

BULK MATERIAL SOLUTIONS

GLOBAL INDUSTRIES



GLOBAL

INDUSTRIES. SECTORS. WORLDWIDE.

Bulk materials are used in all kinds of manufacturing processes. Granules, powders, flakes, liquids – they represent the basis of most industrial products. It is self-evident in food products or plastics, but less obvious in many other industries. In this brochure we will demonstrate the wide range of applications that Brabender feeders have. We will take you with us on a journey through global manufacturing and show you how you can use Brabender Technologie's equipment, to manufacture detergents, toners, plaster and textile fibers for example. Find out how you can use our equipment for flue gas desulfurization and recycling purposes to benefit the environment. Brabender Technologie

really knows the ropes in the global market of bulk materials. We provide solutions for all sectors – or "Global Industries", as we call them. Because we understand bulk materials, we are able to develop the right solutions to meet your discharging and feeding requirements. It does not matter whether you manufacture diapers, adhesives, automobile tires or batteries. Our cross-sector experience always enables us to find the best way of handling your bulk material. If your Research & Development team wants to explore completely new avenues, we will join you on that journey.

CERAMICS

INDUSTRIES

CHEMICALS

ADHESIVES

AUTOMOBILES

DETERGENTS

RECYCLING

BUILDING MATERIALS

Many items we encounter in our daily lives are made of granules, powders or liquids: roof tiles made of fired clay, automobile tires made of rubber. But finished products can also be bulk materials, like detergent, plaster or insulation flakes.



> ANALYSIS. DEVELOPMENT. TECHNICAL CENTER.

What in fact are bulk materials? They include, for example, powders, granules, flakes and fibers. They can be sticky or free-flowing, abrasive or corrosive, dimensionally stable or deformable – just to mention a few properties. They differ in terms of their sensitivity to pressure or temperature, risk of explosion or perishability. Even liquids with high or low viscosity present their own particular challenges and need to be fed in different ways. We analyze your bulk material, determine its

flow properties and identify the optimum feeding device for your application during feeding tests. We have superb facilities for this purpose in our Technical Center in Duisburg as well as at other Brabender locations around the world. We will therefore find the optimum configuration for your specific application within our broad product range, enabling you to start manufacturing your own high-quality products immediately after commissioning.

PROPERTIES OF BULK MATERIALS



Foil shreds – interleaving



Microgranules – free-flowing



Optical brightening agents – hygroscopic



Sand – abrasive



Soot – bridging, explosive



Resin-/wax-nuggets – adhesive

> EVERY BULK MATERIAL BEHAVES DIFFERENTLY

Not all powders are the same. Properties like particle size, shape and distribution, moisture content or humidity absorption have an impact on flow behavior. Added to that is the surface structure of individual particles, bulk density and consistency, static charging during mixing operations as well as during the filling and emptying of silos and tanks. Only once all factors have been taken into consideration, does everything keep flowing – without sticking, rat-holing, agglutination, deformation or similar production constraints.

Tare-compensated loss-in-weight feeder

Paddle-massaged PU hopper: FlexWall®Plus
loss-in-weight feeder

Blade screw

Control concepts

BagMaster: bulk bag unloader

FDDW
for high-viscosity liquids

MULTI-HERCULEAN-TASKING

We need to have a great deal of know-how and a range of versatile products to meet the requirements of a broad spectrum of applications. That's why our machines are as different as your production needs. We provide everything you need, from digital or analog weighing technology, rapid cleaning down to the tiniest detail as well as formulation management in our control systems. Our versatile range copes with the Herculean task of providing the optimum equipment for any bulk material in all global industries.

FlexWall® Plus



JetFilter – the self-cleaning filter

Feeder with bag dump hopper

Spiral screw

BAV: vibratory bin activator for bulk material discharging from silos and bins

Weigh-belt feeder

Twin screw feeder

Twin concave screws

> DIVERSITY REQUIRES GUIDANCE

To provide optimum guidance, we have segmented the wide range of options available for various operations. This enables you the customer to identify all of Brabender Technologie's machines immediately and classify them according to your requirements as appropriate.

