Legs Grid: This option turns on an additional grid for the legs.

4.4.4 Cylinder Location

Cylinder Location is designed for locating source emissions on a cylinder with either flat, elliptical, or hemispherical endcaps or no endcaps at all. It is similar to 2D Planar Location with the x, y coordinates being the unwrapped cylinder distances, but one or both of the axes wraps around the body of the cylinder.

When setting up your sensors on your cylinder, there are several guidelines to keep in mind. As with 2D Planar, the software cannot successfully locate any source when all the hits are from sensors in a single straight line. The advice on good vs. bad sensor layouts for 2D Planar applies here too. Avoid rectangular sensor layouts where the distance between rows differs greatly from the distance between columns as shown in the Bad 2D Planar Layout diagram. As stated before, the optimal arrangement would be a triangular grid made up of equilateral triangles. For Cylinder location, also be sure your sensor triangles on the heads are not significantly different in size than the triangles on the body especially if your cylinder has flat heads. If you do so, you may get spurious event locations clustering along the head-body border.

Sensors that are 180 degrees apart can also cause mathematically invalid events too. Geometrically, it is similar to problem with a straight line of sensors. If an event consists of a sensor on one side of the cylinder & 2 others exactly 180 degrees around the body, there is no way to distinguish source locations in the positive direction from the negative . Generally it is recommended that you use 3 sensors around the circumference of the cylinder in a given row. If you must use 2 sensors per ring around the cylinder, definitely stagger the alternate rows or else you will not see any locatable events.

Use the Sensor Placement dialog shown below to set up the cylinder as well as place your sensors. Cylinder location is only designed to be used with the Horizontal or Vertical Vessel structure types. For Cylinder location, the Structure list in Sensor Placement *must be* set to either Horizontal or Vertical Vessel (cylinder) as shown above. You will receive a warning if you attempt acquisition or replay with a Cylinder location group that attempts to use any other kind of structure.

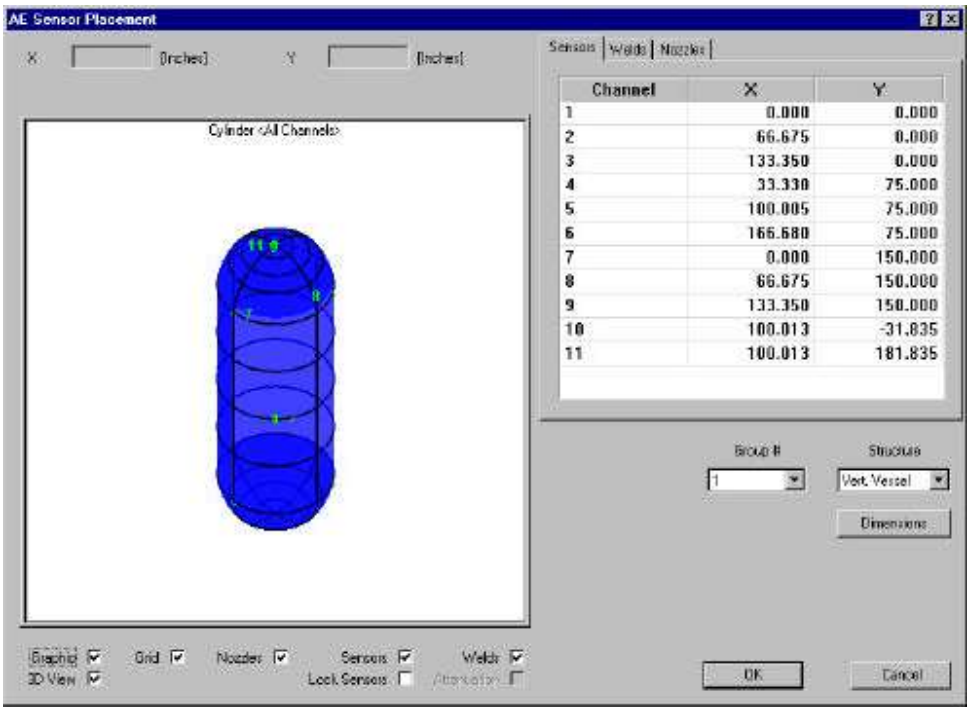

Figure 111. Cylinder Sensor Placement (3D View)

By default, Sensor Placement shows a 3D cylinder view. If you prefer a 2D view, simply uncheck the 3D View option at the bottom of the dialog & you will be presented with an unwrapped 2D view of the cylinder shown below.

