



# INNOVATIVE SOLUTIONS FOR PLANNED SUCCESS

**Company presentation**

Better Project Solutions





Dear clients, customers and business partners,

HOCHTIEF Engineering would like to present itself to you, both as a trusted design and engineering company in its current form, and with regards to its consistent focus on the design and construction issues of the future.

We are certain that, as a partner, we can offer our customers a comprehensive range of products and services, from traditional design, engineering and consulting services to pioneering new products and ways of working.

Our collaboration is characterized by solid standards and innovative technologies and solutions, by advanced building information management applications in design and project management, and by sophisticated methods and efficient instruments for value engineering.

In this way, we offer you particular and future-proof added value grounded in classical design skills. In the following, we would like to illustrate and enumerate how and why.

As the General Manager of HOCHTIEF Engineering GmbH and its associated holdings, I know your interest in excellent engineering work and trust in your faith in our solid expertise, broad experience and innovative ideas.

Yours

Dr. Hansgeorg Balthaus, General Manager

# HOCHTIEF Engineering

**HOCHTIEF Engineering mainly provides project-related services such as design, engineering, consulting, planning and project management, building information modelling (BIM), and technology development.**

**We provide solutions in the construction-related fields of transport infrastructure, energy infrastructure and building construction.**

**The combination of our resources and expertise provides our customers with added value and comprehensive support, even in highly complex and very large projects.**



## What sets us apart

- Decades of design for successful projects
- Independent market presence with mostly external clients
- Expertise in design, design management, engineering and consulting
- Five German and six international locations
- Nearly 500 employees currently working on several hundred projects and design tasks
- Proven and innovative engineering solutions for all types of structures in all project phases
- First-class resources, state-of-the-art IT tools, comprehensive insurance cover and audited quality management
- Added value for customers thanks to international experience in large projects, practical orientation, management skills and orientation towards functionality, efficiency and life-cycle aspects

**Business Line**  
**Infrastructure**

Dr. Erdem

**Business Line**  
**Energy, Industrial & Special Structures**

Dr. Meyer

**Business Line**  
**Construction & Project Management Services**

Stenmans

**Business Line**  
**Virtual Design & Construction**

Schumann

**Consult Infrastructure**

Essen  
Hamburg  
Amsterdam  
Sydney

**Consult IKS**

Frankfurt/Cologne

**HOCHTIEF IKS Schweiz AG**

Zurich

**Consult Construction Management Services**

Essen  
Frankfurt  
Hamburg  
Berlin

**HOCHTIEF ViCon GmbH**

Essen  
Sydney

**HOCHTIEF (India) Private Ltd.**

Chennai

**Consult Construction Materials & Technology**

Mörfelden-Walldorf



# Company profile

HOCHTIEF Engineering GmbH is the engineering office of HOCHTIEF.

For more than 100 years, HOCHTIEF Engineering stands for innovative solutions and project success. We operate worldwide and provide engineering services to industrial, public and private clients.

## Range of services

We consistently align our engineering services with market and customer needs for design and engineering in the fields of transport infrastructure, energy infrastructure and building construction. Alongside structural design, design management and consulting services in these fields, we provide required cross-functional services in construction management, project management, materials technology and in virtual design and construction (VDC) in all areas.

Our experience extends to all types of transport structures, and to conventional and renewable power generation, transmission and storage, as well as to industrial production facilities and all kinds of public and private buildings.

What distinguishes us, in addition to precision and proven experience in all these areas of expertise?

## Wide range of experienced experts

In many specialised areas, we have extensive consulting and solution expertise, for example:

- Special aspects of building construction
- Technical equipment for buildings and infrastructure projects
- Excavations and foundations of all kinds
- Building near and in water

## Design and engineering

- Architectural design, structural engineering and M&E design at all stages and levels of detail
- Design review
- Value engineering
- Independent checking

## Consulting and expertise

- Construction materials technology
- Steel and composite structures
- Welding technology/corrosion protection
- Geotechnics
- Seismic design/structural dynamics
- Probabilistic design methods
- M&E, building physics, façades, green building
- Lifecycle management

## Design and project management

Design management

- Design coordination
- General design management

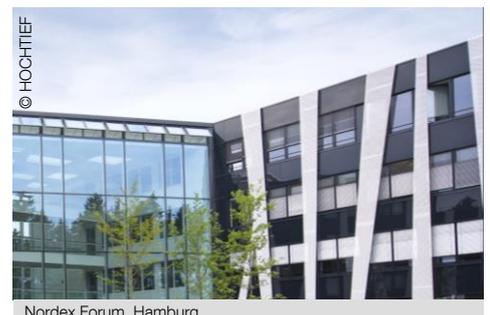
Construction process management

- Schedule planning and control
- Site setup and works preparation
- Site logistics

Project engineering: CM/PM

## Building Information Modeling (BIM)

- BIM consulting
- BIM management
- 3D/4D modelling
- BIM-based production systems



### Holistic project view

We offer a broad range of skills and the ability to support all phases of a project with consulting, design and management. This allows us a holistic view of the project, from the concept phase to execution and the later operation of a facility.

### Broad experience with complex, international projects

Thanks to years of international project and construction experience, we are able to execute projects of enormous size and complexity with short mobilization periods, large teams and in foreign language environments.

### Economical and practical construction in focus

Our work has been shaped over many decades by proximity to the needs of the construction and the requirements of the project execution.

This uniquely puts us in a position to develop and implement design solutions that are practical and functional at an attractive price and with a short execution time. Especially regarding detailed engineering, our location in India provides particularly economical services.

