EDITORIAL

We Did That 20 Years Ago . . .

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OK . . . so I remember back when I was a much younger engineer working in the field of design, analysis, and testing – all of which was directed toward structural dynamics applications. I remember as a younger engineer that we would come up with ideas that we thought were new to the field. Or in some cases, other young colleagues would come up with new concepts. Basically we were all trying our best to push the state of the art as new technology or ideas would lend themselves to helping us solve problems we faced every day.

And I remember when we would get excited about our achievements and really feel that we were onto something that might revolutionize the current methodology and approaches employed. But I also remember when we would present our latest and greatest to the more senior engineers or upper technical management and we would hear the infamous . . . "*we did that 20 years ago*" and it would deflate our enthusiasm faster than a sharp pin to a balloon! It always seemed that the old-timers knew it all and had all the answers and everything we ever tried was already done by them many years prior. But I remember asking myself "If they have all the answers, then why haven't they solved all the problems?" It was fairly simple – they didn't know how to solve all the problems.

Of course, now some 30 or so years later, I now am on the other side of the fence. (How fast that time has flown by.) Now I realize that there is much knowledge that has been gained and more of the pieces of the "big jigsaw puzzle" are assembled into place and I can see what is now a much bigger picture.

But I guess that happens to all of the senior people in this field. We start out young and green and then as we mature, there is a development of a better understanding of the big picture, and as we assemble more and more of the pieces of the puzzle, we start to have a much better overall picture and understanding of the problems we face.

As an educator, it is very clear that some of the problems that students face need to be learned by the students themselves. (Somehow I remember my father specifically showing me how to use a saw without me actually using the saw, and that didn't really help me learn how to use the saw. I needed to pick up the saw and actually use the saw.) If I were to specifically identify how to solve certain problems, then the students would only learn how to solve the problem the way I have envisioned it. I have found that it is better to let the students learn how to solve the problem themselves – but with some guidance and mentoring and pointing in a direction to help them move forward to a solution.

But of course students don't always want to have to think – they want a clear set of notes that move them from A to B in a clearly defined path with specific outcomes. But engineering isn't always this way – especially in a development or research environment. As far as education is concerned, I try not to provide the students with a very specific well-defined answer the way I would solve the problem. I try to get them to think about how they would solve the problem.

And this is why we really shouldn't say "*we did that 20 years ago.*" That's because there are some very bright young minds out there that are going to revolutionize the way we solve problems in the next 20 to 30 years. They will bring to the table new ideas and concepts that we never thought of. They may have completely new ideas *or* a very innovative twist on what we did 20 years ago but never really saw the solution when we worked on it at that early time. Remember the DFT was already available *but* Cooley and Tukey put the FAST into it. And even a few years ago in modal parameter estimation, some folks realized how to rewrite the basic equations we have used for years but found a little hook or a mathematical gimmick to make it easier to interpret for the end user. As a Monday-morning quarterback, we can now see that there was a new twist in how to view the theory or equations – but we really didn't see it back in the days when we developed it.

And it was just a few years ago that there was a younger modal researcher that came up with an idea as to how to adapt a laser to measure in a continuous fashion to get very fast mode shapes from a structure. When he explained it to me, my first comment was "Hey that looks just like what we did 30 years ago with digital acquisition systems and a multiplexer." His comment was that "You know . . . I explained this to another old-timer and he said exactly the same thing." Of course, really what I should have said was: "Hey that is a really neat idea. It parallels what we have done in the past with multiplexer systems. But you have taken it and applied it to newer technology and have blended together some previous things we have done to make it into a much more versatile system overall. Boy, I wished I would have thought of that."

I have found that maybe the way we solved the problem 20 years ago is not really the best way to solve the problem today – with new tools, new technology, faster computers and better hardware.

So when I say "*we did that 20 years ago*" it is likely that we did something similar, but at a different point in time, with a different ability, with the technology that was in place at that point in time, that had a set of restrictions, that would only enable us to see as far as the current technological barriers would let us see at that time.

But of course where do you think we would be today if Christopher Columbus was told his ideas were not plausible and the concept of the world being round was foolish. And think about Cooley and Tukey when they first suggested the "FAST" in Fast Fourier Transform to their senior technical management and being told that they already did the discrete Fourier transform years ago . . . and didn't proceed to push their concept forward!

Look at some of the testing techniques that were used 20 or more years ago that were abandoned at the time (like analog swept sine using the FFT analyzer) due to new technological break-throughs with advanced excitation techniques (like burst random, pseudo random, etc.). These were complementary to the FFT approaches used with two and four and maybe even eight channel systems. That was the best way to go at the time until we started to have affordable large-channel-count systems, and then people brushed off the cobwebs on swept sine, converted it into a digital implementation and were able to capitalize on the best features of swept sine and the FFT approach. But basically I could say that "*we did that 20 years ago . . .* "

Maybe today what the old-timers should say to those younger engineers is very simply this . . . "Hey that's a nice idea you have. I'm not sure, but I remember that we tried something along those lines many years ago; but because of limitations in the technology (computers, instrumentation, hardware, etc.), we just couldn't get it to work.

"But now with a new perspective, faster computers, better instrumentation and better hardware, maybe you might be able to make a break-through and get this problem, which has been a persistent boil, finally solved and make significant strides in advancing state of the art for this application. But also let me tell you some of the problems we faced in case you run across some similar difficulties . . . " *But* as a younger engineer, if you still hear the old-timers say . . . "*we did that 20 years ago*" then interpret it to be the statement above – it really should be what we actually say.

And with regard to something we use every day in our structural dynamics work, that is $F = ma$; if Newton were still around, I guess we would hear him say . . . "*we did that centuries ago.*"

Now I need to get back to being one of the old-timers. And remember all you young engineers – you will be on the other side of the fence sooner than you think. SV

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