V FEED



G FEED



FINELY TUNED FEEDERS

Our V-FEED and G-FEED brands offer you a range of different volumetric and gravimetric feeders (by volume or weight) for your bulk material handling requirements. Thanks to state-of-the-art technology and premium workmanship, these machines deliver results of maximum accuracy. All devices can be retrofitted at any time and modified to changed requirements.

S BATCH



M BATCH



PRECISION WEIGHING

Brabender Technologie offers a range of different solutions branded S-BATCH and M-BATCH for the automatic, batch-specific feeding of bulk material quantities. These enable single-material and multi-material weigh-batching in line with the "loss-in-weight" or "gain-in-weight" principles.

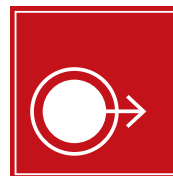
D CHARGE



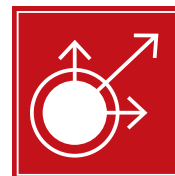
PROPERLY FILLED – WITH PRECISION

D-CHARGE is the Brabender Technologie brand that offers a range of different products to meet your bulk material discharging needs. Whether it's bagged materials, bulk bags or silos and bins, our discharge aids enable every kind of bulk material to be discharged without problems.

S CON



M CON



CONTROLS INCORPORATING SMART SOFTWARE

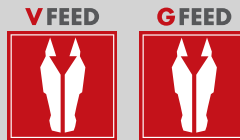
Brabender Technologie's S-CON and M-CON brands are control systems. Be it single-feeder or multi-feeder control systems, feeder-mounted or control cabinet-installed, our smart systems enable up to 16 feeders in one process line to be controlled.

> (PRACTICALLY) ALL IN ONE!

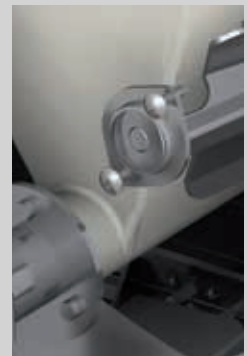
Our FlexWall®Plus loss-in-weight feeder is a great example of how highly effective our equipment is. This all-purpose metering feeder is suitable for nearly every type of bulk material and is at home in every bulk material-processing industry around the globe.



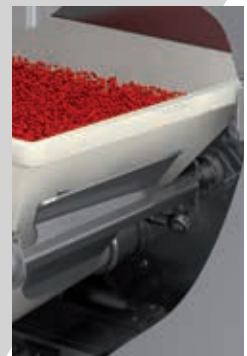
FlexWall®Plus with digital load cell for maximum feeding accuracy



Be it in G-Feed (gravimetric feeder) or V-Feed (volumetric feeder) format, our FlexWall®Plus ensures consistent screw fill levels and proper mass flow thanks to its paddle-massaged flexible hopper. This is particularly important when handling bulk materials that are sensitive or have poor flow properties. The hopper's patented trapezoidal shape positions the bulk material at the optimum flow angle to the feed screw. Its compact design allows several feeders to circle around a single inlet.



Massage paddle



Flexible hopper



Fixed downstream connection pipe

> INDUSTRIES IN FOCUS

Industries are constantly developing new production methods. Long-serving materials are making way for entirely or partially new ones incorporating altered raw ingredients. High-tech plastics are replacing steel, new composite materials with a range of very different makeups are being created. Manufacturing methods are changing too, for example, from batch weighing through continuous production processes. Why? The market requires weight savings, durability and cost-effectiveness. Material properties and coloration are becoming more and more important. As a specialist provider of feeding and discharging solutions, we are well-placed to track these developments, as our customers and their requirements are as diverse as manufacturing itself.



We have more than 60 years of bulk materials handling experience. That is why we are able time and again to provide proven solutions from our broad product range that remain in trouble-free service for many years after installation. What is key here is constantly being able to access our vast wealth of experience. Thus, for example, we are able to apply the knowledge we have gained in a large number of detergent plants to a fertilizer facility. But we are also receptive to entirely new challenges: our design engineers will develop new machines and methods together with you, if our portfolio does not initially provide the optimum solution.

