

AMERICAN ENGINEERTM

A PUBLICATION OF THE AMERICAN ENGINEERING ASSOCIATION

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AEA, Active Or Passive?

Engineering is not a spectator sport. When we are doing engineering we are involved, active, dynamic and we make things happen. Each time we put our pencil to paper we effect a change, introduce an idea, solve a problem, develop a product, enhance a system, analyze a function, communicate, conceive a new method or bring us closer to completing a task. Engineering is activity! Engineering is participation!

We are all members of the engineering community and must, if we wish to succeed, bring our engineering capability and enthusiasm to AEA. If we want AEA to be an active, aggressive and representative association, capable of making an impression and enhancing our profession, we must all participate.

We are not asking for a large commitment, but we do need help to increase our membership. Only fifteen minutes of your time each week will make a difference. Just apply your enthusiasm and capability to spread the news about AEA and introduce AEA to a prospective member.

Information and brochures about AEA are available to all members to enhance your participation and ease the effort. These will help you introduce AEA to your friends, associates and all potential members. Members can obtain copies by writing or calling AEA, c/o Richard F. Tax, P.O. Box 2012, River Vale, NJ 07675 (201) 664-0803. If you can, please send a SASE to help cover the cost of postage.

The following is an excerpt from our new brochure:

Introduction

AEA is a nonprofit corporation with members in virtually every high-tech center and industry in the United States. Our members are from all engineering disciplines including electrical and electronics, mechanical, civil, industrial, aerospace and chemical to list a few.

We're involved from micro circuits to transmission lines, go-carts to moon shots, energy conversion to energy conservation and from the ocean depths to outer space. AEA members are from ALL industries, branches and specialities of the engineering profession.

AEA is dedicated to the enhancement of the engineering profession and U.S. engineering capabilities.

AEA is the only engineering association dedicated exclusively to

the professional needs and concerns of the U.S. Engineering Community.

Concerns

Age Discrimination and lifelong career, preferential immigration laws, unfair trade agreements, offsets, discriminatory legislation, loss of U.S. manufacturing and engineering capabilities, productivity, loss of jobs, layoffs, wage busting, importation of foreign engineers, poor pensions, portable pensions, underutilization of engineers, patent agreements, incentives, skill development, recruitment of foreign students, tax incentives for U.S. corporations, salary compression and unpaid overtime, Engineer Shortage Propaganda.

Efforts

We communicate, promote issues, provoke issues, prod others into action, report news, make news, keep engineers aware, publish engineers views, improve working conditions, uphold standards, set standards, testify before Congress, review legislation, draft legislation, oppose positions, endorse positions, participate in other societies, influence other societies.

"AMERICAN ENGINEER"

The "American Engineer" is the official publication of the American Engineering Association. Published monthly, the "American Engineer" will strengthen and enhance the bond between all members of the engineering community.

AE addresses our engineering capabilities and the issues and concerns that effect our professional lives.

AE unites the engineering community to influence legislation and political issues.

AE keeps our membership informed and plays a major role in achieving our goals and improving conditions.

AE is supported by a staff of concerned seasoned volunteers with years of engineering experience and a history of dedicated service to the profession and to the members of the engineering community.

If you want things to improve tomorrow, you must do something to influence that change today.

Richard F. Tax, Vice President

Meeting Notice: Engineering Careers And Professional Societies

AEA Vice President, Richard F. Tax, will be the guest speaker at a meeting of the North Jersey Section IEEE Professional Activities Committee.

Mr. Tax will review the efforts of the engineering societies to enhance the profession and comment on where they succeed and where they fail. He will prescribe future activities to improve job opportunities and engineering capabilities. He will also comment on the role of AEA in enhancing the profession.

This subject is important to engineers who are concerned about their future in the profession and their ability to improve the job

market for engineers. AEA members and members of the engineering community are encouraged to attend.

DATE: Wednesday, December 11, 1991

TIME: 7:30 PM.

PLACE: ITT Auditorium, 500 Washington Ave., Nutley, N.J.

PRE-MEETING DINNER: Jade Fountain in Clifton, 6:00 PM.

