ENERGY KNOWLEDGE FOR YOU

BASIC AND ADVANCED TRAINING

Program Guide

Version: November 2021

Foreword

Dear reader,

Welcome to KWS Energy Knowledge eG's Basic and Advanced Training brochure. While we have been issuing such publications in the past, this brochure is different. For one, it is the first of its kind devised exclusively for the benefit of our international customers. Its layout, content, and writing are unique and not mere translations of existing German-language publications from KWS. This shows how seriously we take our customers abroad and how greatly we appreciate your business.

This publication has been compiled to whet your appetite, in a manner of speaking, meaning to introduce our school and its services to as many new international clients as possible.
While KWS Energy Knowledge eG is pretty much a household name in its traditional market, Europe, many potential customers in other parts of the world may still be unfamiliar with us or may not even know we exist. With this brochure, we are trying to fill this void.

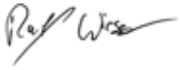
Our approach is to give you a first good look at us in a compact, easy-to-read booklet that does not overextend anybody's attention span. Furthermore, instead of just feeding the reader facts and figures, we let people speak, both men and women from KWS and some of the young professionals who train at KWS. We believe their words speak for themselves. Needless to say, we can give you all the facts and figures if and when you want them – and then some.

We realize, of course, that we are not the only institution in the world to offer top-notch basic and advanced power plant personnel training. However, we have been successfully competing in this business since 1957 and are confident of the quality of our services. So confident, in fact, that we invite independent reviewers to verify it. Still, we never let up to get even better by listening intently to our clients and giving them what they want, anywhere, anytime.

No customer shall ever regret having chosen KWS over the competition. That's a promise.

Kindest regards,

Uwe Möller



Ralf Wiescher

Jörg Schulte-Trux

KWS AT THE POWER-GEN AFRICA IN SANDTON (JOHANNESBURG, SOUTH AFRICA)

KWS took part at the Power-Gen Africa from July 19 – 21, 2016 as one of the more than 3,000 participants present during this world-renowned power industry event that brings together power plant operators, manufacturers and service providers as well as policymakers.

In addition to a trade exhibition that prominently featured a KWS information booth, an expert conference was held.

KWS's contribution to this conference was a lecture on the topic "Holistic long-term training project to build capacity for effective operational management of power plants", which was selected as one of the three best lectures held during the conference and awarded a prize.

KWS awarded a prize

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About KWS

KWS Energy Knowledge eG is more than a mere vocational training school – it is an institution whose origins date back to the late 1950s.

In the 1950s, Germany's power industry, represented by the VGB, the Association of Large Boiler Owners, decided to act on the recognition that disturbances, malfunctions, and serious accidents in power plants were often mismanaged or even caused by insufficiently trained operating crews. With the rapid expansion of Germany's power plant capacities and the ever-increasing complexity of power plant technology, the need for standardized high-quality personnel training throughout the industry was evident. Therefore, KWS Energy Knowledge eG, a school dedicated exclusively to comprehensive basic and advanced training of power plant personnel, was set up in Essen, Germany in the year 1957.

Initially, training focused on power plant shift supervisors from German fossil-fuelled power plants only, and all courses were conducted on the school's premises in Essen, with emphasis on theoretical classroom instruction.

Today, it is a whole new ballgame, as the saying goes. First of all, the range of training offerings is greater than ever, covering virtually all levels, departments, and aspects of power plant operations including maintenance, occupational safety, environmental protection etc. You name it, we've got it.

In addition to conventional coal- or gas-fired power plants, KWS's training today not only encompasses CCGT, hydro power, or renewable energy plants, but also industrial or thermal waste utilization facilities.
While classroom lectures are still important, modern instruction tools like sophisticated mobile power plant simulators permit realistic, hands-on training wherever the customer desires. Also, the scope, the contents, and the duration of training courses can be tailored to meet any client's specific needs, thanks to KWS's modularized course structure.

Most significantly, KWS Energy Knowledge eG has evolved from a national to a global player. First, companies from other European countries and later customers from all over the world increasingly availed themselves to KWS's services.

Some things never change, however, particularly KWS's commitment to offering top-quality, state-of-the-art training and value for the customer.

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The KWS Worry-Free Plan

For the benefit of its clients, KWS's basic and advanced training measures are comprehensively coordinated, organized and conducted from beginning to end.

Initially, KWS screens a client's potential trainees in order to determine their fitness with regard to their future assignments. This includes defining job specifications and qualification criteria and identifying existing skills of individuals with relevant professional experience based on completed vocational training in given fields.

The next step is the conception of client-specific training measures by evaluating the facts identified during the screening and working out recommendations for qualifying measures. KWS then makes detailed suggestions to the client as to where and when such measures may be conducted and develops an individualized training plan. All of this is subject to the client's approval, of course.

What follows is the actual training phase. All needs of the trainees are taken care of. If training takes place in Germany, visas and all other necessary legal documents

are obtained, accommodations on location and leisure activity options after hours or on weekends are provided. Where applicable, complementary training measures and trainee participation in exams for CCI certificates are implemented as part of KWS's worry-free plan. Training measures may be conducted in English, French, and Russian or, with the help of competent interpreters, in any language required.

During the training phase, the performance and progress of each trainee is thoroughly assessed and verified. KWS's training enables participants to actively and purposefully apply the knowledge and skills they have acquired in theory and practice in their new field of activity. Graduation exams with participation certificates and CCI exams with graduation certificates (where applicable) document training success and assist human resources development in power industry businesses.

KWS's basic and advanced training program strictly adheres to all occupational safety requirements. Also, environmental protection and resource conservation standards as well as business-specific demands in the fields of operations, planning, maintenance and repairs are observed.

All of KWS Energy Knowledge eG's activities follow a quality management system in accordance with the DIN EN ISO 9001: 2015 standard. This system is officially certified by CERTQUA (Gesellschaft der Deutschen Wirtschaft zur Förderung und Zertifizierung von Qualitätssicherungssystemen in der Berufliche Bildung mbH).

All the World is a.....Classroom

(and Each must Play a Part)

KWS's international assignments are quite diverse both in terms of training contents and locations.

Turkey: Modular training program for new operating personnel of the Denizli power plant for RWE Turcas Güney Elektrik Üretim A.S.

Training was conducted jointly by KWS and S.T.E.P. Consulting GmbH. The courses were designed to prepare the operating crews for the startup of the new power plant. Training was assisted by simulator-based instruction in Essen. The courses were held in Turkish, using English-language instruction materials.

