



Central Technical Division





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The Central Technical Division within the Group

A pillar of technical know-how

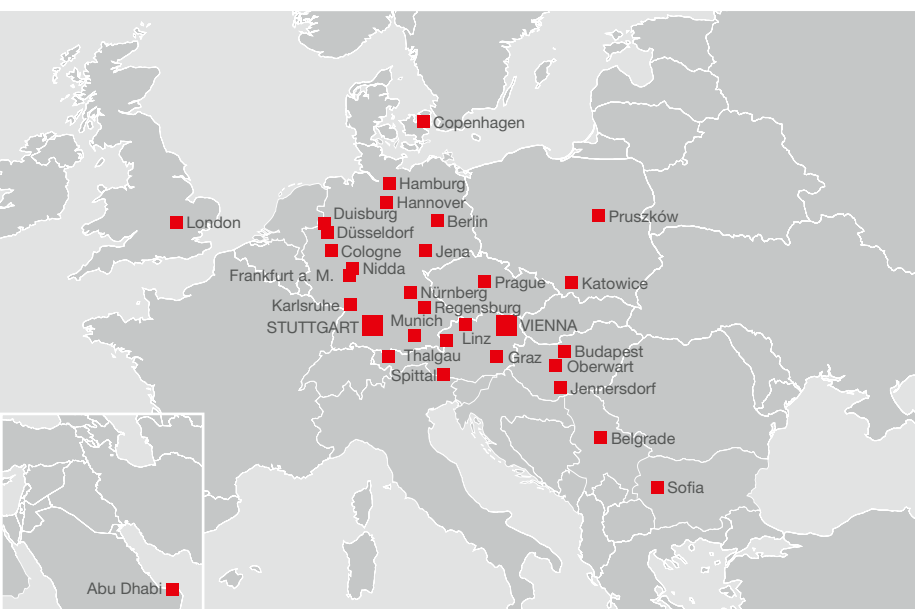
The Central Technical Division (ZT) is where the Group's most important technical planning capabilities are concentrated. We provide our comprehensive services for the support of the Group's operative units in our superior specialist areas turnkey construction, structural engineering, civil engineering and tunnelling as well as transportation infrastructure. Here, ZT accompanies the entire construction process: from the acquisition phase, through the tender bid process, the implementation of the execution phase, to the final commissioning of the project.

To this end, ZT offers innovative solutions for buildings and infrastructure projects, including building construction, building structure, technical equipment and LEAN.Construction. Our innovation activities focus on holistic, goal-oriented system design in connection with smart buildings and design-to-production solutions.

We see sustainable construction not only as a future challenge, but primarily as an opportunity. The construction sector increasingly understands itself as being responsible for developing resource-saving technologies. We at ZT are very much aware of this responsibility. To this end, we are working on solutions in all specialist areas in order to advance resource-efficient construction for all our business areas. An essential success factor for this is the integrated design based on the life cycle approach, which takes into consideration the principles of the circular economy.

Locations

In order to support our customers directly and quickly throughout the Group, the ZT is spread across 30 locations as well as fully implementing digital communication and working methods. In this way, we network our experts wherever they are based pooling our knowledge and making it available on site for projects of all sizes and complexities.



TEAMCONCEPT® – the Group’s partnering model

The price competition in the construction industry leads to an unfavourable price-performance ratio for those involved in construction – product quality, confidence in the performance quality, customer satisfaction as well as the necessary economic cost-efficient performance of the contracted companies are all suffering.

With the TEAMCONCEPT® partnering model, the Group promotes and strengthens quality competition: If all parties involved in a project collaboration in a constructive partnership and in an open and trusting way, the project goals, high quality, customer satisfaction and efficiency can be fully achieved. It is, therefore, essential to have a contractual environment that allows the general contractor to contribute its expertise in a comprehensive way during the early design phase of the project. The TEAMCONCEPT-approach aims for a continuous design, planning and execution process, whereby valuable information is retained for the later project phases.

Services

Technical support for the operative units

- General Design Contractor
- Specialist Design
- BIM Management
- LEAN.Construction Process Management
- Building Physics Calculations
- Sustainability Consulting
- Commissioning Management

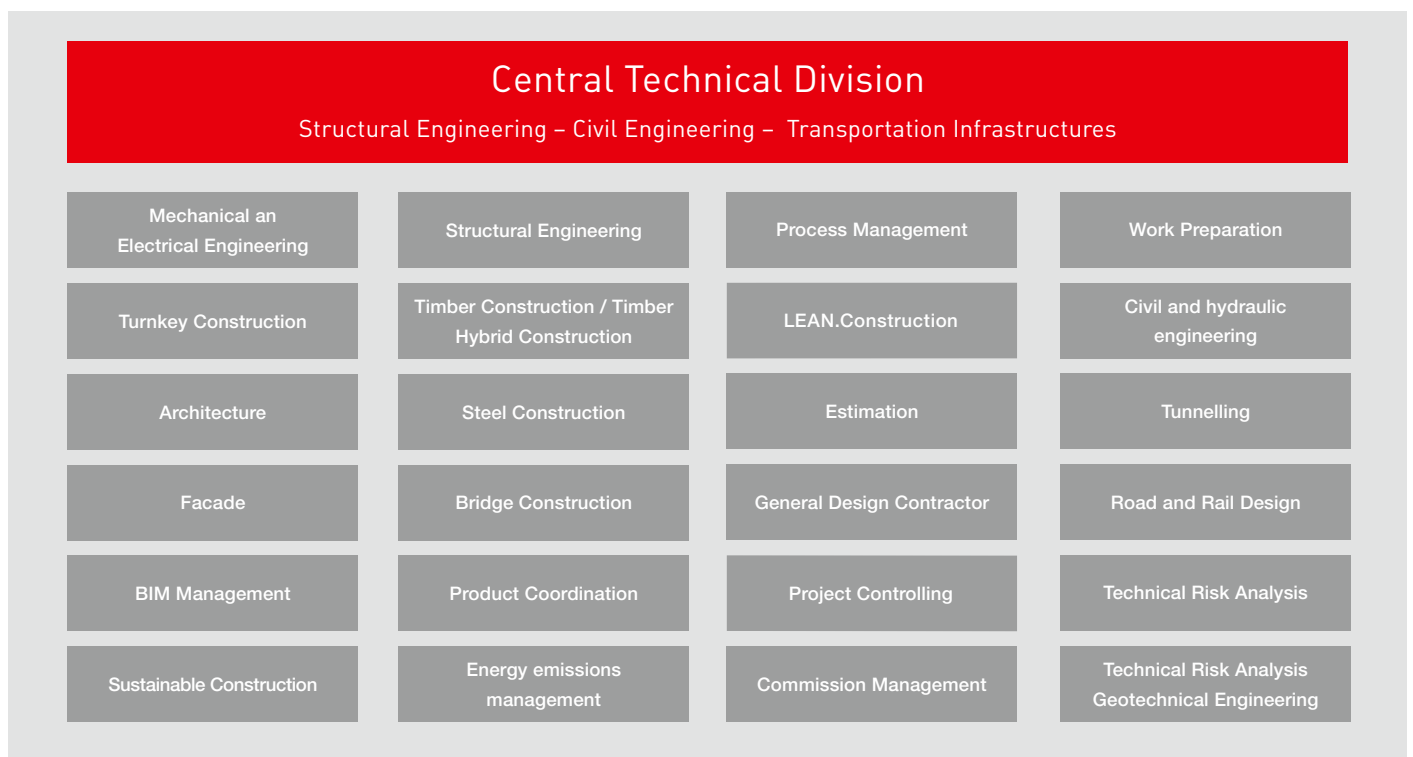
Higher level tasks

- Know-how Transfer Platform
- Process Standardisation
- Administration of working tools
- Personal development

An early involvement of ZT’s technical competences enables the optimising of the construction time as well as costs to the highest possible quality. The modular services enable ZT to accurately tailor the offer to the individual needs of our clients. The teamconcept approach is based on the idea that all parties are involved in compiling the contractual, commercial, and technical aspects as well as setting the deadlines and goals of a project together and as equal partners.