FURTHER INFORMATION: Robert Sinusas (201) 228-3941.

The Invisible Engineer

Part II

TO REARRANGE NATURE

The industrial revolution was essentially craft lifting itself up by its own bootstraps to become modern engineering. While the scientific revolution of the 18th century may have provided a model of method and order, it could give no formulas for invention or design. What the scientist, then known as a natural philosopher, had learned to do was explain and predict nature. But it was the scientific instrument makers, the stone masons cum bridge builders, the pencil makers, who saw in their crafts the possibilities of rearranging nature to create a wholly new (and yet not unnatural) environment of improved and wondrous artifacts and processes.

Many of the earliest modern engineers, some of whom perhaps did not even call themselves by that name, were uneducated and unrefined by most social standards of the time, but that was by no means universally true. In particular, John Smeaton, who carried out research into wind and water power and designed a new Eddystone lighthouse, was of no common background. His father was an attorney, and young Smeaton was trained for a career in the law. However, he apprenticed himself to a scientific instrument maker and opened his own instrument shop in London in 1750. He became a fellow of the Royal Society in 1753.

At the time, water wheels provided the main source of energy for most industries in Britain. Smeaton built models and studied various types of wheels, developing rules for determining their efficiencies. He also studied windmills, and in 1759 was awarded a medal by the Royal Society for his "Experimental Enquiry into the Natural Powers of Wind and Water to turn Mills." Smeaton also developed improved Newcomen steam engines, precursors of the Watt engine. His work on the Eddystone lighthouse led to innovative means of locking stones in construction and to early uses of a mortar-like material for joining them.

Smeaton was called frequently to London to testify before Parliamentary committees in support of bills authorizing the construction of bridges, canals and other public works. During his visits to the city, Smeaton attended meetings of the Royal Society and cultivated friendships with members of the Royal Society Club. When in London for extended stays, he also met with the growing new group of canal, bridge and machinery builders who gathered on Friday evenings in the Queen's Head Tavern in Holborn.

What John Smeaton, instrument maker, was doing in the middle to late years of the 18th century is what civil and mechanical engineers do today. But in Smeaton's era, to be an "engineer" meant to be concerned with matters military. Yet the term engineer certainly had more status than, say, instrument maker or builder, and so the need for a new definition appeared. To differentiate himself and his colleagues from the military engineers, in 1768 Smeaton declared himself a "civil engineer," a term which to him also included mechanical and other kinds of engineers. According to Smeaton, "Civil engineers are a self-created set of men whose profession owes its origin not to power or influence, but to the best of all protection, the encouragement of a great and powerful nation, a nation become so from the industry and steadiness of its manufacturing workmen and their superior knowledge in practical chemistry, mechanics, natural philosophy and other useful accomplishments."

In 1771 Smeaton's initiative led to the formation of the Society of Civil Engineers, which, upon his death in 1792, was renamed the Smeatonian Society. While the purpose of Smeaton's original society was to encourage free gentlemanly social conversation on the members' mutual interests, providing a forum for sharing experiences about undertakings generally looked down upon by members of the scientific-minded Royal Society, it also marked an important step toward a formal professionalization of engineers, with the exclusivity that a profession implies. For example, it appears that Smeaton, from his middle-class background and position of prominence in London, did not invite to membership James Brindley, a canal builder of superior achievement but modest background, who had to buy a suit when called to testify before committees in London and who did not appreciate the theater.

But Smeaton was the exception, and for a long time few engineers would come from the educated classes. Thus, they were generally barred from entry into the political and social clubs of London select society, and the importance of the engineer's club for the profession grew. But soon the Smeatonian Society itself became overly exclusive, at least from the point of view of younger engineers, who wanted a more open organization that would provide opportunities for instruction as well as socializing.

By Henry Petroski

To be continued....

