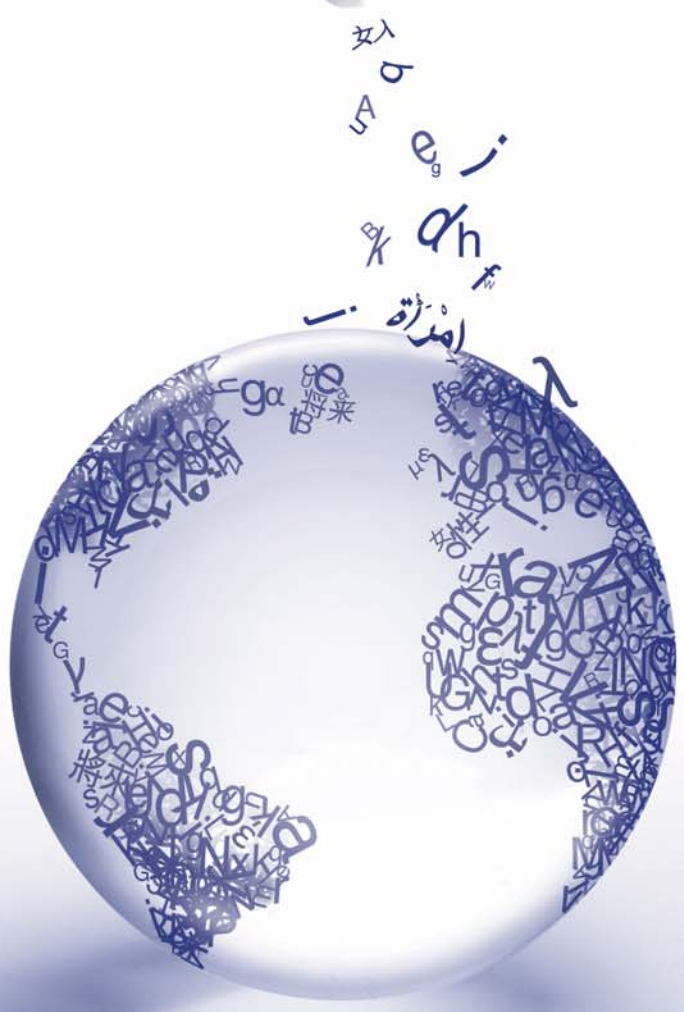




Portrait of Women Engineers 2008



SciTechGirls
WOMEN'S FORUM
FOR THE ECONOMY & SOCIETY

Building the future with women's vision

Portrait of Women Engineers 2008

Women's Forum Survey - *SciTechGirls* project

SciTechGirls is a program initiated by :

L'Oréal
Orange

Institutional Partners :

École Centrale de Paris
École Normale Supérieure
Ville de Deauville

Private Partners :

Accenture
Areva
GDF Suez
Intel
Lenovo
Microsoft
Thales

Chairwoman and Founder of the Women's Forum Aude ZIESENISS DE THUIN

Chief editor Claudine SCHMUCK (project SciTechGirls)

With the contribution of : Chantal DARSCH (CEFI),
Marianne RODOT (FEMMES INGÉNIEURS),
Marie-Hélène THERRE (FEMMES INGÉNIEURS),
Gérard DUWAT (CNISF)

Graphic design Catherine MARTIN (PAGIMAGE)

Survey based on exploitation of national survey conducted by the **CNISF (National Council of Engineers and Scientists)** in 2008, in cooperation with the **CEFI (Survey Committee on Engineers Education and Training)**, data 2007/2008.

The reproduction and use of informations are authorised provided the source is acknowledged.

Contents

Preface	5
Foreword - Portrait of Women Engineers in 2008	7
1. Who are the women engineers in 2008?	9
Women engineers make up 17.7% of all certified engineers	9
Women engineers are younger than the men	9
27.5% of engineers under 30 are women	9
Social origin	10
2. Where do they come from?	11
Qualifying as an engineer	11
Routes into engineering schools	11
In all areas the proportion of women is under 50%	11
What are the specialisations chosen by women?	12
The different specialisations constitute a strong element of differentiation of women engineers	12
The biggest positive gaps are found in agronomy, biosciences and agri-food and in chemical engineering	13
The biggest negative gap is found in Information and Communication Technologies (ICT)	13
New trends are emerging among women engineers under 30	14
3. What do they do?	16
Being a woman engineer is an asset on the French labour market	16
More than nine out ten women engineers are in work	16
Among women engineers working with executive status, more than 9 out of 10 have stable contracts	17
The proportion of women engineers seeking work is 5.5%	17
What activities do they move into?	17
Except for general management positions, men and women engineers perform similar activities	17
R & D, applied engineering, quality and environment are the activities in which women are most present	18
Women engineers and computing: an opportunity not yet grasped	19
What are their responsibilities?	20
Functional and technical expertise is the primary competence recognised in women engineers	20
A higher proportion of women manage small teams	20
The organisation of their professional life	21
For family reasons, one woman out of seven opts for part-time work	21
A higher proportion of women regularly work 5 to 10 hours overtime a week	21
Their professional satisfactions	22

4. Where are they?	24
Companies employing women engineers in France	24
More women are present in the primary sector	24
Government departments and the agri-food industries are the two fields where women are more present	24
As in other sectors, the Paris region is the primary employment zone for women engineers	26
Trends in the labour market in 2007	26
Computing services, engineering services, energy, agri-food and civil engineering were the biggest engineer recruiters in 2007	26
In about one third of the sectors, the recruitment of women is equal to that for engineers overall	28
Analysis of recruitment by type of activity confirms the position of women engineers in the areas of research and production	28
The proportion of jobs taken by women engineers in the public or quasi-public sector remains higher	29
More recruitments of women engineers under 30	29
5. How much do they earn?	30
General data on 2007 salaries	30
The gap between men's and women's salaries increases with age	30
Breakdown of salaries	30
2007 salaries according to some major criteria	31
Median and average salaries by year of starting work as engineer	31
Salaries by dominant activity	31
Salaries by sector of activity	34
6. Methodological note	36
The various meanings of the word "engineer"	36
References to the world of engineers tend to be masculine	36
The population of certified engineers	36
Structure of the sample	36
Engineering schools taking part in the survey	37

Preface

Portrait of Women Engineers

A year ago we launched the Deauville Statement during the Women's Forum and *SciTechGirls* project was born; it is an international program, that we are steadily developing with the backing of the institutional partners and leading private companies, as well as an exceptional "marraine" : Claudie Haigneré. The goal is clear : encourage women to move into Science and Technology.

The aims of *SciTechGirls* are modest yet ambitious. The programme must enable a better understanding of why women are under represented in science. It must also include concrete actions at ground level, which enable all generations of women to meet and discuss.

First step in our approach, "*Portrait of Women Engineers*" is a study that we are launching this year with the support of CNISF¹, CEFI² and "*Femmes Ingénieurs*". It addresses a priority that has been identified by the European Union for years, namely the need to know in greater details the profile, the origin and the type of jobs of women engineers.

In order to develop a survey that would be easily accessible, it is focused on answering five key questions: "Who are the women engineers?", "Where do they come from?", "What do they do?", "Where are they?"; And finally, "How much do they earn?".

As Marie-Hélène Therre, President of *Femmes Ingénieurs* explains in her Foreword, this study brings to light several significant phenomena, among which :

- overall, a degree in engineering is now a clear asset for a woman on the French labour market,
- there is still a gap between men's and women's salaries in this sector,
- there is now a strong female presence in some specialisations (mainly agronomy, biosciences and agri-food),
- on the contrary, there is considerable reluctance to undertake specialisations such as information and communication technology, yet the study also shows that the sector which recruited most engineers in 2007 was IT!

These results compel us to continue to move forward, and investigate further.

If our first goal is to build awareness on these issues from all meaningful decision makers (economical, sociological), we have to go further by conducting ground actions. It is our conviction that mentalities can evolve by stimulating meetings, exchanges and dialogs.

This is why for the second year, 150 high school students will be invited to attend the *SciTech-Girls* day in Deauville. During that day they will have the opportunity to meet remarkable role models in Science and Technology, this will enable them to verify if their perception of careers in these areas fits with the reality experienced by these role models.



1. Conseil National des Ingénieurs et des Scientifiques de France : National Council of Engineers and Scientists of France.
2. Comité d'études sur les formations d'ingénieurs : Committee of Studies on the Trainings of Engineers.

This is also why we will continue to create opportunities for girls, parents, teachers, decision makers and media to meet, exchange in order to leverage existing best practices.

Right now we will focus on sharing the results of this survey "Women Engineers in France" with all attendants of the next Women's Forum in Deauville. I thank all of those who have contributed to this survey.

Enjoy this reading!

Aude ZIESENISS DE THUIN

Chairwoman and Founder of the Women's Forum

Foreword

Portrait of Women Engineers in 2008

Based on the 19th CNISF survey

analysed for the Women's Forum in 2008

The association *Femmes Ingénieurs* is delighted that the Women's Forum has taken the initiative of producing this study of women engineers, based on periodic analysis (broken down by gender) carried out over the last fifteen years and more on the basis of the socio-economic survey by the *Conseil National des Ingénieurs et Scientifiques de France* (CNISF - National Council of French Engineers and Scientists), thus leveraging the use of existing data.

This report is a statistically-based overview of the place of women graduates from French engineering schools based on responses to a questionnaire specially designed for members of these alumni associations.

Do women have an equal place to that of men in the engineering professions? That is the question this report seeks to answer. Few occupations have this kind of factual knowledge of their own profession, stretching back several years. We do indeed need to "count ourselves in order to count" in the eyes of society! Today there are almost 170,000 certified women engineers – 17.7% of all certified engineers – and on average we are younger than our male counterparts.