We require information to begin with. We can only select the right equipment and configurations to meet your needs, if we have an accurate knowledge of your bulk material and process. Key factors in the choice of equipment are material properties such as bulk weight, particle size and flow behavior, as well as the positioning of the equipment within your process. Be it in the laboratory or in a hot, dusty, explosive industrial environment, we will find the right solution to meet your challenge.



> DETERGENT

Around nine million tons of detergent are produced annually. Whether in liquid, gel or powder form, detergent production involves a wide range of substances, like surfactants, water softeners, washing alkalis, enzymes, silicones, fragrances and anti-caking salts that keep washing powders powdery during storage, being mixed together.



Washing powder, production of heavy-duty detergents



THE CHALLENGE: FEEDING LARGE QUANTITIES

Worldwide detergent consumption requires huge volumes of production capacity. Output figures of 80 tons an hour in just one plant are no exception. This by far exceeds the performance limits of conventional gravimetric feeders. Specific high-performance solutions are required.

THE SOLUTION: TARE-COMPENSATED FRAME

Loss-in-weight feeders that are specially developed for detergent feeding are frequently used in such applications. Net feeder weight is already very high in the case of these large units featuring blade screw diameters of up to 250 millimeters and hopper volumes of up to 3 cubic meters. Here special frames are used, which tare the net weight using a baffle and record just actual product weight using a relatively small load cell. This results in a very high degree of feeding process accuracy even at these high levels of performance. When refilling large bins, the displaced air is guided to the feeder outflow using a suspended pipe and then via the collection belt to the central dust extraction point. Where this is not feasible, specially developed jet filters conduct the purified air away into the ambient environment.



Loss-in-weight feeder featuring an in-hopper screw and agitator hopper in an H-frame

> TONER

Despite digitization, demand for toner is rising and the demands on its quality are increasing. At a particle size ranging from 5 to 30 μm , the powder has excellent flow properties and adheres well to magnetized rollers.



A part of our daily lives: printers and copiers



THE CHALLENGE: SMALL AND LARGE BATCHES

Rich colors, subtle shading, thinner application – but only on paper, not on the fusing roller. To achieve this, the requisite individual ingredients are mixed in large and small quantities with maximum formulation accuracy and then continuously fed into an extruder as a base compound.

THE SOLUTION: TWO-BATCH METHOD

Using the “gain-in-weight” method, the basic raw materials – wax, resin and PE – are fed as batches one after the other directly into a mobile mixing tank by volumetric feeders. The tank is placed on a load cell, and just a single control system is required for all volumetric feeders. Next, the tank travels to another position, where small quantities of aggregates like metal particles, release agents and metallic salt are simultaneously fed in using the “loss-in-weight” method. Finally the dye, carbon black or a color pigment for example, are added – two feeding principles that complement each other perfectly during production. Once all the ingredients have been assembled, they are then mixed and afterwards continuously fed into an extruder by a single gravimetric feeder for further processing.



Batch-withdrawing using a twin screw feeder

> TIRES

Tires are made to a large extent from rubber. Different compounds are used for the various sections of the tire like tread, sidewalls or interlayers. Steel and textile form the casing and determine its shape.



Automobile tires for various requirements

THE CHALLENGE: POOR FLOW BEHAVIOR

To manufacture rubber, Natural rubber is fed into a processing machine. Sulfur is added as a curing agent to turn the mix into an elastic rubber. Liquids like oil and resin have an impact on adhesion and function as plasticizers. Carbon black and silicate improve the tire's consistency. Additives like light stabilizers and antioxidants as aggregates make particular demands on the feeding process, because they often have extremely poor flow properties. Added to that are liquid raw materials like resin, which can only undergo a feeding process in a heated state on account of its high degree of viscosity.



Twin screw feeder with an agitator hopper



Electric trace heating on a liquid feeder

THE SOLUTION: IN-HOPPER AGITATORS AND HEATED FEEDERS

The large quantity of raw materials used requires a flexible feeding method that factors in all relevant flow properties. Generally speaking, steep-walled hoppers are used in most cases to avoid bridging inside the hopper. Where raw materials have very poor flow properties, hoppers with agitators must be used that conduct the material reliably to a self-cleaning twin concave screw. Electrically or fluid-heated liquid loss-in-weight feeders are suitable for feeding liquid resin. They keep the temperature of the liquid constant and therefore viscosity in optimum check.

