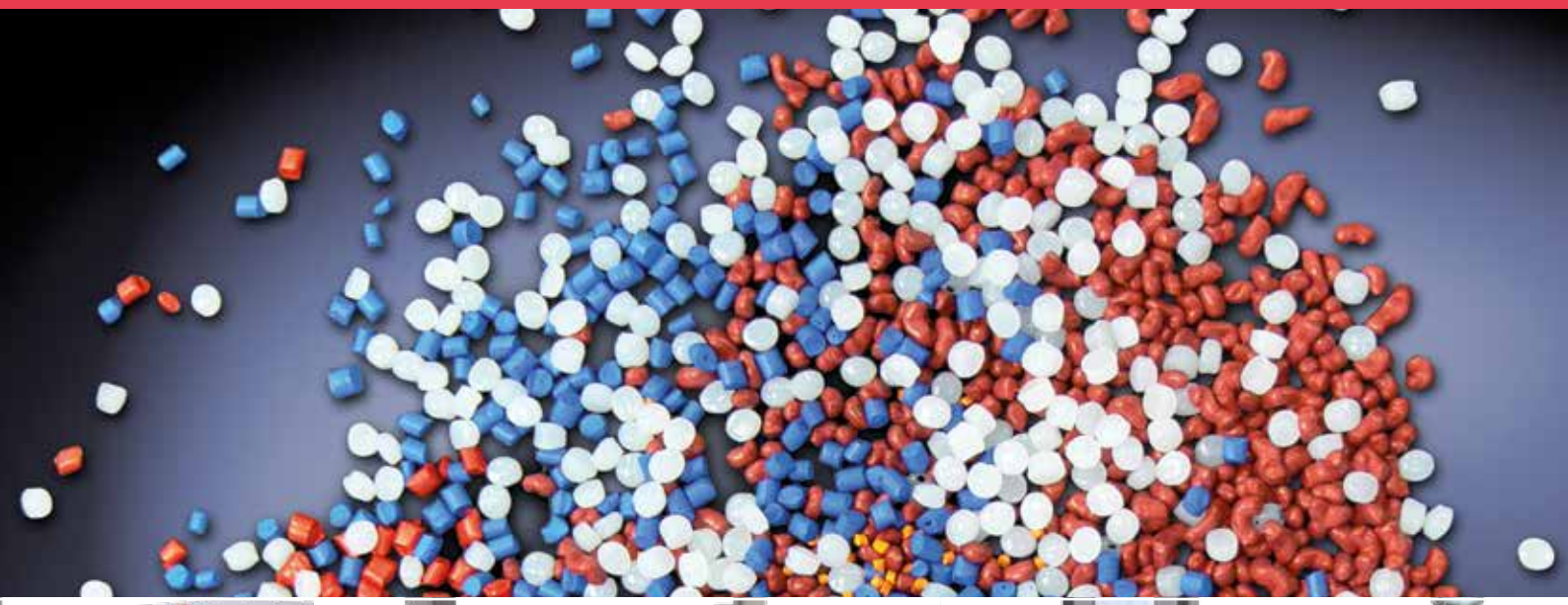
Brabender®



Brabender® Instruments Overview

for Material Research and Quality Control



… where quality is measured.



C. W. Brabender® Instruments, Inc.; New Jersey, USA



Brabender® GmbH & Co. KG, Brabender Messtechnik® GmbH & Co. KG and Brabender Technologie GmbH & Co. KG; Duisburg, Germany



ООО Brabender®; Kazan, Russia

Company profile

The Brabender group

Founded in 1923 by Carl Wilhelm Brabender, Brabender GmbH & Co. KG has been the leading company for the development, manufacture, and distribution of instruments and equipment for testing material quality and physical characteristics in all fields of research, development, and industrial production in the chemical and food industries all over the world.

Today, the Brabender group comprises five companies, each of which is responsible for its special range of development, production, and service. This allows versatility in each of the special lines. To the benefit of our customers.

The Brabender Support

Our state of the art application laboratory is always made available to our customers.

You can choose to send material to us for testing or schedule a specific Lab Trial with our expert team. In our application laboratory, you will have access to our full product line to help come to a solution for your application.

Apart from that, numerous papers dealing with the application of the Brabender instrument systems for several tests have been published all over the world during the past decades. We shall be pleased to send you a bibliography comprising about 1,500 articles at present.



Brabender application laboratory

Brabender® 5-Star Service

The Brabender 5-Star Service provides you with ongoing support for your Brabender equipment:

- On-site service – inspections, maintenance, repairs
- Spare parts service – spare parts, consumables, spare part logistics, upgrade kits
- Factory service – repairs, reconditioning
- Value added services – software update agreements, reference materials, inspection/maintenance agreements, emergency service, remote maintenance, mentoring, service-related training
- 24/7 service line – contacts, spare parts, technical answers, service appointments

Brabender® SpeciMold® - Produce specimen in-line

- **Continuous production of specimen without impairing the extrusion process**
- **No second melting history - the specimen exactly represents the extrusion product**
- **High operating comfort by automated processes**
- **User-optimized software**
- **Universal application due to compatibility with third-party extruders and universal exchange of the injection mold**

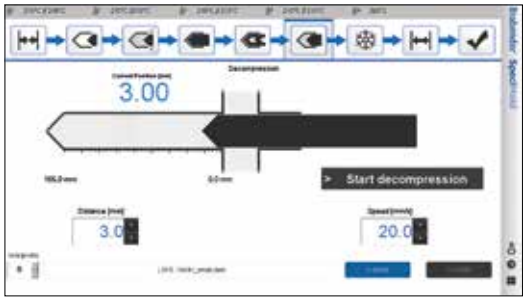
Patented procedure

The Brabender SpeciMold offers a unique and comfortable quick method for producing specimen in a single step in-line with the ongoing extrusion process – fully automatically, without any bypass or additional process steps, directly from the ongoing production process.