(*AE is reprinting this article in several installments, because of its length. It is reprinted, with permission, from the Nov. 1990 edition of "Civil Engineering," the publication of the American Society of Civil Engineers (ASCE).*)

Editorial:

Don't Work For Free

When I was a senior in college, a friend interviewed for a job with an engineering company. Before the interview started, the interviewer gave him a sheet of tough problems to solve. My friend was prepared—with his own sheet of difficult circuit-design problems, which he passed across the table to the surprised interviewer. "Why don't you work on these, instead of taking a coffee break," he said. "I don't work for free, and anyway, I want to be sure you're smart enough to take me seriously." Obviously my friend had been tipped off about the company's interviewing technique and decided to turn the table on the interviewer. Obviously, too, he didn't get the job. I was surprised, though, how many of my classmates were intimidated into working on the problems.

Today, economic times are tough, and many engineers are unemployed and searching for a new job. But, just because an engineer is out of work, he or she shouldn't be coerced—like my classmates—into giving away creative energy. However, from what I've been reading, some companies are routinely taking advantage of the "free" talent on the job market.

Interviewers often ask for—and get—unemployed people to create new business plans, product designs, analyses of business operations, critiques of competitors, and other useful and valuable reports. For example, during a job interview, the company representative says, "We have problems with the software for a new product.

Here's a partial listing you can take home with you. Call me in a week and let's see what bugs you came up with." You may not get the job, but the company may use your free services to help debug a tough software problem. Because the interviewees are desperate for work, they're willing to expend their creative efforts in attempts to get jobs. Knowing this, some companies keep job candidates coming back for interview after interview to gain more free information.

Some job seekers think that when companies tap their skills, it's just part of looking for a new position. However, others think that is a gross abuse of people who are out of work. They argue that past experience and accomplishments tell a lot about a person's abilities. It's not necessary—or appropriate—to ask them to create a lot of new material in order to evaluate their talents and abilities.

We agree. If you know of any companies that are abusing job interviews by asking job seekers to give away their engineering and technical talents, we want to know about it. If you or a colleague has gone back to a company several times with more and more information that the company keeps, but no job comes of it, let us know. We'll investigate and let you know the results. Companies that take advantage of engineers who are temporarily down and out aren't to be trusted. Who will they take advantage of next?

Jon Titus, Editor

(Reprinted from "EDN" (May 23, 1991), copyright 1991, Cahners Publishing Company, a Division of Reed Publishing (USA).)

Reader's Voice

This column in the "American Engineer" allows readers to voice an opinion relevant to any issues that affect the professional life of an engineer. Articles or letters should be in good taste and not slanderous. Each submission should include the name, address, home and business phone of the writer. Except for short excerpts, we will include the writer's name, city and state (unless the writer requests anonymity). We reserve the right to edit each submission, as long as we don't change the gist of it, and to publish or not publish it. We assume that authors who send us material have accepted these conditions, unless they instruct us otherwise in writing.

Editor: In the September issue of AE, we printed part of a letter from W.H.Proud and promised to print more in a later issue. Here's more. In answer to his final question, "What more can you ask (of a career)?" I reply: The entire engineering profession should receive the same breaks as he did, during his career. Success in our profession is part diligence and part luck. Until such time as we have a strong professional organization, no amount of mere diligence can guarantee as rewarding a career as Mr. Proud enjoyed. He stayed in R&D partly because the political climate at his employer's organization allowed him to do so. This turned out to be a good decision, partly because the economy permitted it at the time he was in R&D.

From W.H.Proud of L.A.: - "Two bits of advice presented in either EDN or ELECTRONIC DESIGN about thirty years ago bear repeating:

"1. 'Plot your salary versus time.' Discounting the boom and bust periods of the profession, the curve should have a reasonable positive slope with some consideration for inflation. If the curve starts to flatten, look for the cause: You are not being properly appreciated; you are being taken advantage of; you aren't doing as well at that job as you might; you might do better in other jobs; salary compression with age, etc. It may be time to leave!

"2. 'Don't bargain for money; bargain for opportunity.' A particular job may be worth only so much money to your employer, but if you perform well in a more challenging job, it should be worth more to both of you. (However, remember not to try being something you are not.) My 'opportunity' was always being in the R&D end of the business where we were always at the leading edge of technology, and the work was fun.

"I've tried to avoid coming across as the quintessential company man and to avoid repeating a lot of platitudes. I did have the benefit of working thirty years for an excellent employer and then eight years as a consultant to that same firm, as some aspects (of the business) deteriorated. I didn't get rich, but I was well compensated. I enjoyed myself and had fun. What more can you ask?"