Areas of work

The more than 1,000 highly qualified and committed employees of the ZT are the cornerstone of our success. Their employed expertise enables us to meet the requirements and wishes of our clients with a wide range of services. By consistently aligning our services with the market requirements, our teams succeed in expanding the portfolio and ensuring the technological leadership of the STRABAG Group.



Innovation Management

Tasks and Objectives

As an internationally operating technology Group for construction services, we need to pay attention to changes in our environment: These changes directly influence our business activities and shape the behaviour of our customers. If we want to understand the impact of these changes on our core business activity, then we need to take a comprehensive and holistic approach.

Technical progress has enabled enormous increases in production and efficiency. At the same time, it is becoming apparent that both the resource consumption as well as emissions are increasingly exceeding the regenerative capacity of the planet. In December 2019, the EU Commission presented the „Green Deal“. The aim being a CO₂-neutral Europe by 2050, which is to be achieved with a series of measures implemented through binding regulations for the member states.

However large these tasks may be, they offer enormous opportunities – also for our Group. We need to seize them now – with innovative ideas developed by the construction industry. We must constantly develop our building materials, technologies, working methods and tools for the long-term success of our company. Furthermore, we at ZT search for solutions outside the Group that can give new stimulus to our core business within. Innovation Management provides support here, closely coordinated with the operative units and other central divisions.

Services and Support

We ...

- identify external trends and requirements that impact our core business
- support the application process for internal development projects
- have an overview of the development activities in the ZT
- are the contact for the ZT's idea management
- support you on the way from an idea to a development project
- know what developments other units are working on
- report internally on the R+D activities of the ZT
- connect you if necessary, with external experts
- maintain and continuously expand our international innovation network for construction, consisting of companies, research institutions, universities and associations
- are in exchange with the
www.innovation.strabag.com



General Design Contractor

Tasks and Objectives

As lead consultants, we represent the design and engineering expertise of the ZT and take on the entire design of building and infrastructure projects at all stages. In response to the increasingly complex requirements of construction projects, we – together with the operating units – offer design and construction from a single source. In doing so, we rely on the use of digital design and management methods in order to pool the expertise of all design disciplines, coordinating them and aligning them to achieve the best overall outcome for the project.

With a comprehensive view of the project, we bring the parties involved together as early as the first design stages. We ensure holistic design oriented towards the high qualitative requirements of our clients. The design process is based on working together in a common data model according to the Group standards with early consideration of the construction requirements.

Service and Support

Planning consulting

Regardless at which design stage we get involved in a project, we accompany and advise our clients on all aspects relevant to the design and planning works, be it Lead Consulting or engineering topics, the scope of works in a project or special topics such as BIM or LEAN design.

Project organisation

We take on the organization of the entire design and planning, from the basic structuring of the project, through the selection and commissioning of designers, engineers and consultants, to the organisation of the required BIM and LEAN processes.

Design coordination and project management

As part of our task, we take on the overall responsibility for coordinating, monitoring and reviewing the work of the consultant team. The focus here is on achieving the cost, schedule and quality targets of the project. We ensure that the project moves forward by adapting the design and planning works to changing circumstances as required.

Controlling

Permanent monitoring of the work of the consultant team, its deadlines and costs enables us to accurately assess the project status. This is also part of our quality management.

Documentation

The results of the different design stages are explained and summarised in a comprehensive documentation reflecting the progress of the design and planning works.



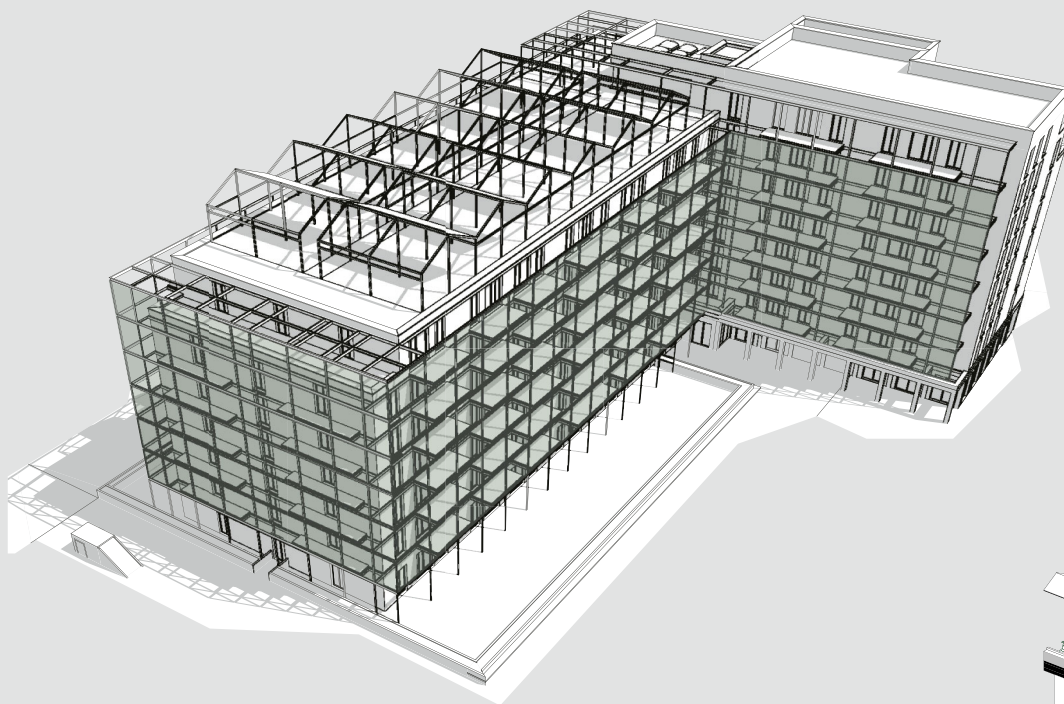
BIM Management

Tasks and Objectives

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1 Meischlgasse: City Quarter Meischlgasse in Wien Liesing © AllesWirdGut Architektur ZT GmbH/
2 JEDGE: EDGE East Side, Berlin; © EDGE/Bloomimages



Service and Support

BIM Management

- Partner in the STRABAG Group for the operative processing as well as pilot and development projects
- Model and data preparation for the transfer to the life cycle phase of operation
- Processing and control of BIM requirements from acquisition to handover to operation
- Coordination and definition of applied cases as well as responsibilities in the project