Principle

The SpeciMold is subdivided into the heated SpeciMold block with the piston and the injection die, and an injection mold which can be opened and closed through a toggle mechanism.

The polymer is homogenized, molten and transported as usual in the extruder. Then, the melt passes the SpeciMold block before it is shaped in the extruder die head, cooled down in the water bath, and cut in the pelletizer.



SpeciMold software: Process mapping



Different injection molds

For testing the extruded product already during production, the SpeciMold goes into action.

A chamber beside the actual melt channel is slowly filled with the polymer melt. The melt from this chamber is then injected into a temperature-conditioned injection mold where it is cooled down. During this process, the internal pressure of the injection mold is measured continuously. The actual compounding process continues during this process – no interruption required.

Advantages of the SpeciMold

- Matches a large variety of polymers and polymer compounds
- Saves time by continuously producing specimen in-line with the ongoing extrusion process
- No changes of the material characteristics caused by a second melting history
- High operating comfort by automated processes
- Quick and easy exchange of the injection mold
- Editable injection molding parameters



Specimen in the injection mold

Applications

The SpeciMold suits a large variety of applications:

Material testing

- in research and development laboratories

Quality assurance

- in recipe development
- in additive production
- in compounding lines

Instrument description

The Brabender SpeciMold comprises the following main parts:

1. Control panel
2. SpeciMold block
3. Closing unit
4. Collector box
5. Height-adjustable castors



Developed in cooperation with

Fraunhofer UMSICHT

within the BMWi-ZIM project „Development of a modular inline specimen injection molding system for recipe optimization and quality assurance in polymer processing" (KF2505201VT9; KF2084805VT9)

... where quality is measured.

Plasti-Corder® Lab-Station / Plastograph® EC

The heart of a flexible testing and simulation unit

- Modular configuration
- Multi-master system with self-intelligent modules
- Self-validation
- Real-time transmission of events and actual values
- Control and evaluation software for all current Windows® versions and for the new, web-based Brabender MetaBridge
- Real multitasking
- Easy connection of additional equipment such as mixers and extruders
- Automatic recognition of additional equipment

Fields of application

- Raw material and recipe development
- Material testing
- Quality control parallel to production
- Optimization of the production process
- Laboratory-scale production of samples for further investigations

Why go modular?

In laboratory applications, flexibility and versatility are paramount.

Users no longer need to have numerous stand-alone machines with many different controls. With just one drive unit, you can use manifold Brabender processing units:

- Measuring mixers
- Single screw measuring extruders
- Twin screw measuring extruders (compounders)

Using modular systems means a cost-effective solution to work flexibly with numerous laboratory machines.

The core element of the versatile modular Brabender system are the drive units or torque rheometers.

Principle - the role of the drive units

The Brabender drive units

- provide the motion by the drive motor for the processing modules
- contain the direct torque measurement system
- control and/or read the parameters of the processing modules, feeders and follow-up units, like melt and zone temperatures, speed, pressure etc.



Plasti-Corder Lab-Station with twin screw extruder TSE 20/40



Plasti-Corder Lab-Station with measuring extruder 19/25



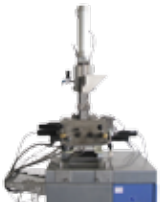
Plastograph EC Plus with measuring extruder 19/25

Tailor-made system configurations for different applications

Plasti-Corder Lab-Station



Single screw extruder 30



Internal Mixer 350



Twin screw extruder TSE 25

Plasti-Corder Lab-Station EC



Measuring mixer 30/50



Twin screw extruder TSE 20/40



Conical twin screw extruder



Planetary mixer P 600



Single screw extruder 19



Twin screw compounder TSC 42/6



Plasti-Corder Lab-Station / EC

For applications which require higher torque and speed, we recommend this floor-standing model, where the modules are attached on their docking station.

The Lab-Station model with its 16 kW drive power which provides 400 Nm torque and 350 min^{-1} speed can handle all the processing modules of the Brabender modular system.

The Lab-Station EC variant is a more economical version with 6.8 kW drive power.

The compatibility of the different processing modules and Plasti-Corder Lab-Station drive units can be seen in the schematic on the left.

Plastograph EC Plus



Conical twin screw extruder



Single screw extruder 19

Plastograph EC



Measuring mixer 30/50



Planetary mixer P 600



Plastograph EC / EC Plus

The Brabender Plastograph EC drive units are the economical table-top version of the universal Plasti-Corder Lab-Station models for applications with lower demands as to torque and speed levels.

Both models are equipped with a 3.8 kW drive motor, which provides 200 Nm torque and maximum 150 min^{-1} speed.

