

## Misfits between Man and Technology

Are you being set up for a Human-Error Verdict?

Too often an inquiry or inquest concludes “Human Error” and somebody is named. Our instinctive reaction is to search for a person to blame when the finger should rightly be pointing to the unrealistic complex actions expected from that person.

All too often the answer lies in the neglect of the **Human Factor** in the design of equipment, documentation and procedures.

Here are some reminders from my earlier columns in Process Heating Magazine that point to **misfits and complexity between man and technology**.

- The 23 mile glide and safe crash landing of a Boeing 767 in Gimli Manitoba, out of fuel because of a miscalculation between litres and fuel weight.
- The \$125M Mars Climate Orbiter, lost owing to confusion between metric and non-metric units.
- At the Milford Haven refinery in the UK 20 metric tons of liquid hydrocarbon burst through a pipe, formed a vapour cloud and exploded. 26 people suffered minor injuries and a van just missed entering an area that became enveloped in the fireball. Had it not been Sunday, multiple deaths would have occurred in the plant and injuries would have been expected in an area two miles away where shop windows were blown in. Contradictory signals from plant instrumentation followed by a massive overdose of alarms had defeated the operators’ ability to intervene.
- Burnout of \$9000 worth of silicon carbide furnace elements due to misidentified thermocouple cable colours.

### **And here is a message just received from a reader:**

“A question has been bothering me for sometime. I am an instructor for steam and power plant personnel and have been in the industry for over forty years. As such, I've seen major changes in the scope and power of process automation. At the risk of showing my conservative tendencies I have some serious concerns about the efficacy, safety, and sanity of some of the systems I see installed. I've talked with thousands of students who show up at my seminars and they are the operators charged with getting the most out of their various plants in a safe and efficient manner. What keeps coming up is that they simply don't understand the tools they've been given to work with. You mentioned convoluted manuals and exasperating key punching procedures. You also talked about these systems being so complex that the user winds up utilizing only the simpler functions of a control system and not taking advantage of the more high tech features. The unstated here is that this complexity is leading to some very unsafe scenarios when these folks are faced with problems and are pressured to make adjustments or repairs to equipment they simply don't comprehend.”

Rich features and ingenious designs will continue - rightly so. However, unless the **Human Factor** is addressed we will increasingly be in danger due to mental fatigue, confusion and inability of operators to intervene promptly. It might be you in the dock – the charge: Human Error.

Plant engineers, managers and operators have many other jobs related to process and product technology. There is little time to study the construction, manipulation, features and maintenance of advanced equipment and instrumentation systems. Whether in the workplace or in the home, every manufacturer expects you to devote one or more hours to the study of his manual and to practice on his product.

The day doesn't have enough hours, so you only learn and use the bare essentials. You abandon the high tech features and perhaps some safety features.

It is difficult – verging on the impossible - for the creator of ingenious high tech equipment to put himself in the position of the user. While the creator is making some fast and efficient clicks and actions, “look it's easy” the end user is sweating his way up the learning curve.

Take the violin salesman. Slick demonstration. You buy. You return it - ”this thing don't work”. “Oh! didn't I tell you? You have to buy this manual and practice for at least two hours every day”

Back to your process. Your operations and maintenance staff can tell you all about not being consulted then being called upon to patch and pick up the pieces upon commissioning and operating the process. At the design and integration stage they have a rightful place on the team so please use their experience. They are essential links ever after in the continuity of knowledge of your process.

This topic has been covered extremely well in a book:

**The Human Factor: Revolutionizing the Way People Live with Technology.**  
**by Kim Vicente.**

I hope to look at how this relates this to your workplace in my next Heating Highlights column.