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The Systems Approach

Mike Neundorfer, Founder and CEO of Neundorfer, Inc., speaks with Mae Kowalke, Neundorfer's Manager of Stories, about the difference between problem-solving and opportunity exploration, using the systems approach. Get more episodes and join the conversation on iTunes or at www.neundorfer.com/podcast.

Mae: What is the systems approach, and how does it differ from traditional problem-solving?

Mike: The starting point of the systems approach is to look at the boundary we draw around the aspects of the problem we're going to address. The systems approach generally means we have to draw broader boundaries. In a problem-solution approach, we try to isolate the problem and learn about our assumptions. In the systems approach, we try to un-isolate the problem and look at a broader system.

Mae: What's an example of how this approach has been helpful for the utilities and industrial plants that we've been working with on consulting projects?

Mike: At Neundorfer, in the last several years, we have worked to better understand the combustion part of the process and other maintenance-related aspects upstream of the pollution abatement equipment. We've done this through allying with expert companies and internally through training. What we find is that in a high percentage of cases where customers call with precipitator problems, when we look into those problem--which generally involves going onsite, asking a lot of questions, and listening--the easiest, most cost-effective solutions are often upstream; addressing processes like combustion.

Sometimes this involves things like better grind of the coal, if it's a coal-fired process. Another issue is slagging, which creates displacement of heat transfer. Air heater seal problems cause higher temperatures and higher flue gas volumes. These are some of the things that cause us to take a look at the whole system whenever we're involved with improvement opportunity identification.

Mae: You alluded to sources of excess air. What are some other upstream process factors that often come up as sources when we're looking at problems with pollution control equipment?

Mike: Unburned carbon causes high opacity because is difficult to collect in an electrostatic precipitator because it has a low resistivity, takes a charge very easily, and then loses that charge, so it re-entrains. If we can reduce unburned carbon, it generally improves precipitator performance and reduces opacity. That's further complicated now because in a lot of cases high unburned carbon is actually absorbing and reducing the amount of mercury emitted. There are tradeoffs even from a performance standpoint.

Another issue with unburned carbon is NOx generation. Many plants experience a tradeoff between high unburned carbon and low NOx generation.

These systems are fairly complicated, but if we can address the combustion system to reduce NOx and reduce unburned carbon at the same time, often this opens up new possibilities downstream. It can increase the effective size of downstream equipment by making it work better.

Mae: The approach we're talking about makes a lot of sense. It does seem, though, that it's challenging for utilities and industrial plants to adopt this strategy. Why do you think that is?

Mike: First, we're taught in engineering school and by our organizations to identify problems and solve them using the scientific method. We have a bias toward problem-solution. When we take a systems approach and look at broader boundaries, there are many more uncertainties. We end up looking at cause and effect relationships that require linked models. The output of an upstream model becomes the input of a downstream model, becomes the input of another downstream model. You put these all together and it can create opportunities--but they're not the clean opportunities that management wants to hear. They want to hear, *Here's the problem, here are three solutions, here's the cost of those solutions, and here's the one I recommend.* The systems approach often uncovers much more compelling possibilities but they're just not quite so digital.

Mae: Given those challenges, what are some things managers can do right now to move in the direction of the systems approach?

Mike: I'd like to go back to challenges for a minute. Another challenge is that, the larger the organization gets, the more specialized the groups handling different responsibilities are. In plants now, there are system owners; that's a good thing, because it gives one person ultimate responsibility for the operation and maintenance and efficiency of a piece of equipment. The challenge is to get people who own different parts of the system in the same room, with a broader goal, and have enough trust in the meeting so people are open about sharing information on their particular part of the system.

Cutting across those organizational specialties or silos with information and creating plans is a real challenge.

Mae: Is there anything else you would add as a takeaway?

Mike: The most important thing for managers is to ask powerful questions; to really be curious about possibilities and give the people who are in the room, or are looking at the system, or even looking at specific parts of the system, the opportunity to think. Help them think by asking powerful questions, and then listen to what they have to say and ask more questions. This process is a little bit messy, but it pays off in spades.