Iraq: Screening of personnel from the Erbil, Sulaymaniyah and Duhok power plants in Kurdistan (Northern Iraq) for Mass Global Investment Co. (MGI)

With the assistance of the Profil company, KWS conducted a screening at the Erbil, Sulaymaniyah, and Duhok power plant sites in Kurdistan. MGI, a company from Amman, Jordan, operates some 24 gas turbines in Kurdistan that were retrofitted with recovery boilers. This necessitated preparing on-site personnel for future upgraded operations. The objective of the screenings was to determine the current skill level of the shift crews. Based on the results of the screening, a training program designed to prepare the crews for the construction and startup of the new installations was developed. The screening was conducted in English.

Essen, Germany: Electrical engineering training for engineers from the Energy Authority of Mongolia

The participants visited Germany to receive instruction in topics like new process engineering technologies (with simulator exercises included), Germany's legal framework

regarding power plant operations and environmental protection, digital motor protection and related topics. Their stay also included several field trips to power plants and to relevant component supplier sites in Germany. The course was held in German with a Mongolian interpreter.

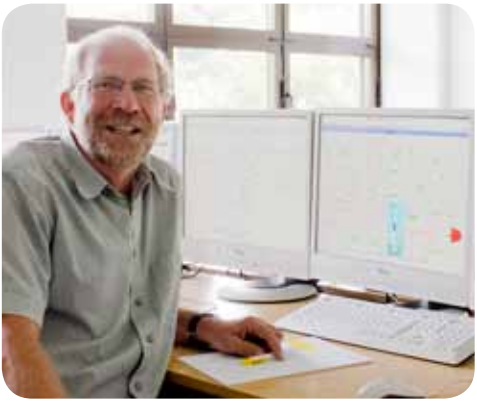
South Africa: Screening of engineers and operating personnel from the Kendal and Matimba power plants for Hitachi Power Africa Pty. Ltd.

The screening and examination was conceived to select suitable trainees for a subsequent large-scale training project for Hitachi Power Africa Pty. Ltd designed to upgrade power plant personnel skills to European standards. The event took place on location and was conducted in English.

Faculty

The yardstick of any educational institution is the quality of its faculty. KWS Energy Knowledge eG currently employs 20 full-time and 270 part-time instructors and lecturers, all of them highly skilled and experienced in their fields of expertise. KWS's teachers are no ivory tower philosophers, but possess substantial professional and personal real-life experience because they have spent significant parts of their adult lives outside the educational system.

Needless to say, all KWS faculty members undergo continuous "train the trainer" instruction to constantly update and refine their cutting-edge didactical skills. Such skills are at least as important as a teacher's technical expertise.



Welcome!

CONFERENCE CENTER

CONFERENCES · MEETINGS · TRAININGS

You are looking for a special location to hold your conferences and seminars?

Our conference center provides you with the perfect all-in service package. Rooms for small and large groups are at your disposal. We will be pleased to support you in the planning and realization of your event. We offer you the following items:

- Modern, light conference rooms for 3 to 130 persons
- Up-to-date technical equipment including WLAN, beamer, whiteboard and smartboard, visualizer
- Videoconference room
- Conference support service
- Further technical equipment on demand

Contact

We are looking forward to be at your disposal for any queries and suggestions.

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Clients

There are two types of KWS clients, members and non-members. KWS Energy Knowledge eG is a registered association founded and administered by its more than 200 ordinary, affiliated, and sponsoring members from Europe and abroad. As a rule, members are directly or indirectly connected with the power industry – electricity providers, utilities, component manufacturers and suppliers etc. KWS is funded in part through membership contributions calculated according to a specific formula based on maximum continuous steam output of a member's power plant pool. However, most of the school's revenue – more than 90 percent, as a matter of fact – comes from training course fees.

Being a KWS member carries a number of advantages, primarily being able to directly influence the school's agenda, training contents and formats. Also, members pay 20 percent less for courses attended by trainees from their respective companies. However, members are not obliged to have their employees trained by KWS. Only if the product is right, namely training quality, will they choose KWS.

The importance of non-members to KWS's business is quite significant, and increasingly so. Without exception, all of the school's services are available to non-members as well, and every effort is made to meet or even exceed their training needs. Non-members are anything but second-class clients.

Especially in the course of its international activities, KWS often trains power plant operating and maintenance personnel on behalf of component manufacturers. Siemens, Alstom, Hitachi and other well-known companies supply and install large numbers of boilers, turbines or control engineering systems all over the world and in many cases prefer to rely on KWS's expertise instead of conducting component training measures themselves.

In addition, the number of power industry clients that directly employ KWS for personnel training is on the rise, especially in Africa and Asia.

In any case, KWS Energy Knowledge eG welcomes every client, member and non-member, domestic and international alike.

Trainees

Once more, Iounis Al-Hajri goes through the run-down of starting up the gas turbine. Everything is under control. All main and auxiliary systems have been checked and are online for the startup procedure. This is a matter of routine for the 39-year-old control room operator from Oman. For 19 years now, he has been with his employer, Wadi Al Jizzi Power Company SAOC, and is anything but a newcomer to the power industry. This time, however, the startup takes place not in his home plant, but in a simulated control room at KWS Energy Knowledge eG in Essen, Germany.

Mr. Al-Hajri and his two equally seasoned colleagues Ahmed Mohamad Hassan, 39, and Humiad Almusalmi, 37, are up for promotion to shift supervisors and were hand-picked by the general management of their company to get some high-intensity upgrade training in Germany prior to their new assignments.

"We're here for two very busy weeks", says Mr. Al-Hajri, "with a very tight schedule of simulator exercises and some theoretical instruction. It's all very beneficial." Mr. Hassan agrees: "Our training is very well organized and our instructor, Mr. Stürenburg, goes out of his way to answer all our questions".

Other trainees agree. "The quality of KWS's education is very high", states Husain Rajab Khalil, an engineer at the Abutaraba Desalination Plant in Libya, "and we learn a great deal in our field of study. It's a great experience. Training is very realistic and tailored to the needs at our home plant. Someone who trained here can take up his job at the power plant in Libya right away".

John Manclark is a shift operations technician at RWE npower's Didcot B gas-fired power plant in Britain. He trains not in Germany, but at his home plant. "Simulator training with KWS right here on location is a great help", he says, "we can rehearse all operations procedures realistically and try things out in ways we never could during real plant operations".

In any case, KWS leaves nothing to chance. "Every aspect of our stay in Essen has been taken care of, including visas and accommodation", points out Wadi Al Jizzi Power Company's Humaid Almusalmi, "and KWS has made sure that we even have time for some sightseeing".

