problems with incentive systems

To the Editor:
I was reading the article by Royal J. Dossett (April 1995). The author, in the early paragraphs, had some very negative things to say about time standard-based piece rate incentive systems. Everything negative stated by the author described a poorly maintained incentive system. Should a system that has been so beneficial to many workers and businesses be totally abandoned by this profession and industry just because of incompetent administration? I say no!

A professionally maintained time standard-based incentive system will have none of the listed negatives and will be of great benefit to both workers and the company. This does not mean that all questioning of time standards will end, but will be minimized. Any IE department must have the enthusiastic support of management in maintaining an incentive system, because it is not easy or glamorous.

There are several new incentive plans like gainsharing that are for large groups. These plans do work in many cases. But, I know of many situations where they have not worked or will not work. There is a large segment of our workforce that only has faith in an incentive system that determines how much they have earned each day. They have no faith in the more sophisticated system that pays bonuses plant-wide. They want their pay based on their performance or their cell's performance. They like the direct relationship between performance and pay in an incentive program. These workers are generally less educated and less sophisticated than the average.

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answers regarding process capability index C pk

To the Editor:
In a letter to the editor in the April issue, Chuck Troll inquired about a statement made in an article in the December 1994 issue. The article was entitled, "The Fundamental Concepts of Statistical Quality Control," by John Maleyeff. Mr. Troll questions the goodness of the process capability index C pk.

The reference in Maleyeff's statement is from our introductory book on statistical process control (SPC), which contains a brief summary of several years of research on process capability indices. Unfortunately, while the convenience of a simple metric such as C pk— or others proposed (e.g., C p, C pm, C pmk, C pkp) for quantifying the capability of a process with respect to specifications—would make life a great deal simpler, all such approaches have several statistical problems.

In summary, the typical use of C pk and other indices fails to recognize the fact that they are random variables. Additionally, estimates of the true process C pk are statistically biased; are artificial measures without any physical meanings; and do not accommodate comparison of the capabilities of processes that do not have like distributions, perhaps one normal and one non-normal. For all of these reasons, C pk cannot be directly related to any single number of non-conforming parts per million (NCP) or ppm, which is arguably our real interest.

Despite the problems with C pk and its relatives, many companies continue to practice what we call "statistical terrorism," by demanding that a supplier produce a certain C pk value (such as 1.33) based on a small process sample (such as 40). Some of these demands make no sense statistically and ultimately can result in higher total costs for the supplier, the purchaser, and the final customer.

For example, in the case questioned by Troll, suppose that the underlying process distribution is normal and in a state of statistical control with a true process C pk capability of 1.33. If 40 items were randomly sampled from this process, the probability that the C pk estimate will be 1.33 or greater is only .418 (based on thorough simulation analysis with 80,000 replications). Another way to think about this result is to consider the fact that, in the long run, 58.2 percent of all suppliers with true process C pk capabilities of 1.33 will appear to have lower quality levels than they really do (using C pk estimates based on 40 data).

Incidentally, the different 362 result taken from our work unfortunately may be interpreted slightly out of context, as it is an example based on only 500 replications. We suspect similar reasoning is behind Troll's different result of .528, which somehow is biased in the wrong direction.

For many reasons, we strongly discourage manufacturers and suppliers from relying on C pk, and instead advocate the use of more valid statistical methods to estimate NCP.

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reader applauds changes at IIE

To the Editor:
I applaud the "Big Changes at IIE" The new magazine, IIE Solutions, May 1995, is a new face, new name, and a new style. A great beginning of a big change. Finally, the change masters overcame our own resistance to change. Let us not stop, let us continue the momentum.

The articles were great and the new format is eye-catching—the first time I ever read this magazine from cover to cover. Evolution is finally catching up. The next generation IIE is shaping up. I am excited and inspired.

Reading the articles about the new role of IE at UPS and AutoEuropa was extremely fascinating for me personally, because we started a similar process of redefining and changing the IE role at Litellfuse in late 1991. Changing the name of industrial engineering to productivity systems engineer was our first step in the change process to reflect the new role of IE at Litellfuse.

"The Human Side of Change" and "Teams Under Stress" were also great articles and timely, since we are in the midst of all that at our company. They both gave me valuable input that I can use.

In my crystal ball, I see an exciting future for IIE if we keep up this momentum of change.

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