The Plastograph EC Plus design has an increased number of heat control and pressure read channels so that it can handle the conical twin screw and the 19 mm single screw extruders.

The compatibility of the different processing modules and Plastograph EC drive units can be seen in the schematic on the left.

... where quality is measured.

Measuring mixers

The efficient machines for quality control and recipe development

- **Raw material and recipe development**
- **Material testing**
- **Quality control parallel to production**
- **Optimization of the production process**
- **Laboratory-scale production of samples for further investigations**

Carl Wilhelm Brabender said:

"It is only testing, measuring, and recording as a function of time which efficiently helps to rise production quality; only this way, certain processes can be recognized which cannot be grasped with static measurements."



Principle

The internal or batch mixers - as their name suggests - are instruments for non-continuous production of homogeneous polymer, elastomer, ceramic or other mixtures. The raw material is loaded through the top opening into the heated mixer bowl where it is homogenized by specially shaped mixing blades.

How can this equipment be used as a torque rheometer, measuring or internal mixer?

The primary physical property measured in such mixers is torque. This torque mirrors the resistance the material opposes to the rotating blades during the mixing process. The torque moves a dynamometer out of its zero position. This path can be measured and visualized as a function of time. The resulting diagram illustrates the relationship between torque (viscosity) and temperature over the measuring time and also shows structural changes of the material.

Application areas

Brabender measuring and internal mixers are perfectly suited for a large range of applications.

Use them as batch mixers for sample preparation if you only need small amounts of sample material. Several different batches can be produced in short time and with almost no waste of raw material.

Simulate on a laboratory scale all processes relevant for the production and processing of polymers and other plastic and plastifiable materials, such as compounding, mixing, masticating, etc. As an example, the fusion time of PVC and other materials can be determined precisely and related to the estimated residence time of the material in an extruder.

Test the processibility and material characteristics of thermoplastics, thermosets, elastomers, ceramic molding materials, pigments, and many other plastic and plastifiable substances.

Blade geometries

Select the optimum blade geometry for your application from a large program of mixer blades.

Decades of industrial experience have shown that roller, cam, Banbury and sigma blades have proven to be perfectly suited for most applications on thermoplastics and elastomers. Apart from these, Brabender offers various special blade geometries optimized for particular measuring tasks, such as e.g. delta blades for thermoset applications.

Evaluation

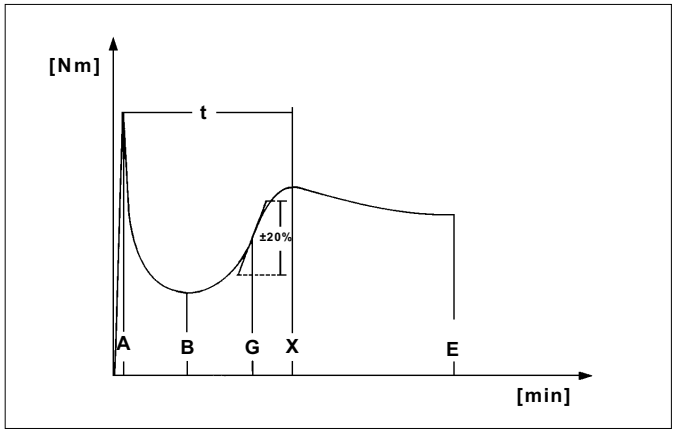
- Fusion behavior of PVC
- Heat and shear stability of polymers
- Flow and cure behavior of polymers
- Flow and cure behavior of elastomers
- Automatic evaluation of the black incorporation time (BIT) with selectable zero point
- Plasticizer absorption of PVC dry blends
- Liquid absorption of powders
- Semi-automatic universal evaluation
- Measuring mixer tests with temperature and speed programming
- Conductivity measurement
- Gas flow measurement
- Degree of property breakdown

Measuring mixers 30/50

- **Sophisticated design for efficient mixing**
- **Easy handling, cleaning and manifold applications through quickly detachable and partially interchangeable mixer blades**
- **Precise and constant heating/cooling**
- **Operating temperatures of up to 500 °C**
- **Wide range of accessories**



Universal docking station with mixer 50 including quick lock



Fusion behavior

Measuring mixers 30/50 and 30/50 EHT

At most of the research and development sites, the versatility of an equipment is a basic requirement due to steadily changing samples and materials.

The most general purpose mixers are the series 30/50 mixers, comprising the liquid heated mixers 30 and 50 and the electrically heated types 30 EHT and 50 EHT.

Mixers with the extension EHT (electric, high temperature) distinguish by their electric temperature conditioning in three control zones with compressed air cooling. This feature allows to extend the operating range to a maximum temperature of 500 °C.

These measuring mixers are perfectly suited for materials like PAEK and PEEK with melting temperatures of more than 300 °C.

The liquid heated measuring mixers stand out for particularly precise heating/cooling and uniform temperature distribution. This makes these mixers the perfect tool for applications at lower temperatures (< 300 °C).

Another notable feature is the rotor speed ratio of 2 : 3 (driven to non driven, US type 5) which results in a high torque resolution and allows a better differentiation, especially when testing low viscosity polymers. Of course, all of the series 30/50 measuring mixers can be supplied with a 3 : 2 (US type 6) speed ratio either.



