Engineering across Europe

A Report by

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# Inhalt

# 1. Engineering

Engineering is defined as looking for functional, convenient and efficient solutions under comprehension of the newest natural scientific and technical expertises. These activities are performed by engineers who must own versatile skills. The different skills of Engineering can be acquired in several, in sometimes relative areas of study.

## 1.1. Branches of study

Contrary to other countries there is no general engineering course or degree in Germany.
Mechanical Engineering is regarded as the general engineering course.
Sometimes the technology department in a company is called the Engineering department.
At any rate you have to choose a special area of study to become an engineer in Germany. Branches of study are:

- Architecture
- Urban Development
- Construction Engineering
- Mining
- Mine-Surveying
- Geotechnics
- Printing Technology
- Media Technology
- Electrical Engineering
- Information Engineering
- Traffic Engineering
- Automotive Engineering
- Precision Engineering
- Micro Engineering
- Nutrition Technology
- Aerospace Engineering
- Mechanical Engineering
- Mechatronics
- Optical Technology
- Physical Engineering
- Manufacturing Engineering
- City and Regional Planning
- Ocean Engineering
- Nautical Science
- Maritime Traffic
- Ship Operation Technology

- Health Care Engineering
- Medical Engineering
- Textile Engineering
- Waste Management
- Environmental Protection
- Ecology
- Chemical Engineering
- Process Engineering
- Geodesy
- Surveying and Mapping
- Cartography
- Building Services Engineering
- Material Engineering
- Material Sciences
- Printing and Paper Technology
- Industrial Engineering and Management

The only course of studies which involves economical appendages is the Industrial Engineering and Management course.
Normally Industrial Engineering and Management are not being taught in engineering courses at Technical Universities(TU).
For this purpose Germany has created the so called “Wirtschaftsingenieur” (=economic engineer), a course which consists of technical and business administration aspects.

## 1.2. Qualifications

In Germany there are two mayor ways to get an engineering degree. The first one is via the Technical University ( technical courses are not being taught at classical universities - only Business Administration and Management)and the second one is via the University of Applied Science. A third one, which is a subcategory of the University of Applied Science, is via the university of cooperative education (“Berufsakademie” or “BA”). Cooperative education is a structured method of combining classroom-based education with practical work experience. A cooperative education experience, commonly known as a "co-op", provides academic credit for structured job experience. Cooperative education is taking on new importance in helping young people to make the school-to-work transition, service learning, and experiential learning initiatives.
For every degree you need to have different qualifications.
For a free choice of the above mentioned courses it is obligatory to have the general qualification for university entrance (allgemeine Hochschulreife).
For some courses it is enough to have a specific qualification i.e. the specific qualification for university entrance (fachgebundene Hochschulreife). Generally, this one allows you to study only specific courses i.e. arts. The requirement for

Engineering is that you have attended a technical highschool. With both qualifications it is possible to study at a Technical University or at a University of Applied Sciences.
For the entrance to a university of applied science there is a third possibility. This is the advanced technical college entrance qualification (Fachhochschulreife).

## 1.3. Degree

At the moment there are three different degrees in all of the branches of study. One the one hand there is the classical Diploma (Diplom Ingenieur =Dipl.Ing.) and on the other hand there are the new Bachelor and Master degrees. There are still some Diploma courses possible in Germany but in the course of the Bologna-Process Germany will be changing all the Diploma branches of study to Bachelor and Master.

For the Bachelor the normal duration of studies is a minimum of six and up to eight semesters with a minimum of 180 up to 240 ECTS. The Master has a normal duration of studies from two up to four semesters with 300 ECTS under comprehension of the Bachelor ECTS. The normal duration of studies for the whole degree is 10 semester.
It is possible to change universities after the Bachelor and doing the Master at another university.