Editor: In the September edition of AE, we printed more from our steadfast reader, Ms. Joan Campbell, and we invited a response from other readers about her assertions. I've thus far received none. Here is Ms. Campbell's reply. Regarding her present comment about Social Security, I suggest she contact our Richard Plummer.

From Joan Campbell of Tulsa: - "You put me on the spot when you invited comments on my last published letter. I'm now on CompuServe, ID number 76260,3214. Members can contact me via CompuServe. I took the last issue of AE to the office and made a bunch of copies which I spread around with encouragement to join AEA. If there are members in this area, we could get together for a dinner.

"One of the confusing things I run into is the multitude of job titles; they're increasing every day. For years I've called myself an Electrical Engineer. By doing so, I'm saying that I can handle any type of assignment within the sphere of that discipline. I become very disgusted with personnel types telling me that I can't do a certain type of design within the field, because I'm (just) an engineer. There also seems to be a trend to equate competence with the electronic machinery you operate.

"Now, after 49 years of 'twisting wires' and not raising a family, I don't know what I'd do, if I stopped work, so I intend to continue until I drop. This brings up another pet gripe: Social Security. Since 1942,

I've paid into this fund; if I continue to work at my normal pay rate, they'll only let me draw a smidgen of it, which is not equitable. It's my money, and if it had been in a private fund, it would pay in full and without question."

Editor: One of our members took exception to comments by AEA VP, Richard Tax in an article in September AE about licensing software designers. Below is his letter to Richard, and the response. Expect more on this in future issues of AE. I have comments on the issue of licensure elsewhere in this edition.

From Lawrence Edelman of Whittier, CA. to R. Tax: - "We both go back a long way in the struggle to help the working engineer. Virtually all the time we agree on the issues. However, once in a while we disagree, but with respect.

"In the Sept. '91 issue of AE, you wrote an article entitled 'New Jersey to License Software Designers.' In that article, you expressed strong opposition to licensing Software Designers. On that point, I have to disagree with your position. I see licensing as a salvation to the engineer, in that it: 1. Sets minimum requirements for entrance into the field. 2. Defines the title of Engineer. 3. Can be a safety valve in limiting entrance into the field, only to those qualified to practice engineering.

"As far as the bureaucracy you fear, we already have a bureaucracy that is working against us. The licensing bureaucracy may be created, but at least it will be working for us. I support licensing for all Engineers."

Mr. Tax replies: - "I would guess that we've been involved in the struggle for the profession for about 18 years. I also remember the day you and I and a group of concerned engineers met in a motel in northern New Jersey to develop plans to influence IEEE. Everyone reached into their own pocket to cover the cost of the conference room. In the case of licensing, we are still pretty much in agreement.

"The New Jersey Assembly Bill #4414 you speak of, is to license everyone associated with the development of computer software and has nothing to do with licensing of engineers, unless they are developing software. The Bill specifies an approved course of study as a requirement. Now we shall say that people cannot develop software unless they were blessed by academia. I disagree with this. I also do not wish to see this work leave the state.

"The Bill addresses software developers, and you are addressing the licensure of engineers. To license engineers requires the removal of the industrial exemption, which I believe is virtually impossible. I believe that licensing engineers without a balance between supply and demand will improve nothing; a glut of licensed engineers is no better than a glut of unlicensed engineers.

"To license engineers, we first need a manpower balance, followed by legislation, and a lot of grandfathering to satisfy the engineering community. The safety valve you speak of (or manpower balance) will only come if Congress stops throwing money at the engineering colleges."

From L.F., of CA: - "Here are some of my ideas about licensing: 1. One of the best sources of information about licensing is *The Engineering Times* published by (ugh!) NSPE. 2. Reform of licensing is extremely difficult because the present situation has tremendous inertia. Consider for example the idea of universal registration (or elimination of the so-called industry exemption). I suspect that many currently unregistered engineers resent the suggestion that they are not now full-fledged engineers. Grandfathering has been proposed as a solution, but many currently registered engineers who got their licenses the hard way—by studying long hours for the licensing exam—would resent hoards of grandfathers. I think currently-licensed engineers would find it easier to accept grandfathering if the benefits of registration were increased at the same time—for example, by initiating government-conducted surveys of salaries and employment status.

