Profile and Service Portfolio

Verein Deutscher Zementwerke e.V.
Forschungsinstitut der Zementindustrie
Management of the Research Institute

Administration

Information and IT Service

Environment and Plant Technology
- Cement process engineering
- Energy saving
- Emissions/environmental impact reduction
- Licensing procedures
- Prognoses of emissions and environmental impacts
- Safety at work
- Further training

Cement Chemistry
- Industrial chemistry
- Industrial mineralogy
- Performance of cement
- Durability
- Recycled material
- Physical and chemical analyses

Concrete Technology
- Performance of cement in concrete
- Cement/Admixtures
- Durability of concrete
- Concrete products, traffic route engineering
- High performance concretes
- Sustainable building with concrete
- Fire protection

Environmental Measuring
- Officially approved monitoring body for industrial emissions
- Emission measurements at industrial plants
- Determination of noise emissions and environmental impacts
- Vibration and acoustic noise prognoses
- Calibration of CEMs

Quality Assurance
- Testing, inspection and certification of cement and other building materials
- Inorganic and organic trace analysis
- Physical and chemical testing of building materials

FiZ-Zert
Certification body for management systems and CO₂ emissions
- Certification of management systems for quality management, environmental management and safety at work
- Verification of CO₂ emission reports
- Certification of energy management systems according to the Renewable Energy Sources Act
Verein Deutscher Zementwerke e.V. - VDZ (the German Cement Works Association) is the technical and scientific association of the German cement industry. Nearly all German cement producers are among its members. Its Research Institute has enjoyed an international reputation for many years. VDZ cooperates with leading cement organisations and research institutes throughout the world and has 31 international cement producers as associate members. Through CEMBUREAU, VDZ is particularly involved in the activities of the European cement industry.

Since the demand for practice-oriented research does not stop at national borders, VDZ increasingly uses its worldwide contacts to establish the exchange of scientific experience. It is a founding member of the European Cement Research Academy (ECRA), which forms an international platform for the discussion of recent research findings. The international VDZ congresses are events which serve as meeting points for cement and concrete experts from all over the world.

With its five departments Cement Chemistry, Concrete Technology, Environment and Plant Technology, Environmental Measuring, and Quality Assurance the Research Institute covers all aspects of cement production and application. It has a pool of modern analytical devices at its disposal and is also optimally equipped for challenging fundamental research. The Institute’s library offers a wide range of technical literature to both employees and VDZ members. The current inventory contains around 40,000 volumes. The library subscribes to more than 130 periodicals which are regularly evaluated and integrated into a literature data base. This data base comprises at present more than 63,000 entries and is accessible not only in the Institute but also online via the Internet.
The management
(from left): Volker Hoenig (Environment and Plant Technology), Silvan Baetzner (Quality Assurance), Klaus Meyer (Administration), Christoph Mueller (Concrete Technology), Martin Schneider (Chief Executive), Martin Oerter (Environmental Measuring), Stefan Schaefer (Environment and Plant Technology), Joerg Rickert (Cement Chemistry)

The Research Institute of the Cement Industry is accredited and certified according to ISO 9001, ISO 14001, DIN EN ISO/IEC 17025, EN 45011 and DIN EN ISO/IEC 17021.
Dear Reader,

This profile and service portfolio provides an overview of the service range of our Institute, which we have continually extended over the last years. With our interdisciplinary team we offer our clients answers to all relevant questions in the field of cement and concrete production, drawing on our extensive research findings which are characterised by being practice-oriented and easily implemented.

From the start of its existence, Verein Deutscher Zementwerke e.V. - VDZ (the German Cement Works Association) has been contributing through its work both to the competitive and environmentally friendly production of cement and to the development of high quality concrete construction. With its Research Institute, VDZ possesses a renowned and internationally acknowledged scientific institution distinguished by its industry-related research and a comprehensive range of services regarding cement and concrete.

We work on the diverse themes along the cement and concrete value chains. Our clients are cement manufacturers and producers of construction materials in Europe and, increasingly, worldwide. We offer solutions to raise efficiency and reduce costs, and competitive measures for the improvement of environmental protection or quality assurance.

