

Women Engineering: In the Age of Information Technology

Milind S. Mali* Dr. Parimal V. Mandke**

Abstract

This paper presents some reflections about women engineers in the workplace. Is the corporate atmosphere more breathable for women now than 10 years ago? Is the explosion of information technology the change women engineers were waiting for? Can we, as engineering educators, influence corporate policy and prepare women for the jungle out there? These are some of the questions for which we need answers now, in the eve of the new century. Solving the problems they encounter in the work environment will make engineering more attractive for women.

1. Introduction

After decades of discussions, conferences, initiatives and special programs, we are still debating how to attract talented women to, and retain them in, scientific and engineering careers. Since engineering is ideally an activity focused to improve our day to day quality of life, it is a shame to waste the talent and energy that women could bring to the profession. After a peak of 15% women out of the total number of graduates in the engineering class of 1987, statistics in the India have not improved. Only 9% of all practicing engineers in the India are women.

2. The need for women in Engineering

Ten years ago, in the midst of the computer, microelectronics, aerospace explosion, we were concerned about the impending shortage of engineers. Everybody, from government agencies to educators to private corporations, was talking about attracting women to engineering. The nineties came with corporate

restructuring and unbelievable productivity increase for engineering activities. Some thought, *maybe we don't need so many engineers after all*. Enrolment trends in colleges and universities already show this underlying opinion. Do we still need to attract women to engineering? Definitely Yes. Here are some arguments:

Our life is more and more dependent upon the life of the *global village*. Our daily existence is affected by surprisingly remote events in this world. This is the effect of a global economy, of the unique market finally established during the last decades of this century. The maintenance and improvement of our standards of living are conditioned by our ability to compete in the global economy. To maintain our edge in high technology, we have to employ the best engineers and scientists. As Microsoft Chief Technology Officer, Nathan Myhrvold, explained:

“There are breakthrough ideas we are waiting for someone to have. The smaller the number of people in industry, the fewer of those ideas we

*Asst. Prof. in Mech. Engg., Smt. Kashibai Navale College of Engg., Vadgaon (Bk.), Pune – 41.

**Director, NIIT Head Quarter, B-64 (FF), Gulmohar Park, New Delhi-110049.

will get. That's more in focus in our industry because growth is directly related to human talent [8]. To get the best, the most simple and logical method is to increase the pool of candidates. *By having women join the pool, we could almost double it*".

- Markets are driven by consumers. More than 50% of consumers are women. If those designing the goods are able to relate to the female section of the population, there is a better chance of winning the competition. *Industry needs women designers.*
- Another strong reason pushing corporations to encourage women employment is women's talent in improving the work environment. This is an important consideration, especially now with the flourishing of team work and new avenues in participatory management. Women excel in verbal and interpersonal skills and are very good collaborators.

More women will join the engineering profession. This will follow naturally in the coming years with the pressure of a good job market in many areas like computer software and hardware, and electrical engineering. But having women join the profession is not the only consideration. Even if we have women engineers, we have to convince them to remain in engineering, and this is simply not happening. We must do something about it.

3. Challenging Difficulties in the workplace

When asked why they have chosen engineering, women students often refer to the challenge [3]:

- The challenge of mastering such difficult and complex subjects,
- The challenge of solving practical problems,
- The challenge of *creating things that works*.

Since usually very good and talented women go into engineering programs, they are often top of the class and they rise to the challenge. The

real challenge for a woman engineer comes when employed. To be a minority in a male dominated profession implies all kinds of barriers. It is the culture of engineering; sometimes with competition opposed to cooperation; sexist perceptions and attitudes; and salary discrepancies [1][5]. Women engineers still fight *the glass ceiling* which stops the promotion to higher managerial positions. But all this is slowly changing. More and more women have demonstrated tremendous talent in the profession and succeeded in gaining recognition and respect [3][4].

Nevertheless, a new battery of difficulties are fought by the professional woman of the nineties; problems arising from the global market and fierce competition in high-tech industry. The *fatherly* company which granted employment for life has become a myth. We have to produce more, better and cheaper. The result is a much longer and much more intense workday. This is in direct conflict with a normal and more traditional family life.

