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Rube Goldberg Winner, Part 2: Electric Control Panels

By **Bill Holmes, P.E.** June 12, 2012 01:57:30 pm

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When I first started to work in the Lincoln Center Ice Arena, I was relieved to find out that there were no pneumatic controls, only electric. (Although by then I had actually started to understand pneumatic controls a little – they were in many of the buildings I was managing and I had to use them to help me produce results, to increase both efficiency and comfort.)

My relief was not long-lived. There were several control panels in an electrical room that had been added when the rink was enclosed. The maintenance man, Carl, took me back and showed me where the panels were. I don't think he had ever opened them. If he had, it was only once. When I turned the latch on the hinged door on the first one, it literally exploded. The panel was so completely packed with wire that it probably took two or three guys just to push on the door hard enough to close it and turn the latch.

Of course, neither Carl nor anyone else at the rink had any idea what was in those panels or how they worked. If they ever needed anything, they just called their friendly Honeywell serviceman who came in, added a few more controls and sent them a bill for a couple thousand dollars. I am sure that is how those panels ended up so overcrowded. I can't imagine they had been designed or installed like that originally.

So, being the naïve young engineer that I was back then, I asked Carl to call Honeywell to see if they could send a technician out to help us understand what we were looking at. That was the last time I ever did something that foolish. I guess I thought they would just do it to help out one of their customers at no charge, make an appointment to meet me there to explain a little bit about the system. Well, I swear. I'm not just making this up to add a little something to my story, Honeywell sent a technician but he didn't set up an appointment ahead of time. He apparently came in looked at the panels, spent a couple of hours and sent Lincoln a bill for \$800. I didn't see him; I'm not sure anyone did. His notes said he couldn't understand it either. No kidding. Scout's Honor.

There were blueprints in the pocket in the door so I took them home and studied them. What I found was that the panels contained all of the controls for the four packaged rooftop HVAC units. There were some electric thermostats and humidity sensors around the rink connected to the panels, and there must have been 50 or 60 electric relays to control the heating and cooling functions of the rooftop units in response to the rink conditions. There were time clocks that weren't being used. The controls really weren't appropriate for managing energy efficiency in the rink. But they did represent the normal approach: Take what we have, use our standard strategy for the types of equipment involved and put it together in a control panel. It will most likely work but it is really not tailored specifically for this application in this facility. Besides, we can just come back whenever they call with a problem and, by the way, the more they call and the more times we come back, the more money we will make. What a deal for us! And the customer? Well, they don't really have a choice, do they?

Maybe the execs for some of the temperature controls companies had worked for aerospace companies in the early part of their careers; some of the ones I had worked with in the Air Force. I went to a lot of contractors' plants all over the country during the final acceptance testing of many of the parts for the engine for the F-15. I remember one of the middle managers for Pratt & Whitney in Florida telling me that their goal was to make the engine just good enough to barely pass the acceptance testing so the Air Force would buy it. Then, where they made the real money was from all of the future work continuously fixing and improving the engine. After all, once the Air Force bought it, P&W had them by

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Author Bio



Bill Holmes, P.E.
Bill Holmes, P.E. founded Holmes Energy LLC www.holmesenergy.com and developed the AutoPilot Monitoring-Based Commissioning (MBCx) System in 1979. He has a B.S. and M.S. in mechanical engineering and has done additional coursework and research for his PhD. He is a former Purdue professor and taught for several years in the Continuing Education in Energy Management Program at the University of Wisconsin.

Bill has produced savings from 20% to, in a few projects, more than 50% from low-cost, no-cost changes in management, operation, maintenance and control alone in all types of facilities including Industrial Plants owned by Fortune 500 Companies.

He is the recipient of a DOE Award for Energy Innovation and was the Indiana Energy

the you-know-whats; there was nothing they could do. Why did looking at this temperature control system remind me of that conversation?

Out came my trusty cutters and every single wire, relay and controller in those panels ended up in a big plastic trash can. Again, nothing happened. The rooftop units had been shipped with all of the safety and standard operating controls. Eventually, as at Quinco Mental Health Hospital, I ended up putting a few controls back into the panels so I could run the building properly, once I discovered what properly was.

That project didn't turn out too badly, either. By adding the Energy Monitoring System at the beginning of the project and the using the resulting data to assist in simply tuning up the facility through changes in operation, maintenance and control, with no capital projects required, the Ice Arena reduced annual utility costs by 67%. The project received the Governor's Award from the State of Indiana and won a DOE Award for Energy Innovation.

More about the ice arena project.

This article is a sequel to "Rube Goldberg Winner – Early Temperature Control Systems."

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Manager of the Year in 1990. He has published numerous papers and been making presentations on his projects and methods for more than 25 years. Bill is a sculptor, a writer and a regular contributor to Sustainable Plant.

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