Process responsibility for the BIM processing

- Organisation and control of the exchange of information between internal and external project participants (as well as their consultation if required)
- BIM processing planning, in particular conceptualisation, finalisation and definition of BIM application cases as well as their expedient and appropriate implementation
- Consultation regarding the use of suitable software solutions and processes for the existing project conditions
- Overall coordination of BIM project participants and model-based cooperation

Chances and risk management

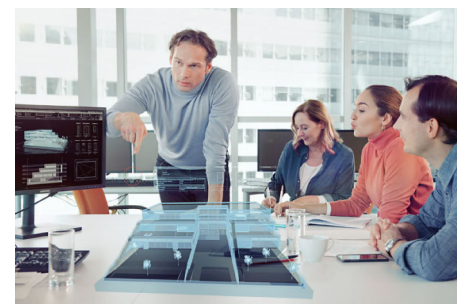
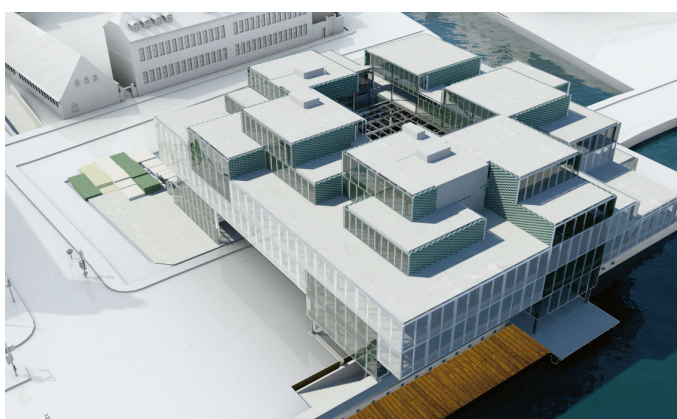
- Review and evaluation of offered and tendered BIM services
- Identification, evaluation and tracking of chances and risks related to BIM in the project

Quality management

- Creating structure and consistency in data exchange from the first workshop through to operational data transfer
- Setting up and management of the Common Data Environment (CDE)

Data transfer in management and operation

- Early coordination and consulting for sustainable use of data from both the design and the construction
- Customer- and project-specific data transfer (such as area evaluation, finishing schedule, plant registration or COBie)



Architecture and Turnkey Construction

Tasks and Objectives

Construction is a complex process requiring cooperation and coordination. It is our aim for turnkey construction projects to jointly acquire, carry out and successfully complete the works by pooling all our resources. We understand our task as being the application of the knowledge accrued in all phases of the works and in the various construction processes in such a way that sustainable solutions are developed to the economic benefit of our clients.

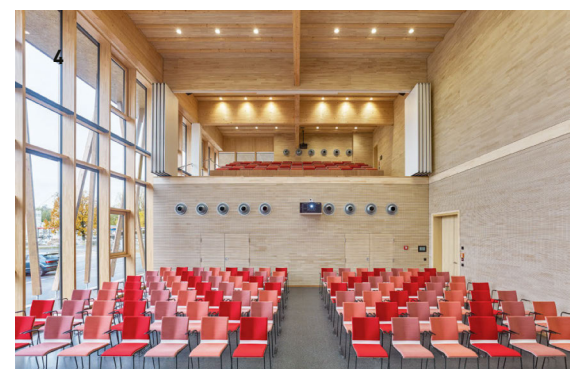
Experienced members of staff ensure a wholistic view of the construction tasks and, in doing so, consider the customer service, design, technology, functionality, cost and contract condition requirements.

At a glance

- Office buildings
- Housing construction
- Educational institutions
- Industrial construction
- Healthcare
- Special constructions
- BIM 5D®

We additionally support our construction sites with seconding of site and project managers as required. It is our aim, within the frame of the object planning, to provide the site in good time with drawings that have been agreed and cleared by the client. This is achieved using clearly defined procedures, detailed schedules and target parameters.

Efficient design and planning tools enable us to gain a competitive advantage. For more than 10 years we have been actively involved with the implementation of BIM, and since the beginning of 2017 all internal processes have been upgraded to a model based working method. In addition, we are testing the first areas of application with Generative Design (GD) in the area of housing construction.



1 Advanced Technical College, Hamm / 2+4 JOWAT „House of Technology“, ZÜBLIN Timber; © Stefan Müller / 3 Municipal Utilities Lübeck / 5 Verwaltungsbau, Mannheim; © Visualisation bloomimages

Service and Support

Architectural design

As a service provider within a construction company, we are able to strike a balance between our creative potential and the demand for economically designed, high quality solutions. Providing support for the operative units, for example during TEAMCONCEPT® negotiations with a potential client, by assessing the requirements, acquisition design, as well as considering topics such as sustainability and resource efficiency.

Design coordination

Design work is an integrated process. Communication and particularly the technical understanding between everyone involved in the project, both internal and external, determines the speed of planning as well as the quality of the design.

Bid processing, estimation, tendering and award

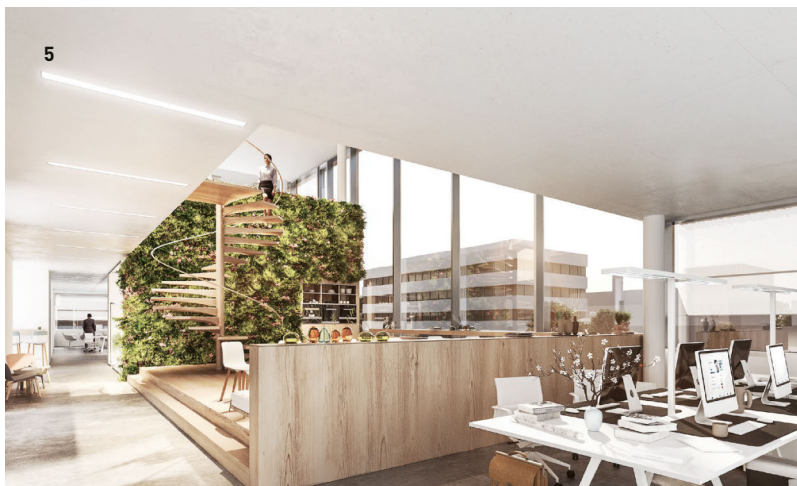
Complete processing of turnkey projects, estimation in cooperation with internal specialist departments, external designers and subcontractors. Obtaining quotations in the estimation and execution phases as well as supporting in the procurement and awarding processes. Carrying out the overall project management for cross-departmental and cross-divisional project processing.

Interior finishing works

We offer both consultancy and procurement support for the interior finishing works.

BIM 5D®, Visualisation

Model based design and estimation, and correspondingly the production of tender bid presentations, digital sampling inspection and VR models.



Sustainable Construction



¹⁾ DGNB (German Sustainable Building Council), LEED (Leadership in Energy and Environmental Design-Bewertungssystem Nachhaltiges Bauen (BNB) (Federal Ministry of the Interior, for Building and Home) ÖGNI (Austrian Society for Sustainable Real Estate)

Tasks and Objectives

The political framework of the Paris Climate Agreement and the EU New Green Deal increasingly determine the profitability and attractiveness of real estate for companies, investors and tenants. Sustainability aspects such as resource efficiency and climate protection, circular economy and health are paramount.