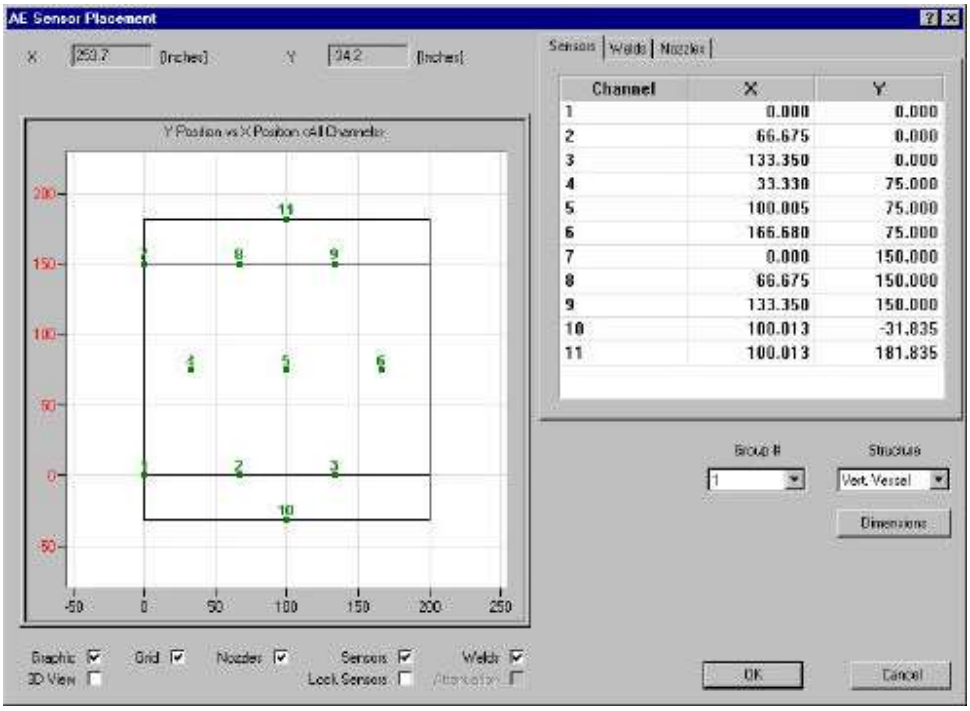

Figure 112. Cylinder Sensor Placement

The Sensor Placement dialog in 2D view & 2D location plots draws a rectangle to represent the body of the cylinder based on the user entered dimensions. You use the Dimensions dialog shown to the right to enter an Outside Diameter and the Height (vertical) or Length (horizontal). For a Horizontal Vessel, the rectangle extends along the x axis from 0 to Length and along the y axis from 0 to the circumference calculated from the user entered Outside Diameter. For a Vertical Vessel, the rectangle extends along the x axis from 0 to the circumference and along the y axis from 0 to Height.

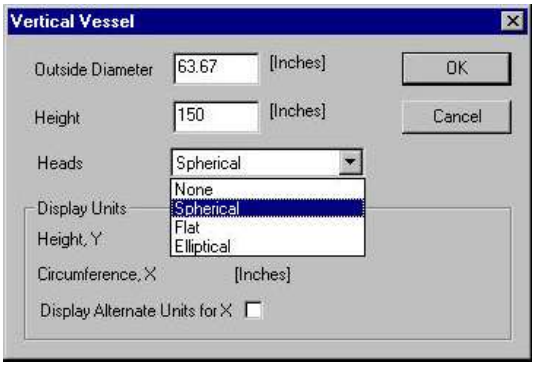

Figure 113. Vertical Vessel

Both dimensions are also vital to accurate source calculations. The Diameter is used to allow for the wrapping around the cylinder circumference. The Height or Length in combination with the Diameter is used in eliminating 2D locations off of the cylinder body caps itself.