Husain Rajab Khalil concurs: "The surroundings in Essen are very pretty. There is so much greenery here, more than in other cities. Essen is a very pleasant and quiet city."

Facility

KWS Energy Knowledge eG is active all over the world, but like any well-organized business it needs a strong home base. Initially, this home base was in Bergerhausen, a central section of the city of Essen, Germany, but since 1995, KWS calls the Deilbachtal in Essen-Kupferdreh home. Located in an unusually rustic environment, the KWS facility was originally conceived for 30 staffers. Since then, KWS's faculty and staff numbers have more than doubled.

With the need for more space for personnel and equipment becoming ever more apparent after the turn of the 21st century, the existing premises were considerably extended and modernized in 2010. Today, there is ample room for additional simulators, laboratories, classrooms, administrative offices and other infrastructure elements needed to run a state-of-the-art training institution.

Building sections housing the various KWS departments are color-coded similar to the Power Plant Identification System to facilitate orientation. Extensive use of plate glass and generously-spaced hallways and break areas create a bright, welcoming atmosphere conducive to making staffers, students and visitors feel at ease immediately.

Some KWS trainees spend many weeks or even months in a row in Essen due to their extensive training schedule. For their benefit, the school operates its own apartment building. This brand-new facility replaces an older site in another part of Essen that was built more than 40 years ago. It is located directly on the KWS campus, facing the training center, effectively combining teaching, living, and leisure areas in one place. The two-floor building contains 54 residential units and four workrooms that feature the same technical equipment as KWS's classrooms, providing the necessary conditions for after-school group work and team studies.

After the day's work is done, trainees may either seek recreation at nearby Lake Baldeney or on the meadows of the Ruhr River. Alternatively, there are the thrills of a big city – Essen is a just a 30-minute drive away.

Tools and Equipment

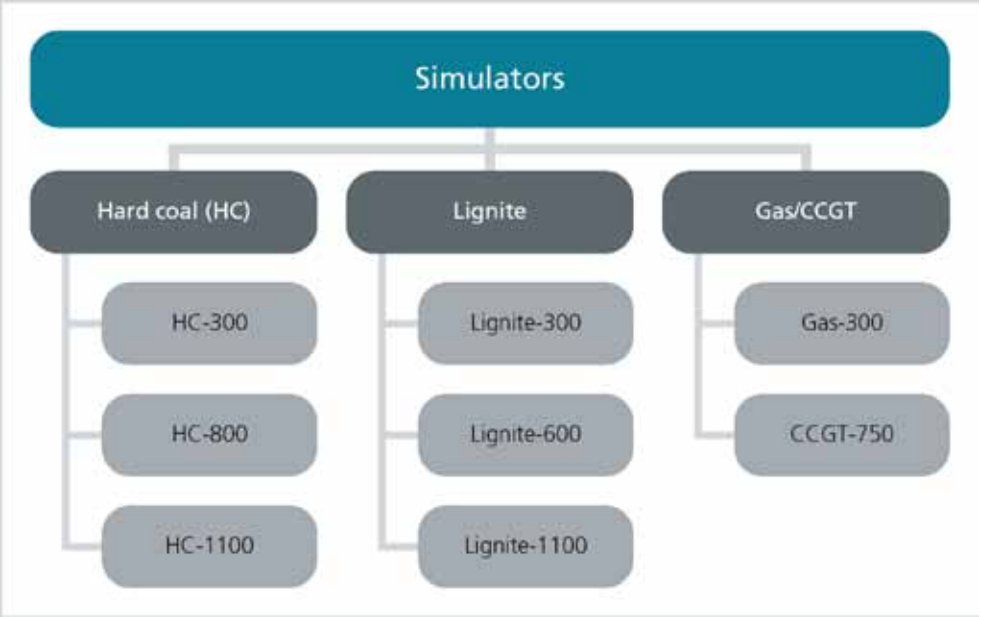
Simulators

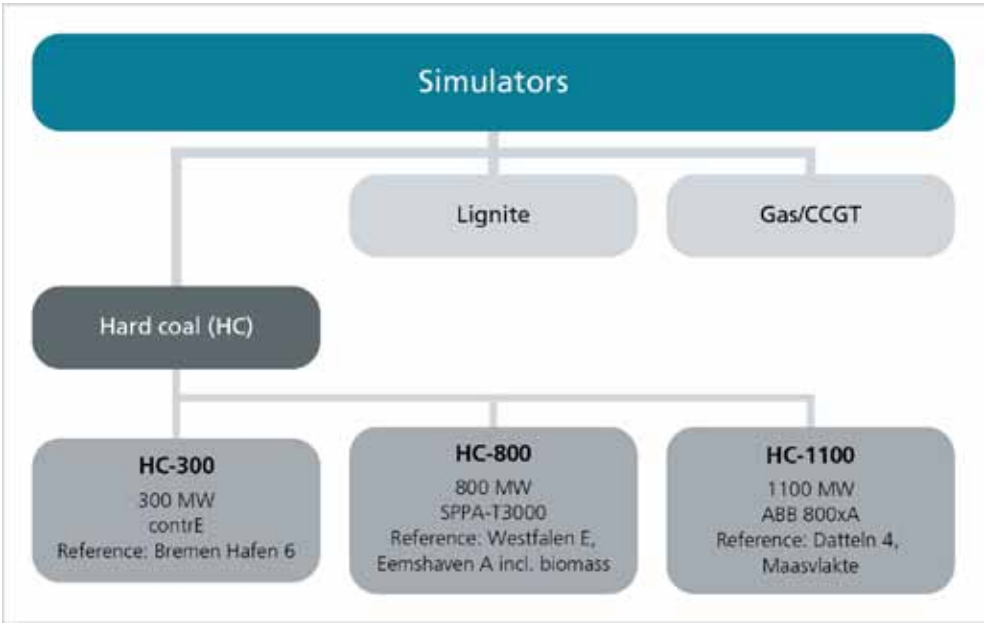
KWS's primary learning tool of choice is the power plant simulator. All of the school's simulators are based on the technical data of actual power plants, the so-called reference plants. Reproduction of plant conditions is so lifelike that one is under the impression of running the "real" plant. Naturally, operating crews from the reference plants enjoy certain advantages during simulator training (short familiarization periods, direct transfer to home plant and control system). In order to make simulator training easier for crews from other power plants, an e-learning unit has been created to facilitate trainee adaptation to unfamiliar process and control technology.

