

Extruders for compounding

Plastics Additives & Compounding looks at the latest developments at some of the world's leading compounding extruder manufacturers.

Extruder handles multiphase ingredients

Yellow Jacket Multiphase Twin Screw Extruders, designed to compound multiphase ingredients simultaneously, have been developed by Wayne Machine & Die Company. The company says that



Wayne Machine & Die Company's new Yellow Jacket Multiphase Twin Screw Extruder.

Multiphase Twin Screw Extruders are outfitted with complete systems for the simultaneous introduction of solid, liquid and gas ingredients and the extraction of gas. It is possible to compound virtually any combination of materials, irrespective of the ingredient's phase and the extruder can process a wide range of thermoplastic compounds including mineral and glass filled, colour and modifier masterbatch, alloys, flame retardant, anti-bacterial, UV stabilized, wood filled, foam and devolatilized compounds. In the future, researchers can also make compounds out of ingredients whose phase is presently unknowable. The Yellow Jacket Multiphase Twin Screw Extruders incorporate segmented barrel sections with various port endowments for

liquid, solid and gas, which are said to allow easy changes to process and ingredient introduction sequences. Standard screw sizes are 19 mm, 25 mm, 32 mm and 50 mm and typical L/D ranges from 36 to 52:1 and longer when appropriate, the company says. It is possible to incorporate Complete Data Acquisition Systems in the extruders, adding trending and statistical analysis. The machine is also available with a line of extrusion downstream equipment for the direct extrusion of blown and cast films, tubing, sheet, wire insulation, profiles, rods and monofilament.

Contact:

Wayne Machine & Die Company

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Century signs Chinese agreement

US machinery supplier Century, Inc. has signed an agreement with China Nanjing Ruiya Polymer Processing Equipment Co. Ltd for the development of a cooperative project in China. Ruiya is the second largest manufacturer of twin screw extruders in China.

Century says that the combination of its technology, design and engineering

transfers, coupled with its expertise in metallurgy and parts manufacturing, will allow Ruiya to offer the global compounding industry improved machine designs and quality with higher speeds, higher torque and greater throughput. The co-developed twin screw machinery designed for export will be CE certified for the European market, and NEC compliant

for North American users. Century says that the agreement means that it will be the fully authorized sales and service source for Ruiya's twin screw extruders, ancillary equipment and other products in North America, South America and Europe.

Contact:

Century, Inc.

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Kneader is ideal for incorporating light fillers

The List kneader is suitable for compounding, blending and grafting applications, according to the German company. List adds that the large cross sectional areas of the kneader reactors make it possible to incorporate light fillers such as Aerosil or nanoparticles in a polymer. According to the company, this distributive mixing in the radial direction ensures incorporation times that are four

times faster than conventional Z-mixers. In addition, List technology can be processed in a continuous mode while the Z-mixer stays in batch mode. Low shear rates ensure that the particle structure of the filler will not be damaged during the mixing process. Used in the grafting process, the kneaders can provide more residence time to accomplish the reaction under optimal

surface renewal conditions and low shear rates. This technology will satisfy kinetics requiring residence times from five minutes up to hours and for (co-)polymers in a concentrated phase which are process limited due to shear sensitivity.

Contact:

List

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High tip speeds give short compounding times

The Draiswerke Gelimat® is an ultra-short cycle time compounding machine that employs thermo-kinetic technology with no added heat input required. Product degradation can be avoided due to the brief exposure of processed polymers to high temperatures.

The company claims that all melting, fluxing and mixing achieved by the Gelimat is due entirely to the very high tip speeds of the tools within the processing chamber, with temperatures of 140°C to 250°C reached in around 25 seconds and complete mixing cycles completed in about 60 seconds. This can help eliminate the overworking of virgin or recycled polymers used by the system to process single compounds or mixtures.

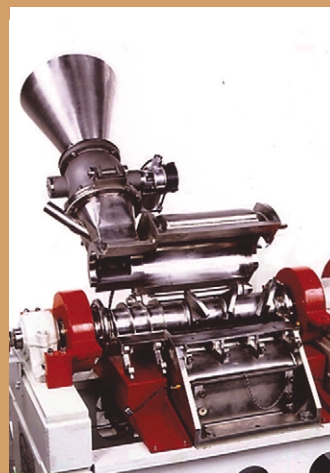
Because the Draiswerke Gelimat is water-

tolerant and does not require pre-drying of recycled materials, it can handle virtually any thermoplastic or thermosetting resin, including highly filled material, the company adds. It is available in sizes ranging from a 1-litre laboratory model up to a 250-litre high capacity machine capable of outputs up to 9000kg/hr. All units are equipped with advanced process controls, giving full automatic operation with continuous logging and display.