Our strength in detail design leads to practical design variants, superior special proposals, high-grade value engineering and innovative solutions.

Our planning and consulting for works preparation, site setup, construction site logistics and time management are guided by the highest standards of practicality and economy.

### Great management expertise for design and project management

Our extensive project expertise is expressed not only in strong professional and methodological management of design processes and large design teams. We also use our diverse experience in project construction management for our clients' benefit.

Under the label "Project Engineering", we offer a wide range of services for the support and management of projects and processes of our private and public clients.

### All forms of contract

We are active in virtually all forms of contractual involvement. These include:

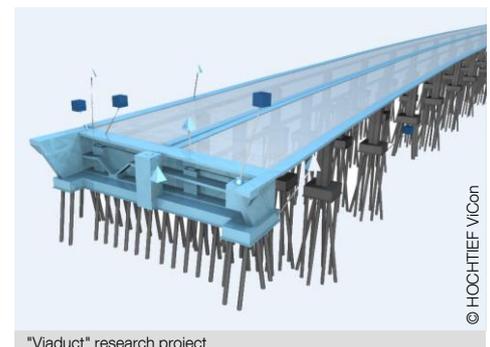
- International standard planning contracts such as FIDIC White Book
- Service contracts
- Seconded employees and teams with daily or monthly rates
- Formal personnel leasing
- Framework agreements
- Lump-sum contracts

### Managed project success

The above special skills and extensive experience provide you with exceptional added value, both individually and in project-specific combinations, through

- Stable processes and punctuality,
- Cost certainty,
- Contractually-agreed quality and
- Managed risks

### Simply better projects.



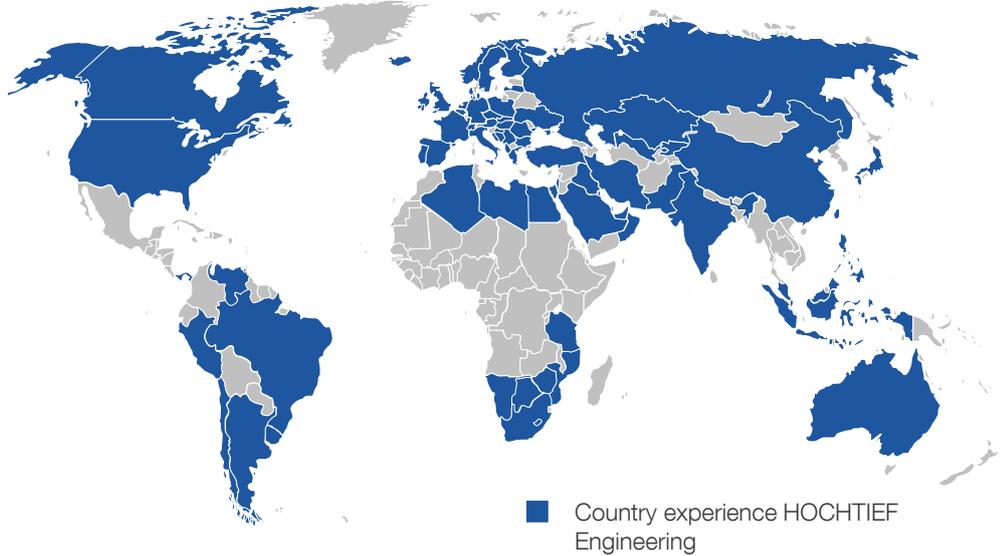


# Employees and project teams

## Expertise and experience

Our employees, with their personal experience and skill profiles, are our most important resource.

- The core team is 75 percent engineers and architects.
- About three quarters of the staff speak English and about a quarter other foreign languages.
- More than half of the staff has worked abroad, and about 50 percent have site experience. Proximity to the project and execution requirements thus guide our work.
- Dealing with different internationally common standards is something we are extremely familiar with and everyday practice.



## Bespoke project teams

- Regardless of the project phase, we put together capable, interdisciplinary teams of planners, designers and technical experts for our customers.
- Our engineering company HOCHTIEF India provides economically very attractive detail engineering for large projects.
- Our employees are fully familiar with the modern tools of project collaboration and communication. They cultivate a collaborative and networked working style.
- Working at the project site is a given, if you so wish.

## Flexibility in the field

Depending on whether we have assumed a comprehensive design task, are performing design management in a large project or sending you an expert to analyze and find solutions for an issue arising on site, the manner of integration, places of work and appropriate contract models are very different. Regardless, we work for you flexibly in every suitable form and can assume a variety of tasks for you in all project stages.



Project initiation	Preconstruction	Project execution	Completion/operation
<ul style="list-style-type: none"> <li>▪ Feasibility studies</li> <li>▪ Project preliminary design</li> <li>▪ Analysis of tender documents</li> <li>▪ BoQ creation/calculation</li> <li>▪ Technical advice on special topics</li> <li>▪ Preliminary and detail design of special proposals</li> <li>▪ Design review</li> <li>▪ Risk analysis</li> </ul>	<ul style="list-style-type: none"> <li>▪ Approval procedures</li> <li>▪ Design/implementation planning</li> <li>▪ Design/check reference details</li> <li>▪ Design management</li> <li>▪ Design coordination</li> <li>▪ Value engineering</li> <li>▪ Scheduling</li> <li>▪ Works preparation/logistics</li> <li>▪ Auxiliary construction measures</li> <li>▪ BIM concepts</li> </ul>	<ul style="list-style-type: none"> <li>▪ Experts for e.g. steel construction, façade, green building, technical equipment, geotechnics, dynamics</li> <li>▪ Site management</li> <li>▪ Construction management support</li> <li>▪ Schedule controlling and management</li> <li>▪ BIM management</li> </ul>	<ul style="list-style-type: none"> <li>▪ Claim support</li> <li>▪ As-built documentation</li> <li>▪ Acceptance support</li> <li>▪ Warranty management</li> <li>▪ Lifecycle management</li> <li>▪ Property management</li> <li>▪ Refurbishment planning</li> </ul>