At ZT we accompany and optimise structures throughout their entire life-cycle based on the principles of sustainability. Our services are tailored to the needs of our clients and are, therefore, an ideal add-on to the CEE (Climate, Environment and Energy) tool in the TEAMCONCEPT® partnering model. As generalists regarding the subject of sustainability, we combine the expertise from the various specialist departments of ZT or the Group into a holistic concept.

We validate and expand our range of services in our committee work at the DGNB as well as through in-house R&D projects.

Service and Support

Green Building Certification – holistic sustainability strategies

Ecology, economic efficiency and social aspects – with sustainability certification we evaluate buildings using a holistic approach. We apply the common certification systems (e.g. DGNB, BNB, LEED) to the object and optimise the building concepts in a life-cycle-oriented manner within the framework of the certification goals. In addition, we carry out initial assessments, prepare guidelines for specialist designers and contractors and provide support throughout the entire project.

Resource efficiency and climate protection – low-emission design and construction

Life Cycle Assessment (LCA, ecological balance) and resource efficiency – we prepare Life Cycle Assessments (LCA) for the transparent presentation of the environmental impacts (CO₂-emissions, greenhouse gases, etc.) of the planned building. Different building materials and construction methods or energy concepts are compared with regards to their impact on emissions and alternative measures for reduction are proposed.

Circular Economy – circular planning and construction

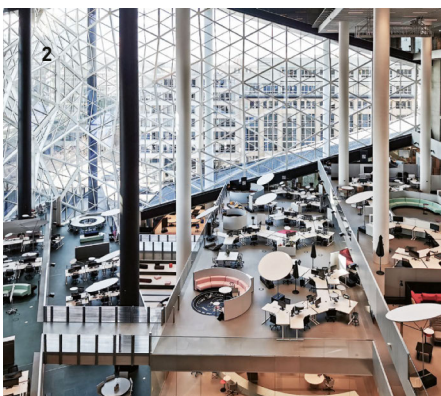
In view of the scarcity of global resources, buildings are to be regarded as „raw material stores“. We conceptualise and advise on the subsequent separability and reusability of building components and building products using the Circular Economy methodology.

Building ecology – low-pollution design and construction

Indoor air quality and pollutant-free building materials during the entire design and construction process, we ensure the use of environmentally and health-friendly building materials and create a project-specific Material APP (material and product database).

Life cycle costs

We identify the investment and follow-up the costs of a building.



Renewable Energy

Tasks and Objectives

The use of renewable energy sources and the increase in efficiency of existing processes in terms of an energy's use are fundamental social objectives. In our context the use of renewable energy sources is always connected to some sort of construction work. As part of an innovative engineering group, we have the task of developing and implementing new creative, efficient, and forward-looking ideas and methods based on our vast technical experience in construction engineering. Integrated trade and material solutions are possible due to the technically diverse processing of projects and ideas within ZT. Through joint research projects together with universities and scientific institutions, the latest technical standards are guaranteed, and the knowledge gained is fully applied.

The electricity supply in Germany is becoming „greener“ year by year. The share of renewable energies in electricity consumption is growing steadily: from around 6 % in 2000 to around 46 % in 2020. Renewable energies are also playing an increasingly important role in the heating supply. Currently, the share of renewable energies in the final energy consumption for heating and cooling is 15 %.

Focus on Integrated Energy Concepts

Creation of integrated energy supply and distribution systems

- Thermal building simulations
- Profile matching of producer and consumer
- Requirement and development analyses
- Energy cost optimisation
- Smart Grid
- E-mobility concept

Focus on Energy Generation

Solar Power

- Photovoltaic plants
- Thermal solar systems

Geothermal

- Design and planning of geothermal systems such as wells, probes or activated components

Biomass

- Creation and design of plants for the energetic use of biomass

Focus on Energy Storage Concepts

Accumulators

- Network-serving PV batteries
- Fast charging batteries for charging stations

Heat accumulator

- Hot water
- Ice storage



M & E Engineering

Tasks and Objectives

Mechanical and Electrical Engineering (M & E) makes buildings come to life. ZT assists the operative units in all phases of the turnkey projects using highly qualified M & E specialists. The task is to pool and constantly widen its specialist knowledge in the fields of heating, ventilation, and airconditioning (HVAC), as well as plumbing, fire protection systems, cooling systems, refrigeration, high and low current systems, building automation, and conveyor technology as well as to integrate all the decentralised M & E units.

Based on our M & E in-depth expertise we identify and minimise risks, optimise technical systems, ZT fosters the competitiveness of the Group. The services offered range from advising on individual issues for smaller projects, to the complete processing of the M & E requirements throughout all phases of more complex projects. ZT also monitors the M & E market for new technologies, developments, updated requirements, and market changes in order to provide the operating units with the optimum service.

Service and Support

M & E Planning

- M & E planning in all phases of planning
- Application of the BIM method
- Development of M & E BIM tools
- Thermal simulation and stream simulation for concept evaluation
- Daylight and artificial light simulation
- Passive house projections Energy Saving Regulations (EnEV) calculations for residential and non-residential buildings



Tender processing

- Value engineering in the acquisition phase
- Technical and commercial viability checks during tender phase
- Tender optimisation
- Integration of innovation and development of alternative proposals
- Cost estimation
- Processing of projects according to the TEAMCONCEPT® model
- Model-based quantity determination
- Assistance in contract drafting
- Risk Assessment
- Expert know-how in the area of Data-Center, hospital, airport, high-rise building

Work preparation / procurement

- Tendering, bid evaluation and negotiations
- Drafting of price comparison lists and recommendation of contractors
- Preparation of contract documents for M & E subcontractors
- NU-TEAMCONCEPT®: Drafting contracts within the framework of the partnering model
 - also for subcontractors

Execution

- M & E project and construction management
- Interface coordination
- Quality monitoring, schedule monitoring
- Examination of engineering design, design controlling
- Customer care
- Claims management
- Documentation
- Commissioning Management, carrying out inspection and handover
- Evaluation of subcontractors
- Certified activities relating to thermography

Provision of various measuring instruments

Innovation

- Development of alternative proposals for higher energy efficiency and sustainability
- Participation in national and international R+D projects
- Market observations, evaluations and integration of new technologies



1 Steam plant, Thun (Switzerland) / 2 Refrigeration machine, Dürr Campus, Bietigheim-Bissingen / 3 Swimming water technology, Thème Thale / 4 Vienna-Schwechat Airport, baggage conveyor system / 5 Vienna-Schwechat Airport, headquarters 2nd floor



Facade Engineering

Tasks and Objectives

We view it as one of our main tasks to pool the Group's facade engineering know-how, to constantly advance its development, and to apply it whenever a project has been acquired or is being executed within the Group. In addition to further development of facade concepts, we also pursue the detection and minimisation of risks, the identification of potential savings, and the optimisation of the various approaches available.

Working in close cooperation with both the operating units as well as the central procurement department, we keep up abreast of the current market situation in facade engineering as well as with the growing requirements and developments in order to support our clients using state of the art technology in the execution of their projects.

Most of the projects that we are involved in pose some difficult technical challenges that provide us with additional experience and the opportunity to gain further specialist knowledge.