ENVIRONMENT

The flue gases generated by incinerating garbage or by burning coal and heavy fuel in power stations contain sulfur compounds. Flue gas desulfurization is a method used to remove them. Wet limestone scrubbing is used very frequently.



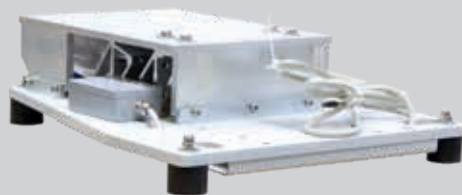
Flue gas desulfurization – the removal of sulfur compounds from flue gases

THE CHALLENGE: SENSITIVE TECHNOLOGY IN AN INDUSTRIAL ENVIRONMENT

Flue gas flows through a vessel and is sprayed with highly dispersed lime slurry at different Concentrations. The sulfur monoxide contained in the gas reacts with this lime slurry and percolates downwards. Fresh lime constantly needs to be fed gravimetrically into the recycling process. The main parameters are the lime surplus, the pH value and the sediment content in the slurry. These numbers serve as guide values for the feeder, which incorporates highly sensitive weighing technology and at the same time is suited to operating in harsh industrial environments.



Operating unit for single gravimetric feeders



Load cell



FC CB frequency converter



Congrav CB-E control module

THE SOLUTION: FAST CONTROL TECHNOLOGY AND ROBUST MECHANICAL SYSTEM

At an internal resolution of 1:4,000,000 and a measurement cycle time of just 20 to 30 milliseconds, the digital load cell delivers highly accurate data to the controller immediately. Data transfer between the load cells, the Congrav® control system and the frequency converter to control the drive motor is set up in serial configuration, thus ensuring reliable, rapid reaction times. A software filter helps to dampen vibrations and aids long-term stability. Robust FlexWall® devices are often used for this application, as they ensure proper mass flow and consistent screw fill levels.

> MILK-BASED TEXTILES

Every year two million tons of raw milk, which for various reasons are not fit for human consumption, are accumulated just in Germany. Is this just worthless waste or a valuable raw material? An innovative company has developed a process in which milk-protein-based biofibers can be produced without using chemicals.



Milk-based textiles

THE CHALLENGE: MINI QUANTITIES FOR DEVELOPMENT PURPOSES

To produce milk fibers, raw milk or waste products from cheesemaking are fermented into curd, which is dried and reduced to powder. This milk protein powder and other bio raw materials are fed into an extruder using gravimetric feeders. During the development process maximum accuracy must be achieved for these mini feed rates.



Pellet/granule feeder for small quantities



Non-contact siphoning off of liquids



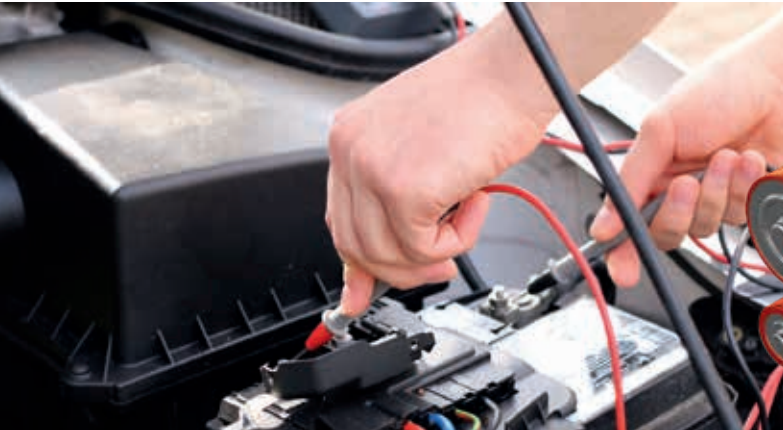
Mass plate

THE SOLUTION: OUR LABORATORY LINE

Our advisers give you valuable practical advice on the optimum way of integrating devices from our Laboratory Line into your application. Laboratory-scale measures to eliminate ambient interference with reliable feeding may be necessary – ranging from mechanical decoupling of the sensitive feeder by means of highly flexible connections and increasing the laboratory feeder's inertia by adding grounding plates to the use of a windshield to eliminate the impact of draft on weighing and therefore on feeding results. Successful process development in the laboratory is followed by upscaling the pilot plant to serial production scale, where Brabender Technologie's gravimetric feeders are again used.