There is also a dropdown list to select the type of Head on the cylinder. Available choices are Spherical, Flat, Elliptical & None. If a head type other than None is selected, the body rectangle drawn in Sensor Placement will have 2 additional rectangles on the top & bottom (Vertical Vessel) or left & right ends (Horizontal Vessel). The head rectangles extended the body rectangle by a distance determined by the head type. For Spherical or Flat, it is the length of the cap radius which is also the body radius and half the user entered diameter. In the horizontal case, the rectangle will extend along the x axis from –radius to Length+radius, while in the vertical case the y axis will

run from –radius to Height+radius. For Elliptical heads, a 2:1 ratio is assumed between the body radius & the perpendicular head radius, so the distance is ½ the body radius or ¼ the user entered diameter.

You can quickly generate rectangular & triangular sensor layouts with the AutoPlace Sensors dialog available by right clicking on the sensor view. If you are using the 2D view of the cylinder, you can also manually place sensors on the cylinder by right clicking. After using either option, you can edit the coordinates of the sensors if structural features (valves, nozzles, welds) require shifting sensors around. Just enter the x,y coordinates in the user's preferred distance units.

When you enter sensor coordinates & you are not including the caps, express your x, y coordinates with a lower limit of 0 and an upper limit of the circumference or the length/height. For example, when working with a vertical cylinder of height 150 and diameter 63.66 (circumference = 200), express x as a value from 0 to +200 and y as value from 0 to +150. Basically, just make sure your sensor is visible in the body rectangle drawn in the Sensor Placement dialog.

If you are using Spherical or Flat heads, these limits are widened for the y axis by the radius to –31.83 to +181.83. These extensions allow for the entry of sensors on the heads. For this vertical cylinder, a pole sensor on the bottom cap would have a y coordinate of -31.83. The x coordinate for a cap on a vertical cylinder corresponds to a rotation angle, but is entered as a fraction of the body circumference. In this case the limits are 0 to +200 and sensors placed 120 (=360/3) degrees apart are separated by 66.67 (=200/3). For a cap sensor placed directly at the pole of the hemisphere, the rotation angle is unimportant in the source location calculations, but a value of half the circumference will place the sensor halfway up the cap rectangle border. In the case of the vertical cylinder shown above, the pole sensor on the bottom cap is at -31.83, +100 (any x really) and +181.83, +100 for the top cap.

When you are finished setting up your sensors & ready to actually do data acquisition, you will need a location graph to display the results of the source location calculations. You can either use a standard 2D graph as described in the section on 2D Planar location or you can use a Cylinder Location graph. Like the Spherical Location graph, a Cylinder Location graph is limited to 4095 data points with newer points replacing older ones once the limit is reached. A Cylinder Location graph is shown at right and it's corresponding Graph Setup dialog settings are below. It has an Options section that is very similar to the one for Spherical Location. See the section on Spherical Location for a description of the options common to both.