# Solutions for transportation

## Range of services

In the field of transportation, our department **Consult Infrastructure** provides design and consulting services for all transport infrastructures. With more than 90 years' tradition in civil and structural engineering, we design roads, bridges, tunnels, ports, airports and other transport infrastructures. Alongside the core disciplines civil and structural design, we also have proven expertise in road pavements, geotechnical engineering, technical equipment and other technical design.

Our particular strength lies where design, work preparation and construction closely interlock. We provide you with solutions that are optimized, both technically and in terms of construction techniques. In addition to cost, our focus is on construction time, safety, risk avoidance — targets whose attainment benefits all involved in construction.

## Public-private-partnership projects and lifecycle issues

As a valued designer and consultant, we are involved in many public-private-partnership transportation projects: In addition to classical design and detail engineering, we supervise site logistics and temporary road layouts, and evaluate building conditions — key points while retrofitting or constructing during operation. One of the best examples in recent years in highway construction is the widening of the A1/A6 in Amsterdam to up to ten lanes. Our BIM-compliant 3D design services included, amongst other things, the Muiderberg highway crossing and three cantilever bridges over the Amsterdam-Rhine Canal. Furthermore, we have extensive knowledge relating to the lifecycle of structures and buildings — whether structural tests, their recalculation and evaluation, or the planning of refurbishment.



PPP project A5 Nordautobahn, Vienna

## Bridge construction

Whether standardized bridge structures for motorway construction or major international bridges — we are equally at home. Our prefabricated solutions for bridges mean a significant improvement in execution quality for our customers, in addition to the time and logistics optimization. Our prefabricated bridge cap, which was used in the PPP A8 highway project, is equipped with measuring equipment and RFID tags for long-term quality monitoring.



3D bridge construction - "SAAone", Netherlands

One of our recent highlights in large bridge construction is the Queensferry crossing in Edinburgh: We made a significant contribution to the development of an optimized caisson foundation for the new connection over the Firth of Forth. We also collaborated in the planning, design, geotechnical supervision and local monitoring during execution.

## Tunnel engineering

Over decades, we have frequently developed new solutions for tunneling — practical innovations, of which some examples are: Our fire-protection concrete, developed in our own laboratory, patented and used for tunnel construction — was also later transferred to other applications. Similarly, we have developed steel-fibre concrete and sandwich elements for tunneling under squeezing rock conditions.



U4 Hafencity, Hamburg - "flying launch"

Together with our construction colleagues, we have developed a "flying" launch structure for machine tunneling with tunnel boring machines (TBM) — a milestone in the optimization of TBM launching in terms of time, space and safety. Particular tunneling challenges in recent years were, among others, the U4 metro line in Hamburg, the Crossrail project in London or the Copenhagen Metro: urban TBM tunneling in difficult ground and under tidal waters. Our range of services includes diverse design for shafts, tunnels and temporary works, as well as geotechnical design and support.

## Port construction and marine works

The flood protection in the port of Hamburg is our daily business: Currently we are designing structures at Schaartor and the Niederhafen that are breaking new ground in technology and construction techniques using modern 3D design software and innovative prefabricated solutions.



3D reinforcement design for CNC control for bending

We are organizing various other marine construction projects from our nearby Hamburg office. We were instrumental in the development of solutions for the Kaiserschleuse lock in Bremerhaven as part of a competitive dialogue. We have also supervised container terminals, quayside construction, bascule bridges and offshore structures, for example in Scandinavia, Poland, the UK and the Netherlands.



Kaiserschleuse lock, Bremerhaven



# Solutions for energy

## Range of services

For many decades in the energy industry, our department **Consult IKS** has provided comprehensive engineering services for electricity suppliers or manufacturers of energy plants — many of them regular customers — who rely on the high design quality of HOCHTIEF Engineering.

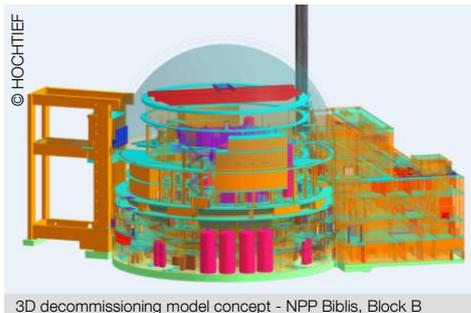
We design:

- Plants with renewable energy generation (e.g. for onshore and offshore wind, hydro)
- Fuel cycle plants/nuclear power plants, including decommissioning design
- Fossil power plants (coal, oil, gas, including combined heat and power)
- Waste-to-energy plants
- Storage and storage technologies
- Plants and infrastructure for power distribution/the power grid

## Nuclear plants

We have worked on nuclear facilities and power plants in Germany and abroad for over 50 years. Our services include construction design for both new and existing plants — all design work from architectural design, structural engineering, infrastructure to the design of technical building equipment.

