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IEEE Exasperates Engineers

IEEE-USA has supported CUTS to the budget for the Space Station Freedom program but requested increasing funding for the National Science Foundation (NSF). This has exasperated engineers from all over the nation, but especially IEEE members from the Galveston Bay, Texas, Section. Apparently, the Galveston Bay Section has many engineers involved in the program. IEEE stands for the Institute of Electrical and Electronics Engineers, but often I wonder why. To many engineers, IEEE has become another four letter word because instead of enhancing the engineering profession some of its members and committees have become a detriment to the engineering profession.

Earlier this year IEEE-USA testified before the Subcommittee on VA, HUD and Independent Agencies House Committee on Appropriations. In this testimony stating they were "...pleased to present the views of the IEEE-USA..." (this includes all U.S. IEEE members) they requested that funds be cut from the Space Station Program and ended by requesting that funds be increased for the National Science Foundation to increase the graduate student production. How could this happen?

Basically, two IEEE committees are involved. First, is the Aerospace R&D Policy Committee, which provided the testimony and second is the Engineering R&D Policy Committee that provided the input supporting increased NFS funding.

They said, "It is unwise to embark on a major program merely because it is technically feasible, or because it makes use of resources which happen to be available and which may serve vested interests." I especially like the part about "...which may serve vested interests." With a critical eye and five pages of testimony they mentioned the 30 billion dollar cost of the Space Station and explored NASA's rational for Space expenditures. They considered determining Space priorities and supported the NASA budget without cuts "...but rather reprogramming to support other applied research and exploratory development needed to define and to develop an integrated space program that advances U.S. industrial competitiveness." The underlining is mine. They suggested a "New Balance" between Automated Satellites and Probes (ASAP) and Manned Aerospace Transport (MAST) with priorities given to reducing the cost of manned space flight. They also suggested extending NASA's involvement into more conventional aeronautical programs but, without increasing the NASA budget. They concluded that "...NASA has shown an unwillingness or inability to plan accordingly."

Following their testimony on the NASA issues, they continued with their testimony, prepared by IEEE's Engineering R&D Committee, stressing "...critical problems regarding the NSF budget: an inadequate level of funding overall and inadequate support for engineering technology research." They wish to double the NSF budget. They cite, with alarm (their words, not mine), "This will have an adverse impact on research, graduate student production, and ultimately, U.S. economic competitiveness." Again, the underlining is mine.

The members of the Aerospace R&D Committee were diligent in their preparation. However, was any thought given to moving a significant part of the 30 billion, engineering intensive, dollars from Space Station Freedom to other NASA programs? How many engineers will be displaced by this decision? How many companies have committed their funds, resources and manpower to the program? How many engineers have already been laid off because of the previous cuts and program stretch outs? How costly have these cuts been to the companies involved? Why didn't the Aerospace R&D Committee review the Engineering R&D Committee's testimony and the National Science Foundation's unwarranted engineer shortage shouting history before asking for increased NSF funding? How can they equate graduate student production to U.S. competitiveness when our engineers are out of work and recent engineering graduates are not getting engineering jobs? How could this happen?

This is how it happened. The Aerospace R&D Committee and the Engineering R&D Committee are part of IEEE's Technology Policy Council. Both the Technology Policy Council Chairman and Vice Chairman are academics. Sixty-five percent of the Engineering R&D Committee are academics. Thus, we get a solution from the academic community. Whose vested interests are being served here?

Less than ten (10) percent of IEEE's membership are academics but, they dominate the IEEE communications and decision making committees and positions. This happens to be just one example. In this case, as usual, the IEEE views are those of the academic community. Obviously, the engineering members from the Galveston Bay Section were not asked for their opinion. Had they been consulted, some of the questions and issues mentioned here might have been considered. I would suggest that the Galveston Bay Section, other IEEE Sections and entities insist that IEEE's committees consist of a balanced representation of IEEE's membership and the committees that cannot achieve a balance be dissolved.

Does IEEE represent the academic community or do they represent the engineering community? The last "E" in IEEE is for engineering. Yet, IEEE's constitution cites "...directed toward the advancement of the standing of the members of the profession it serves..." To what profession is IEEE referring? Must they be so vague?

There is no hidden agenda in the American Engineering Association. We boast, "AEA is dedicated to the enhancement of the engineering profession and U.S. engineering capabilities." We are proud to say we are dedicated exclusively to the professional needs of the U.S. Engineering Community. In behalf of the American Engineer, AEA will continue to influence the other professional societies.

Richard F. Tax

The Invisible Engineer-Part I

A hundred years ago, the general public couldn't hear enough about the wonders achieved by engineering, yet today's professionals are mostly anonymous. Advancing technology and the growth of specialized societies have robbed the profession of a single voice, a public image as clear-cut as a doctor's or lawyer's. For engineers to achieve a more visible role in society in the future, we must seize every opportunity to tell our story.