Main parts of the measuring mixer 30 EHT

Application example: Fusion behavior

Use this evaluation method for testing the fusion behavior of thermoplastic polymers. Measure material-specific Plastograms which also permit to draw conclusions as to the history of the material.

The software analyzes the curve and determines, among others, the extreme values in the torque curve (as a measure for viscosity), fusion time, gelation speed, and the mechanical energy input.

These material characteristics are valuable data for incoming and final inspection or for the configuration of production processes.

... where quality is measured.

Measuring Mixers



Internal mixers 350/350 E

- **Large mixer volumes**
- **Liquid or electric heating**
- **Precise and constant temperature conditioning up to 300 °C**

Internal mixer heads of the 350 series are available with liquid heating/cooling and with electric heating and air cooling. Due to the large mixer volumes of 370 to 440 cm³, these measuring mixers are frequently used for producing sample compounds for subsequent tests. The material can easily be taken out and rolled out to sheets or pressed to plates.

Control and document the entire compounding process from your computer or implement and benefit from an optional process-control of each individual mixing step.

Of course, these measuring mixers can also be applied for material testing (e.g. of rubber compounds).

The series 350 mixers can be equipped with roller, cam, Banbury and sigma blades.



Internal mixer 350 S

- **Accurate feeding**
- **Quick emptying**
- **Easy cleaning**

Due to its special design, the internal mixer 350 S is mainly used in the rubber and caoutchouc industry for mixing and compounding tasks or for material testing. The internal mixer is equipped with an ergonomic swivelling device. The upper and lower half of the mixing chamber can be opened like a jaw in order to facilitate removal of the sample material.

The large net mixer volume of 370 to 440 cm³ has proven favorable for proportioning of the recipe components.

The internal mixer 350 S, which is supplied on a special docking station, can be equipped with roller, cam, Banbury and sigma blades.

Extensive software packages are available for material tests like e.g. the determination of the black incorporation time (BIT).



Planetary mixer P 600

The Brabender planetary mixer P 600 is used for testing the properties of powders like e.g. the liquid sorption and the plasti cizer sorption rate of PVC powders in compliance with international standards or the pourability of PVC dry blends, further for preparing PVC pastes for tests and testing them in compliance with DIN EN ISO 4612.

A special rotor runs in a planetary motion in the mixer bowl. A revolving scraper prevents the sample material from sticking to the mixer wall.

Applicable standards:

- DIN EN ISO 4612
- DIN 54802
- ASTM D 2396

Measuring extruders and Extrusiograph®

The multipurpose machines for testing and processing

- **Application in laboratories and small-scale production**
- **Development of new products**
- **Testing the processing behavior for recipe development or incoming and final material inspection**
- **Quality control during production in combination with measuring heads**
- **Production of small tubes and profiles**
- **Production of blown and flat films**
- **Development and small-scale production of 3D filaments**
- **Co-extrusion**

Application area

Laboratory scale machinery can easily simulate production processes in real time.

What kind of advantages are provided by a laboratory measuring extruder?

The design of this machine allows for small amounts of raw material samples. The mentioned research and sample preparation tasks do not require anymore to interrupt your production processes, which equates to direct savings to your bottom line.

The Brabender modular system allows a complete instrumentation of the extruders.

All of the measured values such as torque, melt and zone temperatures, melt pressure are recorded continuously and can be visualized in various graphs or sheets.

These mentioned parameters can support you to find the optimum processing conditions on your production scale.

Advantages

The Brabender measuring extruders offer the following major technical features:

- Mechanical and electronical overload protection
- Nitrided barrel surface to ensure long lifetime even with abrasive materials
- Up to 4 bores for pressure transducers and 4 further for melt temperature
- The temperature of the individual extruder zones is controlled and displayed by self-optimizing electronic temperature controllers.
- Wear-protected and corrosion-resistant screws – various special steel grades available as well
- Single and multistage screws with various compression ratios, zone lengths and mixing elements are available for testing a large range of materials.
- Wide range of processing and measuring dies



... where quality is measured.

Single Screw Extruders – Modular Design



Measuring extruders and Extrusiograph® series 19 and 30

- **Variable feed units**
- **Interchangeable feed zone**
- **Measuring ports along the barrel with the Extrusiograph models**

The Brabender series 19 and 30 measuring extruders and Extrusiograph models have a screw diameter of 19 mm and 30 mm, respectively and are available in different lengths.

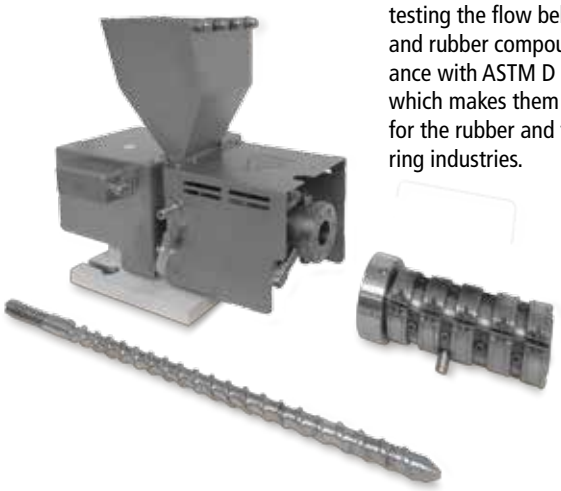
Apart from the standard feed hoppers, vibrating feed hoppers and chutes as well as various types of screw feeders and dosing units for liquid dosing are available.