Historically, the occupation of engineer was traditionally non-feminine, and training courses only started to open up to women in the 1970s, just a few decades ago!

In the questionnaire, a series of questions dealt with the perception of the opening-up of the engineering profession to women: more than 30% of women and also men have no opinion on greater participation of women in the profession, and are even surprised by or react in other ways to these questions in their commentaries. In any case, 40% of them do not know whether it is under way!

Furthermore, more than 60% of the engineers who answered the questionnaire do not know whether their employer draws up a "report on the comparative situations of men and women", the instrument of a policy of professional equality, and/or has set up specific provisions to assist women's careers.

How can our engineers, who are so curious in their jobs, at the cutting edge of innovation, be so unaware of their own profession and the place of women engineers within it?

The feminisation of the engineering professions could be greater: whatever they themselves may think, girls are as good at science as boys: in the 2006 scientific baccalauréat, 49% of the girls, compared to 42% of the boys, achieved better than "pass" grades. But women make up only 27% of the students in the engineering schools, and the statistics of *Femmes Ingénieurs* show a flattening-out of this proportion in the last five to six years, after strong growth in the 1980s and 1990s.

The chapter "Where do they come from?" provides essential information on their previous education before entering engineering school – it is similar to that of their male counterparts. As regards the specialisation chosen at engineering school, new trends can be observed; although the majority continues to opt for biological science and chemistry. The knowledge we have gained through our inquiries enables us to ask: is this through real attraction, a passion for the subject, or a lack of transparency and visibility, of other engineering specialisations?

In the chapters "What do they do?" and "Where are they?" it becomes clear that women engineers are present in all sectors of activity, but not in a uniform way, and they work predominantly in the private sector. They are breaking through the glass walls, the invisible barriers

that confined them in the 1980s to activities such as documentation, teaching or laboratory research. Nowadays, they are more present in research and development and applied developments departments. They are moving into new sectors of activity such as environment and sustainable development, and jobs in quality control, hygiene, safety and environment. Innovation is being pushed forward by women engineers, although unfortunately not yet in all areas. The feminisation of the engineering professions stops where the obstacles linked to practices within career paths start to come into play. In terms of the choice of sectors of activity, they leave the sector of computing, the internet and multimedia, for reasons that remain to be clarified, but which appear to be related to a working environment that seems to them to be more constraining.

It is interesting to note that, overall, 87 % of women engineers work more than 90 % of full-time, with a minority exceeding 10 hours overtime a week.

The feminisation of the engineering professions also stops where responsibilities begin. While young women engineers occupy posts similar to those of their male counterparts, fewer of them start their careers with executive status. Although their functional and operational competences are recognised, major operational responsibilities and access to higher levels in the hierarchy seem to be distinctly more limited for women. Our *Femmes Ingénieurs* statistics show that this situation is not changing, despite the increase in the number of women engineers in the last twenty years. The glass ceilings are still in place.

In the chapter "How much do they earn", we note that women engineers continue to be less well-paid than men, around 7 % less for the under-30s and almost 20 % for the more experienced.

For *Femmes Ingénieurs* there is nothing new about this; but, for the first time, the question was asked: "Do you think that, at equal levels of competence, the salary of a woman engineer is penalised in comparison with that of a man in your company?" Almost 50 % of the women and almost 30 % of all engineers answered "Yes". Although this question is still taboo in France, the engineers answer "Yes" and show that they realise there is inequality. QED ?

Being a woman engineer is an asset in 2008 in the French working world and internationally, for the woman herself in terms of professional situation and personal satisfaction (see the chapter "Where are they?") and also for the organisations that seek them, as shown by the data presented in the chapter "What do they do?"

Let us hope that this statistically-backed review of the situation will raise awareness about the place of women engineers and contribute to a better understanding of the world of the engineers.

Our greatest wish, as an association active on the ground and recognised at several levels – secondary education, higher education, institutions and the world of work – is that this document will lead to constructive dialogue between young women and their educators and parents about their future vocational and life projects, and also the identification of opportunities for positive action by institutional decision-makers and managers so that women come to have a place equivalent to that of men in the engineering and scientific professions.

We wish all of you, both women and men, enjoyable reading!

Marie-Hélène THERRE

President of Femmes Ingénieurs

Vice-President of the World Federation of Engineering Organisations (WFEO)

President of the WFEO Standing Committee on "Women in Engineering" (WiE)

1. Who are the women engineers in 2008?

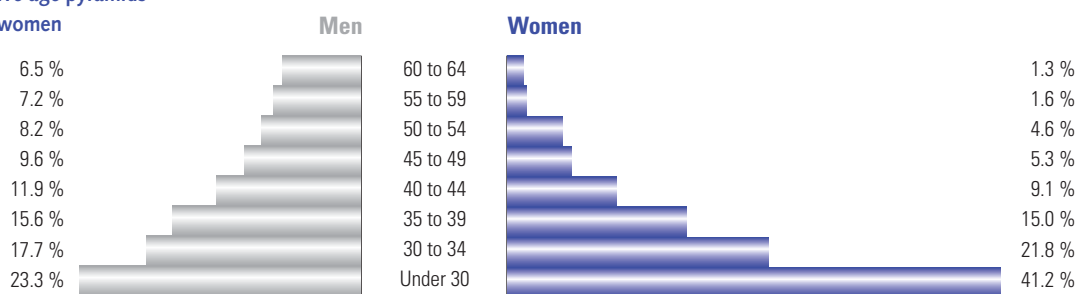
Women engineers make up 17.7 % of all certified engineers

Although the number of certified women engineers is growing, the proportion of women remains low: they make up 17.7 % of the 662,800 certified engineers under 65. As the EU's Directorate-General for Research observes, in France and in Europe as a whole the profession of engineer is the one in which the proportion of women remains lowest relative to other scientific domains (for example, women make up 53.4 % of those working in the biosciences³). Moreover, when one surveys the area of certified engineers working in large organisations (private and public) and having executive status (total : 342,200), this percentage falls. 16.7 % of these working engineers are women.

Women engineers are younger than the men

Three out of four women engineers are aged under 40. The average age of women engineers is 33.5 years whereas that of men is 39.3 (overall average : 38.3), a consequence of the growing feminisation of engineering schools.

■ Comparative age pyramids for men and women



27.5 % of engineers under 30 are women

The feminisation of engineering schools started in the 1970s. The growing proportion of women training as engineers and the growing number of engineers graduating each year have led to a very strong rise in the number of women engineers in the youngest age group, the under 30s, in which there 48,340 women, as opposed to only 1,570 aged 60 to 64.

3. Source: "She Report", Eurostat Education Statistics - DG Research, 2006. This estimate includes women active in the biosciences, other than engineers.

This is also illustrated by the following table :

■ **Trend of number of women graduating from engineering schools and as a percentage of total number of certified engineers since 1964***

Year	Female graduates	Female graduates as % of total
1964	281	4.2%
1968	371	4.5%
1972	422	4.7%
1975	710	7.1%
1978	1194	11.1%
1983	1756	14.2%
1987	2447	16.8%
1991	3094	19.2%
1995	4565	21.8%
1999	5321	22.6%
2003	6313	24.6%

(*) Source: Catherine Marry and CEFI (for 1995 and 2003, the data concern only initial training).

However, following a significant and constant increase until 1995, the proportion of women among engineering school graduates has remained static at around 25 % for several years. Thus the fact that in the survey 27.5 %⁴ of engineers under 30 are women conceals another preoccupying fact: the percentage has not grown for some years.

Social origin

There are few differences as regards the fathers' occupations, but female engineers more often have working mothers than engineers overall (68 % as against 58 %). The four-point difference stems from the strong presence of the daughters of female teachers (18 % as against 14 %). The role of parents, and here more especially of mothers as role models or "influencers" seems to be particularly important.

■ **Breakdown of women engineers by parents' occupations**

Occupation	Mother	Father
Head of company, professions	4.5%	13.2%
Engineer	1.5%	17.0%
Other executive or equivalent	10.9%	23.7%
Intermediate occupation (technician, supervisor, etc.)	7.5%	9.2%
Clerical	19.8%	7.6%
Manual	1.7%	5.4%
Self-employed	2.1%	3.6%
Farmer	2.5%	4.2%
Teacher	18.1%	9.1%
Other (housewife, retired, non-working)	31.5%	7.0%

4. This proportion exceeds the real weight of women in the population because they take part in the survey more readily than men.

2. Where do they come from?

Qualifying as an engineer

✦ Routes into engineering schools

Engineers trained in schools certified by the French Commission des Titres d'Ingénieurs all graduate at the level baccalauréat + 5 years⁵, but they may have entered those schools through very different routes. However, the routes taken by men and women are similar.