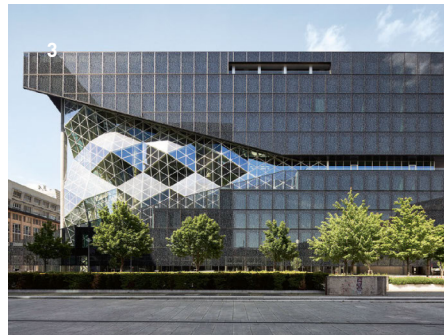
Service and Support

Comprehensive consultancy

- Optimisation of the building concept with a comprehensive view of the interaction
- between the structural works, the facade and M & E engineering works in cooperation with other departments within the ZT
- Comprehensive support for all project phases on issues regarding the entire building envelope, including building regulations, architectural issues, energy-performance and economical aspects as well as having a focus on sustainability (CO₂ balancing, facade greening, building integrated photovoltaics, etc.)

Technical design

- Support in tender estimation, presentations and obtaining subcontractor quotations with in-house design details and technical solutions
- Specialist design for the building envelope works with in-house personnel
- Structural analysis: Use of specialist software solutions for the determination of glass structures and profile dimensions



Tender / Award

- Generating quotation enquiries and preparation of bid awards including comprehensive technical clarification
- NU-TEAMCONCEPT®
- Drafting of contracts using a partnering model framework – also for subcontractors
- Project-specific elaboration and implementation in cooperation with Central Procurement

Tender processing

- Cost estimation for the entire construction works, as well as the checking and verification of prices quoted by subcontractors and partner companies
- Elaboration of alternative proposals with their respective specifications, and details for cost and quality optimisation

Execution

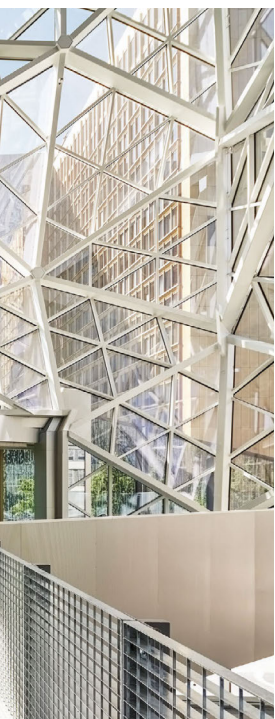
- Coordination of the construction design, workshop and assembly drawings for the building works between the parties involved for architectural, structural and facade planners, general authorities, inspecting authorities and subcontractors. This is done in close cooperation with the operating project team
- On-site coordination of the entire construction works as well as execution of the permanent installations and quality control up to final acceptance of the works
- including the relevant schedule and cost control

Building physics

- Consultation, optimisation, simulations, and verification in the area of thermal and hygric building physics, acoustics, and daylighting during the planning phase
- Measurement of air tightness, sound insulation and thermographic recordings for quality assurance, verification, and certification (i. e., DGNB)
- Design of ventilation concepts for residential buildings

BIM 5D®

- Development of methods and components for model-based project management of the building works from design to execution
- Linking 3D building models with the business processes of a general contractor: estimation, tender and award, scheduling, production, and execution
- Support of the operative units in model-based project management of the building works
- Development of model-based cooperation with manufacturers, planners, and subcontractors



Structural Engineering

Tasks and Objectives

Structures in building construction

An effective building structure is the backbone of every sophisticated civil engineering project, and is thus, by tradition, an essential field within the ZT. Well thought through proposals as well as implementation friendly design of engineering works and complex load-bearing structures are all part of the basis for the successful completion of a project. We rely on a large team of experienced and specialised staff who are provided with continual training to ensure they are always able to apply state of the art technology in our projects.

The goal is to design or optimise load-bearing structures that are as efficient and as sustainable as possible and that can be implemented on the construction site with high quality and as little effort as possible. Hereby, not only the numerous interfaces with the adjoining trades such as architecture, facade, and mechanical services, but also civil engineering, are to be considered and optimal solutions developed. Our many years of experience in the use of BIM, both in the tender processing as well as in the execution planning, help us to coordinate the optimal structural systems in the construction projects for all parties involved. The experience and knowledge gained across the group are bundled in the ZT to develop innovative and sustainable solutions for structural engineering projects now as well as in the future.

Bridge construction

Bridge construction is a supreme discipline of structural engineering and, thus, forms an integral part of our experience and competence. Whether for railways, vehicle traffic or for pedestrians and cyclists, bridge construction is both diverse and essential for infrastructural construction. In addition to our experience in engineering, we also have competence in important areas such as economic efficiency, constructability, and sustainability. As a rule, we rely on our experience in the use of 3D models in bridge construction works.

We also have special expertise in the areas of load-bearing high-rise structures, pre-tensioning, timber construction and steel construction, as well as in the specialist technical areas of sound protection along traffic routes, slab track and cantilever construction equipment for bridges.

In addition, our engineers have been actively involved in the development and design of the current „Recognised rules of technology“ for more than three decades and are therefore, active in various bridge-standard committees, among others.



Service and Support

Model-based tender processing

This working method, in which a 3D model of the building structure or bridge is created as the basis for the estimation, has been standard for us for years. Using an interface between the modelling software and the estimation programme, both the quantities and the associated BoQ items are thus available in an efficient and comprehensible way. In addition, we can use the model to illustrate the planned construction processes or to check the interfaces with contiguous trades – a real added value for all involved. Furthermore, we offer to take on specialist construction management and expert consultancy.

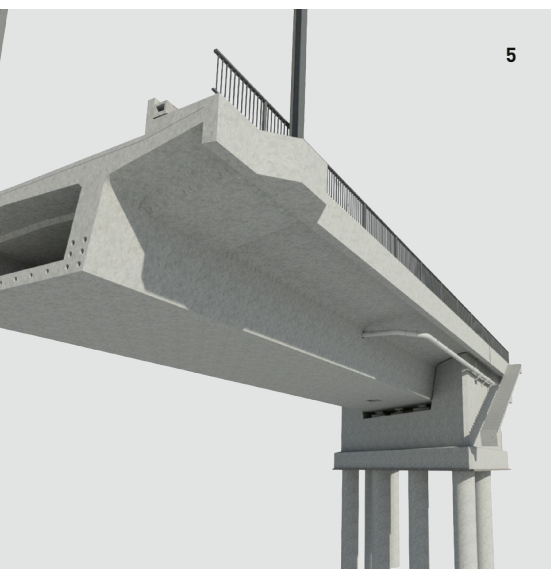
Execution processing

As a basis for the construction execution, we carry out static and dynamic calculations. We illustrate the load-bearing structures in the structural drawings in a clear and comprehensive way and in accordance with the construction schedule. For years we have also been using 3D models from which the drawings are derived, and which are the basis of the BIM coordination for the project.

Research and development

In terms of application, we have often developed innovative structural engineering solutions that go far beyond current standards, and as a rule by agreement directly benefit our execution projects. We have thus, in individual cases, been able to use for example more economical, slimmer, and more flexible support structures for high rise buildings to the benefit of all parties involved. Here, reinforced concrete supports using high-strength concrete with reinforcement have replaced the conventional steel composite solutions.

