

## The Last Revision, or, Victor Borge Engineering?

[The Last Revision](#) is a poem about the work product I produce that's been around as long as I can remember.

[Victor Borge](#), for those readers who are not quite as old as I, was a very funny guy who had more fun being a comedian than the classically trained musician he started out as. I remember a skit he did as [Franz Liszt](#) (I think) being interviewed by [Edward R. Murrow](#) on the latter's TV show, [Person to Person](#), where Murrow asked Liszt to comment on his [putative](#) conceit.

The dialogue went something like this:

Murrow: "What do you say to those contemporaries of yours who say you're conceited?"

Borge/Liszt: "Conceit is a childish fault which I may have had when I was younger, but I'm an adult now, and I've outgrown it."

So, since engineers are as imperfect as is the rest of humanity, what's with this expectation that their creations must be without defect? Oh, that's not the expectation? Oh, it's only been the ideal since NASA's "[zero defects](#)" program at the beginning of the space program and we understand it's a goal that's not always attainable.

Do we, now? Why then do some contractors seem to believe that submittals are unnecessary if they provide what's specified with no deviations? Why then do some engineers refuse to listen to others' concerns about what they've designed? What does it take for us to get it through our heads that the application of technology is a process which requires that we all complement each other rather than quarrel with each other?

While I may not know exactly what it might take, I do have a thought or two.

First, while each of us may have had an unpleasant experience or two with persons who are overconfident and underqualified passing judgment on us in one form or another, we do the process no good at all if we internalize such experiences as our normal expectation. Second, details are not pictures to be applied to drawing packages to fill space, and specifications do not exist to rescue designers when they've not sufficiently thought through their designs.

Details serve at least two purposes. First, they force the designer to think through his/her design, and second, they explain the designer's intent to the contractor.

Or at least, they should.

That is, while there's a place for a standard detail such as that depicting the hanging of pipe or duct which does not need to be referred to each time the work shown therein is to be applied, including a detail for how a boiler or domestic hot water heater is to be piped and what accessories

need to be included, should be referred to in the plan where the piece of equipment is shown, if for no other reason than to flag the contractor that there's more to the installation than that which can be shown schematically on a small-scale plan.

I can't tell you how many projects I've looked at (and I looked at **a lot** back in my days as an estimator) where detail after detail seemed to have been slapped on to the drawings with no reference thereto anywhere on the plan drawings, and to serve no discernible purpose other than to "get the money in the job." I used to in fact hear such locutions from fellow designers while working for commercial consulting engineering houses back in my mid-career employment days. More later.

A similar thought process appears to be in operation when every possible boilerplate section and paragraph is included in a set of specifications, making the very word to be a contradiction in terms. One should be able to expect that specifications are specific to the work at hand, rather being a plan for the full employment of attorneys.

Back to the "get the money in the job" approach to the application of details. When I worked for others, both in the commercial and industrial realms, there were always books full of standard details, to be applied via pressure sensitive appliques in the old days, and as blocks or templates in the current age of CADD. Not infrequently, early in my career, I had no idea when to apply which details, and as I progressed it seemed to me that some not only never understood when to apply what, but also never figured out when a custom detail might be required, nor how to generate such.

The defining difference between the kind of work turned out by the commercial consulting engineers and the heavy industrial design-build firms I worked for back in the day was the level of project-specific detail presented in the project's documents.

When I worked as a [job-shopper](#) for DuPont, Bechtel, Lummus, and the like I would routinely prepare ladder-type control wiring diagrams for systems and equipment for which I'd also been doing power wiring drawings and specifications, and on really complex projects being built overseas there would be bills of material on the drawings for items which had to be purchased in the U.S. for installation at the job site.

I have seen specifications which have gone from the extremes of calling for hermetic refrigeration chillers (without even specifying equipment capacity!!!) only by the manufacturer's name, to be installed in accordance with their directions, to telling the contractor how to tighten a screw.

With all the information which must be imparted and understood to translate from pictures and text to concrete and steel, we would do well to learn from each other rather than suffer from the [NIH syndrome](#) which infects all of us to one degree or another.

So how do we do this thing?

Well, we might start by recognizing that none of us got to where we are without learning at least a bit about our chosen field of endeavor. This, of course, becomes less and less of an issue as we gain more and more experience, since such consists of reality slapping our theory in the face, forcing us to learn that others may also know a bit whereof they speak.

We also might consider asking a question or two when things are not *crystal* clear, oh, and by the way, for some of you contractors and plans examiners out there, taking a closer look at the design package before asking a question or raising an objection might be in order. You might just discover the answer staring you in the face.

I understand this last may appear to be more effort than it's worth, especially considering all my earlier verbiage on the quality of some design packages, but after having been in this business a while, one should be able to tell the difference between [dreck](#) and a well thought out package, with the latter almost taking you through the scope of the project by hand.

As I expect you may be able to tell by now, I deeply resent being dealt with as if I produce the former. It doesn't help us get off to a good start, nor does it make it easier for either of us as the project progresses. And again, for those who review design packages for government agencies, such are not prepared for your benefit or convenience in review, nor to conform to what you may be accustomed to seeing, but to get things built economically and safely.

To get back to where we started from, however, no matter how good or how clear the package, things change or get missed, and such are the reasons for revisions, change orders, and contingency amounts in cost estimates. They are not excuses for games of "gotcha" or ways to recover just payment after accepting work for a lowball price.

All of the preceding, of course, is not to say I believe such difficulties are the norm, because I don't. It's just that they consume so much time and energy that it only takes a small percentage of such projects to make the quality of all of one's work suffer.

## Efficiency in Energy Conversion, or, Ya Gotta Think a Bit Once in a While.

With our recent preoccupation with energy efficiency to the point that there are now Codes governing the subject, one would hope the application of same would be guided by a bit of thought.

Would that it were always so.

I've had occasion to come across at least one plans examiner who believes that electrical heating equipment should have efficiency ratings attached to them, apparently not knowing the reason that 1 kilowatt equals 3413 BTU per hour is because the conversion efficiency is 100%.

I obviously live right.

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