Special features of the Extrusiograph models are the measuring bores (1/2" x 20 UNF) along the barrel for taking additional thermocouples and pressure transducers and, for the 19 mm Extrusiograph, the interchangeable feed zone which can be designed either conically grooved or as a smooth cylinder.

Special variants

Measuring extruders19/10 DW und 19/20 DW

- **Feed roll**
- **Short processing length**
- **Expansible with pin barrel**



The measuring extruder 19/10 DW with its feed roll and its short length of 10 D is particularly suited for elastomers.

It is frequently used in combination with a 10 D pin barrel supplement for improved homogenization to form a 19/20 DW extruder. Equipped with a standardized Garvey die head with its special shapes, the 19/10 and 19/20 DW extruders are per-fectly suited for testing the flow behavior of rubber and rubber compounds in compliance with ASTM D 2230 standard, which makes them valuable tools for the rubber and tire manufacturing industries.

Grooved extruder 19/20

- **Liquid heated**
- **Grooved barrel**
- **Pneumatic feeding**



The liquid heated extruder 19/20 has a grooved barrel over the entire length. Together with the pneumatic feed unit, it is perfectly suited for pasty materials which have a strong tendency to heat formation due to internal friction. Therefore, this extruder is frequently applied with ceramic materials.



Stand-alone extruders KE 19 and KE 30

- **Compact design**
- **Simple operation**
- **Versatile use**
- **Different process lengths**

The stand-alone extruders ("KE" series) offer cost-effective solutions in case the modularity at the drive unit is not essential.

These machines have an integrated drive motor so that no separate drive unit is needed. Except for the direct torque measurement, the instrumentation possibilities are the same as in case of the modular extruders.

Most of the measuring extruders of the modular program are available in stand-alone design either.



Stand-alone extruder KE 19



Stand-alone extruder KE 30

... where quality is measured.

Twin screw extruders and compounders

The ideal companions for continuous compounding

- **Development of new materials**
- **Recipe development**
- **Production simulation**
- **Application in laboratories and small-scale production**

Advantages

Intermeshing co-rotating twin screw extruders stand out for decisive processing features:

- Self-cleaning of the screws by intermeshing flights
- Good feeding characteristics, even with materials with poor flow properties
- High conveying constancy with low pulsation
- Constantly high quality of the extrudate
- Narrow residence time spectrum of the melt within the screw area
- Well-defined plastification time and purposive shearing
- High output at long energy transfer
- High energy input as compared to the free screw volume
- Good distributive and dispersive mixing properties
- Very high screw speeds
- Gentle mixing at low shear rate and high quality homogenization
- Gentle material treatment without temperature peaks even at high speed
- Variable shearing by using manifold mixing and kneading elements
- Kneading blocks with different disk widths and offset angles
- Good control of the pressure in the melt for optimum venting

Principle - application area

The basic steps of compounding can perfectly be realized with co-rotating twin screw extruders. This makes modular co-rotating twin screw extruders the ideal companion for plastics from synthesis up to recycling.

Users will benefit from the harmonized, modular conception of screws and barrels for optimally realizing all processing steps (feeding, conveying, plasticizing, dispersing, reacting, venting, pressure build-up).

The system configuration of each model can easily be adapted to the individual processing task – anytime and at low cost.

Or combine several processing steps within a continuously working extruder and use your Brabender twin screw extruder as a modern in-line compounder.

Depending on the extruder size, the type of material to be tested, as well as the processing task, throughputs as low as 0.06 kg/h or up to 30 kg/h can be reached. This opens up the entire application range to these extruders – from material development up to small-scale production.

Of course, the necessary additional equipment like measuring and control units, feeders (gravimetric, volumetric, liquid) and downstream equipment (water bath, pelletizer, conveyor belt) is available as well and allows for modular setup of complete extrusion lines.

Expansion with different kind of feeders or follow-up machines is possible whenever needed.

The design allows a complete instrumentation of the extruders. All of the measured values such as torque, melt and zone temperatures, melt pressure are recorded continuously and can be visualized in various graphs or sheets. With these parameters, you will easily find the optimum processing conditions on your production scale.



Extrusionslinie: TwinLab-C 20/40 with conveyor belt and pelletizer



Twin screw extruder TSE 20/40

Designed to be a versatile solution for most of the compounding tasks – you can adapt the machine configuration easily and effectively to the different applications.

- Full barrel length 40 D with top openings at 10 D, 20 D, 30 D, 40 D – you can use multiple feeders, reduce the processing length or vary the place of venting
- Side openings at 12 D and 22 D to attach further dosing units
- Our dosing systems allow you to feed any consistency of the materials such as granules, powders, fibers and even fluids
- The complete barrel is split horizontally ("clamshell design") and allows quick opening and access to all parts in contact with the material, easy and effective cleaning and the analysis of the extrusion process
- Distorsion-free, hardened, highly abrasion resistant barrel for a long lifetime
- Modular screw design – supported by our dedicated software – offers almost unlimited possibilities to optimize the configuration to your application
- Optional built-in vacuum pump
- Up to 1200 rpm screw speed is possible with the suitable drive units
- Available as a processing unit of our modular system or as a compact stand-alone extruder TwinLab-C 20/40



Twin screw extruder TSE 25/16 - 54

Use it as a pilot plant, for recipe development, as an in-line compounder or for small-scale production – there are no limits.

