Best available locations
Measurement Location Effects Study

Two offset elbows upstream

Insertion Depth
Diameter
[2nd traverse shown at 1 to 2]

Junction upstream

Insertion Depth
Diameter
[2nd traverse shown at 1 to 2]
Pitot Tube Or Wall pressure taps

Drill wall taps before ducts installed.
Mark the duct: “Connect this end to junction fitting”
After ducts installed, epoxy wall taps and run plastic tubing.
Pressure Measurement Devices

Magnehelic gauges
Digital manometers
Fluid manometers
Calibration
Magnehelic Gauges
Digital Manometer

- Ergonomics
  - Weight, Size, Form
  - Buttons
- RS232 output to computer
- Simple transfer to computer
- Can set averaging time easily
Liquid manometers
(for calibration, only)
Calibration

sensor being calibrated

hand pump or syringe

valve

inclined manometer
Marked Pitot Tube
Greater Accuracy - More Diameters

Insertion depths for two 10-pt traverses

Insertion depths for three 6-pt traverses
Rectangular Duct Insertion Depths
Velocity Measurement

• Locations for measurements
• Thermoanemometers
Velocity measurements

Measure air velocity here

Lx = greatest distance from hood face to source

© 1988 Steven Guffey
Rectangular Traverse of Hood
Smoke

© 1988 Steven Guffey
Boroscope
The End
Questions?
Insertion Depths for VP Measurements

Unequal increments, equal arc

<table>
<thead>
<tr>
<th>No.</th>
<th>Traverse position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pts.</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>0.043</td>
</tr>
<tr>
<td>6</td>
<td>0.032</td>
</tr>
<tr>
<td>8</td>
<td>0.021</td>
</tr>
<tr>
<td>10</td>
<td>0.019</td>
</tr>
</tbody>
</table>