We make a significant contribution to sustainability not only by using „grey energy“ as efficiently as possible, but also increasingly by using alternative materials such as timber construction or timber composite construction. In order to reduce the CO₂ footprint of our construction works we are also involved in various application-related research projects.



1 European Central Bank, Frankfurt am Main, © ECB/ Photographer Henning Kreft, Langen / 2 Carlsberg Byen (Denmark); © Hannah Paludan Kristensen / 3 Gümmerwald, Wunstorf / 4 Axeltoft, Copenhagen (Denmark) / 5 3D model bridge S21, Stuttgart / 6 MesseCity Köln West 4, Cologne; © Volker Dennebier / 7 ThyssenKrupp Test Tower for Elevators, Rottweil / 8 University Main Building Bielefeld

Ground and Geotechnical Engineering

At a glance

Technical tender processing and complete execution design in engineering ground works and geotechnical engineering for Germany and abroad:

- Combined pile and slab foundations
- Frame and trough structures
- Cut-and-cover tunnel construction
- Underground stations
- Water stops
- Hydraulic engineering
- Quay facilities
- Port construction
- Locks
- Weirs
- Construction pits
- Foundation slabs
- (Deep) foundations
- Underpinning
- Soil improvement
- Ground freezing
- Injections
- Monitoring
- Earthworks

Tasks and Objectives

„It's always dark in front of the pick!“ This old miners' saying applies to all underground activities. In contrast to the building and finishing trades with its industrially produced materials, ground engineering is working in and dealing with soil and rock materials that are only partially known in advance and potentially quite inhomogeneous and changeable over small distances.

The evaluation of the associated specific technical risks during construction are part of the main tasks of ground engineering designs. Here, cooperation between the partners and the early coordination between the staff of the designing Technical Office and the team on site are an essential basis for successful project execution.

Risk analysis

Our structured risk analysis includes activities for the systematic assessment, evaluation and prioritisation of technical chances and risks in the project. It thus provides a solid starting point for successful planning of the steps to be taken in the design, execution and controlling processes.

Value Engineering

Our goal is to provide a technically creative and sophisticated economic design that is systematically oriented towards the requirements of the works with an optimised use of resources.



Service and Support

Design, geotechnical consultation, design coordination, specialist project management for:

Construction pits

Design of pit supports and underpinning works, including measurement technique, dewatering and excavation concepts, are among the core competences of ZT. The range of possible trench shoring systems hereby ranges from soil-nailed pit walls to diaphragm and bored pile walls for deep urban construction pits.

Structures

A key aspect is the construction design of cut-and-cover tunnels, underground stations, framed and trough structures. Tight space conditions, the traffic management, and the time available are decisive parameters for the appropriate construction solutions.

Foundations

Foundation design for differing structures is a challenging engineering task. The necessary foundation element is created according to the boundary conditions and requirements; this could include ground improvement works or pile foundations using large bored piles, displacement piles or driven piles, often also as a combined pile and slab foundation.

Hydraulic engineering

Ports and quays, locks and weirs, hydroelectric power plants, and land reclamation measures both national and international, are designed and planned with consideration given to the local characteristics, and in close consultation with the executing divisions.

Monitoring and measuring technology

Sophisticated construction pits and structures require intensive measurement technological monitoring during their life cycle – especially in inner cities with sensitive peripheral buildings, facilities, and service lines. With increasing use of monitoring methods, they have become an integral part of the design.

Alternative solutions

ZT has unique competence in the design of buildings underpinning works, as well as with specialist processes such as jacking or shifting large construction components and raising building structures.



1 Trough excavation pits, A100 motorway ring, Berlin/ 2 Detail of new construction Main Collection West, construction of underground station, Stuttgart 21/ 3 Bored pile shaft, supply culvert, Kiel-Holtenau lock, © Sebastian Engels Photography, www.sebastian-engels.de/ 4 Ground freezing of protective roof, Severinstraße underground station, Cologne/ 5 Steel pipe shafts, supply culvert, Kiel-Holtenau lock, © Sebastian Engels Photography, www.sebastian-engels.de/ 6 Extension of MCT quay, Port Louis, Mauritius

Tunnelling

Tasks and Objectives

Design and engineering services in both tunnelling and in underground construction works are an essential part of ZT's competence and have been part of our core tasks for over 35 years. Our services and products are based on the knowledge and dedication of our employees, who – on behalf of our operating units – alone during the last five years have carried out the preliminary and detailed design for more than 25 tunnelling projects around the world.

Our focus aims at:

- Achieving a high level of customer satisfaction through technical competence and high quality
- Efficiency and innovation skills applied in all construction phases of the tunnelling works
- Education and development of enthusiastic and capable staff for our company
- Accumulation and provision of tunnelling specific know-how for the whole Group

Products

SOFIA – Software for grouting works

Design and monitoring of grouting schemes (e. g., compensation grouting in urban tunnelling projects or permeation grouting).

Shield Transfer System (STS)

Special designed carrier for TBMs used for the transport of TBMs through stations where conventional longitudinal shifting is not possible due to geometric reasons.

Energy tunnel lining segment (Energietübbing®)

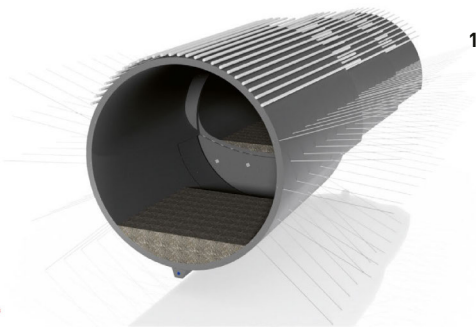
Special PCC segments equipped with geothermal elements to make use of the geothermal energy available underground

RFB-segments

Steel segments allowing for unlimited orientation of boreholes for freezing and grouting purposes.

Q-Bolt

Coupling bolt for the transmission of large shear forces in segmental lining and other PCC elements.



Service and Support

Design services and research in all key topics of tunnelling:

Geotechnical engineering and geology

- Design of subsoil investigation measures
- Analysis, interpretation, and evaluation of geological and geotechnical data
- Tunnel drives tailored to meet project specific requirements
- Accompanying assessment of the geology encountered during construction

Mechanical tunnelling and pipe jacking

- Tunnel drive design (e.g., face support pressure)
- Parameterised and model-based segment design
- Design of launching and receiving structures for tunnel boring machines and their transportation through stations
- Design and layout of separation plants for slurry shields

Conventional tunnelling

- Model-based primary lining
- Model-based secondary lining design
- Pressurised air heading design, incl. the corresponding temporary structures

Special measures for tunnelling and special construction works

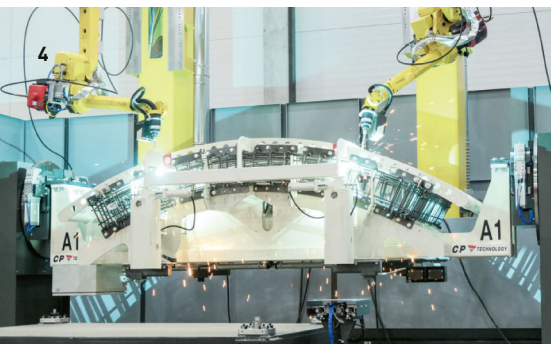
- Design of launching tubes, launch walls, pipe canopies, etc.
- Settlement calculations and building damage assessments (risk analyses)
- Creation of monitoring schemes
- Design of powerhouse caverns, pressure tunnels, shafts, cross passages, and emergency tunnels
- Execution of complex 2D / 3D FE calculations for specialist tasks or problems
- In-house software for optimised tunnel dimensioning, accounting for national and international standards.