"3. Another problem is that most states do not register engineers according to branch or specialty; when last I checked—about

(Reader's Voice continued)

1985—California and two other states were the only exceptions. I feel that engineers should be registered according to major branch, e.g.: electrical, civil, mechanical, chemical, with no vague, overspecialized, Mickey Mouse branches like traffic, safety, fire protection and aerospace. To its credit, the California board rejected the aerospace category, but unfortunately included some other worthless categories. The aerospace category should also be removed from government statistics. (Any engineer who works for an aerospace company can be called 'aerospace engineer.')

Proposed solution: having currently unclassified engineers choose a single branch, with registration in other branches available by examination.

"4. I agree that the Texas requirement of references from three licensed co-workers is bad. In California, qualifying CE experiences must be under the supervision of a civil PE. These requirements force many applicants to fake it and probably discourage many engineers from seeking licensure.

"Some people think that professional licensing is a panacea that will cure the ills of engineering. I feel that we should concentrate on increasing the benefits of registration rather than on increasing the number of engineers who are registered. When engineers see the benefits, more will seek registration.

"Length of education: So far as I'm concerned, the longer the better. If the basic engineering degree took ten years, for example, you can bet that employers would have to make engineering much more attractive than it is now."

Name withheld on request.

From P.M. of CA: -
Dear Congressman:

I wrote to you in May of last year to tell you about what I see happening to High Tech in Massachusetts. The essence of my letter was that there is a restructuring of the industry to employ immigrant personnel, resulting in depressed levels of compensation that are below the true value of science and technology to society.

I understand that as of a month ago, the lid is off. The procedure has been that a company has to advertise 3 times and list the position for 30 days with the Department of Employment Security. I have responded to these advertisements, but have never had a response except for one phone call asking why I was interested in a job paying such low salary. Now the Government has decided it is in our national interest to open the gates wide for people with technical skills. This replaces the previous policy of letting in family members of people already in this country. Somebody must have noticed these families have the capacity to increase in size indefinitely.

This new policy is a triumph for the academic community, who have been lobbying for a long time to make it easier for their graduate students to remain in this country. I remember an experience I had that is now over ten years ago. I decided to drive in from the suburbs to attend a seminar at MIT. When I walked in the room, every face was oriental. I understand that orientals make up 25% of undergraduate enrollment now at MIT, far more than their representative proportion in the population.

I have a couple of anecdotal tales to tell. I have a friend in his early 30's who is an Electrical Engineer. He is out of work, but unlike me in my 50's, he is able to get interviews. One interview he went to last month, there were four other people also interviewing for the job, an Arab, two Israelis, and an Indian. The only person who could speak English was the Indian. He went to another interview yesterday. The fellow conducting the interview was an oriental. My friend is a large all American jock. The interviewer said: "We'll tell you in a month".

There are a lot of people ready to give opinions about what is wrong with our economy. Foremost seems to be the opinion that we don't have enough engineers: quote "Too many lawyers and not enough engineers." The academics love this cry, because they are in the business of producing more engineers. What about the ones they have already produced? I live in the working engineering community, and there is no shortage of engineers. They have just left the profession because they can't earn a living. There's a

shortage of gold too, at \$35 an ounce. There's a shortage of engineers at \$35K.

The real problem for our economy is the wastage of trained engineers, who no longer find it possible to work in their field. It doesn't help to let the colleges keep pouring out technical people whose working life is ten years. The school guidance counsellors are always pushing engineering on those students capable of the work. They point out the relatively high starting salaries. Indeed, the affinity industry has for new grads is akin to the attraction of a virgin in an 18th century bawdy house. But by the time they are 30 half of them will be looking to do something else.

In case you are thinking that the ones who leave are less qualified and can't compete, the opposite is in fact true. The enterprising ones realize the score early and get out. It is the ones with less initiative that remain stuck in the profession.

