

COMPANY SYNOPSIS



www.ver-gmbh.com

VER Verfahreningenieure GmbH
Breitscheidstraße 78
01237 Dresden
Germany

Company introduction:

The VER Verfahreningenieure GmbH is working on the development and implementation of innovative processes and projects in energy and commodity economy. Our Knowledge is based on years of experience in planning, construction and operation of fluidized bed drying and firing systems, etc. in the field of drying and gasification of biomass, waste materials and coal. Although there is an extensive knowledge on various technical drying processes, such as DWT (steam fluidized bed drying) and the DFT[®] (vapor-fluid drying), as well as the gasification process to LQV[®] (air cross-flow gasification) and the CombiPower-Plus process are referred. But also the generation of electricity and liquid fuels (methanol) by using KBK process (combined fuel and power), is one of the areas of the VER Verfahreningenieure GmbH. The following are the activities of the individual work areas are briefly introduced.

Drying technology:

- The **DFT[®] drying** was developed by VER GmbH and the first time in 1997 in VZR recycling center Reichstädt, area of Dresden, for the drying of color and paint sludge used successfully. The product to be dried runs through the dryer and is moved continuously intensively by a centrally arranged agitator. This movement - fluidization - produces a very good heat transfer from heating medium to the product to be dried. Today approximately 70,000 tons of color and paint sludge were processed in the automotive industry. Another DFT[®] - system for processing of tar and sewage sludge was from the VER GmbH in 2000, delivered to the SVZ Schwarze Pumpe GmbH. With this system was about 500,000 tons of sludge processed in just 5 years. The principle of the process makes it possible for a variety of products such as industrial and municipal sludge, grain, wine and fruit pomace in an environmentally sound process to the highest technical level.

- **DWT-drying** was developed in the early 80s. Employees of VER GmbH were involved during this period of development, operation and optimization of steam fluidized bed systems in Zeithain and Borna, as well as in studies of Australian brown coal including the interpretation of the DWT plant at Loy Yang. We can therefore rely on a wealth of basic knowledge, experimental results and patent protected professional knowledge.

Gasification technology:

- The **LQV[®] gasifier** for energetic use of organic materials was developed in 1993/94 by VER GmbH and in Freital, near Dresden, taken a pilot plant in operation. The fixed-bed gasifier was used to test the suitability of different gasifier feedstock in terms of their composition and preparation, interpretation of data to determine the planning and construction of major gasification plants, based on specific feedstock. Based on these experiences was planned a gasification plant for generating energy from biomass briquettes with a fuel capacity of 2 MW_{chemical} after LQV[®] principle engineering skills.
- Another small-scale gasification plant was delivered in 2000 at the Technical University of Dresden as a research facility. This is available for experimental investigations.
- The **CombiPower** process is a fluidized bed gasification technology to generate electricity and heat > 2 MW_{electrical} with air as gasification medium. As feedstock are renewable energy sources and also indigenous lignite reserves used. An extension is the CombiPower-Plus process, with the CombiPower unit is added to the oxygen enrichment by pressure swing adsorption system. Thus, a distributed generation of electricity, heat and industrial gas from biomass and oxygen-enriched air as a gasification medium, can be economically realized in the range of 25 MW thermal powers.
- Together with LEHMANN Maschinenbau GmbH developed VER Verfahrenstechnik GmbH a process for the gasification of organic residues with a fuel capacity of 200 kW. After a preheating of the biogenic material and a simultaneous subsequent drying at 100°C follows the step of degassing at 400° to 500°C. The resulting coke will gasified further, as well as the carbonization gas continues a thermally conversion at up to 700°C.
The residual coke is burned at 900°C. The fuel gas will be cleaned of tar and other harmful elements, cooled and than it can be used of a CHP unit or another thermal utilization.
As gasification medium air is blown in at the bottom of the gasifier modul.

Production of liquid energy sources:

- The **CombiFuel** process is a procedural combination of drying and gasification, the product gas is synthesized with the addition of hydrogen to form methanol.
- The **KBK** - Process (combined fuel and power) is used for simultaneous, large-scale production of electricity and liquid fuels, in this case methanol. This combines the KBK process the processes oxyfuel (new power plant concept, is burned at the brown coal with oxygen and the CO₂ produced is no longer to be released into the atmosphere) and CombiFuel to a complex, so as to take advantage of procedural synergy. With this process can beside 500 MW_{electrical}, 1000 MW_{chemical} Methanol produced simultaneously.

Fuel gas cleaning:

- The **WSK**[®] (fluidized bed cooler) is used to cool the fuel gases from biomass gasification. The operation is based on the positive heat transfer characteristics of fluidized beds in combination with a bed material from residual coke gasification, to which the bituminous components of the fuel gas are condensed out. The first example is the use of fuel gas cleaning at the pilot test facility at the Technical University of Dresden. The method of proof WSK[®] technology could in the first test campaigns are carried out successfully. 2011 provided the VER GmbH a WSK[®] system for the Fraunhofer IFF - Institute for Factory Operation and Automation - for a cleaning efficiency of fuel gas from wood gasification with 600 Nm³/h (from 1 MW fuel power).