Contact:

Orthos

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The Draiswerke Gelimat ultra-short cycle time compounding machine.

Modular version of twin screw compounder launched

Thermo Electron Co has launched a modular version of its PRISM Eurolab 16 twin screw compounder, which, the company says, has improved flexibility and control. PRISM Eurolab 16 is now controlled through a colour touch screen with enhanced graphics and a 'plug and play' facility that recognizes when ancillary equipment and the barrel extension are connected. The controls

allow a process configuration and set points to be stored to give repeatable operating conditions, Thermo Electron says.

The company adds that the design of the PRISM extruder allows the barrel to be opened quickly for thorough cleaning, screw configuration changes, or dead-stop melt studies. The barrel is assembled from 4:1 L/D segments, which are rearranged

easily to reposition feeding and venting ports. The standard 25:1 L/D compounder can also be converted to a 40:1 L/D version by the addition of a bolt-on barrel extension and the extruder can be reconfigured with a face-cut pelletizer, the company says.

Contact:

Thermo Electron Co

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Berstorff extends range with standard extruder

A new twin screw extruder designed for standard compounding applications is now available from Berstorff, with a good price/performance ratio. The ZE Basic twin screw extruder is available with six screw diameters ranging between 26 and 77 mm, with standard screw speeds of 600, 900 and 1,200 rpm. The different screw elements of the ZE Basic series can complement each other and are said to be particularly suited to standard compounding applications, such as the plasticizing and alloying of plastics, the incorporation of reinforcing agents, mineral

fillers or natural fibres into polyolefins (POs) and engineering plastics and the production of colour concentrates (masterbatch).

Berstorff says that output rates vary according to application, machine size and screw speed and are between 3 and 2,800 kg/h. As with the company's ZE UTX extruder series, the ZE Basic is equipped with the second generation Berstorff advanced process control system.

Contact:

Berstorff

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The new Berstorff ZE Basic twin screw extruder.

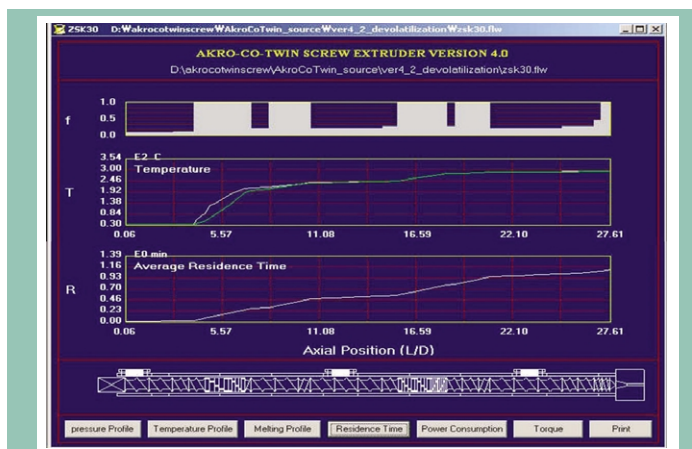
Extruders

New version of PC software developed for co-rotating twin screw extruders

Temarex, based in Akron, Ohio, USA, has developed a new simulation and modelling program for co-rotating twin screw extruders. The Akro-Co-Twin Screw® was the first personal computer (PC) based co-rotating twin screw extrusion simulation and modeling software of its kind and was first made commercially available in the mid 1980s. Version 4.0 of the software, available in a Windows platform, is said to be more advanced than the earlier versions because it can take into account residence time and temperature histories in proposed regions for reactive extrusion. It also incorporates a reactive extrusion (REX) module and can help predict

devolatilization rates and screw temperature profiles, Temarex says. All previous performance predictions included in previous versions are included and improved in this software.

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Two views of the output screens available via Akro-Co-Twin Screw Extrusion Simulation and Modeling Software tool.

Extruder screw elements can be interchanged easily

A co-rotating twin screw compounding system developed by Nanjing Ruiya Polymer Processing Equipment Co Ltd has parts which can be easily adjusted and interchanged, the company reports. The screw configuration, barrel set-up, screw L/D, number and protocol of feeding and venting, screen change and electric control mode can be optimally adjusted according to different principles and process

requirements and the closely intermeshed screw elements, which have good self-wiping characteristics, can be interchanged with each other easily. They are slid onto a spine shaft to achieve higher torque and higher screw channel volume for even higher throughput. Nanjing Ruiya Polymer Processing Equipment adds that the metering feeds are equipped with a single screw, twin

screws, or springs to meet different flow properties of bulk particulates, and, due to its low vibration and noise levels, the main extruder can be installed on most solid grounds with no need for any special base.