- Segmented barrel design – you can have processing lengths of 16 - 54 D
- Using multiple feeders, more complex processing tasks are possible
- Massive, surface hardened barrel segments to ensure a longer lifetime
- Our dosing systems allow you to feed any consistency of the materials such as granules, powders, fibers and even fluids
- The modular screw design – supported by our dedicated software – offers almost unlimited possibilities to optimize the configuration to your application
- Available as a processing unit of our modular system – for more details of the Lab-Station drive unit see our separate brochure



Conical twin screw extruder (CTSE)

The counter-rotating conical twin screw extruder is perfectly suited for quality control, product development and research applications.

- Gentle and effective mixing properties at shear sensitive materials such as PVC
- Nitrided barrel surface to ensure a long lifetime even with abrasive materials
- Polished chrome plated screws – various special steel grades available as well
- Vent port

... where quality is measured.



Mini-Compounder KETSE 12/36

With the Mini-Compounder KETSE 12/36, Brabender offers a miniature scale twin screw extruder with application to the chemical and pharmaceutical industry for product development.

- Full barrel length 36 D with top openings at 4.5 D, 10 D, 27 D – you can use multiple feeders, reduce the processing length or vary the place of venting
- Side feeding port at 12 D
- Our dosing systems allow you to feed any consistency of the materials such as granules, powders, fibers and even fluids
- The complete barrel is split horizontally ("clamshell design") and allows quick opening and access to all parts in contact with the material, easy and effective cleaning and the analysis of the extrusion process
- Distorsion-free, hardened, highly abrasion resistant barrel for a long lifetime
- The modular screw design – supported by our dedicated software – offers almost unlimited possibilities to optimize the configuration to your application
- Throughputs down to 0.06 kg/h, small amounts of materials can be compounded
- Optional built-in vacuum pump
- Compact, stand-alone design



Twin screw compounder TSC 42/6

The counter-rotating Brabender Twin Screw Compounder is a versatile machine which can be used for manifold applications in raw material production. The machine stands out for its most variable application possibilities.

In combination with the closing adapter, this machine can be used as a mixer for raw material batch production. After the mixing process, the product can be extruded by opening the valve of the closing plate.

Alternatively, the Twin Screw Compounder can be equipped with a two-strand die with interchangeable die inserts for continuous compounding tasks. Here, throughputs of up to 6 kg/h can be reached.

The benefits of the Twin Screw Compounder are the adjustable mixing or kneading time and the possibility of producing feedstock materials for subsequent production of e.g. injection molding products.

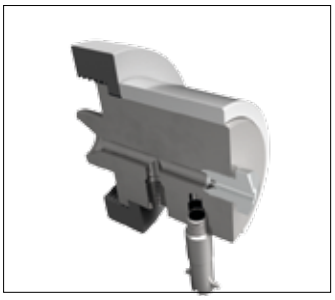
Measuring and processing die heads

Brabender measuring die heads are high-precision tools fitting all of the Brabender single and twin screw extruders.

Use the versatile Brabender measuring extruders and the extensive line program of measuring and processing die heads. Extrude all sorts of plastics and plastifiable materials such as thermoplastics, thermosets and elastomers. Analyze your material on a laboratory scale in real conditions for various criteria, e.g.

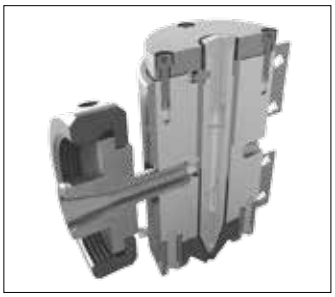
- Uniform plastification, gels, surface gloss
- Color dispersion and color check
- Transparency and formation of streaks
- Swelling and contraction behavior
- Segregation of individual recipe components of a compound at the die and/or at the screw tip (e.g. titanium dioxide)
- Output per unit of time
- Rheological properties, etc.

Upon request, special constructions are available, such as liquid heating/cooling, non-standard sizes or special materials.



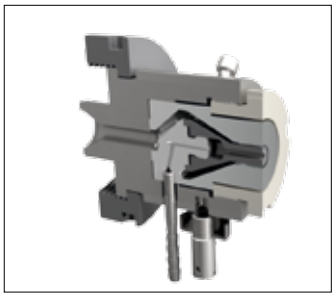
Round strand die heads

The single round strand die head is designed to accommodate nozzle inserts to allow for variation of the strand diameters without changing the entire die head. Multi-strand dies extrude several round strands at a time and can help enhancing your extrusion capacity.



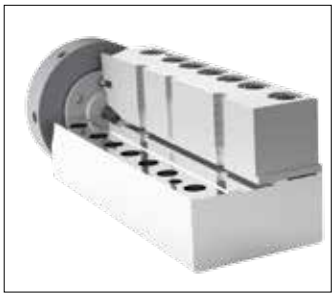
Wire coating die head

With the wire coating die head, polymeric coatings can be extruded on wires of different diameters. This die head can perfectly be combined with the Brabender Wire Take-Off Unit to obtain a laboratory-scale wire production line.