## 1.4. Legal competences

In Germany every federal land has its own law for engineering. This laws are the so called “Ingenieursgesetz (IngG)”, valid since 1970 and “Ingenieurskammergesetz (IngKammG)” valid since 1978.
The difference between these two laws is that the “Ingenieurskammergesetz” is for self employed Engineers. The mission of self employed engineers is the freelance and independent technical and economical design and control of technical projects. That means the consultancy, assistance and representation of a client for planning, controlling and execution of coherent questions and supervising the completion work. Consultant Engineers have to sign in the “Liste der beratenden Ingenieure” in their federal land. They have to fulfill a list of specifications for doing so. These specifications are also written down in the “Ingenieurskammergesetz” and are different in all the federal lands of Germany. Therefore for an engineer the rules not of his working land but his specific residential federal land apply.
The “Ingenieursgesetz” is the law for protecting the job title “Ingenieur” and explaining who is allowed for using the job title. For example in this law the number of semesters or the kind of university is established

## 1.5. Market entry

There are several ways for engineers to get a job. Apart from recommendations from a student's professor and job offers resulting from holiday jobs or stages in a company, probably the easiest one is the internet.
There are a lot of different online platforms like:

www.jobboerse.arbeitsagentur.de/
www.monster.de/
www.jobscout24.de/
www.jobpilot.de/
www.jobrapido.de/
www.experteer.de/
www.stellenanzeigen.de/

Another way on the internet are the social networks like

www.xing.com
www.meinvz.de
www.facebook.de
www.twitter.de

The second one is the daily newspaper. The bigger companies are normally placing their job advertising in the bigger newspapers like Süddeutsche Zeitung, FAZ, Welt or VDI-Nachrichten. In the local papers are these for smaller companies local newspapers are the appropriate media.

www.faz.de
www.sueddeutsche.de/
www.welt.de
www.zeit.de

# 2. Associations

The” VDI (Verein Deutscher Ingenieure)” has been successfully established up to now as the representative association for Engineering. It was founded in 1856 and the amount of members is about 139000 in 2010. It is one of the biggest technical orientated associations and organizations in the world.
The two other associations for engineers are the “Deutsche Ingernieurinnenbund” and “Ingenieure ohne Grenzen”. The “deutsche Ingenieurinnenbund (dib)” is especially for female engineers and the “Ingenieure ohne Grenzen” is developing the worldwide engagement of engineers in humanitarian projects.

## 2.1. VDI

Verein Deutscher Ingenieure e.V.
Präsident: Prof. Dr.-Ing. habil. Bruno O. Braun
Direktor: Dr.-Ing. Willi Fuchs
VDI-Platz 1
40468 Düsseldorf

Telefon: +49 (0) 211 62 14-0
Telefax: +49 (0) 211 62 14-5 75

www.vdi.de
kundencenter@vdi.de

### 2.1.1. VDI Germany

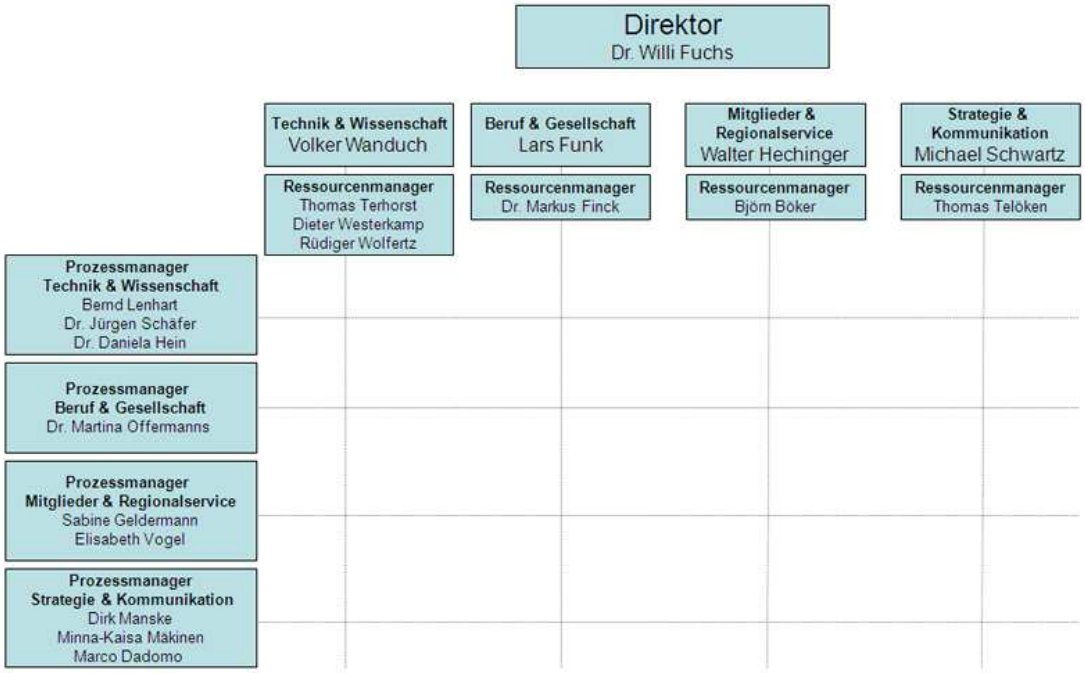
With 139,000 personal members – over a third of which are students and junior engineers under the age of 33 – The Association of German Engineers (VDI) is one of the largest technical-scientific associations in Europe. Throughout the years, the VDI has successfully expanded its activities nationally and internationally committing itself to foster and impart knowledge about technology related issues. As a financially independent, politically unaffiliated and non-profit organization the VDI is recognized as the representative of engineers both within the profession and in public.

