ELECTRONICALLY REPRINTED FROM
IndustryWeek
Advancing the Business of Manufacturing
Penton • August 7, 2015

One Good Change Leads to Another

By Paul Ericksen, Executive Level Consultant

A fundamental tenet of change management is to under-commit and over-deliver.

Thinkstock

My previous article discussed an example of change management. An important lesson I've learned over time is that change in one area often leads to process improvement opportunities in another, and that was the case in that example. The opportunity was based on what I had observed with engineering deviations.

You may remember from the example that with the "inspect quality in" strategy we had been operating under, Design Engineering was often called upon to "deviate" lots for use in production where inspection results showed out-of-spec conditions, with more often than not the deviation being granted. These deviations usually related to the amount of tolerance that had been assigned to a particular feature, with the request being for an "opening-up" of that tolerance range.

During that previous project I had developed a notion that something was wrong when deviations to increase tolerance were routinely granted. Specifications are set to maximize performance—fit, function, safety and durability—and I wondered if opening up the tolerances was compromising any one of those important deliverables. I further wondered if it would make process improvement permanently expand such tolerances through a print change since it seemed like this would be a lower cost solution than having to continually pursue the same deviations on an ongoing basis. Our factory's transition to a process capability-based quality strategy greatly reduced the number of deviations being requested, making the issue less visible, but the outstanding question I had regarding specifications and deviations lingered.A couple of years later I was working in Purchasing with the issue of specifications and deviations still in the back of my mind. I spent some time exploring the issue with my Design Engineering colleagues. In my experience design engineers tend to be perfectionists and if it was possible would design parts with *no* tolerances, i.e., a kind of "design nirvana." In the discussions with them, however, it became clear that the part's desired performance outputs usually didn't require the tight tolerances Design Engineering was spec'ing.

In other words, most features didn't have an absolute "right" and "wrong" feature specification with larger tolerances always leading to compromises in performance. Rather, there is a specification range—a sweet spot—where features produced within that range will deliver comparable performance. And further, the design engineers were aware of this! When I asked them why they didn't use the entire sweet spot in setting tolerances, the answer was something along the lines of, "Well, if I open up the tolerances someone will just come back later and want them deviated and I'll be the bad-guy if I refuse."

Based on these conversations it became pretty clear that I was going to need to come up with a pretty convincing business case to get Design to change the way they set feature tolerances. And as was discussed in the previous article, business cases for change need to be based *both* on numbers and common sense.

In my previous position as an inspection supervisor I had come to appreciate that for specific types of features, different types of processing were required to hold difference ranges of tolerances. In other words there was more than one way to produce a part feature depending on how tight the tolerances needed to be. In investigating the difference between those different types of processing, I began to see how I might be able to convince my design friends to tolerance prints more expeditiously. In a word, it would be based on helping them hit their design "target costs."

In general, the tighter the tolerance that needed to be held, the more expensive the manufacturing process needed to produce features within that tolerance. And there can be significant differences in cost relative to a slight difference in allowed tolerance. Design engineers can usually design parts that deliver the desired performance. The thing that makes their tasks difficult is designing products that meet the target cost required for them to be cost-competitive.

In my experience, most engineers first design as if cost is no real object. Then, once a functional product has been designed, they work to cost-reduce it to hit their targeted cost. This cost reduction process was seldom rationale organized. And at times the compromises needed to take cost out risked real reduction in part performance. The “aha” moment I had was that these last-minute cost-down exercises could be reduced or even avoided if more pragmatic tolerances were set in the design process. But I would need a way to figure out how to convince the designer engineers of this.

I sat down with a friend who was a design engineer and laid out the idea. As an example I used a type of feature found on many of our purchased wire-form parts and asked if he was familiar with all of the ways that feature could be produced. He wasn’t. When I showed him the process—tolerance cost options for the feature in question—he was amazed. He understood that by opening up his desired tolerance incrementally he could take real cost out of his designs without compromising functionality.

We used a lot of wire-form parts on our product and the result could add up to real dollars. I asked if he and his colleagues understood the cost process/tolerance cost trade-offs for various types of processing and features and if they would be open to abandoning that previously mentioned “design nirvana” strategy and he replied “yes.” I knew I had found the financial basis for justifying a change in setting tolerances. At the same time, the idea of assigning costs to different manufacturing options made common sense, too, so that part of the justification was also delivered.

Working with suppliers, the purchasing department created design manuals for the primary types of purchased parts types. This entailed specifying the most prevalent types of features that were commonly associated with these product types; the different processes that could be used to manufacture these features; the tolerance ranges that these different processes could statistically hold; and their relative cost. We ended up with several such manuals, gave our design group an overview of them and waited to see what would happen.

It was no surprise when we found that once they were aware of the cost benefit, engineers started spec’ing tolerances in a more practical manner. The result was that there was no noticeable degrading of product performance and there were measurable reductions in part cost.

You might ask why weren’t design engineers up to speed on process cost in the first place? This is a fair question. I think at our factory we just assumed they were. When you think about it, though, supplier personnel spend careers working to understand process cost and it’s probably a bit unrealistic to think that design engineers would have a good command of it across the various purchased commodities.

The initial driver for having more effective specifications tolerances was deviations, but as I previously said, the need for deviations had been significantly reduced by our transition to a process capability-based quality system. So citing a reduction in deviations wouldn’t have worked to justify the work needed to implement the way in which tolerances were specified. Rather, the justification was a reduction in part cost as well as a smoother functioning design process. And it reduced piece-prices without having to leverage suppliers.

I often get into contentious discussions with purchasing managers on how to measure productivity of purchasing personnel. There are a lot of executives that “talk a good game” about basing purchasing performance on Total Cost but when it comes down to it they base employee appraisals on material variance, i.e., piece-price. And as discussed in one of my earlier columns, they are primarily talking about negotiated reductions in piece-price—which are incremental improvements, i.e., not really the kind that will give you a competitive advantage. For instance, do you really think your buyers negotiate prices significantly better than the buyers that work at your competitors? And if so, at a magnitude where it makes a difference?

When you work on a project like the one described in this article, the risks of not having a successful outcome are higher, but so too are the rewards if you are successful. In other words, these projects—when successful—yield the step-function type improvements that really do give companies a competitive edge. If you don’t have people in your purchasing organization working on such projects, you should regard that as a “red flag” and it should lead you to ask the question “why?”

One further point. When I proposed and implemented the change that led to the virtual elimination of our Receiving Inspection function, I didn’t even bring up the issue of deviations. Why? Because at that point it would have been difficult to provide sufficient numerical or common-sense justification to get support to include that issue in it. And it could have diffused the focus on what we really needed to do regarding quality strategy.

But during that project I always kept the issue of deviations and tolerances in the back of my mind, educating myself about them and collecting supportive data. And when it came time to distribute the product-type design manuals to Design Engineering, this additional impact represented the “icing on the cake” of that earlier effort. This brings me to what I consider a fundamental tenet of change management, namely: *under-commit and over-deliver*.

Too often change management is done the other way around and gets both the initiative—and you, personally—a bad reputation. Following this strategy increases organizational confidence in you and makes it more likely you’ll receive support the next time you make a proposal.

A second tenet of change management is: *One good change provides the basis for others*.

Be sure to keep these thoughts in front of you as you consider and work on change management.