Grouting and freezing technology

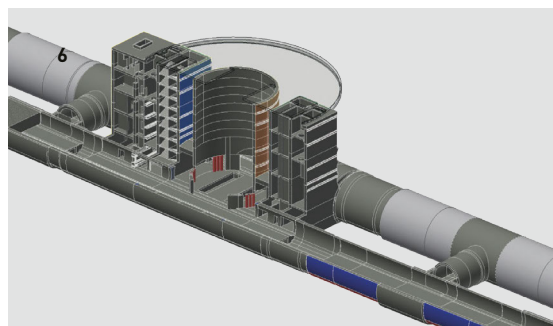
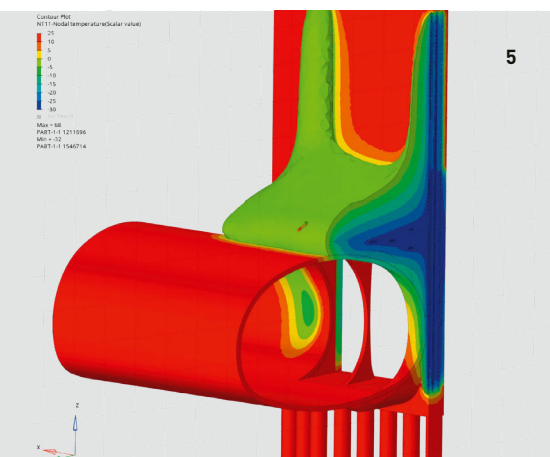
- Grouting design of low- and high-pressure grouting works (e.g., jet grouting canopies or compensation grouting in urban tunnelling)
- Ground freezing design including thermal calculations to determine freezing time and energy demand and for the investigation of specific issues, (e.g., high groundwater flow velocity)
- Research and development
- Steel fibre reinforced concrete lining
- Automated (reinforcement) production of tunnel lining segments
- Segment couplings for dynamic loads
- Construction works with special safety requirements such as hybrid tunnel lining segments with pressure-absorbing properties
- Geothermal calculations to analyse and optimise the extraction of heating and cooling energy from the ground

Research and development

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- Automated (reinforcement) production of tunnel lining segments
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1 BIM model of the primary lining, S21 Pfa 1.3a Stuttgart Airport Tunnel/ 2 TBM receiving, Station Statenweg, RandstadRail Beton Rotterdam/ 3 Alabstiege Tunnel, new construction rail route Wendlingen-Ulm/ 4 Automated reinforcement production of tunnel lining segments, York Potash, Wilton (UK)/ 5 Cross-passage freezing, underground station Sendlinger Tor, Munich/ 6 BIM model of the central access with station tubes, S21 Pfa 1.3a Stuttgart Airport Tunnel/



Road and Rail Design

Tasks and Objectives

Road and rail construction has traditionally been an important, perhaps even the central, field of activity in the STRABAG Group. The transportation infrastructure construction division within the ZT, follows this claim with comprehensive consulting, coordination and design services – from design to operation – with innovative concepts and production-oriented solutions.

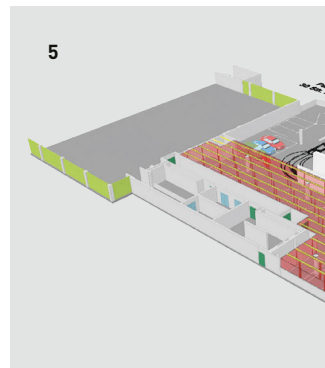
Process optimisation through timed asphalt paving



In our services, we rely on experienced employees working together as partners.

Our aim is to use state-of-the-art technology to design and optimise transportation infrastructure projects from the initial design to the operational phase, considering technical, construction management, construction economics and environmental aspects – for the benefit of our clients and the project participants on-site. All knowledge gained in this context is concentrated in the ZT and benefits future projects both nationally and internationally borders.

In addition, we see ourselves as an innovator and driver of innovation. This includes consistent further training of our employees and active involvement in research projects and expert committees. Whether for roads, railways, or waterways, we rely on the advantages of model-based technical design and planning (BIM.VWB). It is for us of highest importance to use this data in the digital processes on the construction sites.



1 New construction S3, Hollabrunn/ 2+4 Tram line D, Vienna/ 3 Project A2, Graz/ 5 BIM. VWB, Reutlingen multi-storey car park/ 6+7 BIM.VWB visualisation, Koralm Tunnel, Graz-Klagenfurt

Service and Support

Road and rail

In addition to the mapping of transportation infrastructure routes in terms of location and height, the range of services provided includes the design and planning of all cross-sectional elements as well as possible optimisation aspects in coordination with the client. All associated detailed elements, such as pipelines of all trades, utility lines, surface drainage, equipment objects and markings, are considered in the design. Moreover, our portfolio also includes specific technical designs from the railway sector, such as overhead lines, railway earthing, safety equipment, railway platforms, etc.

We always focus our comprehensive design work on sustainability, resource optimisation and efficient construction execution.

Design coordination

Large-scale transportation infrastructure projects involve several participants and multidisciplinary design trades. Our expertise lies in the coordination and mutual agreement of the design trades, including the internal and external specialist designers, to ensure proper and efficient execution design. We contribute to the successful and smooth running of large-scale transportation infrastructure projects with scheduled and interface-synchronised project design coordination in line with the construction process.

Visualisation

To facilitate the understanding of complex design contents, we not only create static visualisation of the construction works, intermediate and final states of projects based on 3D models, orthophotos, survey data and photo documentation, but we are also able to create high-quality animation and moving images, based on the existing implementation schedules. These already offer great added value in the tendering phase of the project in terms of coordination with our clients and public relations.

Outdoor facilities and area development

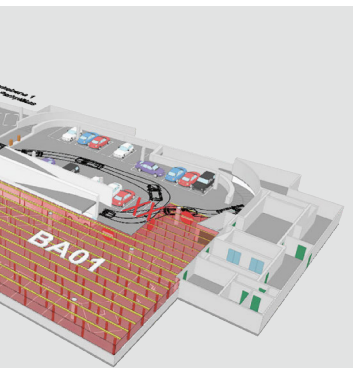
During the construction of outdoor facilities and site development, we offer associated design services e. g., for dimensioning, drainage, trafficability investigations (trailing curves), etc. in all phases of the works.

BIM.VWB

Through our leading involvement in several task groups and our involvement and cooperation in numerous Group research BIM.VWB pilot projects, we ensure the direct transfer of our know-how within all our planning projects.

Partnership-based project management

The future of construction will also be based on partnership, especially in public sector projects. It is important to balance the interests of the various parties involved and to offer our customers workable solutions. We see our role in transportation projects as coordinating all specialist areas in the design and, together with the operational divisions, offering solutions for the design and construction that represent a win-win situation for all project participants, which is quicker and overall more cost-effective, leading to a completion of transportation projects.



