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Press release

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Fluidized Bed Process Technology: Testing gas-solids reactions

SCHWING Technologies with the latest applications and pilot systems at POWTECH 2019

When powder and bulk solids specialists meet at this year's POWTECH show in Nuremberg from April 9th to 11th, experts from SCHWING Technologies will be on site. Ralf Sonnen, Julian Nienhaus and Natalya Prodan will be presenting the latest applications, test series and reactors for fluidized bed processing in Hall 2 at Stand 2-209.

The focus will be on thermochemical reactions of powder particles, granular solids or mixtures of components for the chemical, pharmaceutical, plastics, food, cosmetics and energy industries. The most recent research project is TWIST, in which SCHWING, together with the Technical University of Munich, is developing thermochemical energy storage technology for the long-term industrial storage of generated power. For these and many other applications, the low-maintenance and energy-efficient fluidized bed reactors provide controlled, uniform, reproducible and efficient material processing at temperatures up to 1100 degrees Celsius.

SCHWING Technologies, based in the Lower Rhine, Germany, has been in the market since 1969. The entire SCHWING Group is celebrating its 50th anniversary this year. In the US and Canada, SCHWING team members, Michael J. Robinson and Andrew S. Dickinson, are available to customers at the newly established US office in Princeton, New Jersey.

Test applications and pilot systems for scaling up reliably

For experimental purposes, SCHWING is testing new processes in 4- to 120-liter reactors in cooperation with interested customers - including in pressure reactors. "At our company site in Neukirchen-Vluyn, we are establishing the necessary process conditions, developing reliable processes and laying out all the relevant instruments for our customers," emphasizes Julian Nienhaus, Head of Fluidized Bed Processing Center at SCHWING. Trial applications typically

begin with a lab test (Phase 1). Here, the experts check which gas distributor configuration allows the specific material to be fluidized, in order to subsequently determine the fluidization parameters. This first analysis is the basis for further experiments of reaction conditions, or bench-scale tests (Phase 2). These feasibility studies lay the foundation for further optimization attempts to scale-up pilot plants (Phase 3). Tests demonstrate whether the technology is scalable and provide the necessary security for carrying out further scale-ups of the technology at a later time (proof of concept). In the final step (Phase 4), everything revolves around the design of the production reactors, which are always adapted to individual customer needs. If required, the fluidized bed pilot reactors can also be used by SCHWING for contract manufacturing.

Advantages of fluidized bed process technology

The advantages of fluidized bed process technology are their excellent heat transfer properties. They transform the behavior of individual particles to an actively mixing and liquid-like, solid-gas mixture. Natalya Prodan is a chemical engineer at SCHWING: "Our special system design creates a gently mixing and non-abrasive solid bed in a gas-rich environment. This is achieved above all by a proprietary distributor plate. It is specially configured for particular materials and offers a large exchange surface between gas and solids." Advantages include energy-efficient conversion, high gas utilization and product recovery. For this purpose, the experts from SCHWING use different reaction and inert gases, such as air, O_2, N_2, H_2, NH_3, SO_2, CO_2, Ar, Cl_2, $H_2O_{(g)}$, acetylene, natural gas or perform chemical vapor deposition (CVD) in a hydrocarbon atmosphere at temperatures up to 1100 degrees Celsius. If metal compounds and other raw components require uniform processing and homogeneous quality, then the SCHWING fluidized bed process reactor is a suitable alternative to rotary, shaft, bowl or pusher furnaces. The SCHWING plant concept is also transferable to reactors with elevated pressures.

Individual solutions for a wide variety of applications

Customers from a wide variety of industries with individual applications have convinced themselves of the benefits of fluidized bed process technology from SCHWING. Including the following industries and applications: food industry *(starch treatment, catalyst regeneration for edible oil curing)*, chemicals and specialty chemicals *(catalyst activation and recycling, sulfuric acid production, gas purification, nitrogen recovery, hydrogen production, bleach, barium*

sulfates for paint, varnish, adhesives, putty), material technology *(oxidation of metal powders, reduction of metal oxides, precious metal recycling, hardening, nitriding, drills, knives)*, energy storage *(production of lithium compounds, anode material for batteries, thermochemical energy storage, uranium power plant)*, silicon industry *(purification to solar grades, solar panel, chip industry, brake discs)*, silicates *(special clays, glass beads, detergents)*, nanoparticles *(graphite production, coating of graphite, carbon pastes, lubricants, cigarette filters, water filters, color cleaning*, paint *pigments)*, mineral paints industry *(pigments for car paints and printing inks, special pigments for glass)*, tire industry *(carbon black beads manufacturing, specialty tars),* pharmaceuticals *(particle coating, pigments)*, biomedical ceramic particles *(silica articles for pharmaceuticals)*, plastics *(strength, forming materials, activators for PE catalysts)*, biomass wood industry *(gasification of wood for gas extraction, activated charcoal from wood).*