■ Schooling before entry into engineering school

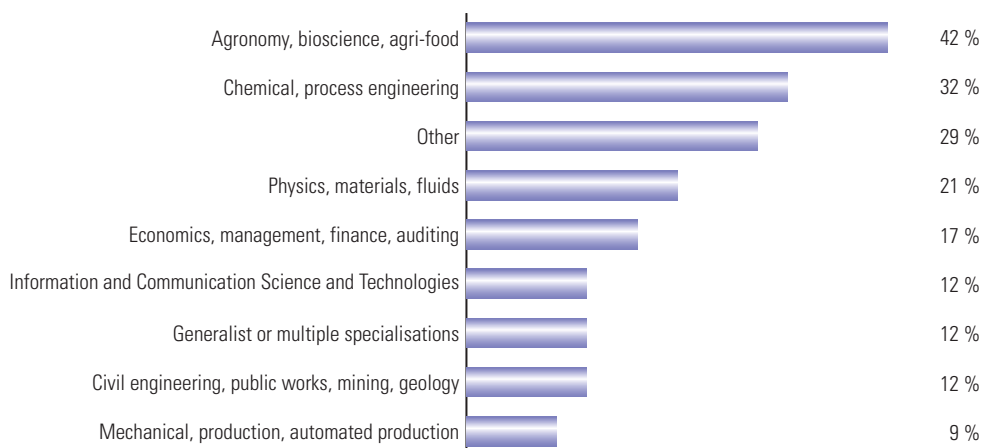
Schooling	Women	All
Baccalauréat	24 %	23 %
Preparatory classes*	52 %	53 %
DUT**	6 %	9 %
BTS	2 %	3 %
DEUG, other Bac +2 or 3 courses	9 %	7 %
Bac + 4 (Maîtrise) or more***	7 %	6 %
Other	0.7 %	0.8 %

(*) *Classes Préparatoires aux Grandes Écoles* (CPGE): The *Grandes Écoles* are the main channel for education in Engineering, Management and certain scientific fields such as life sciences. Entry into a "Grande Ecole" is not achieved the same way as into other higher education institutions. They recruit students in a very selective manner at a national level. It involves the passing through one of the 200 preparatory classes lasting at least two years after successfully passing the baccalauréat.
 (**) The BTS, DUT, and DEUST are technology-oriented degrees, and the DEUG is awarded for general studies. The BTS courses are offered by "lycées" (schools), while DUT, DEUST, and DEUG are awarded by universities.
 (***) i.e. certificate of secondary education plus four years of University education.

✦ In all areas the proportion of women is under 50 %

Concretely, although there are disparities from one specialisation to another, the proportion of certified women engineers is under 50 %. The areas in which they are most strongly represented are agronomy, the biosciences and agri-food; they make up 42 % of the 70,040 certified engineers in this specialisation.

■ Proportion of certified women engineers by specialisation (as percentage of total number of certified engineers)



5. i.e. certificate of secondary education plus five years of University education.

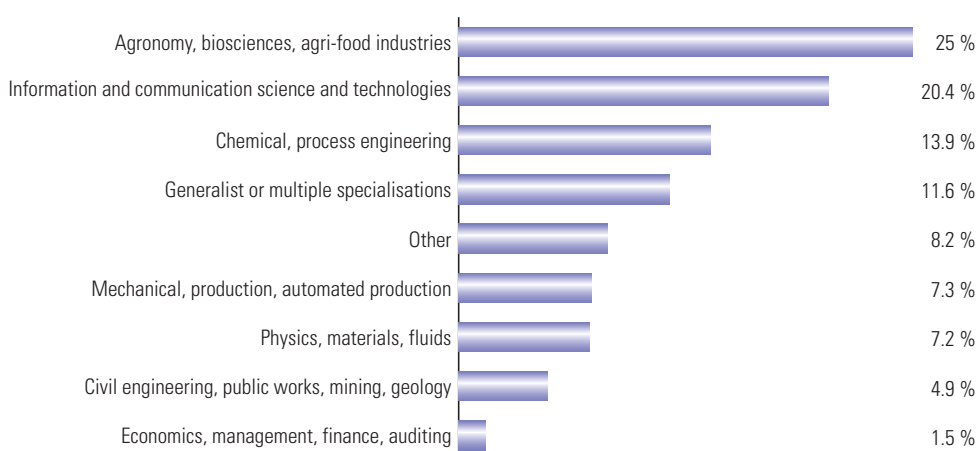
What are the specialisations chosen by women?

★ The different specialisations constitute a strong element of differentiation of women engineers

The breakdown of all certified women engineers by specialisation is different from that for men. The three leading specialist sectors chosen by women are (see figure below for percentages) :

1. Agronomy, biosciences, agri-food industries ;
2. Information and Communication Science and Technologies ;
3. Chemical engineering, engineering.

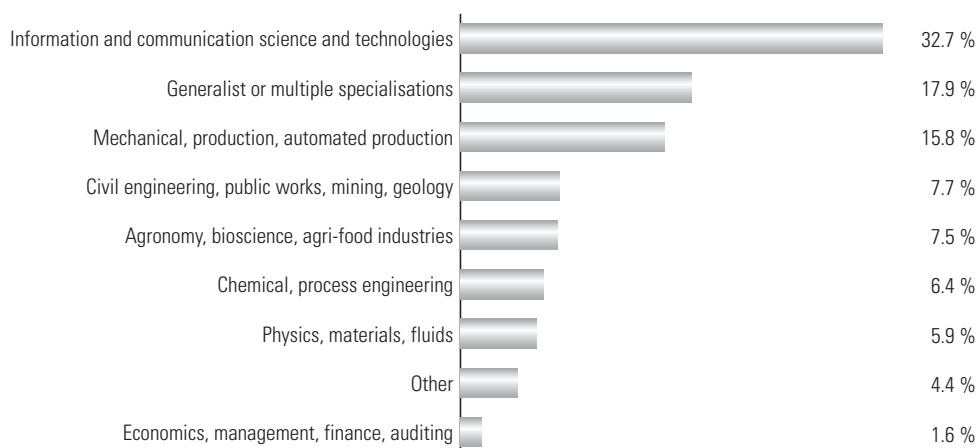
■ Breakdown of certified women engineers by sector (100% = 116,970)



Whereas the sectors chosen by men are (see figure below for percentages) :

1. Information and communication science and technologies ;
2. Generalist or with multiple specialisations ;
3. Mechanical, production, automated production.

■ Breakdown of certified male engineers by sector (100% = 544,130)



The biggest positive gaps are found in agronomy, biosciences and agri-food and in chemical engineering

A greater proportion of women move into two specialisations :

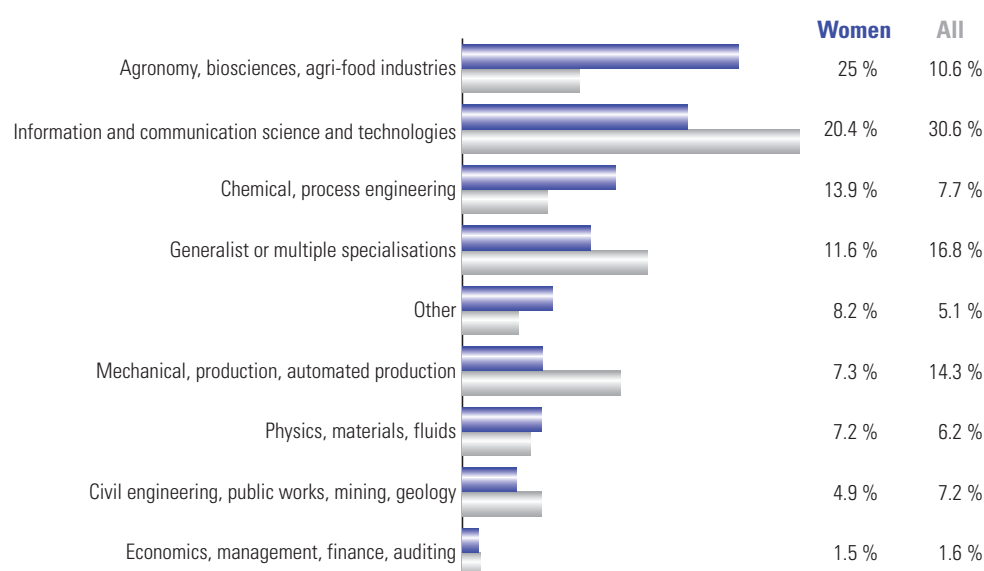
1. Agronomy, bioscience, agri-food industries (+ 14.4 points relative to all engineers) ;
2. Chemical and process engineering (+ 6.2 points relative to all engineers).

By contrast, the sectors in which they are less present are :

1. Information and communication science and technologies (– 10 points relative to all engineers);
2. Mechanical engineering (– 7 points relative to all engineers) ;
3. Generalist areas (– 5.2 points relative to all engineers).

Numbers as percentages by specialisation of training*

(* The data in this figure compares the total breakdowns by specialisation. For example, whereas 10.6% of all engineers are qualified in "Agronomy, biosciences, agri-food", 25% of all women engineers are qualified in this area.



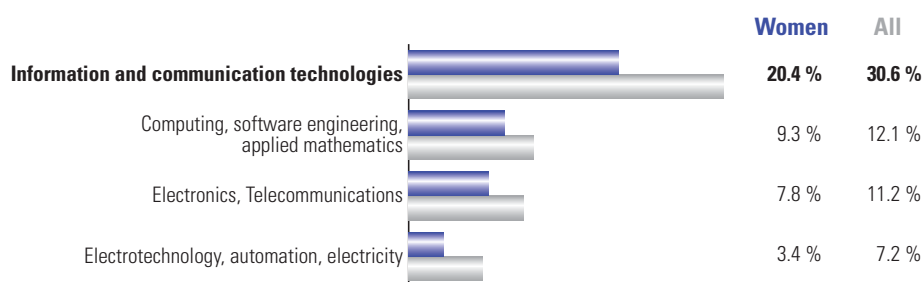
★ The biggest negative gap is found in Information and Communication Technologies (ICT)

Women are now much less present than men in the sector Information and communication technologies (ICT). A more refined analysis of the breakdown of the sub-specialisation acquired in ICT provides more detailed information and shows that two sub-sectors attract a considerably lower proportion of women :

- electronics and telecommunications,
- automation, electronic and electrical engineering.

■ Numbers as percentages by sub-sectors of Information and communication technologies (ICT)*

(* The data in this figure compares the total breakdowns by specialisation.