So don't think you are helping the nation's economic problems by opening the gates to unlimited immigration of technical people. You are in fact finishing killing off our own engineers, destroying for the country the accumulated expertise of its own people.

I intended this letter to apprise you of the public mood, rather than advocate any action. I believe there is latent anger out there, and given the right (ie. wrong) political outlet for its expression, we could see some nasty politics. You saw how fast the change came in Russia, once the people got their voice. Hitler became the spokesman for Germans humiliated in war and suffering under depression and hyperinflation. If the economy doesn't pick up we'd better watch out.

Sincerely,
Name withheld on request.

From P.H. in NY: - "I agree that our elected representatives need to hear from working engineers. Enclosed is a check for \$20.00 to sponsor a gift subscription for (his congressman)...I enjoy reading the "American Engineer" and have started passing a copy of it around to other engineers in my office."

From K.B. in UT: - "Please put \$20.00 of my check towards the legal fund."

From R.W. in CA: - "\$100.00 - Dues, \$25.00 - AEA Legal Defense Fund."

From F.W. in NJ: - "Correct spelling of my name is a minimum requirement for my continued membership." *Ed. Note - You are right of course! Thank you for bringing the error to our attention.*

From J.O. in NY: - "I am interested in being a Congressional Rep. in my district."

From K.K. in ID: - "Thank you for the sample issues (American Engineer) that you have sent me. I immediately decided to join when I saw the article by Roger Boisjoly. Not because of the article, but because of his character. Enclosed is my membership application."

From A.L. in FL: - "Send (AE subscription) to any NJ Senator or Congressman."

From J.G. in TX: - "Enclosed is \$20.00 for Membership. I attended a meeting in Houston of AEA....Keep up the good work. The layoffs are starting again in Petrochemical work."

From B.A. in CA: - "Please send information on your organization. I read of you in the the August 19th issue of EDN."

Robert Bruce, AE Editor
P.O. Box 4493, Great Neck, NY 11023

A 10-Second Commercial

The next time an associate of yours complains about the profession, hand him/her your copy of the AMERICAN ENGINEER. Say "Please read this publication and copy whatever you wish to use. Pass this on to your next associate who complains about the profession."

"American Engineer" - November, 1991 - Page 4

Engineering Code Of Ethics

The IEEE is an engineering organization that is mentioned frequently in these pages, for several reasons:

1. Because many of our members are disenchanted members of IEEE;

2. Because among the professional societies, it appears to offer the greatest possibility of professional progress for its working members (except perhaps the American Chemical Society, which, to my knowledge, has a grievance committee);

3. Because, despite this appearance, many IEEE members are frustrated in their efforts to obtain meaningful professional progress from the organization.

Thus, we follow with great interest the internal activities of IEEE. One internal activity is the creation and finalization of a code of ethics for engineers, reproduced below.

1991 IEEE Code of Ethics

We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members, and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct, and agree to:

1. Accept responsibility in making engineering decisions consistent with the safety, health, and welfare of the public, and disclose promptly factors that might endanger the public or environment;
2. Avoid real or perceived conflicts of interest whenever possible, and disclose them to affected parties when they do exist;
3. Be honest and realistic when stating claims or estimates based on available data;
4. Reject bribery in all its forms;
5. Improve the understanding of technology, its appropriate application, and potential consequences;

6. Maintain and improve our technical competence and undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;

7. Seek, accept, and offer honest criticism of technical work; acknowledge and correct errors; and credit properly the contributions of others;

8. Treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;

9. Avoid injuring others, their property, reputation, or employments by false or malicious action; and

10. Assist colleagues and co-workers in their professional development and support them in following this Code of Ethics.

This Code has the virtue of encouraging engineers to uphold public safety. Of course those engineers who do so by blowing the whistle on dangerous products may face the same intense harassment that Roger Boisjoly received, when he tried to stop the launch of the 1986 Space Shuttle and then testified on his inability to do so. Another problem with this Code is that it's a one-way street. It places restrictions on permissible conduct of engineers, while not commenting on the conduct of other members of those corporations that employ engineers.