One of my friends, a software engineer for a big high-tech company, told me that one night, whilst working on the final stage of an important project: *At 7:30 pm, I felt the urge to go home and be with my two daughters before they went to bed. I got up from my computer terminal. Everybody in the lab acted like I was leaving for the moon.*

The difficulties of balancing an engineering career with family commitments can make women enjoy their career less, even to the extent of quitting and renouncing the whole educational and human investment in their chosen profession [7]. This is a very costly waste for a society.

4. Solutions to retain women engineers in the industry

The corporate world cannot afford to *reverse discriminate*. Women engineers will not be encouraged to see more of their families than men. Nevertheless, many corporations have

started taking steps toward creating a better environment for women [8]. Some examples:

- Exciting and personally satisfying work is assigned to women.
- Continuous education opportunities.
- Salary incentives on hiring of women. Starting salaries are slightly higher for women engineers [5].
- Flexible time.
- Family leaves programs.
- Mentoring and support groups for women.
- Intolerance of sexual harassment and sexist attitudes.

One possible solution, which looks more and more applicable, is the *virtual office and laboratory*. Working from home will solve the balance of family life with one's career. This trend was predicted by economists 15 years ago, but, after a spectacular start, it did not generalize. The technology is in place, but engineers log in from home usually only in the late hours of the night.

The paternalistic instinct of managers still dominates. But this obsolete attitude has no place in a profession with high ethical standards. Women engineers should be trusted to work more flexible hours and places if we, as a society, want to profit from their creative talents.

5. What can engineering educators do to encourage women in engineering?

Numerous studies indicate the persistence of traditional differences in the upbringing and education of young men and women. College educators can bridge the gap. Some steps to take when teaching female students are:

- Stimulate creativity.
- Stimulate independence.
- Teach assertiveness.
- Be equally demanding with students regardless of gender. Women students do not need, and do not like, to have preferential

treatment.

- Be supportive of students' professional choices. They do not want to hear sexist remarks like: *Maybe software is better for a woman*.
- Talk about *the jungle out there*. Prepare the students for the rigours and competition in the corporate world. Show the difference between industry and the protected academic environment.

Another strongly positive means for academics to support female engineering graduates is to be involved with industry. Academics' positive influence can be through:

- Participation in professional societies: ISTE, IE, IEEE, Society of Women Engineers.
- Helping industry recruit women.
- Participation in industry-academic projects involving women.
- Influencing corporate policies.

6. Conclusion

With the wide use of computers in all engineering activities and the Net, the location of many engineering tasks could become irrelevant. This will add more flexibility to the engineering profession, making it more attractive to women to work in the 21st century.

References

1. National Research Council, *Women Scientists and Engineers Employed in Industry - Why So Few?* National Academy Press (1994).
2. National Research Council, *Science and Engineering Programs - On Target for Women?* National Academy Press (1992).
3. McIlwee, J.S. and Robinson, J.G., *Women in Engineering: Gender, Power, and Workplace Culture*. State University of New York Press (1992).

4. Carter, R. and Kirkup, G., *Women in Engineering - A good Place To Be?* McMillan (1990).
5. Society of Women Engineers, *A National Survey of Women and Men Engineers* (1993).
6. Kent, C. and Stublen, A.P., *Women in engineering: challenges and opportunities. Industry Applications*, May/June (1995).
7. DiTomaso, N. and Farris, G.F., *Diversity in the high-tech workplace. IEEE Spectrum*, June (1992).
8. Sattin Metz, S., *Glass ceiling lifts for women engineers. Design News*, August (1993).



Attention : All Subscribers and Specially Librarians

Kindly Note:

1. Ours is a quarterly journal and not montly. It is published only in the months of July, October, January and April of the year.
2. The actual despatch may be delayed some times, by a month or so, but not beyond that. Hence, kindly report non-receipt within 3 months i.e. before the month of the next publication.
3. We send our invoice in the month of April/May for those whose subscription period commences in July and in December for other whose subscribing period is January to December.

But generally, we find our invoces are totally neglected by the customers and they ask for a fresh invoice at any time in the year. This may kindly be avoided.

4. **All subscribers to please note that we continue the supply even when the subscription period has ended, without waiting for their renewal request. In case you wish to discontinue, please inform us to that effect.**
5. We would very much appreciate prompt yearly payment of subscription, so as to avoid the necessity of sending reminders from our end.

Prof. N. V. Ratnalikar
Editor