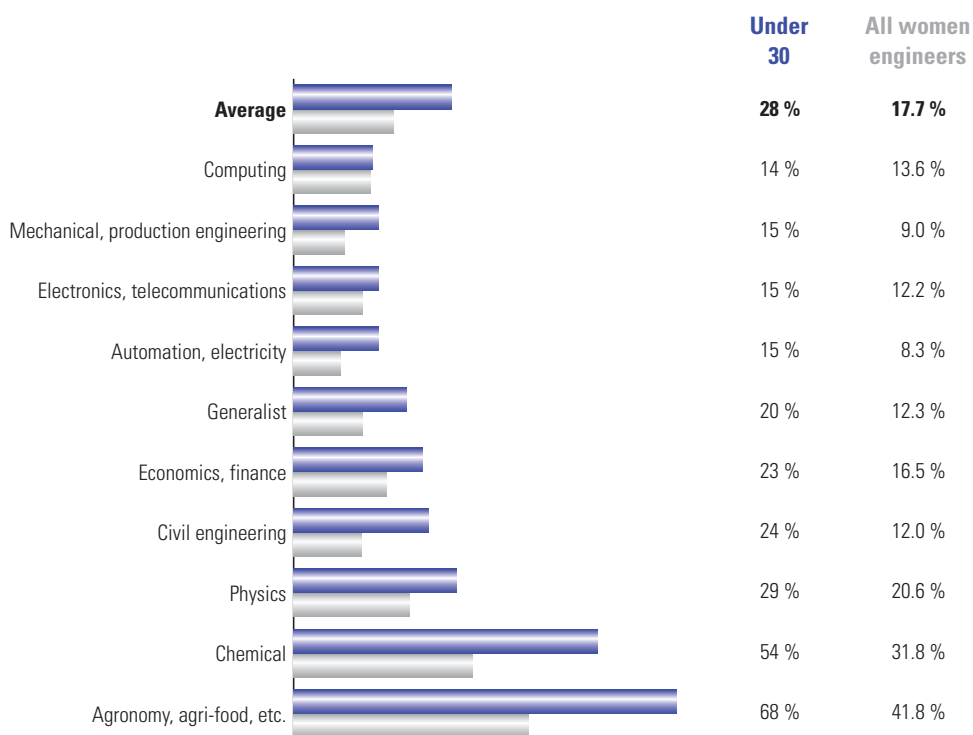
✦ New trends are emerging among women engineers under 30

Comparison of the choices made by women engineers under 30 relative to all engineers confirms the dominance of agronomy, the agri-food industries and chemical engineering among the career routes preferred by women, in which they account for more than half of the population.

Moreover, new trends are appearing with the rise of specialisations such as physics, civil engineering, economics and finance, as well as generalist training.

■ Comparison of specialisations of women engineers by age group*

(* The data in this figure compares the total breakdowns by specialisation.

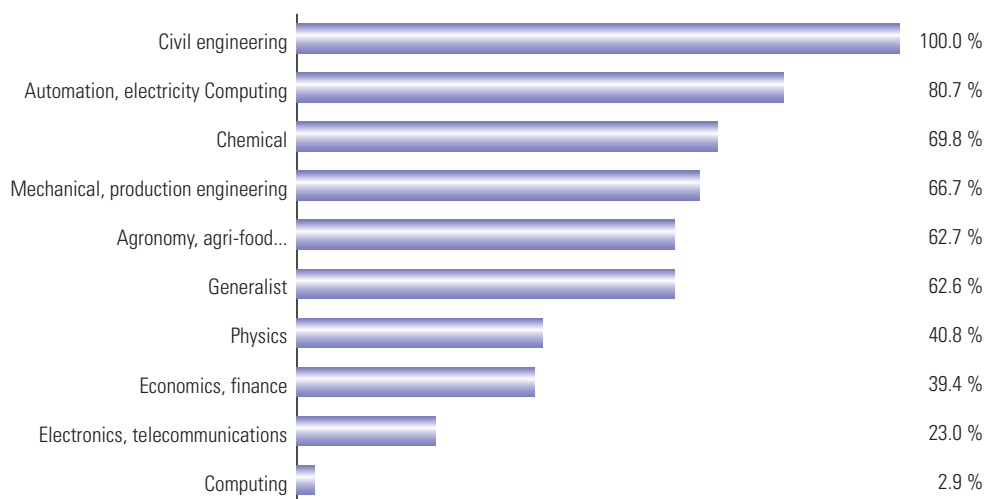


Detailed analysis of the trends by sector brings to light new developments which show that women are moving into training courses in which they previously had a small presence.

The training specialisation showing the largest increase is civil engineering, with a 100 % increase in the number of women graduating in this area. The sectors that then emerge as most attractive are presented in the figure that follows : automation, electricity (80 % of increase), chemical engineering (69.8 % of increase).

There are distinctly lower growths in electronics and telecommunications (23 % of increase) and in computing (2.9 % of increase).

■ Change in specialisations chosen by women engineers under 30



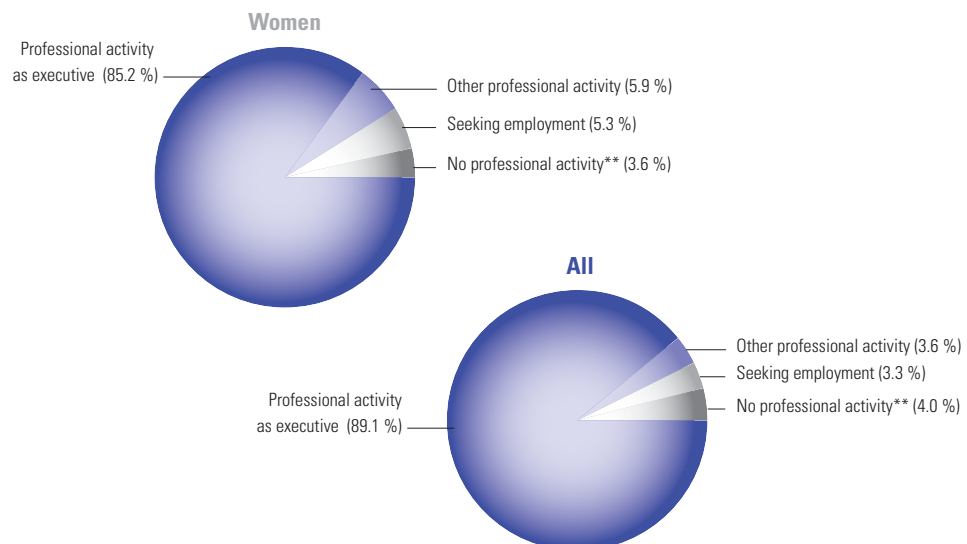
3. What do they do⁶?

Being a woman engineer is an asset on the French labour market

More than nine out ten women engineers are in work

The number of certified engineers aged 60 was 625,700 at the end of 2007. Overall, the proportion of certified engineers in work is high. The proportion of women engineers is also high (91%). The employment opportunities in these professions are therefore very significant, for women as well as for men.

The proportion of women engineers in work is high*



(* All corresponding populations. Total women: 117,000; Total all engineers: 662,800.
 (**) The heading "no professional activity" comprises engineers in various situations: "parental leave", "housewife", "early retirement without remunerated activity", "retired without remunerated activity", "student", and "other: unpaid leave, training leave, etc."

15% of men have interrupted their professional activity for more than three months, and 28% of women. Ten points of difference are due to the fact that women have looked after their children or other members of their family.

Reasons for interrupting professional activity by type

If you interrupted your professional activity for more than 3 months, it was due to :	Men	Women
Illness	1%	2%
Unemployment	11%	12%
To look after your children or other members of your family	0%	10%
Training	2%	3%
Spouse moving to new workplace	0.4%	5%

6. All responses relate to the situation as of 31/12/07.

★ **Among women engineers working with executive status, more than 9 out of 10 have stable contracts**

Women engineers benefit, like men, from stable work contracts, with a slightly higher proportion of women with civil service tenure (+ 1.7 point).

■ **Types of employment contract**

	Women	All
Employed on permanent contract	81.7%	83.8%
Tenured civil servant	6.6%	4.9%
Employed on limited-term contract	5.0%	2.7%
Contract linked to thesis: ATER *, CIFRE**, postdoc, etc.	1.8%	0.8%
Contract under local law if working outside France	1.6%	1.4%
Expatriate status if working outside France	1.3%	2.4%
International volunteer in company	0.6%	0.5%
Temporary or insecure contract	0.5%	0.3%
Self-employed, consultant, non-salaried expert	0.4%	0.6%
Head of company, non-salaried manager or director	0.4%	2.5%
Early-retired or retired with remuneration	0.1%	0.2%
Corresponding number	99,300	587,700

(*) Attaché Temporaire d'Enseignement et de Recherche (ATER): Temporary attaché of teaching and research.

(**) Conventions Industrielles de Formation par la Recherche (CIFRE): research agreement with the industry.

★ **The proportion of women engineers seeking work is 5.5 %**

The proportion of women engineers seeking work is low relative to the national average which is of 8.9 % for all working women.

■ **Proportion seeking work by age group**

	Women	All
Under 30	7.4%	4.4%
30 - 45 ans	3.3%	2.1%
Over 45	7.4%	5.0%
All	5.5%	3.5%

What activities do they move into?

★ **Except for general management positions, men and women engineers perform similar activities**

The breakdown of women by type of professional activity is fairly similar to that observed for engineers as a whole. More than a third of female engineers are present in project, research and design activities. A quarter have jobs described as "production and related functions". The third activity in which they are strongly present is information systems, with more than one woman engineer out of seven performing this type of role in a company.