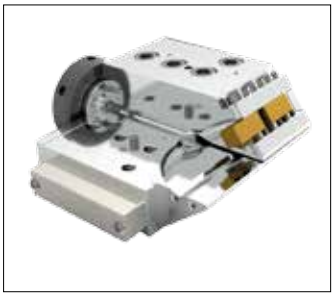
Tubing die head

The tubing die head is designed to produce tubes or hoses of different dimensions. Nozzle inserts of different diameters can be mounted to achieve different diameters and wall thicknesses without needing to change the entire die head.



Rheological die heads

You can extend the capabilities of your single-screw extruder to enable it performing rheological tests. The resulting flow curve or viscosity curve mirrors the rheological characteristics of your material in the occurring shear rate range.



Ribbon die head

Brabender supplies various designs:

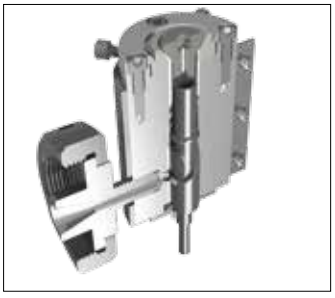
- "Fishtail" with fixed gap
- "Fishtail" with adjustable gap
- "Coathanger" design with flex-lip

All of the ribbon die heads are available with different gap widths and openings to obtain a large variety of sheet dimensions.



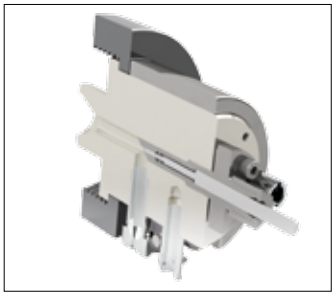
Garvey die head

This die head was specially developed for the rubber and tire manufacturing industries. The special shape of the die outlet opening, combining relatively flat surfaces, sharp corners, and thin sections, reproduces typical geometries in tire building blocks and fully complies with ASTM 2230.



Film blowing die head

Both pinole and spiral mandrel designs are available. The pinole type die heads are designed to accomodate die inserts of different sizes according to the desired bubble diameter. Co-extrusion dies are also available on request.



Swelltest die head

Used in combination with the Brabender Swelltest, this die head allows for high-precision, non-contact measurement of the diameter of objects with a circular cross-section and any transparency by means of a visible parallel GaN green LED beam.

The Brabender MetaBridge®

Discover the Brabender MetaBridge

The new software is characterized by its easy and intuitive handling. After log-in, the user finds all information about the device and a choice of options for his purpose on the start screen.



Brabender MetaBridge software running on tablet

The advantages

- User-friendly operation by touch – perfect for tablets and smart-phones
- Responsive web design: screen resolution adjusted automatically
- Ready to use, no installation necessary
- Security of tests and data through password protected user log-in
- Live test tracking by authorized users from multiple end devices all over the world at a time

Intelligent features

Benefit from new and optimized functions:

- Administration mode for user access rights
- Web-based solution – possibility of sharing information and data with other users worldwide
- Live tracking of tests with end time indication for logged-in users
- Optimized basic functions like data recording and evaluation, printing and export of test results – clearer, easier, faster
- Central test administration and data storage provides for quick and easy access of authorized users
- Easy definition, clear display and quick integration of reference curves
- Optimized functions for editing and adapting diagrams to your individual needs

Winder

- **Flexible and easy retrofitting of roll to belt haul-off or vice versa**
- **Precise setting of the haul-off speed**
- **Adjustable distance between haul-off and oscillating unit**
- **Ergonomic control panel**
- **Easy integration in existing Brabender extruder software**

Complete your extrusion line and wind up your extruded round strands or hoses with the Brabender Winder.

An oscillating unit ensures even and steady winding of the extrudate. The oscillating speed is controlled automatically as a function of the preset haul-off speed and of the extrudate and coil diameters. In order to achieve a perfect winding result, the tension between the nip rolls and the oscillating unit can be adjusted. The full coil can easily be taken off and stored or be used for further tests.



Pelletizer



- **Adjustable pellet size**
- **Easy discharge**
- **Low-noise operation**
- **Constant pellet length even with deviating intake speed**

The Brabender pelletizer stands out for its two separate servo-drives which ensure a constant pellet length even if the intake speed varies. After granulation, the plastic pellets are caught in a drawer or sack and can then simply be removed. Optional extras for this are an interchangeable drawer or secure mounting option for sacks of various sizes.

The pelletizer can be controlled manually at the control panel or via CAN bus from the PC.

Blown film take-off unit



The Brabender blown film take-off unit serves for simultaneous blowing, cooling, taking off and winding up of extruded blown films. The unit has a motor-controlled height adjustment. An ultrasonic diameter control is available as an option. The film blowing unit is suitable for the small production of foils under production conditions. It can be extended with the foil quality analyser FQA to a complete production line with inline film quality analysis.

- **Precise control of hose diameter**
- **Infinitely adjustable height up to 3200 mm**
- **Expansible with Film Quality Analyzer**
- **MetaBridge Software**

(More information on page 16)

Univex flat film take-off unit



The Brabender Univex is a universal haul-off unit for taking off, cooling, and winding up flat films up to a max. film speed of 30 m/min. Liquid temperature conditioning of the nip rolls positively influences e.g. crystallization processes in the film. The winding roll is fixed with clamping cones for easy takeoff. The Univex can be controlled manually at the control panel or via CAN bus from the PC.

