distance from the distal end, and inflating the single inflatable bladder, thereby centering the centering ring and the temperature measurement device within the SMR tube. Then introducing catalyst into the SMR tube, thereby enclosing the temperature measurement device in catalyst.

In one aspect, there is provided a method of installing a temperature measuring device inside a reactor tube while filling the reactor tube with catalyst, comprising a) inserting a positioning system, comprising a single inflatable bladder connected at a central location to a centering ring, into a reactor tube, the reactor tube comprising a distal end and a proximal end, b) attaching the temperature measurement device to a distal end mesh disk, c) inserting the centering ring around the temperature measurement device, d) locating the positioning system at a first predetermined distance from the distal end, e) inflating the single inflatable bladder, thereby centering the centering ring and the temperature measurement device within the reactor tube, and f) introducing catalyst into the reactor tube, thereby enclosing the temperature measurement device in catalyst.

Brief Description of the Figures

For a further understanding of the nature and objects for the present invention, reference should be made to the following detailed description, taken in conjunction with the accompanying drawings, in which like elements are given the same or analogous reference numbers and wherein:

Figure 1 is a schematic representation of a cross-sectional view of a reactor tube and the centering ring, in accordance with one embodiment of the present invention.

Figure 2 is a schematic representation of a cross-sectional view of a reactor tube and inflated single bladder positioning system, in accordance with one embodiment of the present invention.

Figure 3a is a schematic representation of a cross-sectional view of a reactor tube with a single temperature measurement device, in accordance with one embodiment of the present invention.

Figure 3b is a schematic representation of a cross-sectional view of a reactor tube with a strand of multiple temperature measurement devices, in accordance with one embodiment of the present invention.

Figure 4 is a schematic representation of an isometric view of the uninflated single bladder positioning system located in a reactor tube, in accordance with one embodiment of the present invention.

Figure 5 is a schematic representation of an isometric view of the inflated single bladder positioning system located in a reactor tube, in accordance with one embodiment of the present invention.

Figure 6 is a schematic representation of an isometric view of the inflated single bladder positioning system located in a reactor tube indicating the lowering of the sock containing catalyst into the tube, in accordance with one embodiment of the present invention.

Figure 7 is a schematic representation of an isometric view of the inflated single bladder positioning system located in a reactor tube indicating the introduction of

What is claimed is:

1. A method of installing a temperature measuring device inside a reactor tube while filling the reactor tube with catalyst, comprising:

a) inserting a positioning system, comprising a single inflatable bladder connected at a central location to a centering ring, into a reactor tube, the reactor tube comprising a distal end and a proximal end,

b) attaching the temperature measurement device to a distal end mesh disk,

c) inserting the centering ring around the temperature measurement device,

d) locating the positioning system at a first predetermined distance from the distal end,

e) inflating the single inflatable bladder, thereby centering the centering ring and the temperature measurement device within the reactor tube, and

f) introducing catalyst into the reactor tube, thereby enclosing the temperature measurement device in catalyst.

2. The method of claim 1, wherein the catalyst is introduced into the reactor tube with a catalyst sock.

3. The method of claim 1, further comprising:

g) deflating the single inflatable bladder and relocating the positioning system at a second predetermined distance toward the proximal end, and

h) repeating steps b) – f) until the reactor tube is filled as required.

4. The method of claim 1, wherein the temperature measurement device is a thermocouple.

5. The method of claim 1, wherein the temperature measurement device is a strand of multiple thermocouple sensors.

6. The method of claim 1, wherein the single inflatable bladder is inflated using pressurized nitrogen.

7. The method of claim 1, wherein the single inflatable bladder is inflated using pressurized air.

8. The method of claim 1, wherein the reactor tube is vibrated during or after step e).

9. The method of claim 1, wherein the first predetermined distance is less than 5 feet.

10. The method of claim 1, wherein the first predetermined distance is 1 foot.

11. The method of claim 3, wherein the second predetermined distance is less than 5 feet.

12. The method of claim 3, wherein the second predetermined distance is 1 foot.