

The plight of SA women

Of the registered professional engineers in South Africa, only 238 are women, whereas 15 534 are men. To elucidate the factors that attract or repel women from pursuing engineering careers, Leon Liebenberg, a senior lecturer in mechanical engineering at the Rand Afrikaans University, interviewed a few female engineering role models.

South African universities deliver almost 1 800 engineering graduates annually, of which only 8% are female. Furthermore, most women who find their way into engineering do not thrive professionally, and many leave the profession.

One of the few who have made it to the top ranks of the profession is **Allyson Lawless**. She made her mark in history when she became the first female president of the South African Institute of Civil Engineers, which has 7 300 members.

Lawless also runs her own engineering company, specialising in the production of infrastructure-development software.

"Once through university and into an industrial environment, many women engineers report that technical competence and congeniality alone are inadequate for survival, let alone success," comments Lawless.

"In fact, vigilance, bulldog determination, and fierce independence are necessary defences against subliminal messages of inferiority, indifference and isolation that are often sent from colleagues and bosses.

"This unfair treatment causes many women to quietly leave the profession."

Her statements are corroborated by research findings of the Institute of Electrical and Electronic Engineers (IEEE) in the US.

It was also found that the low percentage of women engineers is not unique to South Africa – in

the US, a paltry 8.5% of all engineers are women, whereas, in Japan, it is 2.9%, and 22% in France.

Lawless explains that people still do not expect to meet women engineers.

Men, especially, are sceptical about women engineers: "There seems to be this powerful assumption that engineering simply isn't a field that could or should attract any significant numbers of women."

Wendy Richards agrees with this statement. She is managing director of LaserM, a company which has won several design excellence awards, including the prestigious State President's award for export achievement.

"I recently had to deliver a technical paper at a conference in the US.

"Upon presenting myself to the session chairman, he enquired whether I was the travel agent!

"People worldwide don't expect to meet successful female engineers", says Richards. Her daughter, **Karen**, is marketing director of LaserM.

The glass ceiling is also still prevalent in engineering and other high-tech firms.

It is true that the pool of technically-trained women to bring into the top ranks of management is small.

In the US, less than one in ten engineers is a woman (one in 75 in South Africa). Even so, far less than 10% of the chief executive officers or technical directors in high-tech US firms are women.

The lack of career advancement remains an issue of great concern to women engineers.

In Europe, only an estimated 30% of women engineers become managers and 20% reach the position of chief engineer or company director.

RAU Department of Electrical and Electronic Engineering acting head Prof **Beatrice Lacquet** says that, for some women, entrepreneurship may be a rewarding alternative to engineering.

"Many of the things that engineers do well, such as planning, thinking logically, and creating innovative solutions to problems, are transferable skills much in demand by the rest of society," she comments.

"Thus, if a good engineer decides to change his or her career, it is relatively easy to find an opportunity elsewhere, often in a completely, or apparently, unrelated field."

Mathematics and science are prerequisites for engineering studies at university.

In South Africa, girls match or exceed boys' achievements in mathematics and science consistently, as measured by course final marks and by aptitude tests. Why is it, then, that so few girls opt for engineering studies?

Lawless states that schoolchildren do not really know what engineering is.

Also, few girls are encouraged by high-school teachers to go into engineering, says Lawless.

"Fortunately, there are several successful intervention programmes through various engineering societies and institutions to encourage young women to take mathematics and science at school, and to consider engineering as a career."

Another discouraging force is that fewer girls than boys ever talk to their parents about science and technology issues.

It is also mainly boys who enjoy taking things apart and putting them back together again.

Lacquet advises that an enquiring mind is crucial for engineering studies; however, some students study engineering for quite the opposite reason; they are challenged by their fear of machinery, or for taking things apart.

Lacquet is highly rated worldwide, and has enjoyed tenures at the prestigious Massachusetts Institute of Technology (MIT) and at the University of Alberta.

Production of engineering graduates

Country

South Africa	5
Average or peer group*	9
Italy	12
Egypt	17
Australia	28
Canada	37
UK	42
US	42
Germany	48
Japan	74

Approximate number of engineering graduates per 10 000 of the population

*South Africa's peer group countries include Albania, El Salvador, Fiji, Jamaica, Mauritius, Syria, Tunisia, Costa Rica and Cuba, based on similar GDPs per capita (ie \$1 000 – 4 000)



Allyson Lawless

in engineering



Beatrice Lacquet and students

number of women in this field is, in part, tied to the public image of engineers, as revealed by popular television shows. Lawyers have *Ally McBeal* (and let us not forget *LA Law*), doctors have *ER* and *Chicago Hope*, and architects currently have the soapy *7 de Laan*.