The history of engineering is a little written and less read book. For all their contributions to society, engineers have worked largely behind the scenes. Their sleepless nights and anxious days, their brave participation in the proof tests of their structures and dogged determination to get it right are seldom remembered in the dedication ceremonies of the bridges, tunnels and skyscrapers they have created.

It is the rare engineering achievement that is named for its engineer and, while the classics of literature and science become with time even more closely identified with their authors, the opposite is too often true of the artifacts of technology. The Brooklyn Bridge, frequently offered for sale by those with no claim to it, let alone any sense of its history, may be the ultimate symbol of this fate. It is unlikely that one out of a hundred profferers of the bridge could tell his customer who designed and built it.

In the prologue to his justly acclaimed book, "Brooklyn Bridge: Fact and Symbol", Alan Trachtenberg evokes no images of engineers or engineering but rather presents moving visual and tactile images of the bridge itself. At one point, he writes, "It is tempting to linger on the balcony, to walk around the center pier, to gaze up at the underside of the arches, to feel the coarseness of the Maine granite, or to read the plaques attached to it. But another experience lies ahead."

Rushing from experience to experience, the author does not tell us what the plaques might say. He does not tell us that one of them commemorates John Roebling, "who gave his life to this Bridge," his son, Washington Roebling, who became incapacitated after a construction accident, and his wife, Emily Warren Roebling, who "with faith and courage...helped her stricken husband...to complete the construction of this Bridge from the plans of his father."

At the opening of the modernized Brooklyn Bridge in 1954, when the plaque to the Roeblings was already in place, with the "C.E." appended to the names of both father and son, neither the mayor of the city of New York nor the borough presidents of Brooklyn and Manhattan, which the bridge connects, used even the words *engineer* or *engineering* in their speeches. And, needless to say, no engineers were mentioned by name.

The closest reference was in a description of the bridge as "the first great suspension bridge erected by man," which not only ignores the individual effort and creativity of the Roeblings, but denigrates John Roebling's earlier milestones in suspension bridge building—across Niagara Gorge and the Ohio River at Cincinnati—as well as the work of Thomas Telford and a host of Roebling's predecessors. The politician might as well have called World War II the world's first great war.

Several factors have contributed to the invisible, if not inferior, status of the engineer in society. The profession's roots in the craft tradition and the ultimate dependence upon skilled manual labor to realize the grandest engineering structures even today may bear part of the responsibility for the slighting of engineers, along with the wish of career politicians to emphasize their own roles in financing engineering works and the simple ignorance of speech writers. But there is reason to believe that the personalities and politics of engineers themselves have played and continue to play important roles in the almost total lack of recognition for their accomplishments by the general public.

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).

Engineering Salaries Losing Ground To Inflation

"The salaries of engineers continue to be adversely affected by inflation, and for some engineers over the past four years the impact has become substantial," according to Albert A. Grant, Chairman of the American Association of Engineering Societies (AAES). The salary figures are taken from the most recent survey done by AAES' Engineering Manpower Commission (EMC).

Since 1987, the annual EMC salary surveys have indicated that many of the profession's compensation systems are not keeping up with the falling value of the dollar. Grant continued, "After four years of continued shortfalls, the impact is beginning to become substantial. When inflation is taken into account, the average starting salary for new engineers has eroded more than $2,000. This could have serious consequences on the profession's efforts to attract college students."

The 1991 salary survey reveals that in the past year entry-level salaries for engineers increased 4.9% on average, while the cost of living increased 5.3%. Similar gaps were observed in 1988, 1989 and 1990. So in terms of 1982-1984 constant dollars, the value of a typical starting job in the profession has declined 7.6%, or by about $2,000 over the past four years.

Similar results apply for typical engineering positions. In terms of absolute dollars, the median pay for all engineering positions increased from $45,000 a year in 1987 to $51,500 in 1991, a rise of 14.6%. During the same period, the cost of living increased 21.2%. Accordingly, in terms of 1982-1984 constant dollars, the typical median salary for engineers in general actually declined, from $40,468 to $38,242.

According to EMC Chairman Donald C. Brown, "A number of factors are probably contributing to these results: first the number of engineering graduates doubled between 1975 and 1985, resulting in a larger pool of engineering talent; second, and related to this, engineers as a group of people are becoming somewhat younger; third, there was widespread industry downsizing during the past 6-8 years, as well as the more recent layoffs resulting from reductions in U.S. defense budget; and lastly, there are general effects of the current economic recession."

The EMC's 1991 salary survey covers 130,427 engineers employed by 284 private organizations plus 8,456 engineers in 33 agencies of federal, state and local government.

Laura Ksycewski, AAES

Editor: The above article is a news release of AAES, and is reprinted with permission of the author. I find myself at odds with it on two small points. First Mr. Grant says, "This (drop in real income) could have serious consequences on the profession's efforts to attract college students." But Mr. Brown observes that the doubling of engineering college enrollments from 1975 to 1985 is a probable cause of lower salaries today. Have these two men spoken to each other recently?