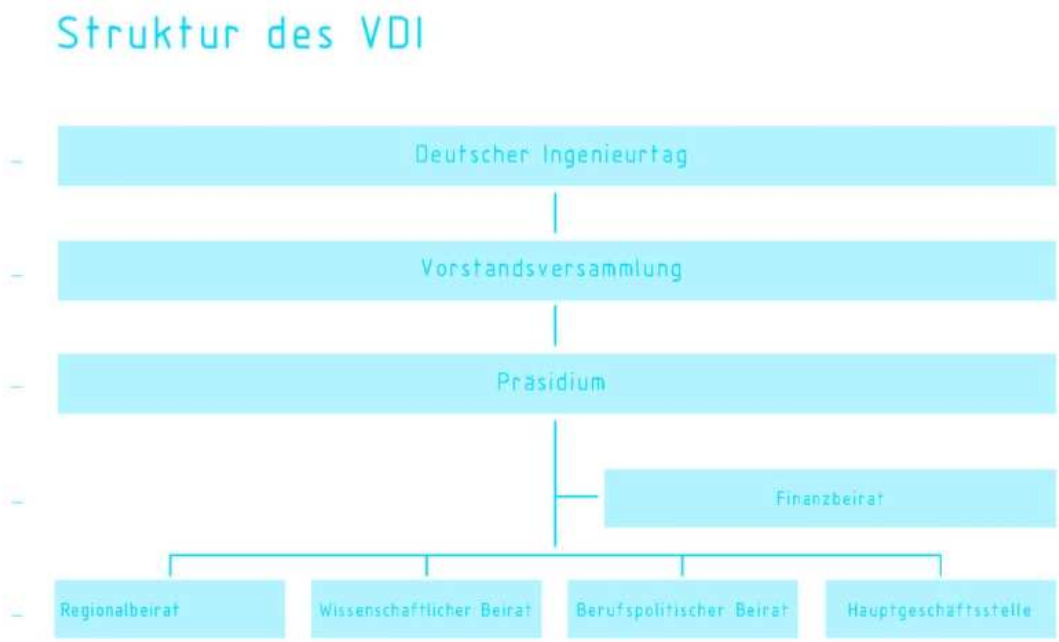
The VDI covers a wide range of technical topics and communicates this knowledge through studies, technical discussions and congresses or the VDI guidelines that create generally accepted technical rules. As an advisory partner the VDI engages in the relationship between technical and social developments. It focuses on the promotion of young talents and the support of upcoming engineers.

The VDI comprises 45 Regional Chapters and 15 representatives in the federal states that organize seminars and social events. The participants benefit from technical know-how and valuable expert exchanges. To interact internationally, the VDI is a member of the FEANI (Fédération Européenne d'Associations Nationales d'Ingénieurs).
The VDI has played an important role in founding the ASIIN and gave the association support in the start-up period both financially and logistically. Right from the start, the VDI has supported the implementation of Bachelor and Master programmes and their accreditation

VDI Organisation and Structure:

- VDI Technical Societies
- VDI Professional Divisions
- VDI Mermber Relations (National and International)
- VDI Strategy and Communication
- VDI Companies






The Regional Structure from VDI is the result of a solid and supportive presence in Germany. It comprises 45 Local Chapters, more than 100 Local Groups and 12 Regional Chapters. In addition, technical information and contact exchange is carry out through more than 600 Working Groups. Equally important are the events conducted by the Regional Chapters. More than 5.000 events are conducted yearly bringing about 200.000 participants who benefit from technical know-how and valuable expert exchanges.