These professional people are portrayed as being highly skilled and earning high salaries.

Engineers have no equivalent to these highly successful and influential television shows.

Furthermore, little media attention is given to engineering achievements, thereby denying the profession and individual engineers the respect they deserve.

The image of engineering is limited to ecological crises, to global warming, to pollution, and to the evils of modern technological society; and so young people shy away, especially in Europe, where the citizens are particularly ecosensitive.

The youth there perceive engineering as the cause of the trouble rather than the solution.

A significant discouraging force remains the fact that there are few female role models in engineering.

The image of the engineer contrasts with the image of figures in Western society that teenagers consider heroes.

Young people do not see glamour and immediate social benefit in real engineering.

Talking about hormones and intellect, men and women differ in the way that they solve intellectual problems.

Gender differences in problem solving have been studied systematically in adults in laboratory situations.

A recent special report by *Scientific American* shows that, on average, men perform better than women at certain spatial tasks. They also outperform women in mathematical reasoning.

Women, on average, excel on tests that measure recall of words. They also tend to be better than men in performing precise manual tasks. Women also score higher on mathematical calculation tests.

Wendy and Karen believe that women bring special qualities to the practice of engineering, including perceptiveness, caring and relationship building.

"Women tend to have good personal skills of co-operation and communication," says Karen.

"We also tend to be better listeners and are better at thinking of the little things."

While one needs mathematics and science to study engineering, the profession is primarily about problem-solving in real-world situations, they say.

"To be successful in engineering, your required people skills and creative problem-solving skills far outweigh the need to deal with the hard sciences," explains Wendy. "This makes engineering fun and highly challenging."

Lacquet advises that, as a woman engineer,



"one should always surround oneself with people pursuing similar goals and who are passionate about attaining those goals.

"Be honest; don't be submissive; never abuse your womanhood to further your engineering goals; be conservative, but be yourself.

"You need not be a feminist to succeed as a woman in engineering; also, don't expect special treatment or privileges because you're a female in a male-dominated profession."

But, to produce more engineers, a better grounding in mathematics and science for all citizens is not only a matter of making good on the South African promise of equal opportunity.

It is a pragmatic necessity if South Africa is to become economically competitive on a global scale, says Lacquet.

In the era of a global technology-based economy, education is the country's most important determinant regarding its competitiveness.

In the end, people are the ultimate asset in global competition.

But an important further step will be to extend the pool from which engineers are recruited by bringing in more women, more racial minorities and more of those who have not participated due to economic, social and educational disadvantages.

Lawless, whose infrastructure-development software has been used in large projects across the world – an airport in Grenada, ten new sports stadiums in Botswana, a 400-km-stretch of freeway in Ethiopia, most of the toll-roads in South Africa, mine headgear, and kilometres of conveyors – is positive about the future of engineering in South Africa.

She enthuses about the role of aspirant and practising women engineers: "No time in history is nearly as exciting and glorious as that which is still coming."

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Karen and Wendy Richards

Parents have been found to discourage women entering what is traditionally men's professional career territory.

Nevertheless, today there is a crucial mass of women studying engineering, so they no longer need to feel like pioneers.

"I was the only woman civil engineering student at the University of Natal in 1973," says Lawless.

"I found myself at the mercy of 250 male students, who unapologetically took the mick, and without a sense of humour I would not have survived."

Of the women who are either practising engineers or are studying engineering at university, the majority have a father or brother who is an engineer.

Another problem is that child-rearing is still seen as primarily the woman's responsibility. The majority of female engineers are married to engineers, so they are in two-career families.

But the majority of male engineers are married to women who are not career-orientated, such as sales assistants or secretaries. So, for women engineers, the family and the children become a drag on their careers.

Although Lawless reports that she has been harassed countless times in her career, she is not intimidated by such actions.

"By not being intimidated, the perpetrators themselves become intimidated or embarrassed and give up," she reckons.

The paternalistic attitude of some male managers in the engineering industry is illustrated by their reference to women co-workers as 'girls'.

A study, conducted by the University of Cape Town, found that this denigrating practice is often used in industry to remind a woman of her 'subordinate place'.

Lawless is of the opinion that the engineering profession has progressed tremendously in gender enlightenment. However, she cautions that a complete social transformation will take time.

"One cannot instantly change the attitude or behaviour of individual men who have grown up in a different era.

"You have to laugh at some of the actions, but report those that become disturbing or are illegal."

South African labour policies have contributed to the transformation of many companies into female-friendly environments.

Looking at the image of engineering, the low