One focus of the design work for German power plants is plant decommissioning. Our engineers provide services covering, amongst other things, permits (building permit for decommissioning infrastructure), logistics (planning of transport infrastructure), simulation (calculation of the required resources and time) or statics (stability of intermediate states).



3D decommissioning model concept - NPP Biblis, Block B

## Conventional power plants

Our performance in this area can be seen in the example of the construction of the Eemshaven coal- and biomass-fired power plant. It was constructed at RWE's location in the Dutch province of Groningen as a twin-unit plant.

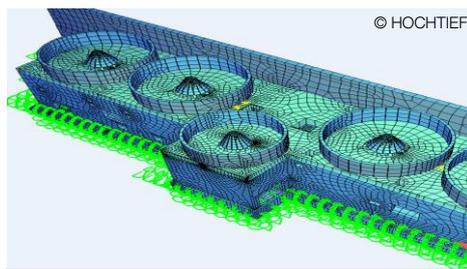
Consult IKS was commissioned with the design and execution planning for more than 100 buildings. For the project, we developed about 300 statics reports, 750 formwork drawings, 5,500 reinforcement drawings and 550 general steel construction drawings.

In total, we managed approximately 22,000 design documents.



STK Eemshaven, Units A/B, Netherlands

A particular challenge was the design for the construction of the approx. 60-meter-high silos using sliding formwork. We created the design and structural solution based on 3D CAD software.



3D statics (silos - Eemshaven power plant, Netherlands)

## Wind energy

We offer experts in both onshore and offshore wind energy. We upgraded foundations of existing onshore wind turbines using a method developed in-house. We also have concepts for different variants of towers, including hybrid solutions.

We have acquired offshore expertise through participation in numerous offshore wind energy projects.

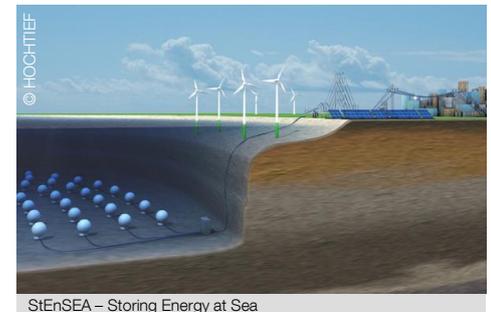
We perform tasks with great expertise in project management, scheduling and logistics planning, geotechnical engineering,

steel construction, expertise in seafastening, corrosion protection and as expert welding engineers. We support this segment with rapid response times from our Hamburg location. Our materials experts develop and test recipes for grout in our own research institute, and supervise its manufacture and installation on the high seas around the clock. We have upgraded the foundations of existing onshore wind turbines with a method newly developed by us.

## Energy storage technologies

HOCHTIEF Engineering has extensive knowledge and numerous references in the design of hydropower and pumped storage power plants.

But we also collaborate on newer ideas and concepts. In the Stensea project, we assumed the structural engineering design and the construction of the first prototype of the concrete spherical storage tank that works in principle like a pumped storage power plant. It utilizes the pressure gradient between the sea surface and the seabed. Together with partners such as the Fraunhofer Institute, we are developing this concept for production.



StEnSEA – Storing Energy at Sea

## Transmission lines and towers

Electricity generation, particularly by wind and photovoltaics, is increasingly decentralized. The foci of generation and highest load are often located far apart. This means that the existing grid must be retrofitted or upgraded. We carry out the statics and structural design of the transmission towers, including foundations, for our customers. We also perform experimental studies on the capacity of inventory structures at small-scale or 1:1 in our own testing hall or on existing pylons on site.

# Solutions for industry

## Range of services

Our range of services for industry includes not only traditional construction and infrastructure design, structural and mechanical & electrical (M&E) design, but also industry-specific topics such as special expert services related to the German Water Management Act (WHG), steel construction with welding and corrosion-protection expertise, and also ageing and lifecycle management.

Many regular customers, including vehicle manufacturers, chemical companies, food manufacturers, pharmaceutical manufacturers or heavy industry, have relied on the high quality of our design for many years.

## Ageing/lifecycle management

For operators of production sites, knowledge about the quality of the structural substance is becoming increasingly important. To help, **Consult IKS** offers ageing and plant lifecycle management services.

Using the existing planning and building documents, our experts create an initial analysis before on-site inspection. Then an on-site inspection is carried out building-by-building or room-by-room. This is documented using a tablet computer and bespoke in-house software. The overall findings can thus be analysed accurately and categorised for inclusion in a database. In addition, our experts can provide you with well-founded recommendations for renovation or retrofitting.

We assess the material and the load capacity of existing structures using test results and specific measurements. These are performed in the building or at the Innovation & Testing Centre of **Consult Materials**.



## Special solutions in civil engineering

HOCHTIEF built the ERF Newhaven as a design & build turnkey project. Its purpose is the combustion of 210,000 tons of household waste per year, to generate electricity, and it has a capacity of 17 megawatts.

HOCHTIEF Engineering was commissioned with the structural design of the building, structural and infrastructure design and coordination of all design disciplines. A special challenge was the creation of the underground parts of the building. Using an innovative special solution, a so-called floating caisson, we were able to significantly reduce cost and construction time. **Consult Infrastructure** planned the construction technique and processes for this caisson solution in detail and supervised their implementation on site.

The waste bunker was initially cast conventionally on land in a sort of dry dock, and after flooding the dry dock, was then shifted afloat within the sheet-piled basin and lowered onto the previously prepared barrettes.