### 2.1.2. VDI international

VDI The Association of German Engineers
VDI International
P. O. Box 10 11 39
40002 Duesseldorf

Tel.: + 49 (0) 211 / 62 14-3 05/6 85
Fax: + 49 (0) 211 / 62 14-1 40
international@vdi.de
www.vdi.eu

New developments and innovations cannot be kept to single countries or continents. Indeed, as the strands of the global economy intertwine ever more tightly, the world now requires a more extensive exchange of technical knowledge and expertise on an international level. As a further result of globalization, scientists and engineers are often on the move. The VDI was quick to recognize these trends and has taken an active part in helping to shape the rapidly changing conditions in the field of engineering.

More than 5600 VDI members are today living and working abroad, representing about five percent of all VDI members. Considering the ongoing globalization their number will increase in the future. To better support the growing number of members abroad, the VDI is committed to expanding its worldwide network. On the other hand, the VDI wants to become more attractive to engineers from all over the world who, by joining the VDI, will benefit from its technical competence and its further opportunities.

The primary links in this global network are formed by the various VDI Chapters internationally, as well as national and International Partners. 15 VDI Chapters based in 19 cities all over the world organize conferences, seminars and social events. These are mainly targeted towards to VDI members living in a given area, but are open to all engineers who are interested in the latest developments in the VDI in particular or in the technical community in general.

The VDI has signed cooperation agreements with more than 30 engineering associations in Europe, Asia, America and Africa. These agreements express the explicit wish to cooperate across all boundaries; many of them furthermore contain clauses (reciprocal membership, visiting membership) that enable VDI members – during a stay in the partner's country – to profit by its benefits. Members of these partner organizations will also receive many benefits from the VDI during their stay in Germany.

In addition to VDI chapters and other engineering organizations, the VDI collaborates with institutions – such as national and international chambers of commerce – that already have their own global network in place. Furthermore, the VDI Office Brussels not only coordinates all VDI activities that involve cooperation with the various bodies of the European Union but also runs the office of the European Young Engineers (EYE) – a young, dynamic European engineers association.

•VDI-Freundeskreis Argentinien
•VDI-Freundeskreis Australien
•VDI-Freundeskreis Brasilien
•VDI-Freundeskreis Frankreich
•VDI-Freundeskreis Griechenland
•VDI-Freundeskreis Indonesien
•VDI-Freundeskreis Italien
•VDI-Freundeskreis Republik Südafrika
•VDI-Freundeskreis Rumänien
•VDI-Freundeskreis Rußland
•VDI-Freundeskreis Spanien
•VDI-Freundeskreise USA

### 2.1.3. Requirements and fees

The only requirement for registration as a VDI member is to have graduated as an engineer. Done so the applicant has to complete a membership application.

The cost for membership depends on the kind of membership. There are different kinds of membership:

| | |
|---|---|
| Membership | € 120 per year |
| Young membership (to age of 30) | € 60 per year |
| Young membership (to age of 33) | € 90 per year |
| Retired membership | € 60 per year |
| Old membership | € 40 per year |
| Studying membership | € 25 per year |

## 2.2. dib (the German Association of Women Engineers)

**dib**
deutscher ingenieurinnenbund
P.O. Box 11 03 05
64218 Darmstadt
Germany
Phone/Fax +49 700 / 342 38 342
info@dibev.de
www.dibev.de

dib (deutscher ingenieurinnenbund, the German Association of Women Engineers) is a non-profit organization with a current membership of approximately 350.
dib is an association of and for women that work in engineering or study engineering. dib is dedicated to achieving equal opportunities for women in education and employment.
dib was founded in 1986 by a group of women engineers and women engineering students who felt that existing associations and groups were not meeting their needs. dib was created to represent women in engineering and science by offering an alternative to those associations that included female university graduates from a wide variety of disciplines and those engineering-focused groups that were largely male-dominated

