Mounting radiometric sources and detectors for success

Mounting and orientation of radiological sources and detectors play a critical role in how well that equipment will perform. That's why VEGA Field Service personnel follow a specific set of best practices when performing the mounting process. This article is a look at some of the guidelines VEGA experts follow in order to ensure radiometric equipment is set up for success.

Before beginning the mounting process, VEGA Field Service representatives consult an application size sheet, otherwise known as measurement modeling document. This size sheet details the mount location and orientation of the radiometric system components for best measurement performance. Having sources out of alignment, or at incorrect elevations, can drastically impact a radiological measurement accuracy. Experts will mount the source first, then use a survey meter to check for the location of the strongest radiation field on the detector side of the vessel. If it is aimed at the detector properly, then the Field Service expert will either demark that location and mount the detector there, or reposition the source to place the strongest portion of the radiation field at the desired detector location.

To ensure optimal mounting, it is important for VEGA Field Service representatives to learn about a customer's operating conditions. Here a potential scenario in which this discovery process is critical: Perhaps an engineer that ordered the radiometric equipment doesn't know where the operators normally run the process. If a Field Service expert finds out that the customer has a 23' detector but is only ever going to operate in the bottom 5', then the customer would get more resolution out of operating with the head down; this is due to the nonlinear characteristic of radiation field strength with distance from the source, and light loss per length in all scintillator materials.

To understand the relationship between radiation and light loss, think of a flashlight beam. Perhaps you are looking for something small in a dark room, and also wish not to trip on larger items. Directly in front of the beam, the light is the brightest; further to the side, the light is more dim. In that dim area, it is harder to see the details of an object due to a lack of sufficient light intensity. In this case, you would point the brightest beam of the flashlight to your line of sight in order to locate the small object; meanwhile, the lower intensity light off to the side would allow you to still watch for tripping hazards in the other areas.

The radiation field at the bottom of the span cannot be increased by flipping the source upside down and mounting it at the bottom; this is because when the process material rises to a level a bit higher than the source it will block all of the radiation, so no measurement is possible. However, the most sensitive part of the detector at the can be installed at the bottom; that is to say, head-down. This would put the portion of the detector with the least amount of light loss in the area of most interest to the measurement, which would in turn give the operators more resolution in that area. The tail of the detector, the portion with the most light loss, will still be able to see the radiation changes all the way to the top, delivering the optimal measurement throughout the full range.