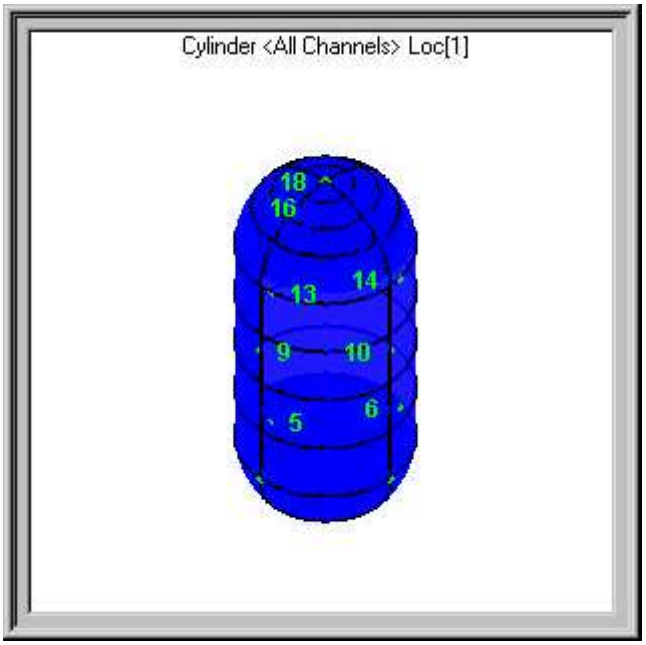

Figure 114. Cylinder Graph

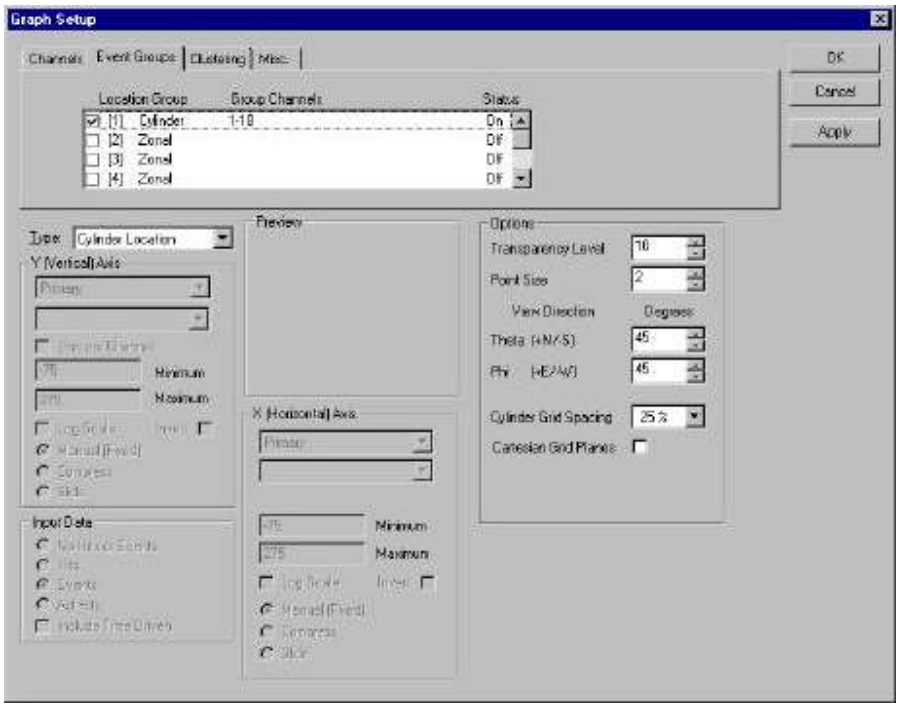

Figure 115. Cylinder Graph Setup

The Spherical Grid Spacing option is replaced by the Cylinder Grid Spacing option, although it behaves in a similar fashion. You may set the Cylinder Grid Spacing to None, 10%, 20%, 25%, 50% or 100% to control the appearance of a grid overlaid onto the surface of the cylinder. The percentages are applied to the heads & the body separately as the dimensions for the 2 regions can vary greatly. If the user selects a grid spacing of 25%, the body will be divided up into 4 equal regions and the head will also be divided up into 4 regions. If the user selects 100%, only the boundary between the heads & the body will be marked. Cylinder Location graphs always use Events as the Input Data, but as for the 2D graphs, make sure you set the Events Groups to the appropriate location group or your graph will not show any data & will not draw the cylinder associated with the group.

4.4.5 Conical Location

Conical location is set up almost identically to Cylinder location mode. In Location Setup, the user selects Conical for the Location Type on the General tab. The other settings in the table are described in the section on the Location Setup dialog. In Sensor Placement, set the Structure list to Vert. Cone or Horiz. Cone as shown on the next page.