## 2.3. Ingenieure ohne Grenzen e.V. (Engineers without borders)

Büro Berlin / Geschäftsführung
Greifswalder Str. 4
10405 Berlin
Tel: +49 (0)30 / 32 52 98 65
Fax: +49 (0)30 / 32 53 28 55

info@ingenieure-ohne-grenzen.org
www.ingenieure-ohne-grenzen.org
www.ewb-germany.org

Engineers Without Borders – Germany („Ingenieure ohne Grenzen e.V.“) was founded in 2003 by 9 engineers and 1 economist. It is a non-profit organization. The mission is International facilitates links and collaboration among its member groups toward improving the quality of life of disadvantaged communities worldwide through education and implementation of sustainable engineering projects, while promoting new dimensions of experience for engineers, engineering students, and similarly motivated non-engineers.
It is a member of the Engineers Without Borders - International (EWB-I)

# 3. Areas of work

As mentioned in part one there are a lot of possible areas for engineers working in Germany. The only qualification an engineer needs to have for his work in engineering is that his kind of professional work is in accordance with his special field of study. So an engineer in architecture is only allowed to work as an architect. This is irrelevant of his location of birth.  As long as the home country of an engineer is an EU Member country a foreign engineer is free to accept a job in Germany. However, for an engineering job, he has to own a degree as an engineer.

## 3.1. Controls, processes and costs

There is no special law or administration for the processes and the cost of a project done by an engineer. The client is responsible for costs and processes to be kept to budget. But on the other hand there is two big German associations for testing projects after parts or the whole project has been finished. This association is the TÜV (**T**echnischer **Ü**berwachungs-**V**erein, *Technical Inspection Association*) on the private side and the other side the different state controlled Ministries.

### 3.1.1. TÜV

The TÜV brand is a registered trademark reserved for TÜV organisations and VdTÜV. The brand is extremely well known and identifies the TÜV inspection and testing organisations. It may only be used by a Technischer Überwachungs-Verein (TÜV - technical inspection agency) or a TÜV subsidiary company. Because of its official registration with the German Patent and Trade Mark Office [Deutsches Patent- und Markenamt (DPMA)], with the Office for Harmonisation in the European Internal Market [Harmonisierungsamt für den Europäischen Binnenmarkt (HABM)] and with numerous trade mark offices in other countries, the brand name is protected almost all over the world.

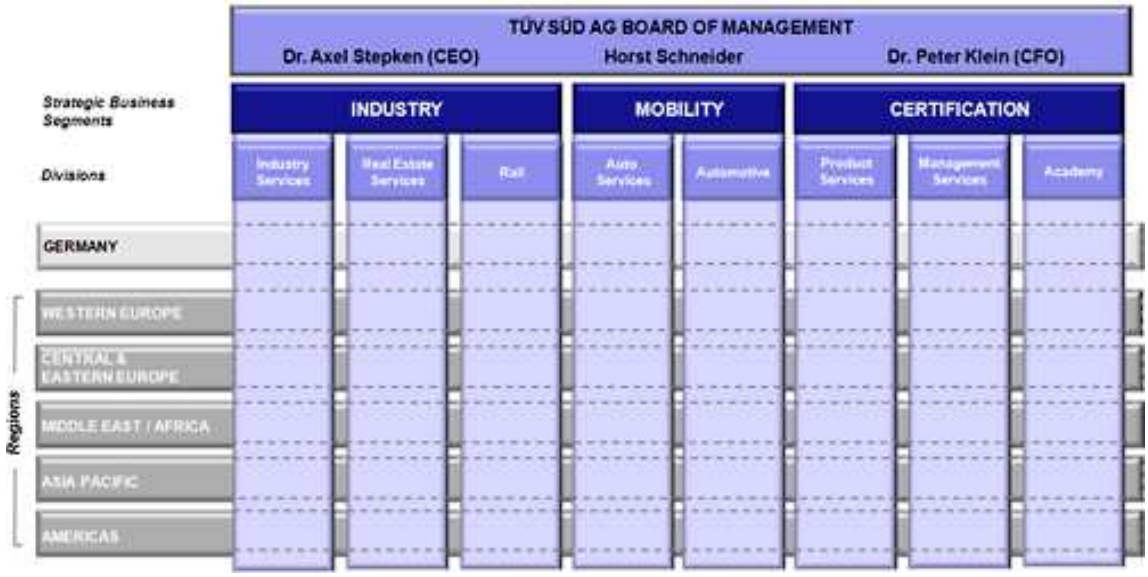
TÜV companies enjoy a superb reputation as regards neutrality and expertise throughout the business sectors in which they work. This accounts for the high profile of the TÜV brand and the great respect in which it is held. TÜV is one of Germany's best-known brands, as surveys have shown again and again. These three letters have become synonymous with safety and certainty, reliability and impartiality. TÜV organizations ensure these principles that are applied not only in Germany, but around the world. Brands make life easier because they ensure recognition, or, in simple terms, we know immediately who we are dealing with and which services and goals are involved in the company in question. However, this can only work if the use of a brand name is actually restricted exclusively to