The serious consequence of a drop in real income is that fewer high school students will enroll in engineering college. And the serious result of a drop in enrollments is that in the future, real engineering income may rise again. We all know that students base their career choice partly on anticipated income. We also know that salaries obey the law of supply and demand.

Secondly, it's not the 'profession' that expends efforts to attract students to engineering college; it's the colleges and industry. The colleges want lots of students, because their income arises from the number of bodies they process. The industry wants lots of students, because a high engineering birth rate holds salaries down, as Mr. Brown so aptly observed. A future reduction in entrants to the profession would have a salutory effect on engineering unemployment now estimated at 47,000 and on engineering salaries. The items highest on engineers' wish lists are a reduction in the glut of engineers and a swift end to the recession.

Alleged Engineering Obsolescence

The main thrust of the alleged engineering obsolescence reports seems to be that a deluge of new knowledge is making engineers obsolete a few years out of school. As proof of this, the reports cite the exponentially growing number of articles published in technical, scientific and educational publications.

Given that humans have not evolved significantly during recorded history and certainly no shift in mental capacity has occurred over the last few hundred years, it follows that training time must increase exponentially in order to absorb the exponentially increasing knowledge. This implies that the student on completing school is at the pinacle of knowledge and it is down hill from then on to total obsolescence at age 35. This leads to the interesting question of how this exponentially growing knowledge is acquired in just four years generation after generation. Certainly this June's graduates are no less competent than those of ten years ago. It would seem that no student could ever graduate if knowledge were expanding exponentially. In fact, the converse is true, because during the late sixties and seventies the number of credit and contact hours for graduation decreased and the percentage of engineering courses decreased, which leads to the conclusion that knowledge has decreased.

This seeming paradox is resolved by the realization that there is no knowledge explosion as far as the fundamental principles are concerned. All the phenomena of electrical engineering are governed by Maxwell's Equations, that are over one hundred years old. The various design techniques such as poles, zeros, scattering matrices, Smith Charts and so on are fifty years old. The fundamental mathematical techniques such as calculus, complex variables and so on are all no less than one hundred years old. It is impossible to tell by looking at the matrix equations if they describe a pentode vacuum tube or the latest FET. The FORTRAN computer language developed in 1955 was rediscovered by a new generation of engineers when microprocessors were developed in the seventies. Truly there is little change in the art and basic principles of electrical engineering.

What does change is the ephemeral "new model," which, like that of the automobiles, involves changes that are only "skin" deep. It is true, that the engineer familiar with the four bit computer will become obsolete when the eight bit, sixteen bit and thirty-two bit and so on computers come on the market, but that is only to be expected. Indeed an engineer that is strictly device oriented (instead of principle knowledge oriented) is likely to become obsolete unless an effort is maintained to work with the new devices as soon as they become available.

Device proliferation does not constitute a knowledge explosion. The explanation for the knowledge explosion is quite simple: there is no knowledge explosion. What we are experiencing is an incredible lowering of publishing standards. Every grant application promises to be the best thing since sex; just send the money. Every article involves all kinds of complications to disguise the lack of substance. Papers are cited whether they are relevant or not so as to make the article look well researched and to convince the reader that the author is well read. The addition of two numbers is expressed as infinite integrals simply to confuse the reader. Yes, there is some new knowledge generated, but the few pearls of wisdom are buried under tons of manure.

Real engineering knowledge is worth a lot of money and to publish it is equivalent to handing over profits to the competition and for that reason not much really valuable information is published. As is usually the case when quantity increases quality drastically decreases. As far as substantive knowledge is concerned, there is no exponential explosion.

While the principles and techniques of engineering have not changed and are not going to change, the components and instruments will keep on improving and there is a need to keep up with the latest gadgets. At one time it was important to know the gain of a 6SN7GT tube, a 2N918 transistor, the propagation delay of 7404N hex inverter, the pinout of the 68000 microprocessor and whatever next years whiz bang device will be. The only way to acquire such direct knowledge is by using the latest devices in your designs. This practical knowledge cannot be learned by reading magazine articles (written by the competition) because if it appears in print it is already obsolete. It cannot be learned in school because by the time the professors learn about it, it is already historic. Such knowledge must be learned on the job, since it cannot be learned in school and the main way to become obsolete is by not doing engineering design for a long time. The way to keep up is by doing or at worst talking to someone doing it—all else is a waste of time.

The advertising hype for each new model sounds as though the latest model is truly revolutionary obsoleting all that came before it and there may be nothing following since the model is the ultimate in perfection. It is obviously in the interest of the vendor to say this, but only by looking back at the evolution of automobiles, motors, vacuum tubes, transistors, television, microprocessors and so on can one gain a sense of perspective. The apparent tornado of change turns out to move at a snail's pace. It takes many years of experience to understand what the significance of a new development is and even to anticipate new developments. An experienced engineer develops an instinctive feel for the state-of-the-art and the way to acquire it is by many years of doing engineering design. An engineer doing state-of-the-art design cannot possibly become obsolete. On the contrary, the years of experience provide the insight to make sound engineering judgements of what will work and where things are going.