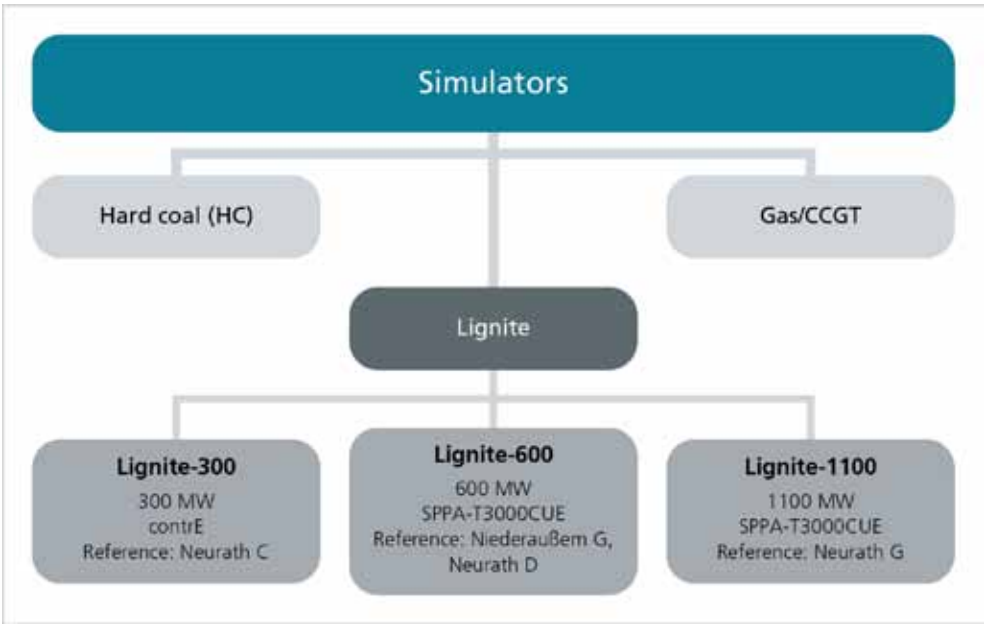
New performance classes in conventional power plant design necessitated an expansion of existing simulators. Therefore, additional simulators for hard coal- and lignite-fired power plants with the most advanced control and process engineering were recently introduced, called StK-800, StK-1100, BrK-600, BrK-1100. Furthermore, a new CCGT power plant simulator with novel control engineering was added to the lineup on January 1, 2013, the GuD-750-3.

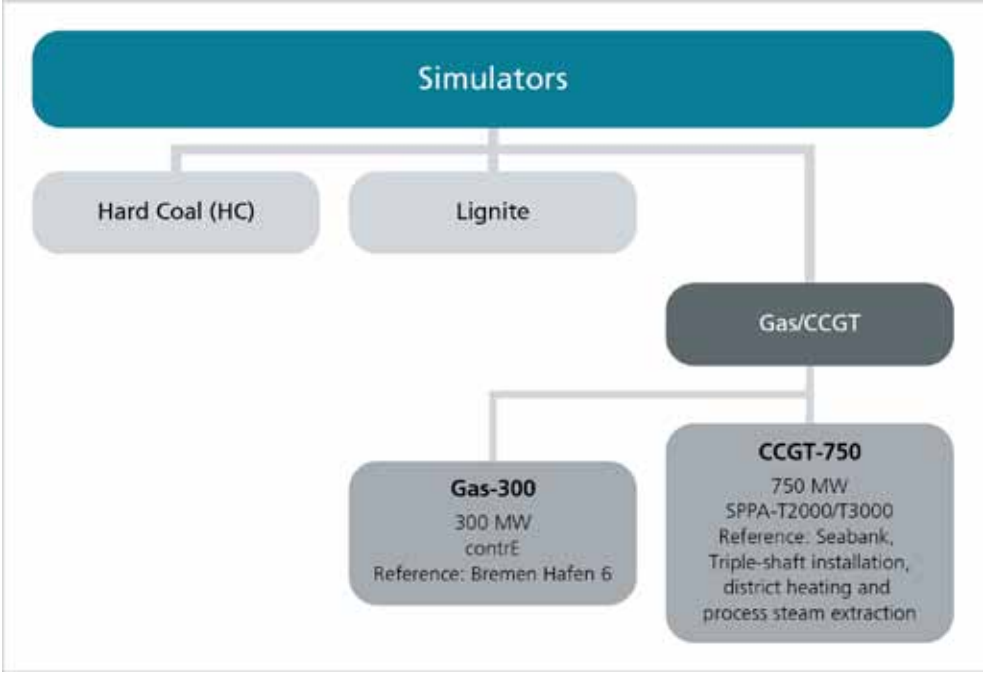
Today, KWS's simulators emulate 300, 600 and 1,100 MW lignite-fired, 300, 800, and 1,100 MW hard coal-fired, 300 MW gas-fired, and 750 MW CCGT power plants with once-through and/or natural circulation steam generators and other technical options. A greater than ever variety of realistic, power plant-specific training options for operating personnel is now on offer.

Our Simulators




Simulators
Lignite
Gas/CCGT
Hard coal (HC)
HC-300
300 MW
contrE
Reference: Bremen Hafen 6
HC-800
800 MW
SPPA-T3000
Reference: Westfalen E,
Eemshaven A incl. biomass
HC-1100
1100 MW
ABB 800xA
Reference: Datteln 4,
Maasvlakte


Simulators
Hard coal (HC)
Gas/CCGT
Lignite
Lignite-300
300 MW
contrE
Reference: Neurath C
Lignite-600
600 MW
SPPA-T3000CUE
Reference: Niederaußem G,
Neurath D
Lignite-1100
1100 MW
SPPA-T3000CUE
Reference: Neurath G



One of the great advantages of KWS's simulator training is its flexibility. Modern screen-based operating systems, real or virtual, fit in a briefcase, in a manner of speaking. Therefore, simulated control rooms consist of little more than powerful, yet compact laptop computers and screens and may be set up wherever the customer desires.

This flexibility is just what the power industry needs these days. Today, more than ever, power plants must operate at maximum efficiency in order to compete in a tight and volatile market. Also, environmental protection standards keep on rising, which makes perfectly tuned power plants a must. Sounds taxing and it is, but with KWS and its state-of-the-art simulators and training methods on hand, power industry businesses can keep their facilities and their staff on the cutting edge of success. You can take our word for it.

Simulator forum

Experiencing a simulated power plant with hands-on control technology is the goal of KWS's recently created simulator forum. It is an additional offering to students, staff, visitors, and guests of KWS, an offering of a new kind. Among other things, it provides the opportunity to get acquainted with Siemens SPPA-T3000 control technology, with or without expert guidance. The very same technology is used in KWS's simulator training classrooms next door. Simulator training participants use the forum to apply in practice what they have learned in the classroom. For guests, the forum is a means of simply getting to know KWS's training offerings.

