Not Lost in the Crowd

Brian Weber

Many readers responded to the article by John S. Rigden in the September issue of *The Industrial Physicist*, "Find the Hidden Physicist" (pp. 52-53). We have printed some of those responses here.

I think we would all agree with one of your insightful comments: that a physicist simply thinks differently from those with whom we are often confused. In particular, the ability to synthesize concepts from a number of seemingly disparate pieces of information appears to be an almost unique capability among those trained in our field. This approach is based on a more fundamental understanding of the possibilities of solutions rather than the constraints pounded into our more pragmatic brethren in engineering and chemistry. The fact that "me and bubba" did something 30 years ago does not automatically preclude a reinvestigation of the problem with more useful techniques and concepts.

Sadly, to speak to the hopeful theme that we should be recognized as what we are rather than our aliases, Phillips Petroleum Company has taken a step backward by labeling physicists as chemists. This move was taken by our chemistry "development" committee (without prior consultation with the oppressed!), which decided that there weren't enough physicists to merit a separate job category. As I have often commented to the committee, mere numbers do not make a valid argument. There are perhaps five physicists here as compared to several hundred

chemists and chemical engineers. In industry, we refer to this as a level playing field. We feel confident that if we had just one more colleague, we'd have them surrounded.

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I am a Ph.D. physicist. At IBM, my official title was staff engineer/scientist, but my business cards read staff scientist. A promotion later, and I was an advisory scientist. General opinion had me as being slightly eccentric for even caring to make the distinction.

I am now at Cree Research, where my title is process scientist. Here, there is a distinction between an engineer and a scientist: I was quite pleased to discover that "scientist" implies a higher level of understanding. One colleague is a Ph.D. electrical engineer, but he is titled microwave device scientist since he knows more than a "typical engineer," as his Ph.D. implies. I expect that attitude comes from the company's founders being materials scientists. As such, they understand that there is a difference between a scientist and an engineer and are careful to make the distinction. I hope this article will help other physicists stand up for themselves and start to educate industry about what industrial physicists are and what we can do.

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I am one of those physicists (B.S. in physics, 1995) who works in industry under the title of engineer. In my case it is test engineer. I design test equipment, write test software, and develop test methods for electronics equipment at a wireless data communications company. There is no recognition here that I have a degree in physics. I was hired in spite of that fact because I had prior electronics experience. Our human resources group understands the E.E., M.E., and C.S. degrees but does not understand the value of a physics degree.

Even though I work in a field other than that traditionally defined as physics, I use my physics training every day. While I don't use Newton's laws or Maxwell's equations in my work, I do use the problem-solving skills and knowledge of basic physical principles that I acquired in my physics training. I wish more industries would recognize the value of physicists. I am also in agreement with your comments on using the title of physicist. Why can't I use the title physicist since I earned the degree? My colleagues with bachelors degrees use their titles of electrical engineer and software engineer. I use the title engineer, but I am constantly having to explain when asked what kind of engineer I am. Am I an

electrical engineer who has a physics degree? No. I am a physicist who works in the electrical engineering field. But it seems by convention that I am not entitled to use the title physicist since I do not have a Ph.D.

I have no solution other than for all of us with physics degrees to promote the discipline throughout industry. Also, B.S. degree programs in applied physics would be a big help for those who plan on entering industry after graduation. The applied physics degree could carry the designation of the major applied subject of study (e.g., optics, acoustics, materials, instrumentation, computation, electronics, mechanics, etc.), which would greatly help physicists in getting a foot in the door for job interviews.

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I couldn't echo your sentiments enough, being a hidden physicist myself. That is one of the major problems facing physics graduates entering the industrial work force in the United States and here in Canada. What ever happened to applied physics? Did it become engineering? If so, it is unfortunate, because I often hear the distinctions between theoretical physics and experimental physics being made. Being a "theoretical" physicist in industry, I can confirm firsthand that you have hit the nail on the head. I can't begin to tell you about the prejudice faced by physicists from "engineers and engineer managers." The education of these individuals is deficient in that somehow the laws of physics have been replaced with the laws of engineering! Very few are aware that they are applying physics when they do engineering, compounding the problem further.

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After receiving a baccalaureate in physics, I was called to active naval duty although I was an inactive reservist, because the degree was a "vital skill" acquired during World War II. Later I worked as a research assistant at Columbia University's research center at Dobbs Ferry, New York. Later still, I was hired as a field engineer by Link Aviation, Inc., to work on jet trainers, jet simulators, and a Matador simulator before becoming a systems designer at the company's Binghamton plant.

At the end of 1962 I applied for a position at NASA in flight simulation to train astronauts. At NASA Manned Spacecraft Center on April 1, 1963 I became an instant aerospace technologist (AST). Applicants with many dif-

ferent types of degrees were called ASTs. To really appreciate what this meant, one must realize that job descriptions are written to reflect what individuals are expected to do, not necessarily what they know.

That is the advantage of a degree in physics: a person with a physics degree is more likely than a typical engineer to treat a discipline simply as an analog of another. A physicist tends to be a jack-of-all-trades as well as their master. With that in mind, when a job description is changed, as happens too often, the physicist readily adapts to the change as one who has "been there and done that."

My experience has been in visual simulation to provide external scenes for the Mercury, Gemini, and Apollo crews. The most challenging task was to provide realistically authentic simulations of solar activity during the Skylab program. The purpose here was to ensure that those astronauts who were not solar physicists would become acquainted with that discipline through dynamic real-time training acquired on the ground. This was followed by realistic landing scenes of Edwards Air Force Base for training orbiter crews during approaches and landings. A realistic color display of the base was provided to the crews' forward, side, and aft simulator windows. The image source was a color model of the base viewed by a color camera through a 120-deg articulated lens. Actually, three color cameras and a high-resolution luminance camera provided landing views—with vertical and horizontal translation provided as a function of the orbiter's position in three dimensions, and the line of sight determined by the orbiter attitude.

The shuttle program eventually replaced the cameras and model with digitally generated imagery. The aft displays were digitally generated images projected by liquid-crystal light-valve projectors onto tilted "pancake" windows. The projectors were basically telecentric but "tilted" to avoid viewing directly into the projectors. Pancake display devices were essentially spherical mirrors and beam splitters that (unlike the usual configuration of a beam splitter at 45 deg to the main axis to fold the image for reflection off the spherical mirror) used polarized elements, so that the spherical mirror and beam splitter were parallel to each other. The space station simulator had a long way to go when I decided to retire at the end of 1988.

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If you would like to share your reactions, mail responses to Hidden Physicists, The Industrial Physicist, One Physics Ellipse, College Park, MD 20740-3043, fax (301 209-0842), or e-mail (tip@aip.org).