Yes, sad to say, engineers do become obsolete. If you are good, you are asked to look over somebody else's work and because you have sound judgement you are asked to direct the work of others. All of this means that you wind up doing less and less engineering until you spend less than one-third of your professional time doing engineering, at which point you can become obsolete. Leaving engineering seems to cause irreversible brain damage as evidenced by so few ever being able to think clearly or do even the simplest designs. At that point, the panic sets in and the educational remedies recommended are tried to stop the brain rot. Instead of going back to engineering, you attend seminars, short courses, conferences and perhaps even go back to school. All to no avail, you are dead as an engineer and no amount of book learning is going to change that. There is nothing as sad as an obsolete engineer who will let go of engineering and concentrate on whatever else is his or her new profession. Abandoning engineering is not a tragedy, the tragedy lies in pretending that academic "face-lifts" will restore one's engineering potency.

Besides voluntary obsolescence, there are the involuntary kinds, yet this does not excuse anyone from becoming obsolete. The only thing you have to sell is your skills and you can't blame anyone except yourself if your skills get rusty. If your company decides not to invest in state-of-the-art product design or if you are sidetracked onto a nondesign job, it is up to you to do something about.

Unfortunately the reports are right in one way: most "engineers" can become obsolete. This has nothing to do with years since graduation, but the percent of time devoted to engineering. Someone three years out of college can be just as obsolete as someone thirty years out of school. The problem is that there are not enough real engineering jobs and most people having the title of "engineer" are just glorified technicians, analysts, etc. and general paper shufflers. The problem of getting these people back into engineering work needs to be examined. Since there are not enough real engineering jobs around, the problem is a serious one. As stated, nothing beats or even comes close to hands-on experience and so we must examine the proposed solution contained in the reports, namely taking courses.

Since engineering is an art and not a science, if one has to attend courses, the only ones worth attending are those taught by practicing engineers with some talent for teaching. That one can do something, does not necessarily mean that one can teach it effectively to someone else. Even with a talent for teaching, it takes a lot of work to prepare a course. While some companies may ask their engineers to give courses and seminars, the time allocated usually is inadequate and not surprisingly the results are, in general, poor, which then is attributed to the inability of engineers to communicate

(Alleged Engineering Obsolescence continued)
effectively. To solve this problem, some consulting engineers have started companies to present short courses and seminars that are taught by practicing engineers. If an engineer is successful in giving courses, he or she teaches more and thus increases their chances of becoming obsolete.

Courses given by schools usually are not worth the time unless you know the Principles. Since so much ink has flowed extolling continuing education, this statement is equivalent to attacking motherhood and the flag, nonetheless it is true and let us examine why this is so. It does not follow that the best student makes the best teacher. Teaching is a talent and being able to regurgitate the lesson is no indicator of teaching talent. It is the best students that become teachers because to teach you need a doctorate and to get a doctorate you must be a good student. The usual progression to teaching is in a completely academic "paper" universe from undergraduate to graduate to doctorate with never a step into the real world of engineering.

Further, there is little incentive to teach well. Schools promote on the basis of number of articles published with 200 articles in a twenty year career being not unusual. As engineers well know, anything worth while takes at least two years, and here we have someone publishing at the average rate of one article per month. Academic life is indeed a way of life of pursuing interesting ideas at a leasurely pace, playing the publish or perish game by cutting and gluing other teachers' papers, finding doctoral students that will take over the onerous teaching duties. This sort of life style has nothing in common with engineering and, as in the past, so in the future attempts to bring academia into industry will lead to more fiascos.

This is a particularly devastating period for engineers when money and engineering jobs are in short supply and engineering obsolescence can become epidemic. If you should hear or read about it, contradict it so it will not spread. Let your representatives know that we need engineering work to maintain and enhance our skills. We are ready for the technological challenges of today and tomorrow. The American Engineering community will meet these challenges but, we must stay current to do so. This will only be achieved by the manpower balance between supply and demand necessary to keep engineers current and productive.

Dr. Robert R. Sinusas

Editor: Robert R. Sinusas has a PhD in engineering with more than 25 years of experience. He is presently chairman of the Professional Activities Committee for the North Jersey Section of the IEEE.

U.S. Engineers Need To Assert Leadership

National Engineers Week, February 18-24 is an appropriate occasion for this nation to take a closer look at the state of a critical national asset: its engineering base. Equally important it is time American engineers engaged in a bit of professional introspection regarding their role in our society and their aggressiveness in pursuing it.

Between 1984 and 1987 the number of American B.S. degrees in engineering fields declined by 10 percent, with the trend of decline in Ph.D.'s even more alarming. This, as well-trained engineers pour from the universities of our global competitors—the Japanese in particular—at an ever increasing rate.

Why is this? Perhaps because what passes for conventional wisdom has decreed that "America is shifting out of manufacturing and into services." Less manufacturing, one could deduce, implies a diminished need for engineers.