The forum will not only facilitate simulator exercises or simulator demonstrations by KWS's experts, but also enables visitors with different levels of existing knowledge to personally handle - under expert guidance – a real power plant control technology system.

The new T-FOKS workplace simulator and many multimedia presentations round out the simulator forum's functions.

Printed media

Since its inception, KWS has been issuing instructional literature for the benefit of trainees in Europe and beyond. These so-called "Lehrhefte" (study books) and "Fachhefte" (advanced study books) and cover a wide range of relevant topics such as Technical Mathematics, Physics, Thermodynamics, Control Engineering (I&C), Chemical Basics and Processes, Materials Science, Turbines, Piping and Valves, Electrotechnology Basics, Power Plant Construction and Operations, and Power Plant Auxiliary and Ancillary Systems. All these books are available in English and are listed in KWS's Media Catalog (to be accessed online at *international.kws-eg.com*).
Study and advanced study books are regularly updated and closely match the learning objectives determined by the German Chambers of Industry and Commerce. Additional material for seminars and courses is compiled by the course instructors.

Laboratories

For many years, training laboratories have been a cornerstone of KWS's instructional efforts. Here, under the guidance of experienced teachers, trainees can conduct a variety of experiments in the fields of thermal engineering, fluid mechanics, control engineering, electrotechnology, electronics, and radiation protection.

Training Made to Order

KWS uses several methods of conveying information, from classical instruction segments to hands-on simulator and laboratory exercises. This includes training courses, seminars, workshops and other training options. Individuals attending any type of training measure receive a certificate of participation. The terminology employed may vary significantly depending on the requirement profile of the contents to be conveyed.

Training Courses

KWS training courses offer proven advanced training with curricula and a list of defined training goals. Unlike in other advanced training options, participants are subjected to learning progress checks in order to successfully complete the course.

Seminars

KWS seminars enable participants to experience interactive training for in-depth memorization of contents. Trainees learn to focus on specific issues and make appropriate decisions based on the situation at hand.

Workshops

KWS workshops transcend established instruction methods and give participants the opportunity to team up for the purpose of developing practice-oriented strategies. This approach involves conducting suitable exercises and subsequent reruns. Later, the learning situations are the subject of joint deliberations. Participants are guided by an expert mentor who also makes suggestions and documents the results of the group's efforts. These results will be made available either to the participants or their employers after the conclusion of the workshop.

Building skills to last

KWS's international customers like to use our expertise in assessing what their staffers are capable of.
For that purpose, we devise courses tailored to the specific needs of individual customers to determine the existing skill levels of their employees. Using general German and European proficiency standards as a benchmark, a direct comparison reveals possible areas of improvement. Customized skill development modules make the difference:

Diagnose and Evaluate

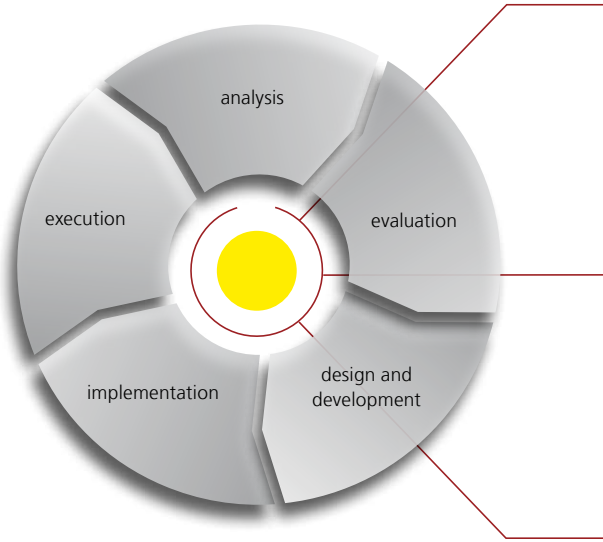
We assess the professional and social skills of the customer's staff, a detailed analysis resulting in an evaluation report.

Respond and Optimize

We develop training contents and methods devised to realize unused potential detected in the assessment and to implement benchmark standards in the workplace.

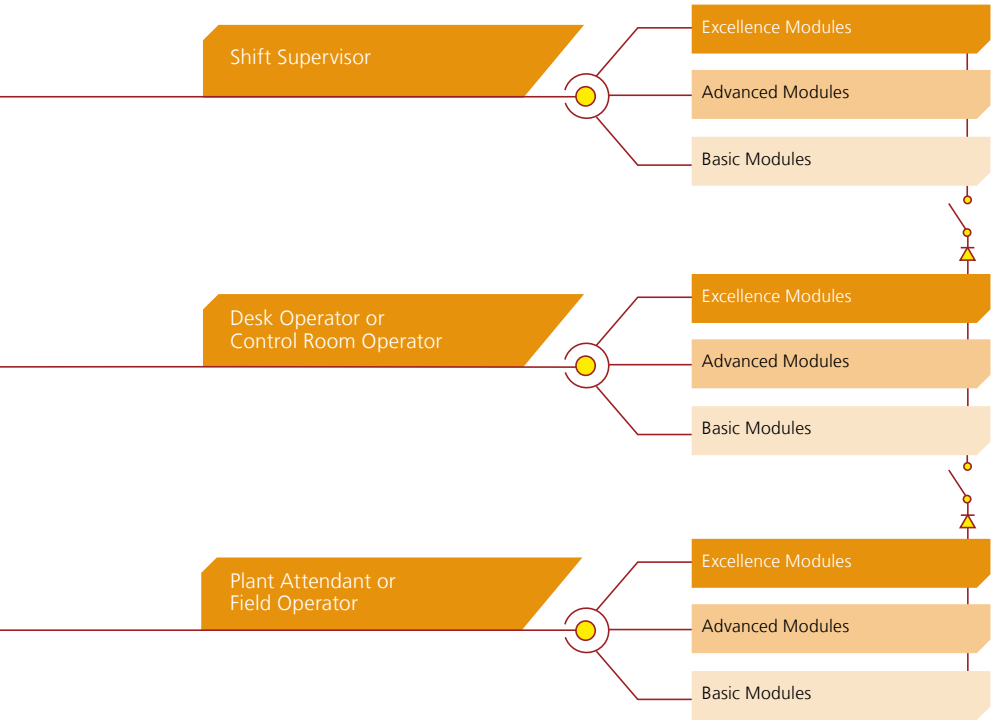
Rehearse and Execute

We rehearse the new standards with the staffers under realistic conditions until lasting improvement is assured.