In reality, as in most sectors of the economy, the most significant gap is found in general management positions. Less than 2 % of women perform this kind of activity, compared to 7 % for all engineers in work.



★ R & D, applied engineering, quality and environment are the activities in which women are most present

Closer analysis of the data in each type of activity brings to light some interesting details :

- in the project sector, almost two-thirds of the women are working in two types of activity : technical studies and testing (14.5 % out of 35.2 %) or research and development (12 % out of 35.2 %). They perform activities in which the implementation of concepts and innovation prevail ;
- in production and related functions sector, the functions of quality control, hygiene, safety and environment alone occupy 8.8 % of the women in this type of activity, thus employing one woman out of three for this type of activity.

■ Breakdown of women engineers by their dominant activity within the major areas of engineers' activities

Production and related functions	%
Production, operation, process, works	5.9 %
Maintenance	0.6 %
Organisation, production management	4.6 %
Purchasing	1.8 %
Supplies	0.2 %
Logistics	1.7 %
Quality, hygiene, safety, environment	8.8 %
Other production	0.5 %

■ Breakdown of women engineers by their dominant activity within the major areas of engineers' activities

Projects, research and design

Fundamental research	2.2%
Research and development	12.0%
Design	2.0%
Engineering, technical studies, testing	14.5%
Consultancy, non-technical studies, journalist	3.7%
Other studies	0.8%

Information systems, computing

Production and operation	0.7%
Development and integration	6.0%
Support and assistance	1.1%
Projects, information systems consultancy	4.6%
Management, information systems management	0.5%
Other computing	0.7%

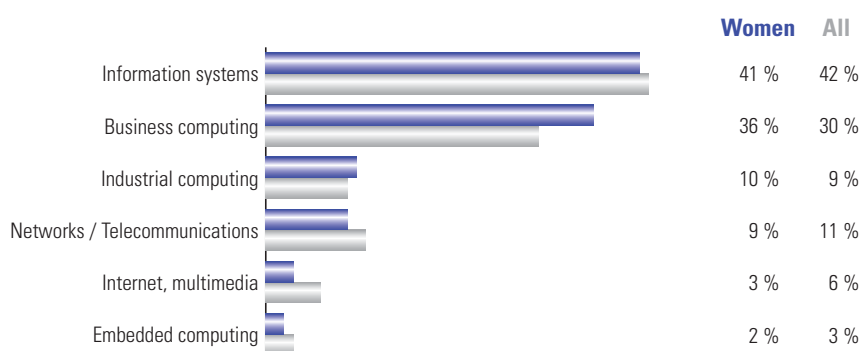
Sales, marketing

Sales, pre-sales, after-sales	1.7%
Business manager, contract manager	1.9%
Technical sales	1.5%
Marketing, product communication	2.9%
Other commercial	0.7%

★ Women engineers and computing: an opportunity to be grasped

For the moment the presence of engineers in corporate computing activities remains limited to the classic functions. For women even more than for engineers as a whole, there is a low proportion working in the expanding areas, in particular the internet and multimedia.

■ Area of activity of computing specialists



What are their responsibilities?

96.3 % of certified women engineers have executive status in France. The actual exercise of responsibilities varies, depending on whether they are operational responsibilities or staff management functions.

★ Functional and technical expertise is the primary competence recognised in women engineers

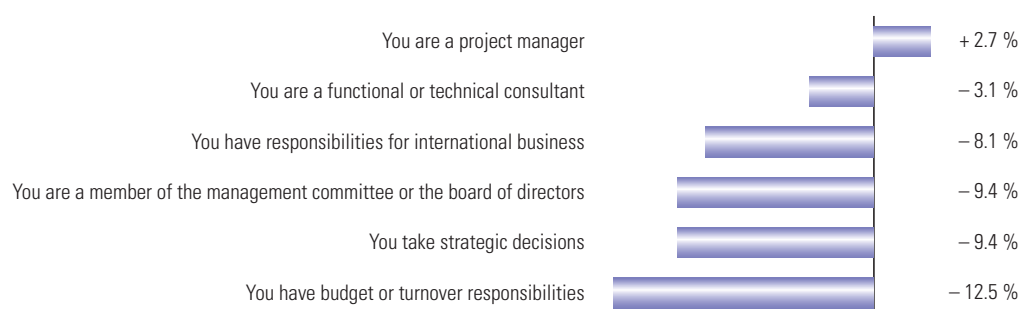
54.1 % of women engineers in work are recognised for their functional or technical expertise; 43.6 % of them are project managers.

■ Responsibilities exercised by women engineers in work

	Women
You have budget or turnover responsibilities	44.2 %
You have responsibilities for international business	25.8 %
You are a project manager	43.6 %
You take strategic decisions	34.1 %
You are a functional or technical expert	54.1 %
You are a member of the management committee or the board of directors	9.5 %

Compared to the total number of engineers in work, a higher proportion of women exercise project management functions (+ 2.7 points). In contrast, they are less likely to have responsibilities for budget or turnover (– 12.5 points).

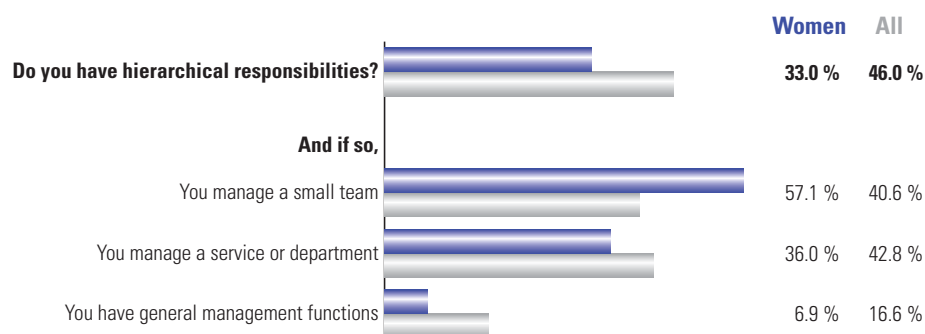
■ Differences in operational responsibilities between women engineers and all engineers



★ A higher proportion of women manage small teams

As regards the exercise of hierarchical responsibilities, the situation is again one of contrasts.

■ Personnel management functions exercised by women



The organisation of their professional life

✦ For family reasons, one woman out of seven opts for part-time work

Whereas men work full-time in 99 % of cases, women opt more often for part-time work, mainly for family reasons. In most cases they reduce their commitment by one day a week.

■ Proportion of working hours (as % of full-time) for women

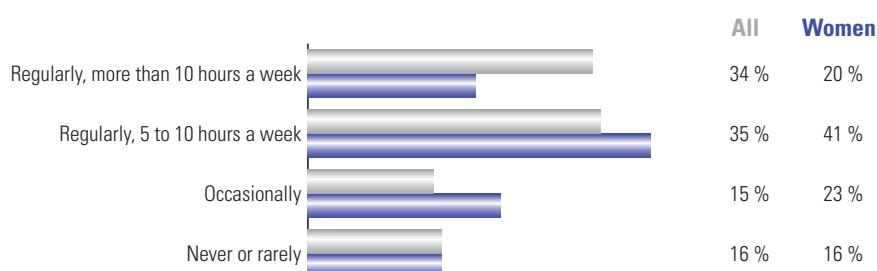
More than 90 % of full time	87.0 %
80 - 90 % of full time	10.6 %
50 - 79 % of full time	1.7 %
Less than 50 % of full time	0.4 %

Women's part-time work is strongly linked to the presence of children : 75 % of women who work 90 % or less of full time have two or more children under 16 to care for. Only 8 % do not (or no longer) have a child under 16 at home.

✦ A higher proportion of women regularly work 5 to 10 hours overtime a week

Traditionally men have more regularly worked overtime hours than women. But, contrary to this received idea, it appears that a higher proportion of women work 5 to 10 hours overtime each week (41 % as against 35 % for engineers as a whole).

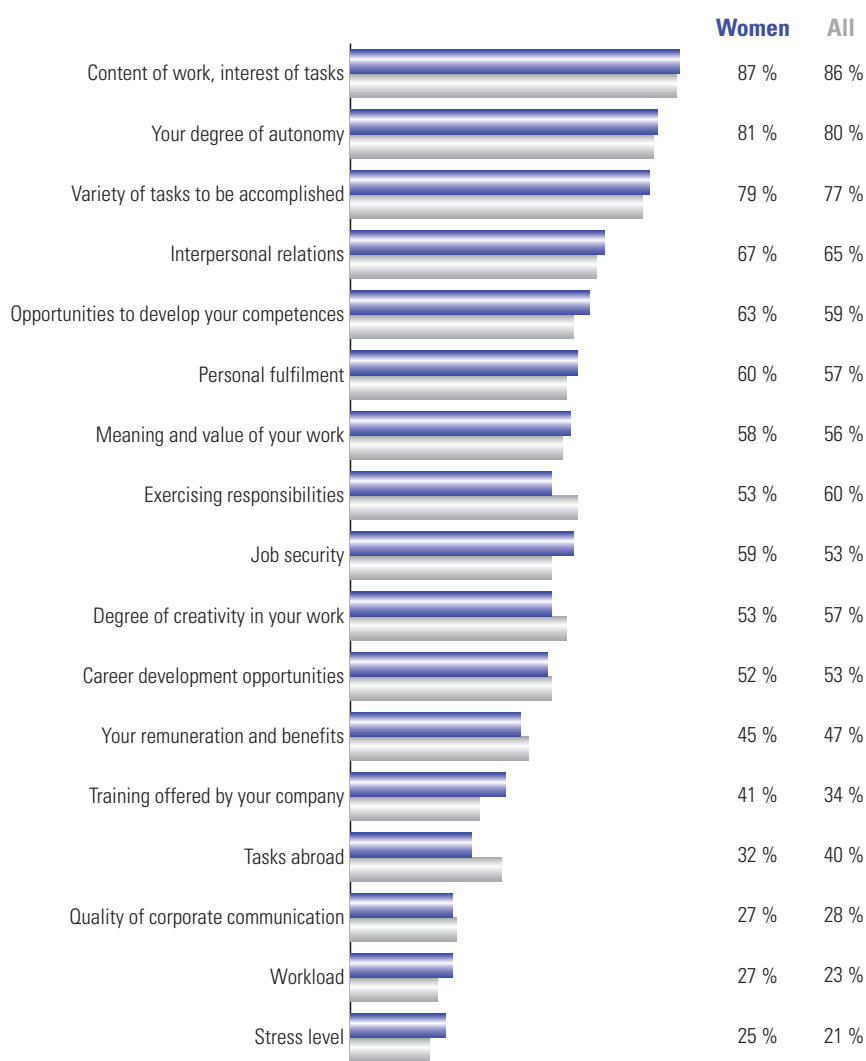
■ Breakdown of engineers by number of overtime hours worked



Their professional satisfactions

When the grounds for satisfaction at work are detailed, on the majority of criteria women express a higher level of satisfaction than men.