Current projects:

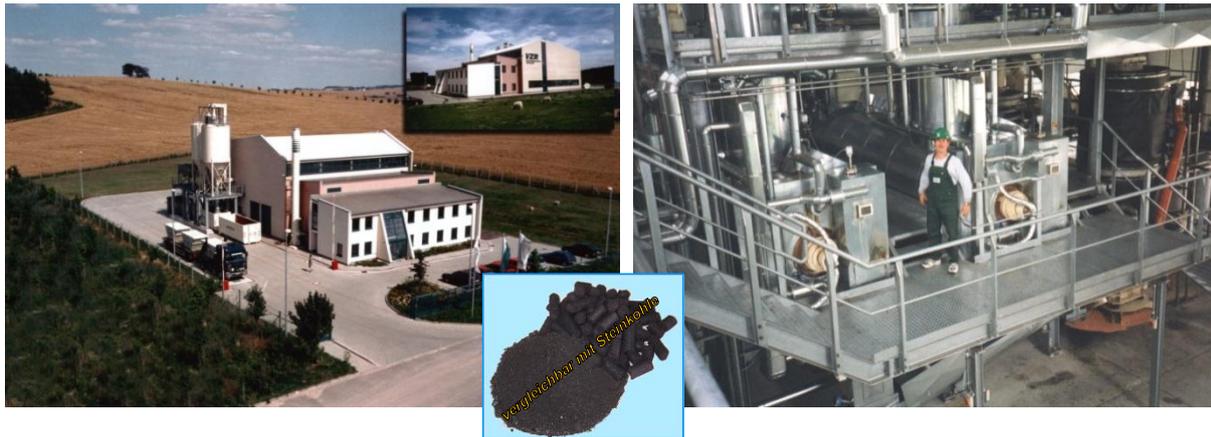
- Construction planning, construction supervision and commissioning of a fuel gas conditioning system with fluidized bed cooler – Fraunhofer Gesellschaft
- Process design, construction supervision and commissioning of a complete LMSV-gasification plant for digestion residues - Lehmann Engineering GmbH
- Reengineering of a multi-stage gasification plant for plastic waste - DEUSA International GmbH
- Project preparation for biomass power plants (CombiPower) in the region Arava, Israel
- Project planning for a business park Willmersdorf BMGW - Biomass Gas Works (CombiPower principle) with 160,000 MWh/a

References:

The pilot plant for gasification of biomass in Freital 1997



VZR recycling center Reichstädt / utilization of paint sludge



DFT®-plant Schwarze Pumpe



LQV®-plant Freital



WSK®-plant Pirna

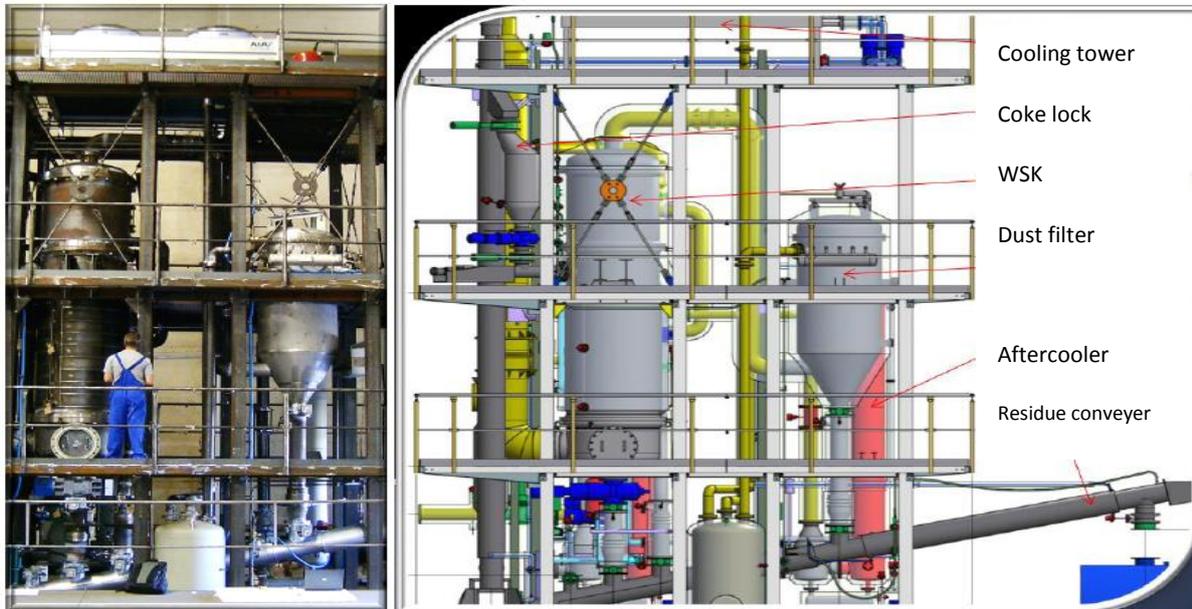


Air-multi-stage-gasifier 2008 – 2011

**RWTH Aachen Oxycoal-AC
Pilot plant 2008 – 2009**



Fuel gas cleaning system with fluidized bed cooler 2011



Reengineering the plant of DEUSA International GmbH 2008 till today



Contact:

VER Verfahrensingenieure GmbH

Breitscheidstraße 78

01237 Dresden

Germany

Tel.: +49351/2048-312

Fax: +49351/2048-117

info@ver-gmbh.com

www.ver-gmbh.com

Status: February 2012