Contact:
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CT compounders offer versatility and rugged design

CT Series compounders are the answer to today's compounding industry's demand for versatile, rugged extruders., according to the US extruder manufacturer B&P Process Equipment. The CT compounders are claimed to offer flexibility including high-speed and high-torque designs. A full selection of elements and barrel designs are available. Standard size ranges for the CT Series extruders begins with the 25mm laboratory model and go up to 133mm for high torque production compounders. The company says that they are well suited for the rigorous

demands of today's compounding applications, as well as most masterbatch and colour concentrate applications. The CT is also claimed to be a good continuous mixer for PP, PE, PS, PET, ABS, TPE, TPU, and PC, unfilled or filled. B&P also offers the Ko-Kneader, a low-shear rotating and reciprocating single-screw extruder is designed for shear and temperature sensitive compounds. The flights on the screw are interrupted and interact with three rows of stationary kneading pins located in the barrel wall. The

interaction between the moving flights and the stationary pins provide dispersive and distributive mixing simultaneously. The range is suitable for a variety of applications, including PVC compounding, wire and cable insulation, engineered thermoplastics and masterbatch/concentrates. The sizes available include 30, 45, 60, 80, 110, 150, 220 and 300 mm, with process lengths of 8, 12, 16 and 20 L/D.

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Single-screw extruders benefit from new mixing technology

Rollepaal BV in cooperation with Rauwendaal Extrusion Engineering (REE) Inc has launched a range of D-REX single screw extruders for the direct extrusion of filled polyolefins (PO). REE says that the D-REX mixing technology represents a radical departure from existing extruders because the mixing technology used in the D-REX incorporates several Chris Rauwendaal Dispersive (CRD) mixers, developed by REE. These mixers which work by forcing the material through the high stress regions several times to achieve a fine level of dispersion. According to REE, CRD mixers combine both distributive and dispersive mixing capability within one device, making it possible to compound highly filled polymers and to combine compounding with direct product extrusion.

This in turn can allow the pipe producers to attain higher outputs at lower reject. CRD mixers are also said to generate strong elongation flows; as a result they can be more effective in breaking down agglomerates and droplets and create less viscous dissipation than shear flow, REE suggests. Rollepaal's single screw mixing technology also has low wear and low energy consumption.

REE says that because the filled POs are easier to extrude, they behave more like R-PVC, with reduced sagging, sticking, predictable crystallization, and easier cooling. The company adds that the maintenance and wear of the double flighted, well balanced single screw is far lower than of the additional conventional co-rotating double screw compounding extruders.

D-REX single screw extruders have a L/D of 55 for mixing powdered fillers up to 60% in polypropylene (PP) or polyethylene (PE), enabling direct extrusion without a separate compounding step. The last stage of the screw generates sufficient melt pressure to overcome the die head back pressure, the company states. The extruders also incorporate Rollepaal's double compression tooling die head used in the production of polyvinyl chloride (PVC) and polyolefins.

The D-REX is essentially a single screw compounding extruder (SSCE) for applications that currently require a twin screw compounding extruder (TSCE). In addition to CRD mixers the SSCE can use vortex intermeshing pin (VIP), and high heat transfer (HHT) mixing technology developed by REE. The company says that this compounding extruder is capable of running high filler levels (50-60%) and can generate high discharge pressures and is suited for direct extrusion applications where the machine can extrude pipe, sheet, or profile without the need for a melt pump. The SSCE uses multiple ports along the extruder for introducing fillers and additives and for the removal of volatiles. The vortex intermeshing pin (VIP) mixer is an important new development by REE. The VIP mixer achieves highly effective distributive mixing, the company reports. The VIP mixer can be used in existing extruders without modification of the barrel and its low cost allows it to be used in many applications, REE says. In injection moulding, the VIP mixer can be incorporated into the non-return valve (NRV) and can significantly improve the mixing capability of their injection moulding machines simply by replacing the standard NRV with a VIP NRV. REE says that the advantage of the VIP mixer is

that it achieves a full intermeshing action over the full circumference of the screw. As a result, the VIP mixer in a single screw extruder achieves more effective distributive mixing than a similar device in a twin screw extruder.