Introducing the KWS Open Entrance Cascade - your staff's path to excellence

Thanks to the flexibility of the Open Entrance Cascade, staffers may train according to their individual assessment results, the most cost-effective path to professional excellence.



Power Plant Personnel Training Program

Power Plant Operation

Plant Attendant Training

Target Group

Plant attendant training is the entry-level training stage for power plant operating personnel. It is designed to give novices an overview of how power plant technology works.

According to Sec. 8 of Germany's Operational Safety Ordinance, businesses are required to take all necessary measures to make sure that all potentially hazardous tools and supplies (such as steam generators or turbines) are operated only by qualified personnel.

Fully trained plant attendants meet the legal requirements for such duties. They are qualified to supervise and service the equipment assigned to them, to report equipment malfunctions and incidents to authorized higher level personnel appointed by the operator of the plant, and to shut down such equipment in case of possible health and safety hazards to other employees or third parties caused by malfunctions.

Plant attendant training offers every employee the opportunity to move up to get advanced training as power plant operator or even power plant shift supervisor. Beyond that, plant attendant training offers the student another indispensable commodity: Confidence. Trainees learn to assess technical situations as well as their own capabilities, laying the groundwork for continuous development of both their professional skills and their personalities.

Objectives

This training measure is designed to give novices an overview of how power plant technology works. Furthermore, this course conveys the qualifications needed to ascertain economical operations with environmental protection and occupational safety in mind.
Participants receive a graduation certificate that verifies their qualification for operating and servicing potentially hazardous equipment in accordance with Germany's Operational Safety Ordinance.
Training consists of three modules which can be booked independently.

Training Modules

A	General power plant design including thermodynamics	1 week
B	Field Operator Basic Training including boiler, electrical systems, C&I, desalination and FGD	4 weeks
C	Operation Training	2 weeks

Certification

KWS certificate of participation

Power Plant Operator

Target Group

The power plant operator is in charge of running power plant facilities, which requires an understanding of the technical properties of power plant installations. Active learning, that is, learning by dealing with real-life situations, creates not only an in-depth understanding of technical, organizational, and interpersonal processes, but also enhances an individual's decision-making capabilities. The power plant operator job profile (certified by an official degree from the German Chamber of Commerce and Industry) meets all professional demands of current practical power plant operations.

Objectives

The power plant operators' area of responsibility has moved more in the direction of a control room operator in recent years, so that the power plant operator is increasingly involved in control and monitoring assignments and less in performing small hands-on jobs while making rounds in the plant. Therefore, the power plant operator's skills in the fields of control systems and electronics have become more and more important.

Training Modules

A	Control Room Operator basic training	4 weeks
B	Operations training for power plant operations	9 weeks
C	Soft skills	1 week

Certification

KWS certificate of participation and certificate of the CCI.

Power Plant Shift Supervisor

Target Group

The top non-academic position in a power plant's hierarchy is that of power plant shift supervisor. For him, knowing how to run a power plant efficiently is as important as mastering relevant legal issues, environmental protection regulations and safety guidelines. Power plant shift supervisor courses target participants from conventional power plants. Power plant shift supervisor training is designed to produce competent, responsible decision makers.
Objectives:

Training Modules

A	Operations troubleshooting	2 weeks
B	Soft skills	2 weeks
C	Project management, quality management	2 weeks

Certification

KWS certificate of participation and certificate of the CCI.

Desalination

Plant Attendant Training

Target Group

Plant attendant training is the entry-level training stage for desalination plant operating personnel. It is designed to give novices an overview of how desalination technology works.

According to Sec. 8 of Germany's Operational Safety Ordinance, businesses are required to take all necessary measures to make sure that all potentially hazardous tools and supplies (such as steam generators or turbines) are operated only by qualified personnel.

Fully trained plant attendants meet the legal requirements for such duties. They are qualified to supervise and service the equipment assigned to them, to report equipment malfunctions and incidents to authorized higher level personnel appointed by the operator of the plant, and to shut down such equipment in case of possible health and safety hazards to other employees or third parties caused by malfunctions.

Plant attendant training offers every employee the opportunity move up to get advanced training as desalination plant operator or even desalination plant shift supervisor. Beyond that, plant attendant training offers the student another indispensable commodity: Confidence. Trainees learn to assess technical situations as well as their own capabilities, laying the groundwork for continuous development of both their professional skills and their personalities.

Objectives

This training measure is designed to give novices an overview of how desalination plant technology works. Furthermore, this course conveys the qualifications needed to ascertain economical operations with environmental protection and occupational safety in mind.
Participants receive a graduation certificate that verifies their qualification for operating and servicing potentially hazardous equipment in accordance with Germany's Operational Safety Ordinance.
Training consists of three modules which can be booked independently.

Training Modules

A	Desalination principles	1 week
B	Desalination plant design	2 weeks
C	Desalination plant operations	2 weeks

Certification

KWS certificate of participation

Desalination Plant Operator

Target Group

The desalination plant operator is in charge of running desalination facilities, which requires an understanding of the technical properties of desalination plant installations. Active learning, that is, learning by dealing with real-life situations, creates not only an in-depth understanding of technical, organizational, and interpersonal processes, but also enhances an individual's decision-making capabilities. The desalination plant operator job profile (certified by an official degree from the German Chamber of Commerce and Industry) meets all professional demands of current practical desalination plant operations.

Objectives

The desalination plant operator's area of responsibility has moved more in the direction of a control room operator in recent years, so that the desalination plant operator is increasingly involved in control and monitoring assignments and less in performing small hands-on jobs while making rounds in the plant. Therefore, the desalination plant operator's skills in the fields of control systems and electronics have become more and more important.

Training Modules

A	Desalination plant components	2 weeks
B	Pre-treatment and post-treatment	2 weeks
C	Soft skills	1 week

Certification

KWS certificate of participation and certificate of the CCI.

Maintenance

Target Group

All maintenance operatives in power plants, master craftsmen and technicians with management duties, high-level management personnel from maintenance contractors staff, promising expert craftsmen, junior professionals.

Objectives

Training objectives are threefold: First, to create an awareness of what constitutes staff and contract personnel misconduct. Second, to enhance an understanding of why professional conduct is imperative during maintenance operations. Third, to improve existing professional conduct of power plant staff and contract personnel during maintenance operations.