In theory the engineer/managers of working engineers should abide by the same ethical rules as the working engineer, but this does not often happen. Engineer/managers believe they owe their loyalty to the organization that employs them, more than to the public interest or the profession.

Until such time as *all* engineers (including managers) have their first obligation to public safety, their second to the profession, and their third to the organization that employs them, the IEEE Code of Ethics will be just another idealistic document, a little less influential than the Declaration of the Rights of Man. Elsewhere in this edition of AE, there are reader comments on engineering ethics.

Robert Bruce, AE Editor

What Are Engineering Ethics?

Ask a lawyer what his/her ethics are, and you will probably hear, "Support the organization and its rules of operation." Ask a manager the same question, and you'll probably hear, "Support the organization and its rules of operation." Ask a physician or surgeon about his/her ethics, and you'll probably hear, "Support what you believe is best for the patient."

Ask a professional engineer (PE), and he/she will say, "Support what is right for the public as a whole, thereby supporting your customer directly. Don't misplace a decimal point to please a customer. Your public responsibility overrules that." Remember the problems with the first few C-5 transports? Weakened by bean counter demands, it had to be reinforced.

To whom does this ethical responsibility apply? To just a PE, or to each and every one of us? If we make a mistake that costs money, we lose our job forthwith, don't we? If an engineering boss comes in and says, "I want you to approve this change," whose neck is on the line, if it doesn't work? The boss says, "But you approved it." The engineer saying "You ordered me to" isn't good enough. It's your neck on the line, not his.

A response like, "I'm sorry, but I can't until I know the change will in fact solve the problem" is more correct. If the engineer is forced to accept the change, he/she must get a statement in writing and properly witnessed, that the decision was forced.

If the question of possible misapplication of safety considerations had been raised at Bhopal or Chernobyl, many lives might have been saved. Consider the difference between those two disasters and the small nuclear "disasters" in this country, like our worst: Three Mile Island. To this date, there is not even a hint of anything worse than an expensive clean-up; no discernable evidence of any threat to human life. Our engineering wasn't perfect, but its fail-safe design was much better than Chernobyl.

Ethical engineering is part of the answer. In the nineteenth century, many boiler explosions on steamboats forced the estab-

lishment of rigid design specifications on steam boilers. Engineering in its modern sense was only breaking into design of these modern "workhorses."

The public service awards of IEEE were made to engineers who stood for good engineering: BART engineers who publicly stated that the train control system was unsafe (management's failure to listen to the engineers finally caused an accident); the engineer who publicly disclosed the Challenger Space Shuttle O-ring problem that caused loss of life.

We must establish clearly what engineering ethics are and what they mean, so the public will understand, and bean counters will accept their importance. We must establish that if an ethical engineering decision is overridden, the matter must be taken to the top levels of management and to the Board of Directors, if necessary. There should be an engineering "path" to assure proper attention to the issue. There should be protection for the engineer who goes public.

Keats A. Pullen, ED, PE

Editor: Space limitations forced me to include only portions of this interesting article, but the point is clear. The engineering profession and the public need protection from involuntary bad engineering.

Notice On Postage Paid Reply Mail Permit

Due to the increased cost of postage, we have discontinued our Business Reply Mail permit which allowed the member to mail his or her application on a self addressed, postage paid basis. Any of you who still have the postage paid envelopes should destroy them.

THE POST OFFICE WILL NOT DELIVER THESE ENVELOPES!
To continue to use these envelopes will only cause all of us problems. We have not printed or distributed these envelopes in over a year. Thanks for your cooperation.

Look Beyond The Shortage Numbers

Once again, engineers and their disputed numbers are in the limelight. This month's IEEE Careers Conference panel on "Engineering Manpower in the '90s: Bust or Boom?" and last month's Engineering Manpower Commission conference on "Engineers in America's Future: Shortage or Surplus?" are proof of the continuing controversy over whether or not there is—or will be—a shortage of engineers.

True, the numbers are important. Engineers equal innovation, and the US needs a healthy supply of creative minds to help maintain its competitive edge in an increasingly fierce and global electronics marketplace. The problem is, altogether too much emphasis is placed *solely* on supply.

If engineers are so important to our prosperity, then we should not only care about where we'll get our future supply, but we should also care about how we can best use and improve our current workforce.