Our goal, together with our clients and members, is to continue to position cement as a cost-effective, environmentally friendly and therefore sustainable construction material in the future. For further detailed information please visit our website www.vdz-online.de or contact us directly.

Martin Schneider
Chief Executive
Verein Deutscher Zementwerke e.V.
Head of the Research Institute
In the field of mortar and concrete, our research and the services we render deal with the most recent and important questions regarding concrete constituents as well as concrete technology and application. A substantial part of this work is currently dedicated to the application of cements with several main constituents in durable concrete constructions. Special attention is given to carbonation, resistance to chloride penetration and the resistance of concrete to freeze-thaw, and freeze-thaw with de-icing salts. Furthermore, several research projects deal with the prevention of a harmful alkali-silica reaction and the sulphate resistance of concrete.

Our team of concrete technology experts also investigates in detail the interaction of cements and concrete admixtures such as plasticizers and super-plasticizers, shrinkage reducers, long-term retarders and air-entraining agents. High performance concretes and the use of concrete in traffic route engineering are further focuses of our work.

Sustainability assessment and the supervision of procedures for general technical approvals and European Technical Approvals are also part of our service portfolio.

**Research focuses**

- Interaction between concrete constituents
- Resistance of mortar and concrete to
  - freeze-thaw and freeze-thaw with de-icing salts
  - chemical attack
  - carbonation and chloride penetration
- Alkali-silica reaction
- Optimisation of cements with several main constituents
- Concrete in traffic route engineering
- Autogenous shrinkage and cracking propensity
- High performance concretes
- Sustainability assessment
Services

- Development of optimised concrete and mortar mixes, customised for specified applications
- Testing of fresh and hardened concrete and fresh and hardened mortar
- Durability testing
  - Resistance to freeze-thaw and freeze-thaw with de-icing salts according to the CF, CIF, CDF, cube, slab and beam test methods
  - Alkali-silica reaction in the 40°C fog chamber and according to the 60°C RILEM method (performance test)
  - Chloride migration test
  - Penetration behaviour of water polluting substances
    - Grinding wear
    - Determination of air void parameters in hardened concrete
- Determination of the pore structure using, for example, mercury intrusion, permeability and water absorption measurement (15 MPa)
- Rheologic examinations with the Viskomat
- Determination of the heat of hydration (isothermal and semi-adiabatic method)
- Extraction of pore solution from concrete for the determination of pH value and conductivity
- Electroacoustic determination of the zeta potential
- Testing of admixtures
  - Initial testing according to EN 934-2
  - Electrochemical corrosion test according to DIN V 18998
- Examination of aggregates
- Testing of grouts
- Determination of autogenous shrinkage and cracking propensity

Contact: Christoph Mueller (bte@vdz-online.de)
A basic precondition for the optimisation of the clinker burning process and the product properties is to fully understand the chemical and mineralogical processes which take place during the production and application of cement. Cement chemistry research is oriented towards current issues and covers both the evaluation and optimisation of main cement constituents and the development of testing and measuring methods.

Chemistry and Mineralogy

We possess a high-performance analytic laboratory with a wide range of technical equipment. The laboratory is accredited according to DIN EN ISO/IEC 17025:2005. Due to many years of cooperation with cement producers and concrete users, the Research Institute has gained ample experience in the analysis, the development of methods, and the provision of expert advice in the field of chemicomineralogical testing of raw materials, cements and products made from them.

Research focuses

- Evaluation of main cement constituents
- Reactivity of blast furnace slag and fly ash
- Influence of the particle size distribution of cement constituents on concrete properties
- Influence of cement constituents on the alkalis in the pore solution of the hardened cement paste
- Sulphate resistance of mortar and concrete
- Chromate analytics and long-term stability of chromate reducing agents
- Environmental compatibility of cement and concrete
- Utilisation potentials of kiln dust
Services