Training Modules

Basic Training modules:	
General power plant design	1 week
Power plant components	2 weeks
Work safety, work permits	2 weeks
Advanced Training modules:	
Modular training on special power plant components	Up to 2,5 weeks
Workplace organization training	1 week
Soft skills	1 week
Professional Training modules:	
Maintenance strategies and organization	1 week
Soft skills	2 weeks
Project management, quality management	2 weeks

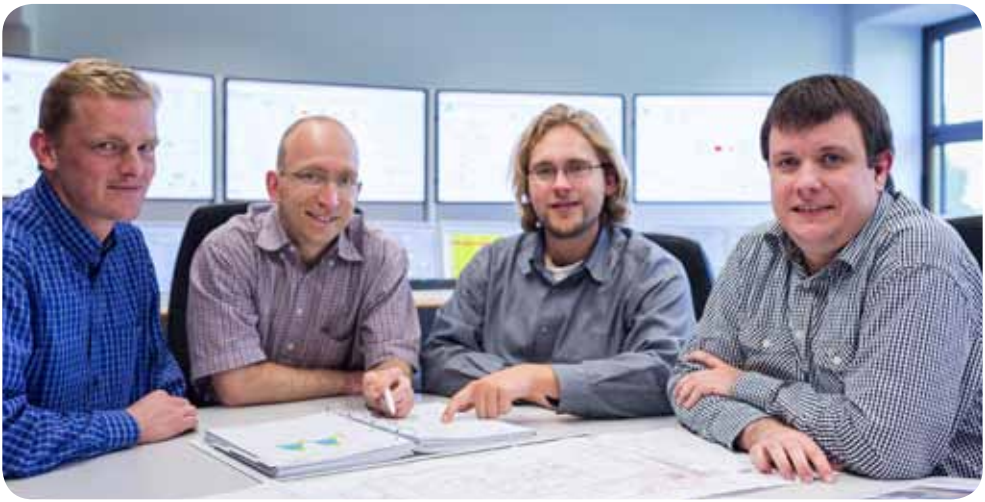
Certification

KWS certificate of participation.

Simulator training modularization and customization

Simulator training is an essential part of most training measures conducted by KWS. Decades of experience in this field prove that the more simulator training adapts to the specific requirements of a client the more effective it is.
Therefore, KWS has created a module pool that contains the building blocks for the compilation of individualized simulator courses. The novelty of these modules is their compartmentalization, which means they can be customized to defined target groups and training goals.

Modularized simulator training may benefit a wide range of target groups such as operating personnel (power plant operators, foremen), operational management personnel (shift supervisors, team leaders, unit leaders, master craftsmen), administrative management personnel (personnel managers, ops engineers), technical personnel (technicians, chemists), business personnel (business economists, comptrollers), government representatives, and students (secondary and tertiary level).
Depending on the target group and the course's objectives, modules will be taken from the four areas and compiled individually for a specific simulator training course program.



While the first three areas of the module pool cover well-established technical topics (process engineering, electrotechnology, control engineering), interdisciplinary skills training teaches trainees vital communication capabilities.
Malfunctions management effectiveness increases considerably if shift crews have been trained to interact properly and efficiently during disturbances. The degree of interdisciplinary skills training to be conducted depends solely on the individual requirements of a given client.

Once again, KWS's maxim holds true: What a client wants, he gets.

Simulator Training

The KWS Modularized Course Concept

The module pool designed to adapt simulator training to the specific advanced training needs of our clients, features four areas of instruction:

- Process engineering
- Electrotechnology
- Control engineering
- Interdisciplinary skills

Compartmentalizing these modules with regard to target groups and training goals defined includes:

- Pre-existing knowledge and skill level of trainee(s)
- Identification of specific and interdisciplinary skills to be enhanced by training
- Matching simulators to existing power plant technology

The compilation of a client-specific simulator training course defines training contents, duration, resources required (simulator, e-lab), training objectives, and, if necessary, trainee progress checks in a given course.
Working a modern control room mandates not only technical, but also a great many interdisciplinary skills that should also be developed and enhanced in the training process, such as:

- How to give unequivocal orders and feedback
- How to gather and evaluate relevant information and make decisions during malfunctions
- How to paraphrase

Recent experience shows that the number of simulator courses with interdisciplinary skills exercises included is on the rise due to increasing popularity in the power industry. Reflecting on process engineering technology interaction on the one hand, but also on shift crew interaction during malfunctions training increases malfunction management effectiveness considerably.
Such modularized simulator courses feature an 80 percent share of technical skills and a 20 percent share of interdisciplinary skills training modules (see core course with inter-divisional contents on page 41). Stand-alone interdisciplinary skills training takes place in team leader and teamwork training.

Courses Types

The course types listed below are to be regarded as examples and suggestions. Thanks to KWS's modularized course concept, combine suitable modules from the four areas available (process technology, electrotechnology, control technology, and interdisciplinary qualifications) may be combined in one simulator training course in any way that meets your individual requirements.

These courses may be conducted on any simulator with the exception of a few electrotechnology and control technology modules (see core courses page 32) that are currently available only on the Stk-300 simulators. For most effective training results, target groups need to be identified first:

- Operating personnel (power plant operators, foremen)
- Operational management personnel (shift supervisors, team leaders, unit leaders, master craftsmen)
- Administrative management personnel (personnel managers, ops engineers)
- Technical personnel (technicians, chemists)
- Business personnel (business economists, comptrollers)
- Government representatives
- Students (secondary and tertiary level)

Core Courses: More Examples

Process Engineering Section
- Efficiency optimization in power plants
- Feed water and steam temperature layout and modes of operation
- How to manage malfunctions safely
- Steam turbine safety and control systems in theory and practice
- NEW! Block unit control with primary, secondary, and tertiary frequency control, modified and natural even-pressure gradient

Electrotechnology Section
- NEW! Grid disturbance impact on plant operations
- Generator operations and grid behavior as well as voltage control
- NEW! Drop-off to station supply/isolated operations – running in station supply/isolated operations mode – grid control strategies
- Post-blackout plant startup sequence

Control Engineering Section
- How to handle screen-based operations after a conversion from hard control panel operations
- How to handle new control technology (navigation and malfunction analysis in function charts)

Interdisciplinary Skills Section
- Effective teamwork during a shift (team and decision-making behavior)
- Communication training (how to gather and evaluate relevant information during malfunctions, how to make decisions, give unequivocal orders and feedback)
- Efficient and appropriate team management during a shift
- Identifying the four safety levels in power plants, malfunction review and analysis
- Process optimization during shift changeover
- Decision making in a group (e.g. according to FORDEC)

On Assignment with KWS

KWS's instructors and lecturers really get around and meet people from all corners of the world. Their experiences are plentiful and would easily fill a book in its own right. For the scope of a brochure like this one, a few brief remarks will have to suffice. Here is what some of the men and women of and KWS's have to say on a variety of topics in their own words.