■ Comparison of proportions of engineers who say they are satisfied according to various professional criteria relating to work (women and overall)



The criteria that obtain the highest scores and are selected by more than two in three women engineers concern the qualities they find in their work : interest, autonomy and variety are mentioned by more than eight in ten women engineers. In contrast, they show a lower level of satisfaction on four aspects : remuneration, the degree of creativity in their work, the exercise of responsibilities and career development opportunities. They are also more reserved about the general organisation of the company.

■ **Comparison of proportion of engineers who say they are satisfied according to various professional criteria related to work (women and overall)**

General organisation of company	Women	All
The way your suggestions are taken into account	45%	45%
Relevance of company strategy	38%	43%
Management style	34%	37%
Recognition of merits by company	32%	35%
Clarity of its strategy	29%	35%
General quality of organisation in company	29%	30%

4. Where are they?

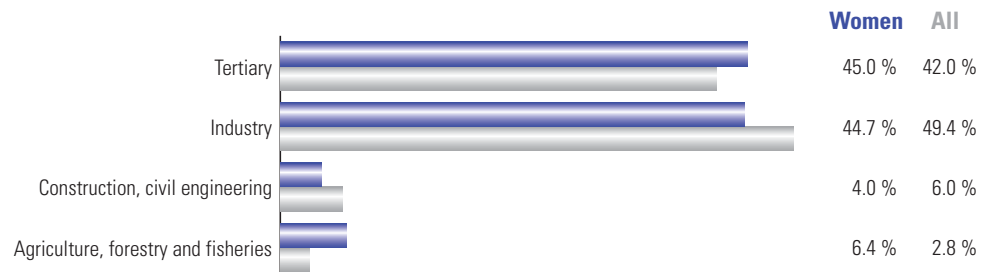
Companies employing women engineers in France

The breakdown of women by major categories of activity and sectors, type of company and location is fairly homogeneous with that observed for engineers as a whole, though with a few differentiating features.

✦ More women are present in the primary sector

Although minority areas compared to the secondary and tertiary sectors, agriculture, forestry and fisheries attract twice as many women : 6.4 % choose this sector (as against 2.8 % of all engineers), which is a result of their previous choice of specialist training courses.

■ Breakdown of engineers by category of activity



✦ Government departments and the agri-food industries are the two fields where women are more present

One woman engineer in 10 opts for government departments (10 % as against 6 % for engineers overall) and 7 % opt for the agri-food industries (more than twice the rate for engineers overall). Their higher presence in agriculture and agri-food is linked to the more than 50 % presence of young women in agronomy schools (in the broad sense of agri-food and agriculture, forestry and fisheries), the specialisation which feeds into these two sectors.

■ Breakdown of women engineers by sector

Government departments	10.0%
Computing services and software publishers	8.0%
Agri-food industries	7.1%
Engineering service companies	7.0%
Agriculture, forestry and fisheries	6.4%
Energy	6.4%
Automotive & other vehicle manufacture	5.8%
Electrical, electronic, computing goods	4.9%
Construction, civil engineering	4.0%
Insurance, banking, real estate, holding companies	4.0%
Chemical industry	3.9%
Aerospace	3.9%
Telecommunications	3.0%
Pharmaceuticals	2.9%
Mining, metallurgy, foundries	2.0%
Transport (road, rail, air, etc.)	2.0%
Sewerage, water, environment, waste management, etc.	2.0%
Other	15.8%

The higher proportion of women in the non-private sector is mainly due to their greater presence in government departments and in non-profit organisations (NGOs, associations, international bodies).

■ Engineers are predominantly employed in the private sector

	Women	All
Private sector	76.0%	82.5%
State companies (EDF*, SNCF**, etc.), public-private, EPICs***	8.4%	7.6%
National govt., local authorities, public hospital sector	6.8%	3.9%
Others, associations, NGOs, international bodies	4.7%	2.2%
Individual companies or self-employed	4.1%	3.7%

(*) **Électricité de France (EDF)** is the main electricity generation and distribution company in France.

(**) **SNCF (Société Nationale des Chemins de fer Français)** The French National Railway Company is a French public enterprise. Its functions include operation of rail services for passengers and freight, and maintenance as well as signalling of rail infrastructure owned by RFF (Réseau Ferré de France).

(***) **Établissement public à caractère industriel et commercial** (or **EPIC**): Public body of industrial and commercial nature.

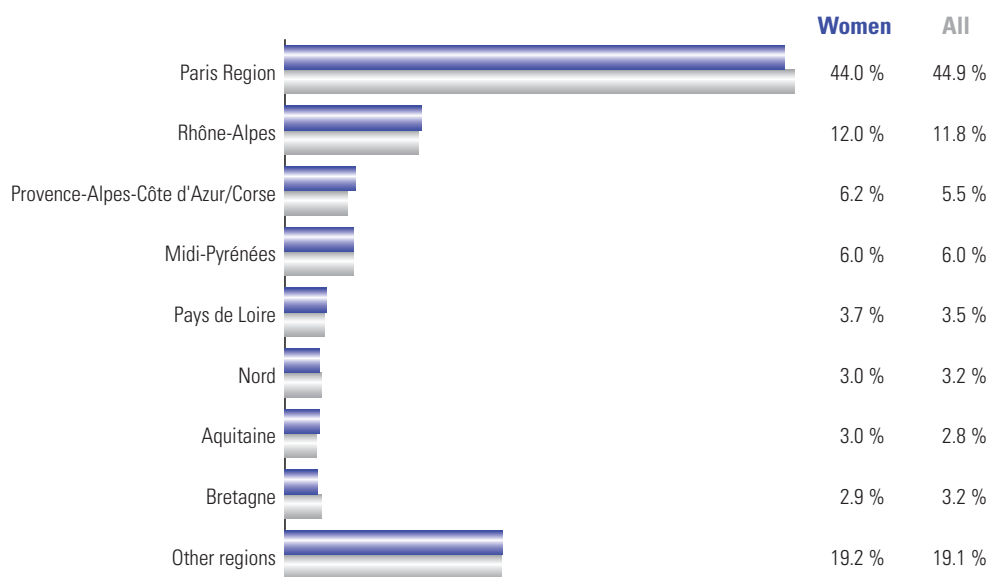
In contrast, women engineers are significantly less present than men in the following sectors :

- Mechanical engineering, machinery, arms manufacture : – 60 % ;
- Electrical, electronic and computing goods : – 42 % ;
- Automotive and other vehicle manufacture : – 35 %.

★ **As in other sectors, the Paris region is the primary employment zone for women engineers**

There are strong similarities between the regional location of the workplaces of women engineers and those of engineers as a whole.

■ **Comparison of breakdown of engineers by region**



Trends in the labour market in 2007

Overall, 62,800 new jobs were taken up by engineers in 2007 ; of these, a third (18,600) were taken by women.

★ **Computing services, engineering services, energy, agri-food and civil engineering were the biggest engineer recruiters in 2007⁷**

For all engineers, new jobs were found in five main sectors. These five account for 29,540 new jobs, almost half of the 62,800 jobs created in 2007.

■ **Ranking of the 5 main sectors creating new jobs for engineers in 2007**

Sectors	All
Computing services	10,105
Engineering services	6,290
Construction, civil engineering	4,590
Energy	4,425
Automotive, shipbuilding and other vehicle manufacture	4,230

7. Includes actual external executive recruitments in France in 2007, for all sectors including the public sector.

For women engineers, the same analysis shows that sectors such as energy and the agri-food industries are attractive areas which take a large proportion of the new recruits.

■ **Ranking of all sectors by number of jobs created for women engineers in 2007**

Sector	No. of women
Engineering services	2,000
Computing services	1,740
Energy	1,500
Agri-food industries	1,500
Construction, civil engineering	1,180
Chemical industry	960
Automobile manuf., shipbuilding, other vehicles	940
Pharmaceuticals	900
Agriculture, forestry, fisheries	860
Other industry	850
Insurance, banking, real estate	730
Mining, metallurgy	550
Electrical, electronic, computing goods	500
Sewerage, water, environment	490
Aerospace	410
Telecommunications	380
Mechanical engineering, machinery	330
Transport (road, rail, air, etc.)	320
Wholesale distribution	240
Paper, board, rubber, plastics	220
Parachemicals	130
Textiles, clothing, footwear	130
Retail, repair, hospitality	120
Non-metallic minerals, materials	110
International bodies	110
Govt. departments	50

★ **In about one third of the sectors, the recruitment of women is equal to that of engineers overall**

In eight sectors, the proportion of women recruited is equal to or greater than 50 %. The importance of the agricultural and food sectors is confirmed. By contrast, except for the pharmaceutical industries with 900 new posts taken by women, the proportion of jobs for women in other sectors remains low.