## General design

As general designer, we performed the complete constructional design for the BASF measurements control center. This included parts of the design and permit planning as well as the full implementation planning for design disciplines — from the building design including façade engineering, structural design and the construction physics calculations to M&E and laboratory design.

Particular design challenges were for example:

- Dimensioning of the pile foundation considering an external pressure wave,
- Flameproof design of the building envelope (windows and doors)
- Creation of a "safe haven" — an area for maintaining controlled emergency operation of the entire plant for a defined period (including secure breathing air supply)





# Solutions for buildings and construction infrastructure

## Range of services

Alongside classical construction design including exterior facilities, structural and M&E design, our range of services includes further construction-specific engineering services such as green building certification, expert assessment of fire protection, and deadline and construction logistics planning, as well as engineering services for building physics and specialist façade engineering.

Our services can be found in:

- Office and administration buildings,
- Residential buildings, hotels,
- School and university buildings,
- Museums, event buildings,
- Special structures such as high-rise buildings, hospitals, sports venues or department stores.

## High-rise buildings

Especially in Frankfurt, the cradle of high-rise construction in Germany, HOCHTIEF planners and engineers have developed their skills from project to project. Many high-rise buildings contain the know-how of HOCHTIEF Engineering:

- Construction logistics in cramped inner-city locations
- Top-down construction techniques
- Combined pile and slab foundations
- Energy saving concepts (including energy piles)
- Ceiling slab optimization
- Optimization of high-rise reinforcement, for example in terms of dynamic requirements
- Use of high-performance and mass concretes



## Airport planning

For over 20 years, we have designed and consulted in the field of airports. Projects such as the international airports of Dusseldorf, Frankfurt, Hamburg, Munich, Athens, Budapest, Warsaw, Riyadh and a number of others are the basis of our wealth of experience. In particular, our design and construction experience means we are extremely familiar with the requirements for construction during simultaneous flight operations and under highly stringent security and schedule requirements.



## Planning coordination/design management

The coordination of the design disciplines, especially for large, complex construction projects, is of extreme importance. In addition to the professional expertise in all relevant disciplines, this also requires deep knowledge of and methodological expertise in quality, cost, scheduling, construction procedures and law. A good climate of collaboration and a cooperative atmosphere, especially in the design team but also amongst all those involved, are also factors in the success of a project that should not be underestimated. Having an experienced design manager heading the design process plays a crucial role. The design coordination team also includes experts on "planning the design", as well as controlling and meeting the schedule.



## Design and design management for mechanical and electrical components

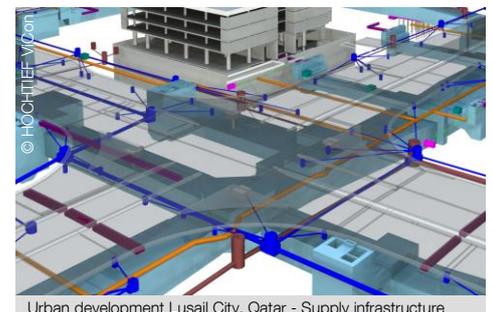
We are experienced designers of M&E for buildings and industrial plants as well as of the technical equipment for transport and energy infrastructures. We cover all relevant areas of mechanical and electrical. Measurement and control technology are just as important as building automation, fire protection and some special works for buildings such as airports, hospitals, tunnels, toll highways and wind turbines.

All designer of sub-disciplines collaborate closely using 3D CAD and thus ensure a coordinated and concerted design process. In this way, we are able to design even complex tasks without external interfaces, and to control them during construction.

## Supply and disposal systems

The development of construction projects with the necessary supply and disposal systems and coordination with the relevant parties are central to our holistic planning and design.

In early concept stages, we pay attention to the completeness and feasibility of integrating with infrastructure. In addition, we design the relevant media trays, both in terms of structure and electrical & supply. And of course, we also design the associated tunnels and shafts, e.g. for waste water or district heating pipes.



# Solutions for construction and project management

## Range of services

In our Construction & Project Management Services business line, the department **Consult Construction Management Services** is engaged as a service provider for construction operations and project management in all types of civil, structural and underground engineering projects and constructions in the following areas:

- Preparation of work
- Scheduling and resource planning
- Schedule controlling and management
- Project controlling and project management

## Preparation of works

The necessary arrangements for successful project execution are made during the preparation of works. Our long experience in all kinds of projects ensures professional and economical preparation of all project-related processes.

Versatile software tools support customer-specific visualizations and facilitate internal and external communication. Our holistic work preparation is complemented by effective scheduling and control. Significant sub-services are:

- Construction site set-up planning
- Construction phases/execution plans (also visualized)
- Construction method technology
- Logistics concepts
- Designing of temporary works to construction

## Scheduling and resource planning

With ever more ambitious construction times under complex conditions, you need experts in scheduling and controlling to ensure achievement of the defined project goals. We consider all key processes with resource-oriented scheduling, considering all logistical parameters.



Gotthard Base Tunnel

This includes the stages of design, approval, tendering and contracting, the construction including commissioning and acceptance, and possibly the moving process.

Together with our project partners, we install effective deadline management. In the case of deviations, we swiftly initiate effective countermeasures.