REE has also developed a new screw geometry that redistributes the gas laden melt so that the heat transfer is increased significantly, helping companies increase the cooling capacity of the secondary extruder on tandem foam extrusion lines. This is achieved by splitting the melt in the screw channel by introducing a flight shift. This forces hot material in the centre of the channel to the screw and barrel surface while, at the same time, forcing the cooler material to the centre of the channel. The high heat transfer (HHT) screw has achieved significant increases in cooling capacity in actual operations and also improves distributive mixing and narrows the residence time distribution, REE reports, in turn reducing the chance of degradation. The HHT screw is particularly useful for companies trying to use a 100% CO₂ blowing agent, REE reports.

Contact:

Rauwendaal Extrusion Engineering

Website: www.rauwendaal.com

Rollepaal BV

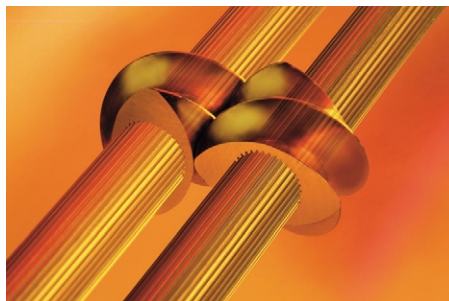
Website: www.rollepaal.com



Rollepaal's DREX 120-55 SSCE at the 2004 K Show.

New shaft design raises extruder performance

Leistritz Extrusionstechnik GmbH has introduced the maXXshaft shaft-element-joint, which gives the screw higher free volume with increased torque. The new shaft system is claimed to offer an increase in performance of 25-35%. The system employs lower cut screw elements that enable a higher free volume, which is particularly important for formulations that are limited in volume. Leistritz adds that there is also a new and improved cooling system that allows effective barrel cooling and ensures a reliable and controlled removal of the physical energy introduced. The new shaft-element-joint is being incorporated in the ZSE MAXX range, offering a 25-35% performance increase through the optimized volume/torque ratio. The company adds that improved ease of use is an important factor in the new machine design. The drive unit is shrouded, which



The new maXXshaft shaft-element-joint from Leistritz.

means that a reduced noise level is achieved. A new frame design with integrated barrel cooling allows easier assembling and disassembling of the heating cartridges and barrels, says Leistritz. Therefore exchanging the complete processing unit can be done much more conveniently. The higher power density requires increased cooling. There is a new barrel cooling system that provides a

30% increase in cooling capacity by means of a new system of pipes, bores and heat exchangers. The ZSE MAXX range covers screw diameters from 27mm to 135mm and provide a D_o/D_i ratio of 1.66.

The ZSE FLEXX range incorporates the advantages of the MAXX series, but adds a quick change system for the processing unit. The system comprises two complete processing units that are used alternatively by employing the transport system. The company says that the line can be reconfigured in very short spaces of time and downtime of the extrusion line can be reduced to a minimum of 15 minutes. The FLEXX range is available for 40mm, 50mm and 60mm diameter models and also provides a D_o/D_i ratio of 1.66.

Contact:

Leistritz Extrusionstechnik GmbH

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New small-scale extruders offer performance and value

German company Noris Plastic GmbH has two new twin screw compounding extruders - the smaller ZSC 20 and the larger ZSC 25. The 20mm and 25mm screw diameter extruders are co-rotating with intermeshing screw profiles. The company says that they both well designed, offering good modular technology and functionality. Noris adds that the new

machines offer high performance and value for money.

The ZSC 20 is suitable for small to mid-size runs of up to 40 kg/h, while the ZSC 25 is ideally suited to a performance level of up to 100 kg/h, for laboratory use or smaller production runs.

Applications include the modification of plastics through reinforcing, filling, alloying,

degassing and filtering, for example, as well as the development and small scale production of additive, colour and flame retardant batches. The machines are also suitable for the development of wood-plastic compounds, colour compounds and direct extrusion.

Contact:

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Extruder increases outputs by 20%

Coperion has developed a twin-screw compounder that not only offers higher speeds but also a considerably higher torque, realizing output increases of up to

20%, the company reports. The ZSK Mc PLUS twin-screw compounder is also said to lead to high productivity and better product quality. Coperion has also outlined

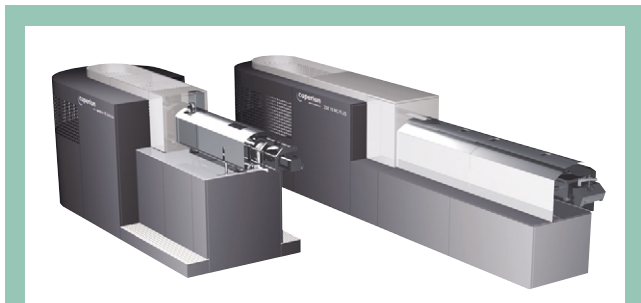
the benefits of its STS compounder. According to the company, its twin-screw kneader has a modular construction and various features such as a wide selection of screw elements. This means it can handle a wide range of applications, from compounding engineering

plastics to producing masterbatch and processing PVC products in a two-stage system. The company adds that processing sections are available in a great variety of lengths and individual housing parts can be equipped with special wear-protection that can enable easy and cost-effective exchange of highly stressed parts. Coperion says that the machine can perform standardized processing tasks in the plastics industry with maximum efficiency and at a good cost/performance ratio.