But those who spend their days struggling to compete with the best competition the world offers, in both services and manufacturing, see clearly that one cannot change economies like hemlines: that a nation must have a viable manufacturing base if it is to develop and maintain a viable service base. They are inextricably linked. Service industries such as TV networks sell advertising to manufacturing businesses: financial services derive much of their income from supporting the manufacturing sector, as does insurance, communications and others as well.

The link is likewise clear between productivity and the world competitiveness and the indispensable component of our standard of living: jobs.

Road building, waste disposal, infrastructure repair; space exploration and the like are all worthy and exciting uses of engineering talent and resources, but without a highly productive, world competitive manufacturing base which is the ultimate source of their funding...they languish.

To whom then, is it left to see that American innovation is dynamic enough, and American productivity growth sufficiently rapid, to win in world markets? In large measure it is the engineer, and in that context America needs to see the profession as the body guard of its standard of living. If it does: if the country perceives the nexus between a powerful engineering base and our very way of life, educational and motivational programs that will preserve and nurture that base will be more forthcoming.

But if engineering should be viewed as a key driver of American competitiveness, is that how the profession views itself? Not quite. The brightest lights are ushered toward the laboratory, the university. The compensation systems, the resources, the glory are largely skewed toward theory, toward elegance, toward self-indulgent innovation; first-of-a-kind solutions. Often the applause for the products of this system dies down when they arrive at manufacturing, and ceases altogether when they reach the marketplace. Making designs work—insuring that they win in the marketplace—is "somebody else's problem," relegated more often than not to the "less gifted" engineers, the "Mister Goodwrenches" on the manufacturing floor. Those whose businesses depend on winning in the global marketplace are slowly coming to the conclusion that our priorities are exactly wrong.

Other countries—our competitors—glorify those who create simple, producible, designs, and those in manufacturing who can keep them in motion down the cost curve. They scorn impractical "elegant" designs in favor of triumphant ones, because they see the linkage between productivity, world competitiveness, and the viability of their societies. Japan without its engineers would never have become the world economic force it is today.

The American engineering profession needs to reassert its leadership; to raise its eyes and voices, roll up its sleeves, and do again for the nation what it did a century ago: make it a winner in the world marketplace. If competing and winning—rather than puttering and theorizing—become the real stuff of the engineering career, our best men and women—our winners—will once again gravitate toward the profession, and the impending decline of American engineering will become a thing of the past.

John F. Welch Jr.

Chairman and Chief Executive Officer of General Electric Co.

Editor: This article originally appeared as a press release from the National Engineers Week Committee of the National Society for Professional Engineers (NSPE) under the title of "Competiveness: The Real Stuff of American Engineering." It was published on the occasion of 1990 National Engineers Week. It was then reprinted in the February 20, 1990 issue of "Dodge Construction News", a McGraw-Hill publication, under its present title. It is reprinted here with permission of all concerned organizations. An editor's comment is in order. Mr. Welch exhorts U.S. engineers to reassert their leadership. This is sound advice that is difficult to implement, except through organizations like AEA. Corporate America (not the engineering profession) decides what, if anything, will be manufactured, and what will be manufactured here in the U.S. To the extent that AEA and like organizations can alter this control pattern, to that and only that extent can "The American engineering profession...reassert its leadership; to raise its eyes and voices, roll up its sleeves, and do again for the nation what it did a century ago: make it a winner in the world marketplace."

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."

Reader's Voice

We set aside this column in each issue of the "American Engineer" to allow readers to voice an opinion on any professional issue they choose. Letters should be a maximum of 500 words, relevant to a current issue that affects the professional life of an engineer. Articles submitted may be longer. They 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 exerpts, we will include the writer's name, city and state in each published item (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.

From R.B. Johnson of The Structural Engineers Association of Illinois (SEAOI): - "In your letter of September 9, 1991 you asked permission to publish a cartoon you had received from SEAOI. (The cartoon of the 'Invisible Engineer.') First let me give you a little background on the cartoon. For several years I have served as public relations chairman for SEAOI. In that capacity I attempted to bring a public awareness of the engineering profession and structural engineers in particular. About two years ago I asked one of the draftsmen where I work (Alfred Benesch and Company, Consulting Engineers, Chicago) to prepare a cartoon based on ideas and a very rough sketch. I presented these ideas to Mr. Kenneth Holt, project technician at the company to develop my ideas further. As you noted Mr. Holt is artistically skilled. Over the years, I sent this cartoon to several engineering societies with the hope of its being published. To the best of my knowledge it has *never* appeared in print.

"In addition I have sent this cartoon to numerous mass media publications with the hopes of bringing a public awareness to the plight of the 'Invisible Profession.' Once again I faced rejection. I could fill pages with my failures in attempting to bring awareness of the engineering profession. Almost universally I have found that the press is just not interested in the news and activities of the nation's engineering profession excepting of course reports on our failures. Disasters make for great 'Sound Bites,' in the jargon of the media.