Our key sub-services are:

- Schedule feasibility studies, construction time optimization
- Resource-oriented master and detail scheduling, including all lead processes from the conceptual stage to handover
- Schedule control (target-actual comparisons), including trend and variance analysis and development of control measures
- Commissioning and acceptance planning
- Model-based scheduling (4D)
- Construction process management using "Last planner"/Lean construction
- Time-chainage diagrams

## Project control, project management

Thanks to our holistic, practical project view, we provide economical and sustainable solutions from the early concept phase through to handover. This applies to all significant services in accordance with the scope of work for project management (AHO, or internationally, PMBOK). For example for:

- Project-specific setup and workflow organization
- Scheduling, capacities and logistics
- Payment plans, cash outflow plans

With our project management tools, we actively support your projects, regardless of size and complexity.

Our experts complement your project team precisely where you need it, and together with you help to ensure project success.



Walsum power plant, Duisburg

## Project Engineering

We offer a wide range of services unified under the label „Project Engineering“. The individual services can be combined flexibly and tailored to your projects' needs.

In recent years, we have provided successful packages of services for the assessment, control and management optimization of projects and active construction sites to large industrial customers in mechanical engineering and the food, chemical and automotive industries, but also to project companies in real estate and infrastructure investments.

	Project review/second opinion
	Building diagnosis and maintenance
	Strategic project enhancement
	Bespoke project organization
	Construction logistics
	Design coordination and management
	Planning and schedule control
	Cost control
	Contract management
	Quality control
	Green Building Management
	Design and value engineering
	Expert statements and reports
	Commissioning management



Elbe Philharmonic Hall, Hamburg



# Building information modelling and virtual design, construction and operation

## Range of services

In the business line Virtual Design & Construction, **HOCHTIEF ViCon** is a leading service provider and consultant for virtual construction and building information modelling (BIM). BIM is a method for optimizing the planning, execution and operation of buildings using 3D computer models and associated databases. According to our principle "Build digitally first", HOCHTIEF ViCon advises and supports its customers in the use of intelligent 3D computer models to minimize risks at an early stage, to communicate more effectively and to reduce costs. In building construction and infrastructure projects, as well as plant construction, ViCon supports developers and projects with sophisticated software and hardware solutions, training, proven processes and the provision of project-specific standards. As BIM consultants, we are involved in different projects in Europe, the Middle East and Australia.

Our **BIM consulting services** include:

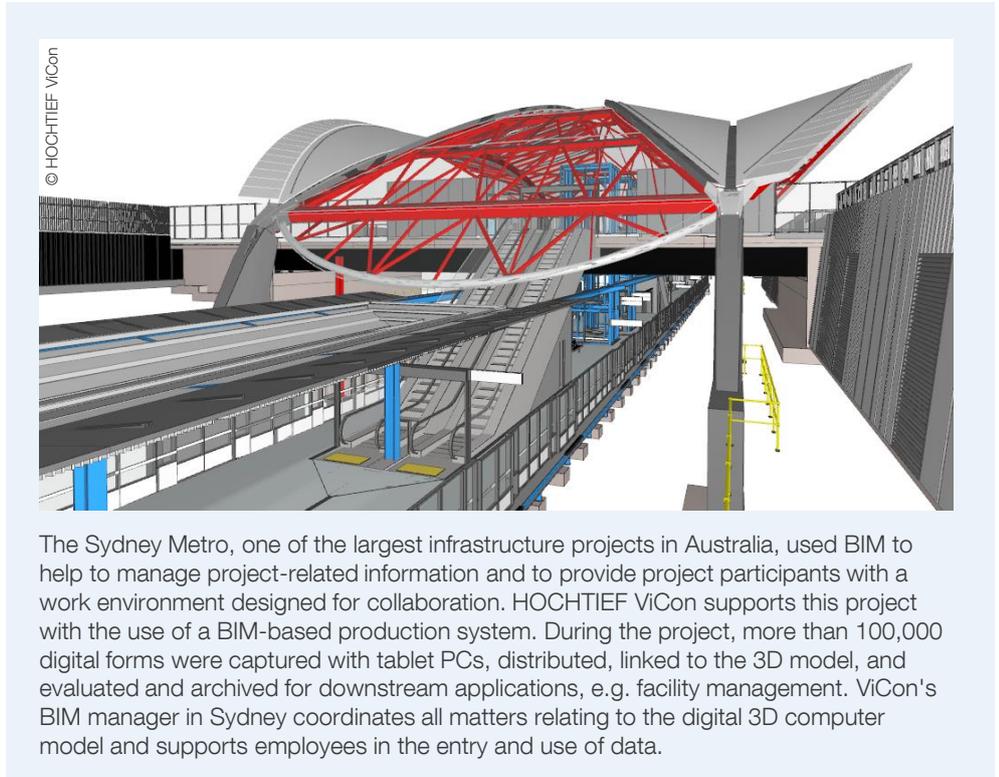
- BIM implementation
- BIM management
- BIM training and certification

In case you or your partners do not want to provide BIM services through own resources we can step in as needed. HOCHTIEF ViCon offers the following **BIM services**:

- 3D modeling and visualization
- 3D quantity take-offs
- 4D scheduling
- 3D building information system
- 3D design coordination
- 3D laser scanning

In addition, we have developed **BIM-based production systems** for the monitoring and evaluation of data from construction and infrastructure projects to control their implementation and operation more efficiently.