Uwe Möller was born on 1958 in Blomberg, Germany, and holds a degree in Mechanical Engineering. Following his graduation from college, he worked for six years as a shift supervisor in a nuclear power plant. Afterwards, he was in charge of quality management for a distinguished machine tool builder as a test and inspection engineer. Since 1989, he has been working for KWS Energy Knowledge eG as Senior Project Manager and instructor for NPP operator and shift supervisor training. During the last four years, he has been Senior Project Manager and trainer for KWS´s International Activities department. "Being in charge of our international activities is really exciting. You get around and meet folks from all over the world. There are new experiences and insights almost every day. Today, there´s a lot of talk about a clash of cultures, but actually, it´s more like a get-together, at least as far as my line of work is concerned. Sure, there are cultural differences sometimes, but I feel there´s nothing we can´t work out together."

Kirsten Prophit supports the training department in the field of International Activities. She has studied communication and marketing and is trained in foreign language correspondence and in project management. "I ensure the smooth and effective functioning of KWS's international training events, assisting instructors and trainees in all aspects inside and outside the classroom. I care for duties of visa application for our instructors and all training-related procedures such as providing training material, equipment, documentation and the evaluation of training units"

Jörg-Schulte-Trux worked as an engineer in industrial power plants in Germany and abroad before joining KWS in 2005. "My first international KWS assignment was in South Africa in 2011, training engineers and maintenance crews at the Medupi power plant on behalf of Hitachi. I greatly enjoyed my stay there. South Africans are very sociable and hospitable. Once you're there, you're family. I even joined a local sports club of which I'm still a member. We'd get together to play soccer and had a really good time."

Ralf Wiescher is an Engineer in Instrumention and Control. "As Diploma I installed a distributed control system in one of the laboratories of KWS, including some programming and developing training material. Since 2006 I am working for KWS as course manager and trainer for operators and shift supervisors as well as a trainer for International Activities. I still remember my first international training in South Africa in 2014. Just like Jörg, I really enjoyed the hospitality there very much. I experienced that also in many other countries, e.g. Egypt in 2016/17."

Rainer Zobel is a business administrator by training and has been with KWS since 2003 as a part-timer. "My field of activity is Human Resources. I started out with KWS during the first Libyan project and conducted more than 2,800 screenings of personnel there. Since then, KWS has really made me go places, South Africa, Turkey, Bulgaria, Kurdistan, Thailand, among others. These screenings of individuals, particularly for leadership positions, requires quite a bit of negotiating skills and instinct. It's difficult sometimes, but always exciting and enlightening because of the cultural differences involved. For example, negotiations focus on positions in East Asia but on people in Africa and the Middle East. You better remember that if you want to get anywhere. One of my most endearing experiences has been with Indians. They're usually very humorous and affectionate. Close contacts, even friendships remain over long periods of time."

KWS Apartment Building

Accommodations

Room for everything: Training, relaxation, get-together

Since its grand opening in July 2013, participants have been availing themselves of the comforts of our new apartment building on the Energy Campus Deilbachtal. Whether it's chilling out in the privacy of one's own apartment, shooting the breeze in the kitchen or working out in the gym, trainees can take their pick. It's only a short walk to the school, so no excuse for being late for class. Don't like to cook your own meals? Take your breakfast and lunch in the campus restaurant of KWS right next door of the apartment building. This is what you get:

- TV, telephone and internet access in all apartments
- Various leisure rooms
- Common kitchen
- Library

Organisation:
Heike Gellings
Tel.: +49 201 8489–193
Fax: +49 201 8489–102
heike.gellings@kws-eg.com

Checking in:
For hassle-free check-in after your arrival, simply use access code any time of day, seven days a week.

Prices:
Please inquire

Leisure

Indoors or outdoors? The country or the city? The choice is yours

KWS's unique location in the middle of a rustic landscape, yet located on the edge of Essen, a vibrant metropolis of the Ruhr region, gives trainees many possible leisure time alternatives.
In the city, visitors find culture, shopping facilities and entertainment to suit virtually anyone's taste.
Some folks can do without the hustle and bustle of a big city. For them, there are the meadows of the Ruhr River or Lake Baldeney, inviting people to take a hike, ride a bike, or go surfing or sailing.
Those who prefer to stay on the campus also have plenty of options to spend their spare time:

- Garden with BBQ area, outdoor chess and table tennis
- Gyms and leisure rooms with pool table and table football
- Concourse with big-screen TV set
- Roofed patio

Studying

Studying on your own or in a group under optimum conditions

Studying is the primary purpose of the Energy Campus Deilbachtal, because that's what our trainees come here for in the first place. Our apartment building was designed to create the best possible conditions for studying, which includes a comfortable working environment as well as up-to-date technical equipment. Bright and spacious workrooms are freely accessible any time of day and provide all necessary tools and equipment like LCD projectors or flip charts. For those who prefer to work individually, all apartments feature noise-reduced design for undisturbed studying.

- Light rooms for a comfortable working environment
- Common rooms offer plenty of space for group work
- Tools as beamer and flip chart are always available
- Silence in the apartment for intensive individual work

How to get to KWS

AK = Autobahnkreuz (interchange)

From Essen City

By car

Take **B227** main road towards **Kupferdreh/ Velbert**, then follow Highway **A44** to **Essen-Kupferdreh** exit. Drive approx. 1.6 km (1 mile) on **Nierenhofer Straße** and turn right on **Eisenhammerweg**. Turn right at the end of the street onto **Deilbachtal**.

Public transport

from **Essen Hauptbahnhof**
- Bus no. **155** (direction Marienbergstraße)

or
- S-Bahn train **S 9** (direction Wuppertal) to **Kupferdreh Bahnhof**

from **Kupferdreh Bahnhof**
- Bus no. **153** (direction Altersheim) to **Kraftwerksschule**

From Düsseldorf Airport

By car

Take Highway **A44** towards **Velbert/A3/Oberhausen/ Köln/A52/Essen**, then take Exit **#22 Kreuz Düsseldorf-Nord** to Highway **A52** towards **Essen/Oberhausen**. Leave highway at Exit **#30 Essen-Bergerhausen**, turn left onto **B227** main road towards **Kupferdreh/ Velbert**.

Public transport
- S-Bahn train **S 1** (direction Dortmund) or
- Deutsche Bahn **RE 1** (direction Hamm/Westfl.) or **RE 6** (direction Minden/Westfl.) to **Essen Hauptbahnhof** (main station)

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