EDN News Edition recently surveyed 1500 of its readers to find out what they think of these and other professional issues facing them. We'll have complete results in our next career section and will present the shortage-related results during the above-mentioned IEEE Careers Conference panel.

Several responses were particularly disturbing and bear mention here. A full 58.8% of readers believe their companies don't make the best use of engineers' time. Only 33.1% said their companies will retrain engineers for open positions.

A mere 29.2% said their companies offer well-developed technical career paths, and only 36.2% said their companies provide EEs with management career paths.

I find it difficult to sympathize with companies that scream engineering shortage when few efforts are being made to use and foster the careers of the engineers that are available.

To be fair, a number of electronics companies do provide engineers with opportunities for career advancement as well as for continuing education. But not enough to keep such policies as the 1990 immigration law, which allows unprecedented numbers of foreign professionals to work in the US, from passing in a year when the US electronics industry lost 100,000 jobs according to American Electronics Association numbers.

Further, engineers are not completely faultless. Even they will tell you about quality problems within their profession and about engineers who can't perform their jobs. The engineering profession is a constantly changing one, and EEs must make the effort to keep qualified and current. Our readers, however, were split on whether or not engineers take enough interest in their professional development: 47.4% said yes; 47.4% said no.

Nevertheless, there is much to do. Maybe large electronics companies can open some of their continuing education classes to smaller, more financially strapped concerns. Maybe the proper role for the government is to partially subsidize engineering retraining, instead of tinkering with immigration laws.

No one will find the answers, though, unless we stop arguing about the numbers and start dealing with the problem. Let's look at what we can do to make the best use of what we have.

Donna Coco, Associate Editor

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Editor's Column

Back around 1977, a major board of the Institute of Electrical and Electronic Engineers (IEEE) issued a policy statement that the "industry exemption" ought to be eliminated. The industry exemption allows corporations that produce products sold to the public to have non-registered engineers (engineers without a PE license) sign off their drawings. On the other hand, PEs must sign off drawings for construction projects, like bridges, buildings, tunnels, etc. This policy statement raised such a hue and cry within the IEEE, that it was rescinded in less than a year. Nevertheless I'm confident that the National Society of Professional Engineers (NSPE) is in favor of ending the industry exemption.

Such a move would serve the American public by raising the caliber of engineers who produce the products sold to the public. This may become academic, when Japan produces 100% of what we buy, but it still has relevance now. It wouldn't be so bad for America's engineers either, because it would cut down on the horrendous oversupply of engineers in America, including alien engineers, who accept jobs at salaries lower than the prevailing wage for citizens.

I can hear some objections from some non-PE engineers with 20 years in practice. Some have little hope of relearning the subject matter on a PE exam and fear they'd be thrown out of a job and a career. Rest easy. Ending the industry exemption is so difficult that it would be no more difficult to include "grandfathering" in the relevant legislation. The main difficulty lies in two quarters.

First of all, American industry can be expected to fight such a move. Second of all, engineering registration is a state-by-state matter. Each of the 50 states registers engineers, so the legislature in each of them would have to be persuaded to amend existing laws to end the industry exemption. One small step would be to end it in an industrial state like New York or California. And I'll bet NSPE would back such a campaign. Do our readers think this is a mission worth pursuing? Do some think it's "tilting with windmills?" Would any reader volunteer to participate?

Robert Bruce, AE Editor

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AEA At The Design '91 Show

AEA and members of the North Jersey Section of IEEE shared a booth at the "Design '91" show in the New Jersey Meadowlands Convention Center on September 24-26. Both groups were there to publicize their activities and promote membership. "Design '91" Expocon Management Associates, Inc., donated the booth space in exchange for advertisements about the show in AE and in the North Jersey Section's "Newsletter". The advertising included free admission for members.

The new AEA brochure made its debut at the three-day show, where mechanical engineers comprised the majority of engineering attendees. Exhibitors and manufacturers' representatives showed an interest in AEA activities. The photo shows (from left to right) AEA Vice President, Richard Tax, together with IEEE members, Al Bottani and Fred Chichester.



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