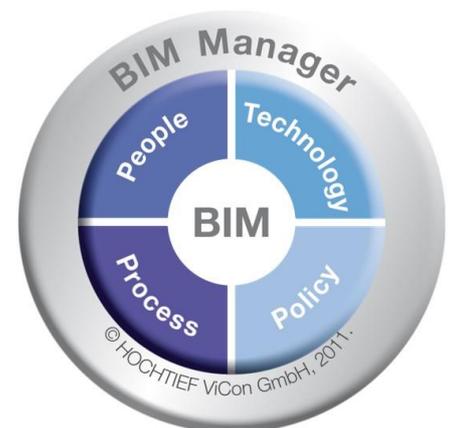
Digital data are captured (for example, using tablet computers), embedded in processes and made available and analyzable for different user groups (management, construction managers). Production systems allow easy visualization and analysis of data on the basis of the 3D computer model.



The Sydney Metro, one of the largest infrastructure projects in Australia, used BIM to help to manage project-related information and to provide project participants with a work environment designed for collaboration. HOCHTIEF ViCon supports this project with the use of a BIM-based production system. During the project, more than 100,000 digital forms were captured with tablet PCs, distributed, linked to the 3D model, and evaluated and archived for downstream applications, e.g. facility management. ViCon's BIM manager in Sydney coordinates all matters relating to the digital 3D computer model and supports employees in the entry and use of data.

## The five components of our BIM methodology

To ensure that the generated digital information is used as effectively and comprehensively as possible, a suitable methodology is required. Our BIM methodology is based on five interconnected components. The first four components are processes, people, technology and standards. The management component supports the other four components, so that they can work in harmony. Our BIM manager identifies the requirements of the project in the four core components.



The BIM manager leads and coordinates all matters relating to the digital 3D computer model. He ensures that current information about your project is always transparently available to all project participants. Our BIM managers are engineers with years of experience in the construction industry. They also have in-depth knowledge of IT, especially in 3D modelling and database management. The BIM manager supports you in the introduction of BIM-related procedures and trains project participants.

Find out more at: [www.hochtief-vicon.de](http://www.hochtief-vicon.de)

# Special expertise and skills

## Project value management and value engineering

A field of activity that distinguishes us from classical engineering companies for design and consulting, is our range of services and our experience in project value management and value engineering. What do we mean by this?

Projects are often exposed to considerable risks. This may be related to political and economic developments, exchange-rate fluctuations and financing conditions. Also project-related effects such as delays, loss of suppliers or planning errors result in a need for correction.

**Project value management** covers methods and tools for the optimization of investment projects in terms of time, cost, risk, quality and project scope. The approaches for may be financial, organizational, technical and/or contractual in nature.

In particular, project value management plays a crucial role in construction, infrastructure and investment projects. The typical phases of a value engineering process are shown in the following graphic.



Value engineering techniques are:

- Alternative designs
- Refined calculation methods
- Measures to exclude load combinations that negatively effect dimensioning
- Probabilistic analysis methods
- Refined inventory analysis
- Alternative construction materials
- Mass savings

- Rearrangement of the construction workflow
- Special approvals in individual cases
- Assessment-supported exceptions to standards
- Simplified construction methods
- Alternative procurement
- More efficient processes and improved risk management

What tools and combinations of methods are used depends, of course, on the desired goal. That is to say whether the project focus is on increased speed, lowered cost or reduced risk.

Our extensive expertise in design, engineering and design management, even for extremely large construction projects, as well as our proximity to project execution predestines HOCHTIEF Engineering to be your partner in value engineering.

As part of a value engineering project for a mining and chemical group in Canada, we took over planning optimization of the physical structures of a new potash plant. While assessing the foundation, the steel and concrete structures and the infrastructure, we were able to utilize synergy potentials identified by comparing common North-American practice with the European state-of-the-art to generate added value in the form of significant construction cost savings. Operational benefits and a reduction of operating and maintenance costs are expected.



Potash plant in Canada

## Construction materials technology

We intensively analyze all construction materials and can provide the right answers to practical questions issues, and develop appropriate solutions.

**Consult Materials** operates the Innovation & Testing Centre — a laboratory and testing center near Frankfurt airport, and the largest private facility of its kind in the construction industry in Germany.

Consult material takes care of all construction materials testing, quality assurance and the development of optimal materials for all areas of construction. We also provide comprehensive consulting on building materials and structures. All topics, such as seals and coatings, fire-protection, masonry, screed, industrial flooring or dry construction, are covered. We are experts in almost all measurement and testing methods, including non-destructive testing techniques.

## Building conservation

In cooperation with the damage and condition assessment of buildings, we also provide special repair construction services. The building conservation team of the **Consult Materials** department performs these services using specially trained personnel to provide high quality and precision.

First of all, our experts analyze the building structure and the materials, for example, using ultrasound, impact echo, magnetic and potential field measurement, thermal imaging or video endoscopy. Based on the test results, our engineers give you corresponding recommendations for refurbishment or upgrading.

Damage repair, for example, grouting cracks in underground car parks or plastering ceilings, is then performed by the building maintenance team.

## Experts

Our units contain internationally experienced specialists for and experts on a wide range of specialized topics, who advise our customers on projects and individual issues. Many of them are also publicly-accredited and sworn experts.



# How we work

## Economic conditions

- Profit-and-loss transfer agreement with HOCHTIEF Solutions AG
- Healthy capital base
- Liability insurance with high coverage via the global policy of the HOCHTIEF Group. Insurance protection for non-admitted countries.

## Quality management

Based on a sophisticated management system, we work with stable, transparent processes.

As we want to continuously improve, we document our work, evaluate processes and optimize them constantly. Tested and selected proposals for change enter our management system as part of this continuous improvement process.

Consult IKS is additionally certified in accordance with the guidelines of the Association of Large Power Plant Operators (VGB) and the guidelines of the Nuclear Safety Standards Commission (KTA).