- **Excellent film quality**
- **High haul-off speed**
- **Precise temperature conditioning**
- **Expansible with Film Quality Analyzer**

Filtratest



The Filtratest fully meets the demands of DIN EN 13900-5 and ISO 23900-5 for determining the dispersion and dispersibility of pigments and extenders in plastics by means of the filter pressure value (FPV) test. The main fields of application for this method are quality control of masterbatches, compounds, and polymers as well as color recipe development.

- **Quick change of screen packs through drawer system**
- **Integrated preheating of the screen packs**
- **Short cycle times and continuous extrusion by by-pass operation**
- **Convenient process and evaluation software**

... where quality is measured.

Film Quality Analyzer



- **Objective**
- **Continuous**
- **Detection of black specks, gels and fisheyes**
- **Evaluation of film quality**

The system provides an optical, automated in-line analysis of the extruded films. The high-resolution instrument detects inhomogeneities and impurities (e.g. black specks, gels, fisheyes, holes etc.) in transparent and pigmented films. The dedicated software allows for optical and both qualitative and quantitative statistical evaluation of the film purity.

Even strongly pigmented films with very low transparencies can be checked by means of adaptive transparency and grey level evaluation. This enables quantitative in-line quality assessment on masterbatches by sizing and classification of agglomerates and pigment particles.

The FQA system can be mounted on different Brabender equipment:

- Univex flat film take-off unit
- Blown film take-off unit
- Auto-Grader in-line measuring system

Auto-Grader®

- **Objective**
- **Continuous**
- **Real-time testing**
- **Integration into process control system**

Due to the frequently high material throughputs in continuous production, continuous in-line quality control is essential in industrial production lines. With the Brabender Auto-Grader, product specifications like constant of a rheological power law, MFR and MVR values at different loads, transparency and purity of a film can be surveyed directly at the production site.

All data can be shown and monitored in a control room of the production plant. Even the machine alarms or the film purity video line can be connected to the control room. Whenever inadmissible deviations are reached, a signal will be transmitted to the appropriate device.

The Auto-Grader adjusts itself automatically to different polymer grades. According to the needs, further in-line measuring systems can be integrated, e.g. a colorimeter or hazemeter. This combined system is suited for all main tasks of a production control.

The Brabender Auto-Grader continuously determines the quality characteristics (typically: MFI, MVR, optical properties) relevant to production practice. The complete machine control as well as the representation of the measured results are done fully automatically and continuously within seconds.

The Auto-Grader can be integrated in-line into a pellet conveying system or in bypass to a production extruder.



Absorptometer "C"

Precise and reproducible absorption test

- **High-precision measuring mixer with special blades**
- **Automatic (sequencer controlled) buret with ready to use default settings**
- **Choice between local and remote operation for economic test procedure**
- **Separate location of the PC for clean operation and long lifetime**



Application

The oil absorption number (OAN) is widely used for characterizing the structure of carbon blacks and other free flowing materials which has a strong effect on the processing and vulcanization parameters and the quality of the product as well.

Oil absorption number analysis is also successfully used in the cosmetics industry as a common quality control method for raw materials, cosmetic powders and conditioned pigments.

Principle

The Brabender Absorptometer "C" is a tabletop instrument with a torque measurement system (dynamometer), which is used for the precise and reproducible determination of the oil absorption number (OAN) of powdery materials.

The test method is based on the changes of the consistency of powdery materials during oil absorption.

How can such consistency changes be recorded and visualized?

The Absorptometer "C" consists of two main parts: a drive unit with a torque measurement system and an attached mixer with special blades.

The torque is measured and recorded throughout a special mixing process: the oil is gradually added by an automated buret into the mixer. The free flowing, powdery material absorbs the liquid and starts agglomerating. During this transition, more and more torque is needed for the mixing and eventually a torque peak appears on the time-torque curve. The OAN itself is given in accordance with the standards and common practice in ml (of the absorbed oil) / 100 g (of sample material).

The Brabender Absorptometer "C" for running precise and reproducible absorption tests fully meets:

ASTM D 2414 (carbon black)
ASTM D 3493 (carbon black)
ASTM D 6854 (silica)

Elatest®

Compact density measurement

- **Excellent reproducibility of the measured values**
- **Easy handling**
- **Reliable, sturdy design**

The Elatest determines the density of polymers, in particular of rubber and non-vulcanized rubber compounds - a dimension which is of decisive importance for rubber processing both during recipe development and for continuous production control.



Void Volume Meter

Determination of cavity volume of structured solids

- **Rapid, straightforward, and material-saving**
- **Precise measurement results**
- **High productivity**
- **Easy to clean**

The Brabender Void Volume Meter has a semi-automatic measuring procedure for small sample quantities. It offers high reproducibility and a higher measurement frequency compared to oil absorption measurement. The method can be performed without additives, such as oil, when measuring oil absorption. There is no risk of contamination due to the measurement method, which eliminates the need to dispose mixed substances. The analysis of the pressure curve provides information on the external structure of carbon blacks and other substances.



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… where quality is measured.

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