"As an additional comment, I have found that engineers are apathetic to their own plight. Many of the problems being faced by engineering professionals are a direct result of their own apathy. I have often heard my colleagues comment that, 'Engineers are their own worst enemy.' Unfortunately I do not see any changes on the horizon. Please be advised you *do* have my permission to reprint the cartoon."

Editor: The cartoon of the "Invisible Engineer" on another page of this issue is Mr. Johnson's contribution, besides this interesting letter. How do our readers think we can make the engineering profession "visible"?

From L. Fafarman of L.A.: - "I thought you might be interested in a comparison of a 'surplus' occupation like medicine against a 'shortage' occupation like engineering. This information is derived from the Department of Labor (DOL) *Occupational Outlook Handbook* (*OOH*). As you know, the current career life for engineers calculates to be either 18 years or 27 years, depending on whether engineering grads replace only engineering grads or replace all engineers; this figure was even shorter in the mid 80's.

"In contrast, medicine, a 'surplus' occupation has a career life of about 30 years (about 535,000 doctors and about 18,000 annual new grads). See attached pages from the *OOH*. In addition, doctors have the following factors going for them: 1. The typical career length to be compared with the turnover period is shorter than for engineers, since doctors generally start work at a later age. 2. Doctors have virtually no foreign competition. 3. Growth in the numbers of older people makes a likely increase in demand. 4 Doctors' monopoly position and widespread self-employment give them a great deal of control over fees and workload. 5. The medical profession now has one of the highest average incomes of any occupation (in the U.S).

"Please note that according to the *OOH*, the outlook for engineers appears to be quite a bit rosier than the outlook for physicians. For example, *OOH* makes no mention of the horrendous salary compression and age discrimination in engineering, but does state: 'One sign that engineering graduates have good prospects is that they have starting salaries substantially higher than those of most other graduates. Another is that most have received at least one job offer before graduation, which has not been the case for many other graduates.'

"Also note the captions on the two *OOH* profiles of engineering vs. medical degrees. Both engineering and medical degrees grew explosively in the 1970's and early 1980's and then leveled off and declined slightly in the late 80's (the decline for engineering, though still small, is relatively larger than the decline for medicine). The caption on the engineering degree profile in *OOH* is: 'The number of degrees in engineering has declined recently.' It makes no note of this explosive growth nor attempts to relate that growth to the competition for jobs. On the other hand, the caption on the medical degree profile states, 'The increase in medical degrees granted has contributed to the competitive outlook for physicians.' The *OOH* has a strange perspective on job opportunity."

Editor: A note on Mr. Fafarman's letter. "Career life" is calculated by dividing the number of practitioners in the field by the number of new entrants to the field each year. This yields the number of years it takes for new entrants to completely displace those in the field. We didn't include the referenced pages from Occupational Outlook Handbook (OOH), these are available at libraries. I agree that the OOH has distorted information. We in AEA would like to find volunteers to work with our manpower expert, Robert Rivers, to correct these distortions. The person(s) undertaking that job would have to obtain data to refute the false information in the OOH, and it would have to be rigorous. It's a big job, and our Publications Committee and Board of Directors are fully loaded right now, since they're volunteer personnel. Which of our readers would like to step forward?

From C.M. of OH: - "I read about your organization in the August 19, 1991 issue of the *EDN* magazine. I found that I share many of the concerns expressed in the article. Please send me membership information for your organization."

From C.I. of CA: - "I believe there is power in numbers and the Engineering Profession does have a voice. If the engineers desire to be heard, then we must be united. And yes we can make a difference.... Please send information on membership into the AEA."

From D.W. of PA: - "I could use several hundred applications and back issues of the newsletter for handouts. We expect heavy layoffs of engineers at GE Moorestown, NJ shortly (hundreds)."

From M.M. of CA: - "I read about your organization in a recent *EDN* and am interested in learning more about you. Please send me some literature. Thank you."

Robert Bruce, AE Editor
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Notice

We have continuing problems with the U.S. Postal "Service." Some mail has been taking a very long time to be delivered or returned when delivery is not possible. Also they have lost some small amount of mail.

AEA sends a letter, acknowledging we have received your membership dues upon receipt of those dues, and normally within less than a week. If you have not received a letter in response to your membership application within thirty days, please contact us at our Ft. Worth address, so that we may determine whether it was received. We will respond to your inquiry.

Bill Reed

Yes Another IEEE Petition

Readers may recall that we published a petition for an IEEE constitutional amendment in the March and April issues of "American Engineer." Partly as a result of our publishing the petition, it received enough signatures to get on the 1991 IEEE ballot in September. The amendment would make the IEEE VP of Professional Activities a voting-member-elected position, whereas right now this position is filled by a vote of a group called the Assembly that is a subset of the Board of Directors. Thus the IEEE Board presently elects members of the IEEE Board, which is not very democratic. The VP of Professional Activities is not the only Board member that the Assembly elects, but this is the focus of the proposed amendment. AEA sincerely hopes the amendment receives a 2/3 vote that will enable it to pass, and we'll know in November if it did. Democratization of IEEE would have a beneficial effect on engineering careers in the U.S. since this society wields a considerable influence (not always in the favorable direction).