We have authorized officers for, amongst other things, the topics of radiation protection, compliance, IT security and occupational safety and health.

We also take into account customer requirements in accordance with DIN EN ISO 14001, the Safety Certificate for Contractors (SCC), the Clean Development Mechanism (CDM) standard in the UK or customer-specific quality management requirements. In this way, we together systematically ensure quality early on in the design phase.

Our quality management system is ISO 9001: 2015 certified. It fulfils the specifications of the international standard EN ISO 9001. In addition, we particularly focus on high and transparent process quality throughout all service phases.

## Membership in professional bodies

We are leading members of the following standards committees and trade associations:

- British Tunneling Society (BTS)
- Deutscher Beton- und Bautechnik-Verein (DBV)
- Deutsche Gesellschaft für Erdbeben-Ingenieurwesen und Baudynamik (DGEB)
- Deutsche Gesellschaft für Geotechnik (DGGT)
- Deutsches Institut für Normung (DIN)
- Deutsches Talsperrenkomitee (DTK)
- German Lean Construction Institute (GLCI)
- Kerntechnischer Ausschuss (KTA)
- Schweizerischer Ingenieur- und Architektenverein (SIA)
- Studiengesellschaft für Tunnel und Verkehrsanlagen (STUVA)
- Verein Deutscher Ingenieure (VDI)
- PowerTech (VGB)

## Sustainability management

Since the early 1990s, HOCHTIEF has engaged in active environmental and sustainability management, is a member of the relevant organizations and complies with their guidelines and standards.

### Transparency International

Member since 1999

### International Labour Organization (ILO)

Member since 2000



### United Nations Global Compact

Member since 2008

### Code of Responsible Conduct for Business

In 2010, HOCHTIEF committed itself to this code.



Deutscher  
NACHHALTIGKEITS  
Kodex

### German Sustainability Code

HOCHTIEF has submitted a declaration of compliance with the German Sustainability Code.

MEMBER OF

## Dow Jones Sustainability Indices

In Collaboration with RobecoSAM

### Dow Jones Sustainability Indices

In 2015, HOCHTIEF qualified for the Dow Jones Sustainability Index Europe for the tenth consecutive time — remaining the only German construction company.



### CDP (formerly Carbon Disclosure Project)

In 2015, HOCHTIEF was awarded the status of "Index Leader MDAX" and "Sector Leader Industrials".



### B.A.U.M. e. V.

German Environmental Management Association. HOCHTIEF has been a member since 2002.



### encord

In 1989, HOCHTIEF was a founding member of encord, the research and development network of innovative European construction companies.



## FTSE4Good

### FTSE4Good Index

HOCHTIEF remains listed in the FTSE4Good index. This index by London provider FTSE lists companies that have excellent sustainability performance in their industry.

## Stifterverband für die Deutsche Wissenschaft



Gründungsmitglied der

**DGNB**

Deutsche Gesellschaft für Nachhaltiges Bauen  
German Sustainable Building Council

# The result: added value for our customers

## Expertise and extensive international experience

Our units and specialist teams provide dependable planning solutions against a background of experience from hundreds of projects around the world. They provide reliable expert information in almost all specialist disciplines.

To date, our **references** include approximately:

- 40 airports
- 60 large bridges and viaducts
- 80 tunnels for metro systems, rail, road and media
- 15 large public-private-partnership infrastructure projects
- 70 ports, quay walls, locks and boat lifts
- 25 dams and hydropower projects
- 130 power plants and turbines (conventional/renewable/offshore)
- 100 industrial plants (heavy industry, chemicals, vehicle manufacturing)
- 200 geotechnical projects for foundations and excavations
- 50 high-rise buildings
- 15 stadia

## Practical solutions for construction sites

Thanks to our extensive experience with practical project execution planning, we can offer our customers a variety of execution-oriented design solutions. We always focus on efficiency and functionality. Working in a project is as natural for us as team-oriented work, even in large, interdisciplinary planning groups or construction teams.

## Project objectives in focus

Your project goals determine our project orientation. With appropriate designs, design reviews, value engineering and alternative technology, attractive prices and cost-saving approaches often become apparent before the start of the project or during execution. We work closely and collaboratively with your team, so that you can always benefit from our alternative design, special proposals or novel products.

Our solutions contribute to reducing risks and costs, shortening construction times and optimizing quality.

## Management and resources

The management of design processes and support in construction and project management are among our core competencies. Our human resources are well-suited to large-scale projects and massive operations. We have a large, active network of appraisers, specialized designers and experts.

## Integrated solutions

Thanks to our consistent focus on lifecycle costs, energy efficiency, occupational safety, environmental protection and transparent risk minimization, we provide safe and environmentally-friendly design solutions with controlled risk.

## Innovative work

We are distinguished by the fact that, in addition to our core competencies of design, engineering, consulting and design management, we develop innovative techniques and proprietary products (Engineered Products), take a leading role in building information modelling, and use our wide-ranging expertise in project value management for the benefit of your projects (chart).

Simulation, new materials, advanced capture techniques (such as laser scanning or camera drones), monitoring and evaluation processes, or lean construction methods result in economical, innovative solutions.

As a result: **added value** for you in the form of stable and optimized processes, cost-effective solutions, and conformance in terms of quality and managed risks.

## Better Project Solutions.



# Locations and contacts



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### Locations

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Frankfurt  
Hamburg  
Cologne  
Zurich  
Chennai

### Local offices

Amsterdam  
Sydney



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