- Characterisation of Portland cement clinkers
- Quantitative phase analysis using the Rietveld refinement
- Reference testing on cements and concrete constituents according to current standards
- Determination of the heat of hydration
- Sulphate optimisation of cement
- Determination of the calorific value
- Determination of the microstructure of cementitious systems
- Environmental analyses, e.g. trace element analysis on metals and semi-metals
- Determination of the water-soluble chromate content according to TRGS 613 and EN 196-10
- Determination of the biogenic content of fuels

Contact: Silvan Baetzner, Joerg Rickert
(zch@vdz-online.de)
The high significance which the cement industry attaches to environmental protection is reflected in the numerous activities of the Research Institute. Due to our extensive experience in the area of plant evaluation and permit management, useful synergies arise, especially with regard to environmental impact audits, since even for complex projects all necessary services can be obtained from one source.

Further to the continuous training of our staff, their involvement in current research topics enables them to constantly revert to the latest scientific findings for the preparation of experts’ reports.

**Research focuses**
- Behaviour of trace elements in the clinker burning process
- Abatement of NOx and Hg emissions
- Propagation behaviour of gases and dusts as well as acoustic noise and vibrations
- Determination of the fine dust contents in the exhaust gas of cement plants
- Relevance of quartz in dusts from cement production
- Quality criteria for secondary materials
- Leaching behaviour of trace elements in concrete
- Evaluation of the impact of construction products on groundwater and soil
Services

- Preparation and examination of permit applications
- Prognoses of emissions and environmental impacts
- Atmospheric dispersion of stack emissions / stack height calculation
- Recommending measures for improvement regarding the emission and/or ambient pollution situation
- Environmental compatibility studies
- Plant technology examinations (state of the art / best available technique)
- Complex propagation calculations
- Soil examinations
- Acoustic noise reports
- Evaluation of the impact of construction products on groundwater and soil

Contact: Volker Hoenig, Stefan Schaefer (ubt@vdz-online.de)
Our clients benefit from our many years of experience in the field of thermal and mechanical process technology, which we have gained both nationally and internationally while providing consultancy services for plant optimisation. Together with our clients we develop innovative processes to allow for the emission reduction in cement works at reasonable costs. To this end we employ an expert team covering all technological aspects and have the latest measuring equipment at our disposal. We plan and organise all process technology-related investigations carried out in cement plants. Trials, analysis and evaluation are offered from one source. Our know-how spans thermal as well as mechanical process technology, including complex environment technology-related questions.

**Research focuses**

- Burner technology for secondary fuels
- Impact of secondary fuel use on kiln operation, emissions and product properties
- Reduction of recirculating material systems (e.g. using bypass systems)
- Computer simulation of the operational behaviour of kilns and grinding plants
- Operational optimisation of kiln and grinding systems
- Primary and secondary measures for emission reduction
- Reduction of CO₂ emissions
Services

- Technical audits / Benchmarking e.g. for kiln operation, grinding operation, electrical energy demand
- Material balances, energy balances, measures to reduce energy consumption
- Process measurements in kiln and grinding systems
- Primary and secondary measures for emission reduction
- Operational optimisation of kiln and grinding systems
- Examination and limitation of recirculating material systems
- Computer simulation of the operational conditions of the clinker burning process, parameter studies and development of optimisation measures
- Preparation and grinding of solid materials
- Laboratory examinations (e.g. determination of particle size distribution, grindability)

Contact: Volker Hoenig, Stefan Schaefer (ubt@vdz-online.de)
The Research Institute of the Cement Industry operates an environmental monitoring body which is both accredited according to the international DIN EN ISO/IEC 17025:2005 standard and notified as an independent monitoring institute by the German environmental authorities. We are an interdisciplinary team of engineers, natural scientists and laboratory staff with many years of practical experience. The services we provide cover all environmentally relevant areas including any kind of emission measurement required by the related national and international regulations. Besides dust and gas emissions we also assess the environmental impacts in the surroundings of cement works. Our services also include measurements and prognoses of acoustic noise and vibrations.
Services