BATTERIES

Be it in cellphones, watches, children's toys, laptops or automobiles, regular and rechargeable batteries have become indispensable. Inexpensive layered-film or lithium-polymer rechargeable batteries, the design of which can be perfectly matched to where they are to be installed, can now be manufactured.



Batteries have many applications



THE CHALLENGE: EXPLOSION PREVENTION

Rechargeable and regular batteries are made of very different basic materials, depending on requirements. Some of them are explosive and need to be fed using devices that comply with explosion prevention guidelines.

THE SOLUTION: EXPLOSION SAFEGUARDS

Our client identifies the zones where the feeders are to be set up together with their own or a commissioned explosion prevention expert. During this process other prerequisites like materials provisioning, refilling and the processing machine itself are taken into consideration. We derive the necessary explosion prevention category from this zone classification and define the relevant measures to be taken. These could include special load cells, motors or temperature sensors at provisioning points. We install the necessary electrical components like PTC thermistor evaluator, isolating switch amplifier or standstill monitor in our control cabinet. Of course we can deliver ATEX-compliant (Europe) or HazLoc-compliant (USA) safeguards, depending on where our machines are to be set up. That then provides manufacturing peace of mind.



Vertical outlet with earthing



Temperature sensor on double shaft gear unit



EX-marked identification plate

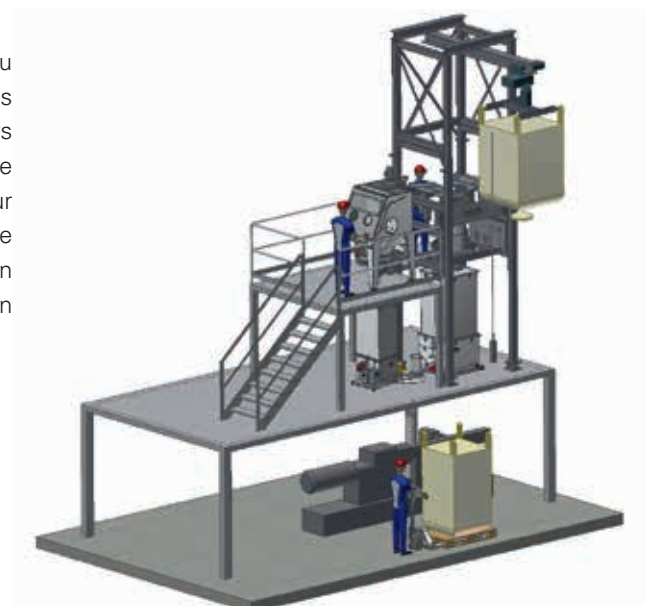


Frequency converter with ATEX parameter set

> CLIENT-PLUS



Why not get in touch with us – we would be delighted to provide you with the advice you require. We help you to identify your specific needs and recommend the right equipment. You can test out how our feeders handle different bulk ingredients at our test labs. To enable you to use our equipment effectively at your production facilities, we train your staff on how to operate the machinery properly. Our maintenance agreements enable us to provide you with a practical, no-risk solution for long-term reliable use. If your production parameters change, we can help you search for a suitable solution.



SERVICE



Spare parts store



Alteration to a weighing platform



Remote maintenance and support



Upgrades/retrofits



Screw replacement



Professional service

IN GOOD HANDS – FAST AND UNCOMPLICATED

You first become acquainted with our after-sales service, which we provide to you and your Brabender equipment when the machinery is commissioned. We will always provide you with a professional service, ranging from our Hotline via remote maintenance through service engineers visiting your premises. Our branches and service partners around the world enable us to offer you an extensive

customer service and stocking of all spare parts and consumable worldwide. Personal attendance by one of our service engineers to diagnose and eliminate a fault with one of your gravimetric feeders is not always necessary. In certain cases we can conveniently remote-access your microcomputer control system using the "TeamViewer" program, check the system and eliminate any faults or errors.



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Keep the Flow