Contact:

Coperion Group

Website: www.coperion.com



Coperion's co-kneader and ZSK twin-screw compounder.

Twin-screw extruder available for testing

Steer Engineering P Ltd has installed a fully equipped twin-screw extruder with gravimetric input feeders and strand pelletizer at the company's headquarters in Bangalore, India, for potential clients to try out the processing of their material under production conditions.

The company's extruder is designed to achieve good energy-saving screw geometry through the use of special materials and specific surface treatment, incorporation of modern drive systems,

and user-friendly and efficient automation.

The company says that the extruder incorporates an infinitely variable speed range and direct torque control drives. The drive controller is equipped with full protection for the motor and also complete interlocks for safe operation of the extruder.

There are also user-friendly controls using state-of-the-art automation to operate and monitor the extruder and peripherals from

the control room or from close to the extruder.

Steer offers the extruder for all compounding applications, such as polymer reinforcing or filling, masterbatches, polymer blends, de-volatilizing, reactive processing, melting and homogenizing and palletizing flow bulk density powders.

Contact:

Steer Engineering P Ltd

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NFM unveils new devolatilization testing facility

NFM has expanded its existing Pilot Research & Development facility with the addition of a new Devolatilization Testing Laboratory. The new facility is designed to handle Class I, Div. II, Group D materials. The company says that the investment provides the marketplace with the most cost-effective and accurate alternative for companies not capable of doing this type of testing in-house.

According to NFM, the direct benefit to customers is that the facility reduces the risks of 'scaling-up' from laboratory models to production units. Prior to purchasing a

new piece of equipment, customers can evaluate how their material will perform and analyze the results.

The NFM Devolatilization facility is equipped with a Welding Engineers' (WE) 2 inch (51mm), 60:1 L/D twin-screw extruder as well as auxiliary products including static mixers, pre-heaters, and a pelletizer unit. The WE system handles 5-60% polymer solutions and is capable of production rates of 45-227 kg/h (100-500 lbs/h). The primary focus of this technology is on EPDM and SBR production.

NFM says that it has been at the forefront of devolatilization for more than 25 years, and was the first manufacturer to commercialize twin-screw devolatilization of reactor solutions for devolatilizing acrylic and styrenic polymers from 50% solids.

The WE devolatilization line offers reduced energy consumption, lower operating costs, shorter residence time, and overall improved product quality in a streamlined turnkey system, adds NFM.

Contact:

NFM Welding Engineers

Website: www.nfm.net

Entek develops extruders for new technology areas

Entek Extruders offers a range of twin-screw co-rotating extruders and extrusion lines for compounding, masterbatch, film/sheet lines and wood-plastic composite production. The company adds that it can also manufacture most makes of OEM replacement screw elements, barrels and shafts. Entek adds that it also offers a 24-hour technical support service for both machine and plant breakdown support, as well as process support. Process engineers can problem-solve machines via remote modem link.

Entek is developing its current extrusion lines for new technology areas, such as natural fibre-plastic composites, highly filled

single pigment dispersions, biodegradable compounds and compostable films. The company adds that it has been involved in direct extrusion technology for over 20 years, in particular profiles, sheet and film. Entek's range of high-speed, high-throughput co-rotating twin-screw compounding extruders, E-MAX™, are available in sizes from 27mm to 133mm. Entek adds that complete turnkey systems can be provided to include screen changers, feeders, strand dies and pelletizers. The company adds that it is also able to provide a complete service package from screw design and process engineering through to on-site training. Entek adds that the versatility of the E-MAX™ extruder

permits high throughputs of natural fibre-plastic composite profiles. The E-MAX range can provide typical throughputs of 50kg/h to 3600kg/h, depending on the formulation. Turnkey systems for these applications can also include loss-in-weight feeders, melt pumps, calenders, dies and pelletizers, for example. The company's experience includes sheet lines, direct extruded wood-fibre filled lines and many lines with feeders, extruders, water bath/slides and pelletizers.

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