Another petition for an IEEE constitutional amendment is now circulating. It would make <u>all</u> members of the IEEE Assembly (the same subset of the Board of Directors) ineligible for nomination to the Board of Directors, while they're in the Assembly. Following is the petition for this proposed amendment. Nine hundred signatures will get it on the 1992 IEEE ballot. I urge you to sign it and mail it to:

H. Troy Nagle, Box 7911, Raleigh, NC 27695.

Robert Bruce, AE Editor

IEEE PETITION

We, the undersigned voting members of the IEEE hereby petition for the following constitutional amendment to be placed on a ballot and mailed to all voting members of the IEEE in accordance with Article XIV of the IEEE Constitution. The purpose of this amendment is to make members of the Assembly (Delegate Directors on the IEEE Board of Directors) ineligible for election as Institute officers (the various Vice Presidential and other officer positions) by the Assembly.

Add the underlined words to ARTICLE VIII - THE ASSEMBLY. Section 1. An Assembly composed of Delegates, including Delegates-at-large, shall receive reports and perform such functions as required by law or specified in the Bylaws. The Assembly shall, at its annual meeting, elect Directors-at-large who are not Delegates. <u>A member of the Assembly may not be considered for election to any position by the Assembly</u>.

Please make copies for additional signatures.

The following Members of the IEEE hereby petition for a ballot for a constitutional amendment to make members of the Assembly (Delegate Directors on the IEEE Board of Directors) ineligible for election as Institute officers (the various Vice Presidential and other officer positions) by the Assembly.

SIGNATURE	PRINTED NAME	IEEE NUMBER (or City & State)	DATE

Please mail to H. Troy Nagle, Box 7911, Raleigh, NC 27695

Chilling Out Coast To Coast

Chief Editor John Coleman's July editorial "Soured on Manufacturing," describes one manufacturing professional's flight from US industry, citing "dissatisfaction, discouragement, frustration, layoffs, relocations, and poor pay" as reasons for throwing in the towel. This profile of a refugee struck a nerve with many of you.

From the West Coast comes a Help Wanted ad: "Engineer, Project, to assist in design , develop bills of materials, operate all tooling and equipment, make prototypes, and purchase material. Requires using micrometers and calipers and knowledge of welding. BS in Mechanical Engineering plus six years experience as project engineer required."

"This employer," writes a laid-off manufacturing engineer, "wants someone who will function as project manager, material control clerk/expediter, designer, machinest/modelmaker, buyer, and welder—all for $760 per week. You can see how the job market for engineers has collapsed in southern California in the wake of the aerospace-defense shakeout. Given the limited options available, I may also start searching outside of manufacturing for a livelihood."

An ME working for a large manufacturer in New York says that, with a bachelor's degree in industrial technology, a master's in industrial management and 10 years of steady employment, he still earns less than a New York City sanitation worker. What's more, bureaucracy blocks any recognition for outstanding achievement. The result? Mediocrity. "Ambitious, industrious employees either leave after a few years or resign themselves to the situation and stop putting in the extra effort.

"Management must find a way to recognize and reward excellent performance. We need a large dose of entrepreneurship in our major companies so the best professionals don't leave for greener pastures."

For a reader in the Midwest, money is not an issue. He is taking his BSIE, MBA, 17 years of progressive management experience in manufacturing and materials, and consistently high performance reviews, and moving on. His complaint: the political power, perks, and public praise that sales and finance receive from top management, while manufacturing gets little but criticism.

"There is no such thing as a career path in manufacturing," he laments. "Our senior VP of operations comes from finance. An operating VP of one of our major subsidiaries started off in sales. And—the final blow—a major promotional opportunity in manufacturing just went to an outsider fired by his last employer for stealing from a customer.

"I am willing to risk virtually all my accumulated assets, double my working hours, and earn less money just to have some control over my destiny, rather than leaving it to the inept, uncaring people we call top management."

Is this unrest merely disjointed ramblings from a handful of malcontents? Is it a regional issue? Or are we seeing the tip of a huge, very cool iceberg of top management indifference—just when US industry should be heating up for the fight of its life.

Rita R. Schreiber, Managing Editor

(Note: This editorial is reprinted, with permission, from the September 1991 edition of "Manufacturing Engineering", the publication of the Society of Manufacturing Engineers. Our thanks to Rita Schreiber.)

Help Wanted/Help Given

I'd like to acknowledge the help that Frederic G. Myers, PE, gave me in editing this publication. When I first took over the editorship of "American Engineer" in March, I was swamped with work. From correspondence with Fred, I learned that he had editing experience. I asked if he could do some of the editing, and he did. He edited articles that appeared in the April 1991 issue of AE and some that will appear in future issues. I like to give credit where credit is due. Mr. Myers is a principal in: FGM Consulting Services Corp., 63551 Miami Road, South Bend, IN 46614

Robert Bruce, AE Editor

Facts About This Publication

Readers should be aware that it takes about 6 weeks to produce an issue of "American Engineer," from the time all articles for the given issue are in my hands, till the time the publisher mails out the issues to the readership. Readers who wish a contributed article to be in a given issue of AE should submit it to me during the first few days of the month before the date of the issue.