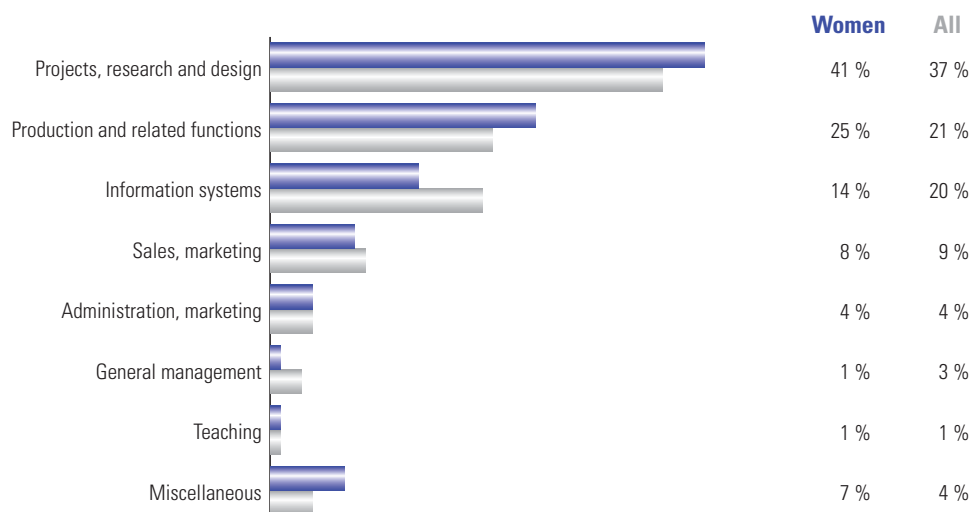
■ **Ranking of sectors in which recruitment of women engineers is equal to or greater than 50 %**

Sector	% of women	No. of women
Agri-food industries	76%	1,500
International bodies	69%	110
Pharmaceuticals	67%	900
Sewerage, water, environment	64%	490
Chemical industry	57%	960
Parachemicals	54%	130
Agriculture, forestry, fisheries	53%	860
Textiles, clothing, footwear	50%	130

★ **Analysis of recruitment by type of activity confirms the position of women engineers in the areas of research and production**

The jobs taken by women engineers are mostly in activities in which they are already well represented. In contrast, the under-representation of women in functional or managerial jobs persists.

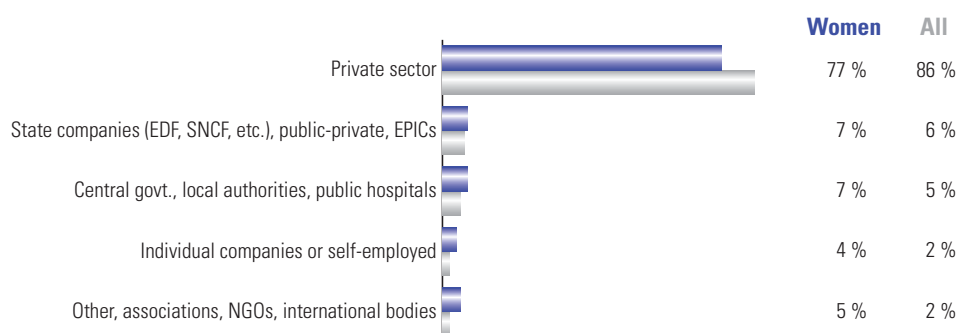
■ **2007 recruitments by types of activity**



★ The proportion of jobs taken by women engineers in the public or quasi-public sector remains higher

The position and role of women in the sector and quasi-public sector should continue to strengthen, yet with 8 % more jobs taken in 2007 by women engineers this proportion tends to diminish.

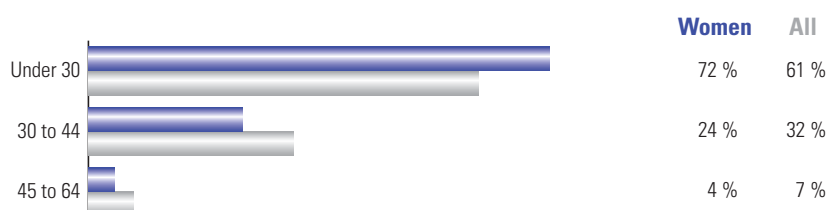
■ Comparison in percentages of posts filled by type of organisation



★ More recruitment of women engineers under 30

The number of jobs filled by women engineers aged under 30 is greater than that for engineers as a whole which is logic since they are more numerous in this age group.

■ Comparison in percentages of posts filled by age group



5. How much do they earn⁸?

General data on 2007 salaries

✦ The gap between men's and women's salaries increases with age

While salaries increase with age and therefore experience for both sexes, men's salaries are systematically higher than those of women of the same age. As seen in previous years, men start with an advantage of 7.5 % on average. The gap grows to 24 % at age 45 to 49, which corresponds to the fact that women less often occupy managerial positions.

■ Median annual gross salaries by age and sex of engineers in 2007 (in euros)

Age group	Men	Women	Advantage men/women
Starting	32,850 €	30,556 €	7.5 %
Others under 30	37,500 €	35,000 €	7.1 %
30 - 34	47,309 €	43,116 €	9.7 %
35 - 39	58,024 €	51,059 €	13.6 %
40 - 44	67,645 €	58,987 €	14.7 %
45 - 49	77,204 €	62,296 €	23.9 %
50 - 54	83,000 €	68,247 €	21.6 %
55 - 59	89,541 €	70,308 €	27.4 %
60 - 64	84,811 €	n.s.	-
Median	55,000 €	42,000 €	31.0 %
Average	64,337 €	48,045 €	33.9 %

✦ Breakdown of salaries

Whereas 90 % of male engineers were paid more than 34,000 euros, only 75 % of women reached this figure. At the other end of the scale, 10 % of women were paid more than 72,200 euros, while 25 % of the men achieved a similar salary level. However, when comparing the salaries of men and women engineers, one has to bear in mind that 30 years ago there were few women in the profession. Because salary is related to experience, part of the disparity is due simply to the relative youth of women engineers. However, the table which follows shows that this does not entirely explain the gaps.

8. See note on method at the end of this chapter.

■ Breakdown of gross annual salaries 2007 (in euros)

Quantile	Definition	Women	Men	All
1 st decile	10% of engineers earned less than	29,300 €	34,000 €	32,768 €
1 st quartile	25% of engineers earned less than	34,292 €	41,121 €	39,507 €
Median	50% of engineers earned less than 50% of engineers earned more than	42,151 €	55,000 €	52,500 €
3 rd quartile	25% of engineers earned more than	56,250 €	76,200 €	73,000 €
9 ^e décile	10% of engineers earned more than	72,231 €	105,965 €	101,061 €
Average	Average	48,226 €	64,548 €	

2007 salaries according to some major criteria

★ Salaries by dominant activity

■ Comparison of median gross salaries by groups of activities, in 2007

	Women	All
Production and related functions	41,305 €	52,598 €
Projects, research & design	37,962 €	45,522 €
Information systems	44,467 €	49,670 €
Sales, marketing	50,970 €	66,000 €
Administration, management	54,143 €	65,000 €
General management	53,000 €	103,731 €
Teaching	43,527 €	48,383 €
Miscellaneous	43,174 €	58,000 €

★ Median and average salaries by year of starting work as engineer

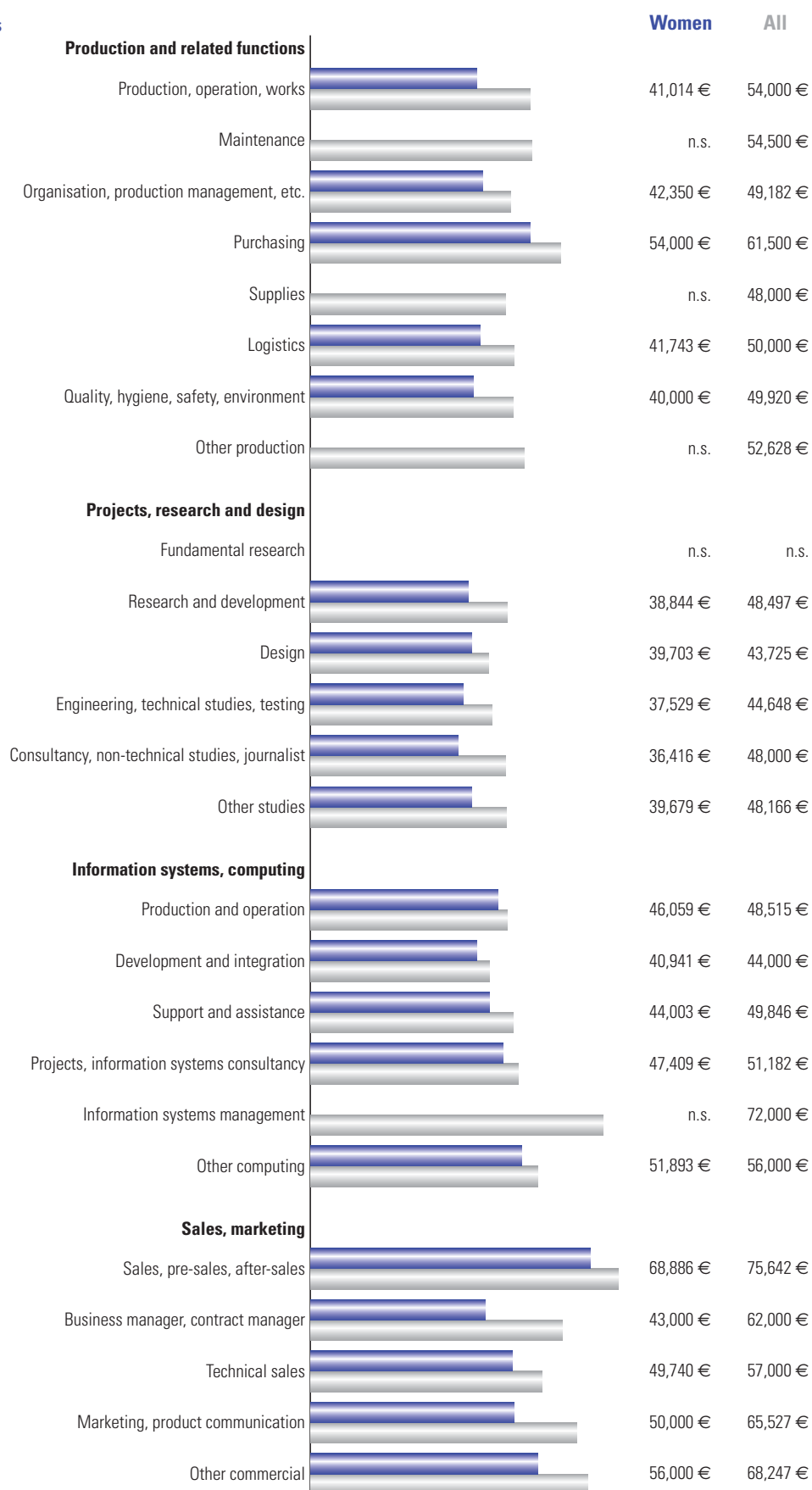
Salary is strongly correlated with the number of years of seniority in the job. The year in which work as an engineer started is a fairly good indicator of this, although it does not allow for periods in which work is interrupted.