those companies for which it has been registered. Brands must be protected in the interests of both the customers and the companies. Like other TÜV organizations and their joint association VdTÜV, TÜV SÜD is therefore making every effort to maintain and strengthen the protection of the TÜV brand.

Today TÜV is separated in multiple divisions:

- TÜV Süd
- TÜV Hessen
- TÜV Nord
- TÜV Thüringen
- TÜV Saarland
- TÜV Rheinland

The TÜVs as a group became part of the German landscape about 130 years ago, as part of the public and workplace safety initiatives of the time. In 1870 there were 43 TÜVs in total. They were geographically based, as they are today, hence the names, SÜD, NORD, Rheinland, etc. The TÜVs were originally formed to inspect steam boiler installations across the country. Interestingly, a major part of their business is still based on the inspection and certification of boilers and pressure equipment (see the Pressure Equipment Directive for more). As the years passed and technology progressed, the 43 TÜVs merged and now there are 6 TÜVs remaining in Germany plus one in Austria and one in Turkey. The largest is the SÜD group with 11,000 employees and 800 locations worldwide. The only commercial certification body in the world larger than the TÜVs combined is Société Générale de Surveillance, based in Switzerland
The many subsidiaries of the TÜVs can also act as project developers for energy and traffic concepts, as problem solvers in environmental protection, and as certification bodies. Many of the TÜV organizations also provide certification for various international standards, such as ISO9001:2008 (quality management system) and ISO/TS16949 (automotive quality management system).



### 3.1.2. Ministries

But not only theTÜV is responsible for the certification of projects in Germany. In Germany there are hundreds of government agencies which are dedicated to special sectors of control and certification of engineering projects. All these agencies are organized under the top level federal ministries of Germany:

- die Bundesministerien:
  - Auswärtiges Amt (Ministry of Foreign Affairs)
  - Bundesministerium der Finanzen(Ministry of Finance)
  - Bundesministerium der Justiz( Ministry of Justice)
  - Bundesministerium der Verteidigung( M.o. Defense)
  - Bundesministerium des Innern(Ministry of Interior)
  - Bundesministerium für Arbeit und Soziales(Ministry of Labor and Social Affaires)
  - Bundesministerium für Bildung und Forschung(Ministry of Research/Education)
  - Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz(Ministry of Agriculture)
  - Bundesministerium für Familie, Senioren, Frauen und Jugend(Ministry of Family Affaires)
  - Bundesministerium für Gesundheit (Ministry of Health)
  - Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit(Ministry of Environment)
  - Bundesministerium für Verkehr, Bau und Stadtentwicklung(Ministry of Traffic)
  - Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung(Ministry of Development)
  - Bundesministerium für Wirtschaft und Technologie(Ministry of Economics

For example: For the German Bundesbahn(Railway System) which is part of the Bundesministerium für Verkehr, Bau und Stadtentwicklung(Ministry of Traffic), alll non-movable parts like tracks, switches, signals are controlled and certified by the Bundesnetzagentur, while the movable parts like trains, locomotives and wagons etc. are certified and controlled by the Eisenbahnbundesamt. Both agencies are also part of this Ministry.

## 3.2. Insurance

In Germany the fees for insurance for individual engineers are so high that it is the Professional Associations or the companies themselves that pay for this type of insurance. But you can take an insurance with every insurance company in Germany (Axa, Generali, Allianz, etc…)