- Planning and competent implementation of emission measurements at industrial plants
- Compilation of measuring schemes in consideration of the pertinent regulations
- Emission measurements and sampling of airborne pollutants (e.g., nitrogen oxides, trace elements, dusts, organic hydrocarbons, PCDD/F etc.)
- Determination of acoustic noise emissions and ambient noise levels
- Elaboration of noise reduction concepts and plant-specific noise maps
- Determination of emissions and ambient pollution levels from blasting vibrations
- Inspection of the proper installation, functioning and calibration of continuously operating measuring equipment
- Inspection of on-site measuring devices
- Measurement of environmental impacts

Contact: Martin Oerter, Ute Zunzer (umt@vdz-online.de)
Product certification
Quality surveillance and quality assurance of cement and hydraulic binders constitute one of VDZ’s traditional core competences. Around 540 cements from about 65 works are tested and monitored according to national and European legislation. Due to existing agreements with foreign bodies, surveillance can also be carried out pursuant to regulations under private law.

Certification

The national and European notification as an inspection body, a monitoring body and certification body by the relevant building inspection authorities covers:

- Cement and hydraulic binders
- Concrete additions
- Concrete admixtures
- Mortar and concrete
- Cementitious mixtures

Furthermore, both the quality surveillance organisation of VDZ and the related laboratories are accredited under private law according to DIN EN 45011:1998 and DIN ISO/IEC 17025:2005, respectively.
System certification
The certification body FIZ-Zert certifies and monitors management systems (quality and environment) and is accredited accordingly pursuant to ISO 17021. In particular companies from the mineral building materials industry and comparable industries which are involved in the production and use of building materials (mostly cement, concrete, concrete products and precast concrete elements) are certified on the basis of the standards ISO 9001 and ISO 14001. Certification can also be carried out in combination with the legally regulated and mandatory product certification (e.g. according to EN 197).

Verification of CO₂ emissions
In the context of the European emissions trading scheme, FIZ also verified CO₂ emissions for the first time in 2004. Our clients benefited from both the high technical competence and the comprehensive legal knowledge of our experts in this respect. The experts, who work exclusively for FIZ-Zert, are either approved as qualified experts or are notified EMAS verifiers. This guarantees that the evaluation of monitoring concepts and also the examination of emission reports carried out by FIZ-Zert satisfy the highest demands.

Certification of energy management systems
The Research Institute of the Cement Industry has been performing technical audits for many years in order to assess and specifically optimise the energy consumption of cement plants. In the light of rising energy costs, considerable cost reductions can in many cases be achieved through the analyses and the corresponding optimisation procedures. In 2009 FIZ-ZERT successfully certified energy management systems of cement plants and other producers of construction materials according to the Renewable Energy Sources Act for the first time.

Contact: Silvan Baetzner, Martin Oerter (qsi@vdz-online.de)
The Institute possesses state of the art equipment which is continually adapted to the latest developments. All measuring and testing devices for the essential examinations on cement and concrete are available. In many cases we further develop suitable analysis and examination methods according to special requirements. Thus we can also react to the most recent requirements, be it in the field of emission or process technology measurements, or regarding chemicomineralogical or physicomechanical tests.

A Laboratory Information and Management System (LIMS) allows for a high degree of transparency of the processes in the individual departments of the Institute and also enables us to track each individual sample quickly and efficiently. All employees involved in a certain project have direct access to any data which is relevant.
Knowledge Management and Further Training

Our Institute offers you and your employees a large variety of options for your personal development, helping you extend and deepen your knowledge. Lasting technical, social and leadership skills are created through target-oriented and continual human resources development. Our service range extends from training in fundamental technical principles through to the imparting of specific technical knowledge and long-term advanced training courses for executive personnel.

Our Institute has a thoroughly homogeneous IT infrastructure. Networking throughout the organisation and accessibility via Internet ensure that our staff can use all relevant information directly. Interested persons can be given access to our literature database as well as to numerous reference books which are available in digital format from a central source. In addition, over the past years we have developed an electronic teaching and learning platform covering the entire process of cement manufacture. Independent of their location, learners can deepen and test their knowledge in 48 online courses ranging from the preparation of raw materials to the use of the final products. In addition to textual explanations and illustrative diagrams the courses contain interactive animations, videos, tests and exercises. For further information please visit www.elearning-vdz.de.

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