Keywords: Gas-solid reaction, fluidized bed reactor, fluidized bed process technology, thermochemical reaction, powdery particles, granulated solids, component mixtures

Further Information: https://www.fluidized-bed-process-technique.com/de.html

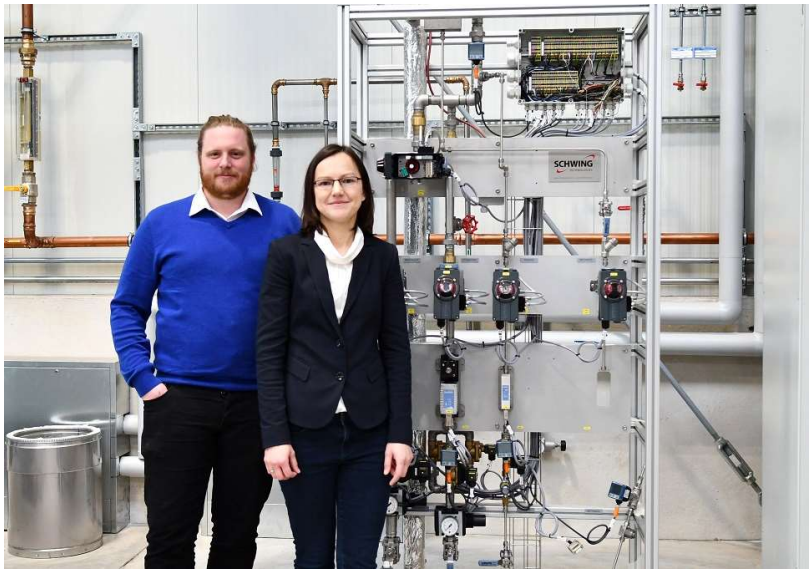

Photo: Julian Nienhaus and Natalya Prodan, Experts of Fluidized Bed Process Technology at SCHWING Technologies
Photo credit: SCHWING Technologies
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Photo: Ralf Sonnen, Expert of Fluidized Bed Process Technology at SCHWING Technologies
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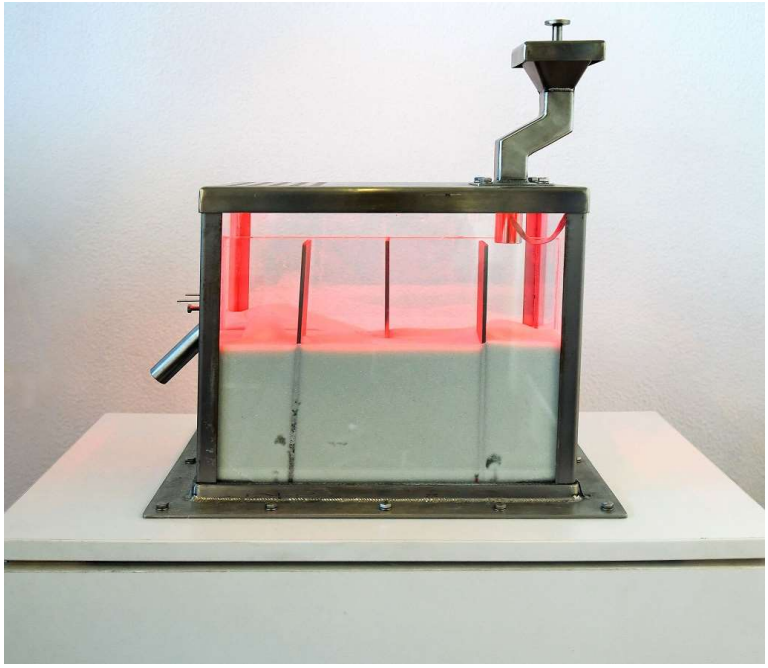

Photo: Fluidized bed process technology model of SCHWING Technologies
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Photo: Material samples, SCHWING Technologies
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SCHWING Technologies

SCHWING Technologies has been operating for 50 years and is the worldwide technological leader for high-temperature systems for thermal cleaning, thermo-chemical finishing and heat treatment of metal parts and tools. The owner-managed company designs, manufactures, and operates systems at its headquarters in Neukirchen-Vluyn in Germany's Lower Rhine region. Built upon the achievements of German engineering, the medium-sized business is globally the best-known specialist in the removal of plastics. Among SCHWING's approximate 2,500 international clients are companies from the plastics and fiber industries, as well as from the chemicals and automobile sectors. With its 80-strong personnel, the company is equipped with the tools and systems for any cleaning need and delivers the best economy, ecology, and quality. SCHWING is also a reliable service partner for contract cleaning by processing more than 250,000 tools and parts each year to the highest environmental and qualitative standards. So far, there has not been a single component that we have not been able to free from polymers and inorganic contaminants, confirm the three managing directors Ewald Schwing, Thomas Schwing and Alfred Schillert. Founded in 1969, the company celebrates its 50th anniversary in 2019 and opened SCHWING Technologies North America Inc., a new sales company in the USA, this year.

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