LEAN.Construction and Process Management

Tasks and Objectives

LEAN.Construction and Process Management focuses on the continuous improvement of the construction processes and site-related procedures throughout the entire construction phase. In addition, new control processes are permanently being developed for our building construction, civil engineering, and transportation infrastructure projects. Thereby, we support the STRABAG operational units in an effective as well as integrative way with process design, resource planning and site logistics as well as accompanying the construction progress in a transparent and collaborative manner.

With simple visual aids such as wall posters and post-its the processes can easily be illustrated. This significantly improves communication and transparency on site.

Subsequently, this information is processed into digital data. From this, resource- and quantity-based construction schedules are created, which can be visualized as a construction process simulation by linking them to a 3D model.

The continuous development and use of new innovative working methods is a central aspect of our scope of services, where short-cycle findings from research and development projects are integrated into direct project processing.

Service and Support

- Scheduling tendering and execution phase
- Execution of Target Value Design, Agile Design Management or the Last Planner System
- Implementation of LEAN.Construction through cycle design and cycle control, Last Planner System, Shopfloor Management and other LEAN tools of VDI2553
- Site installation according to „5S“ (methodology for systematic order and tidiness)
- 4D Construction process visualisations

Typical results

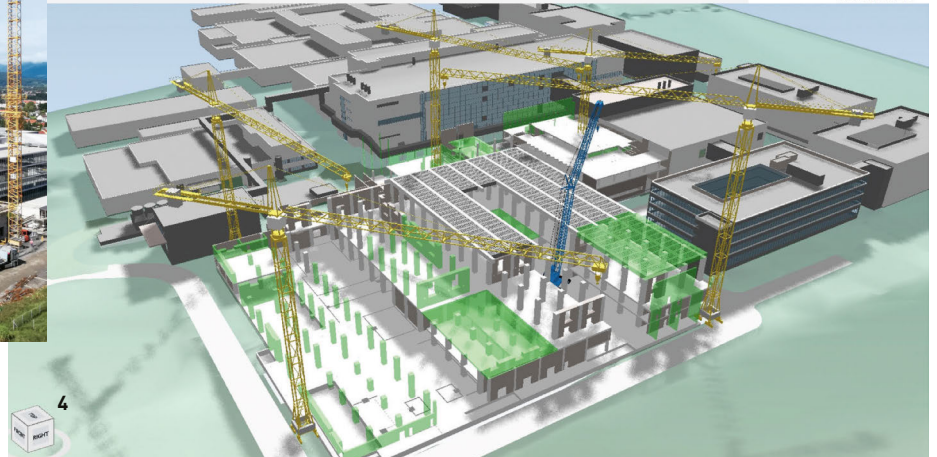
- Effective planning and control of construction processes
- Evaluation and optimisation of the use of resources
- Transparency in the processes
- Creation and establishment of a collaborative way of working
- Early problem detection



Jun	Jul	Aug	Sep	Okt	Nov	Dez	Jan 2020	Feb	März	Apr	Mai
kw 8	kw 12	kw 17	kw 21	kw 26	kw 30	kw 34	kw 39	kw 43	kw 47	kw 52	kw 56

11.09.2019

Woche: 22



1 Poket map with the cycle areas for orientation on the construction site / 2 Process optimisation through clocked asphalt paving / 3+4 Clocked 4D construction process visualisation from project to model

Estimation and Work Preparation

Tasks and Objectives

A crucial precondition for the successful completion of construction projects is the consideration of construction management principles and their consequential implementation. Our work begins in the tendering phase with the creation of the tender estimation, and the development of scheduling and site installation concepts. In the execution phase, we are responsible for schedule planning, formwork, site installation and site logistics, and we strive to keep these updated throughout the construction phase.

Service and Support

Estimation/civil engineering and bridge construction

- Estimation of the shell construction works for bills of quantities and functional building specifications (in close cooperation with the other departments of ZT)
- Partial estimation of process-determined services for civil engineering works (i.e. tank construction, power plants, tower block constructions, towers)
- Realisation of alternative proposals in agreement with the operative units
- Development of technical concepts for shell construction / structural engineering
- Complete tender estimation for shell construction works / structural engineering works
- Temporary staff deployment (project management, addendum administration / management)
- Leadership of the SID BIM Taskgroup TGO5 Bridge Construction

Work preparation in tender and execution phase:

- Creation of the site installation design
- Creation of the milestone and schedule planning
- Development of logistics concepts
- Development of formwork and support scaffolding concepts
- Support of the operative units for the tendering and awarding of these works
- Temporary staff deployment (project management, creation and updating of the scheduling and site installation planning)
- Training of various scheduling applications in both Stuttgart and Vienna as well as on site
- Product coordination, user support and telephone hotline as support for the operative units - for the scheduling programmes POWERPROJECT, PRIMAVERA, TILOS, MS PROJECT, SYNCHRO
- Leadership of the SID BIM Taskgroup CTG03 „Model-based scheduling/TP WP“




5 Maasvlakte power station, Rotterdam (Netherlands)
6 New construction of Rhine bridge, Rheinfelden



Well networked and with innovative solutions, our highly qualified teams bring the know-how to site.

→ TO OUR CONTACTS



the right contact person for every concern



With us you can build on your career

Career opportunities

Young Professionals

- Apprenticeship as a construction draughts-woman / draughtsman
- Internship
- Dual study
- Student trainee
- Theses (Bachelor and Master)
- Trainee programme

Professionals

- Civil engineers
- Architects
- Planning coordinators
- BIM Managers
- M & E engineers
- Geologists
- CAD design engineers
- Draughtsmen / draughtswomen
- Technicians

Experts

- Project managers

Together Strong. As a team.

As a central think tank within the STRABAG Group, knowledge exchange, learning and teamwork are the focal points in our ZT teams. We offer you the opportunity to actively shape the construction and planning of tomorrow at one of the world's largest technology groups for construction services. Your development opportunities are exponential. Your area of responsibility is maximally diverse. Your salary and working hours are fair according to RTV Bau. Your contribution is meaningful. Do you feel called to join us?

Working together in a team and developing personally: as diverse as our projects are also the career opportunities at the Central Technical Division:

What We offer

- Employee referral programme („Good people know good people“)
- Mentorship programme (onboarding as part of a structured induction process)
- Professional and personal development opportunities
- Potential management and employee development

The Company

- Exciting project diversity at home and overseas
- Nationwide presence
- Down-to-earth, good working atmosphere and openness
- Security through a stable workplace
- Integration into the team from the first day
- Mixed-age teams with great know-how and enthusiasm for the profession
- Innovation carrier and cooperation partner for R & D and educational institutions
- Internal service support from travel booking to IT support

Development

- Diverse career opportunities
- Career planning in dialogue
- In-house Group Academy
- Tailor-made training offers
- Occupational Health Management (OHM)
- More knowledge, more opportunities – internal knowledge management

Monetary

- Pay according to collective agreements
- Capital-forming benefits / subsidy for Soka-Bau or direct insurance (Allianz)
- Accident insurance at work and during leisure time
- Employee discounts with various companies and online service providers

→ INTERESTED?



Visit our career page. We look forward to receiving your application!



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