Another fact about this newsletter should be obvious. This publication, like all others produced with volunteer editing, operates on the "NINO" principal (nothing in/nothing out). While I often have an editor's column, I could never write this publication in its entirety and also be the editor. Literary contributions come from the readership and the Publications Committee of AEA. When such contributions do not appear in sufficient quantity, we will have a short edition. This is not as pleasant as having a full, 8-page publication each and every month. End of story.

Robert Bruce, AE Editor

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.

APPLICATION FORM

AMERICAN ENGINEERING ASSOCIATION

P.O. Box 820473, Fort Worth, TX 76182-0473

Name: _____ U.S. Citizen: _____ Naturalized Citizen: _____

Address: _____ Apt: _____

City: _____ State: _____ Zip Code: _____

Home Phone: _____ Work Phone: _____

☐ MEMBER ($20.00) ☐ PROFESSIONAL MEMBER ($50.00) ☐ SPONSORING MEMBER ($100.00)

The difference between membership grades is the financial support and dedication to the issues. All members receive a subscription to the AEA publication "American Engineer." Sponsoring members will also receive a subscription to "The Professional Job Shopper."

SIGNATURE: _____ DATE: _____

Annual membership begins on receipt of Application. Dues in the American Engineering Association are tax deductible.

Reach Out

Reach Out to the following for specific issues:

Roger Boisjoly PE, 3047 E. Menlo St., Mesa, AZ 85213
(602) 641-0887
Ethics & Legislation re: Whistle Blowers Act, Improvements

Robert Bruce, P.O. Box 4493, Great Neck, NY 11023
"American Engineer" publication and related issues

John Densler, 42 Maple St., Auburndale, MA 02116
(617) 244-4417
Immigration issues & related Legislation; Importation of foreign students/engineers

Al D'Nak, P.O. Box 465, Plainview, NY 11803
Contract Engineering, Legislation Section 1706, P.L. 101-583, Free O.T.

Richard Plummer, P.O. Box 326, Valley Forge, PA 19481
Discrimination/Issues/Legislation

Bill Reed, President, AEA
P.O. Box 820473, Fort. Worth, TX 76182-0473
(214) 264-6428
Industrial Base, Import/Export Jobs Technology transfer

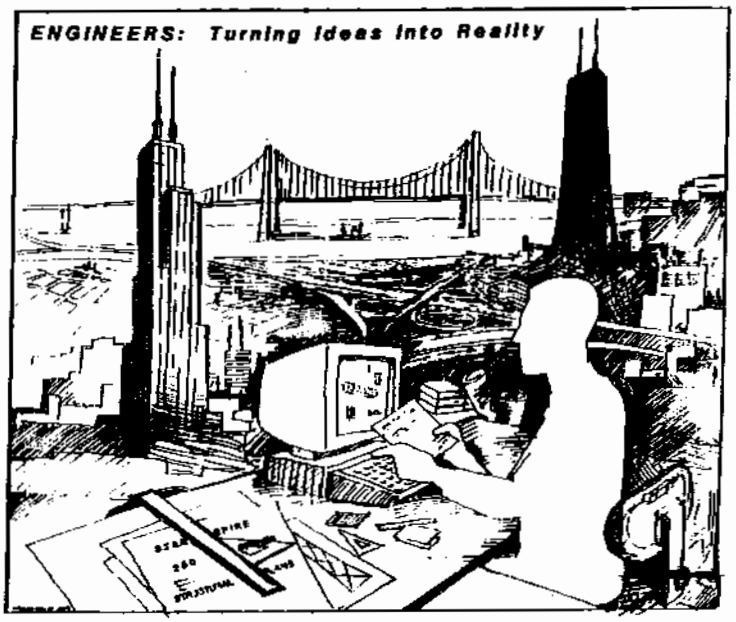
Robert Rivers, AIRCOM, P.O. Box 129, Union, NH 03887
Manpower Issues & Legislation; Employment - Underutilization; Engineer Shortage Propaganda (ESP)

Richard Tax, Vice President, AEA
P.O. Box 2012, River Vale, NJ 07675 (201) 664-0803
Issues, General & further information

R.T. Pinkerton, Staff Cartoonist
P.O. Box 820473, Ft. Worth, TX 76182-0473
Ideas and subjects for new cartoons

AEA Brochure

AEA has recently published a brochure to introduce the AEA to the members of the engineering community. This is available to all interested parties wishing to know more about the AEA. Reach out to your associates with this new brochure. It will help you present AEA to them and all potential members. Our strength is with the engineering community: the more members we have the more clout you will have. Members can obtain multiple copies by writing to AEA, c/o Richard Tax, P.O. Box 2012, River Vale, NJ 07675. If you can, please send a business size SASE to help cover the cost of postage.



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