The salaries of engineers with 15 years of experience are twice as those of beginners. For women, the coefficient is 1.8.

■ Median salaries
2007, by year of
starting work
as an engineer



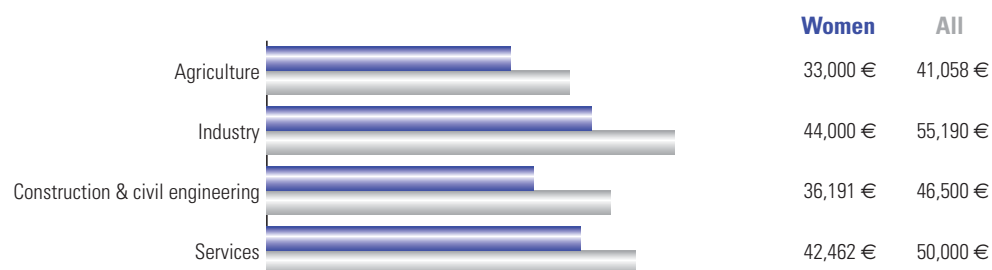
■ Median salaries
2007 by activity



★ Salaries by sector of activity

An overall analysis by broad category of activity, then broken down by sectors, makes it clearer where the salary gaps are most significant.

■ Median salaries 2007 by broad sector



The sectors in which women are most present (e.g. agriculture and chemical engineering) are also those in which the disparities in salary between men and women are greatest: 40% in agriculture, 47% in the chemical industry. By contrast, the sectors where there are fewer women, in particular computing or telecommunications, are those where the gap is smallest – only 6% in telecommunications (a smaller gap than in any other sector studied), and 10% for computer services and software publishers.

■ Median salaries 2007 by economic sectors and gender (in Euros)

	Men	Women	All	Advantage men/women
Agriculture, forestry, fisheries,	45,548 €	32,432 €	36,089 €	40 %
Energy	54,500 €	45,378 €	52,000 €	20 %
Mining, metallurgy	50,774 €	39,600 €	47,700 €	28 %
Minerals and materials prodn.	58,750 €	44,500 €	53,902 €	32 %
Chemical industry	59,778 €	40,672 €	52,400 €	47 %
Parachemical	55,417 €	39,600 €	48,000 €	40 %
Pharmaceutical	51,030 €	40,615 €	47,200 €	26 %
Mechanical, machinery, arms manufacture	46,529 €	40,000 €	46,000 €	16 %
Electrical, electronic, computing goods	52,301 €	44,089 €	51,245 €	19 %
Auto. & other vehicle manuf., shipbuilding	49,094 €	43,793 €	48,250 €	12 %
Aerospace	46,800 €	41,528 €	45,978 €	13 %
Agri-food industries	52,000 €	37,000 €	43,000 €	41 %
Textiles, clothing, footwear	48,000 €	33,000 €	41,118 €	45 %
Paper, board, plastics	56,885 €	40,600 €	52,919 €	40 %
Other industry	45,000 €	37,567 €	42,168 €	20 %
Construction & civil eng.	41,000 €	34,500 €	39,513 €	19 %

■ **Median salaries 2007 by economic sectors and gender (in Euros)**

	Men	Women	All	Advantage men/women
Wholesale distribution	48,875 €	34,269 €	40,153 €	43 %
Retail, equipment hire, repairs, hospitality, catering	55,000 €	40,850 €	50,990 €	35 %
Transport (road, rail, air, etc.)	52,374 €	41,966 €	50,235 €	25 %
Telecommunications	52,000 €	48,883 €	51,849 €	6 %
Computing services & software publishers	40,000 €	36,200 €	40,000 €	10 %
Engineering services	40,000 €	34,175 €	38,788 €	17 %
Sewerage, water, waste management, etc.	46,000 €	35,000 €	41,000 €	31 %
Insurance, banking, etc.	59,000 €	49,848 €	57,103 €	18 %
Government departments	51,059 €	41,409 €	48,000 €	23 %
Other tertiary	50,325 €	39,154 €	48,000 €	29 %

6. Methodological note

✦ The various meanings of the word “engineer”

The basic job of the engineer is to define and resolve often complex problems related to the design, realisation and implementation of products, systems or services, possibly including their financing and marketing, in an ever more effective way within a competitive organisation.

Definition of the certifying authority, the Commission des Titres d'Ingénieurs, which spells out clearly the developing nature of this profession.

In France, the title “engineer” covers two major concepts which coexist while remaining separates. On one hand, engineers are men and women who practise a professional activity requiring an essentially technical competence. But one also speaks of sales engineers, referring to the social status of the engineer rather than the content of his or her activity. The same term also designates persons who have obtained the title of engineer, recognising a five-year study program after the baccalauréat, in an engineering school.

In France, only the title of *ingénieur diplômé* (certified graduate engineer) is protected; the profession of engineer is not regulated.

✦ References to the world of engineers tend to be masculine

The world of the engineers is associated with technology, the senior civil service, the armed forces and industry, all of which tend to be thought of as areas dominated by men. However, since the 1970s, women have entered engineering schools in growing numbers. They are more inclined than their male counterparts to take part in the CNISF surveys and data is regularly published by the association *Femmes Ingénieurs*.

✦ The population of certified engineers

In the CNISF survey, only graduate (certified) engineers were questioned. The CNISF is the association which groups together alumni associations of engineering schools. For the last 50 years, these associations have organised themselves to question their members about their employment, salaries and professional satisfactions. This 2008 socio-economic survey is the nineteenth in the series. The reference population is that of engineers certified by a school validated by the *Commission des Titres d'Ingénieurs*. They often work as technical executives in companies, but also in many other activities. They do not all have executive status. Some may have terminated or interrupted their professional activity.

✦ Structure of the sample

47,515 responses were received, of which 46,195 were from engineers under 65, of whom 9,133 were women. These responses were weighted by age so as to represent the 528,900 graduates in the participant associations. In a second stage, they were also weighted to represent the 662,800 certified engineers under 65, regardless of school.

Female respondents are better represented in the survey than in the total population of engineers and are disproportionately young.

■ Breakdown of responses

	Women	Men
Under 30	56 %	41 %
30 - 39	32 %	34 %
40 - 49	9 %	15 %
50 - 64	3 %	10 %
Base	9,133	37,111

★ Engineering schools taking part in the survey

Most French engineering schools taking part in the survey – over 128 engineering schools (list available on CNISF website - <http://enquete.cnisf.org/>).



The french association
Femmes Ingénieurs

*With a large network of partners in France and worldwide,
the association of women engineers is focused on :*

- ✓ The promotion of scientific women in the working place;
- ✓ The promotion of engineering careers for young, boys and girls,
in the educational world;

By :

- ✓ International exchanges with other engineers worldwide;
- ✓ Internetworking partnership with and inside companies;
- ✓ Relationship development with the political world.

Become an engineer!

Join us!

Discover the site : www.elles-en-sciences.org

Visit our site : www.femmes-ingenieurs.org

And find out our key moments and partnerships with :

- French National Council of Engineers and Scientists (CNISF) : www.cnisf.org
- Femmes et Sciences : www.femmesetsciences.fr
- *femmes et mathématiques* : www.femmes-et-maths.fr
- World Federation of Engineering Organizations (WFEO-FMOI) : www.wfeo.org
- European Platform of Women Scientists (EPWS) : www.epws.org
- International Network of Women Engineers and Scientists : www.inwes.org

Association Femmes Ingénieurs

c/o CNISF, 7 rue Lamennais, 75008 Paris - Tél. : +33 (0)1 44 13 66 88

Portrait of Women Engineers 2008

Produced for the **SciTechGirls** program from the **Women's Forum**

Developped by the **CNISF**