High Efficiency Drum

Melt Filter. From a technical standpoint the product with which Ettlinger Kunststoffmaschinen GmbH in Königsbrunn, Germany, grabbed our attention is not brand new. It is a melt filter with a cylindrical screen that was developed in 2003 and up until now no more than ten units a year have been sold really as a niche product. However, in the last financial year sales tripled.

The ERF melt filter can handle contaminated thermoplastics with a contamination level of up to 18 % (material dependent) (Pictures: Ettlinger)

The operating principle behind the ERF melt filter sounds simple. Contaminated polymer melt is delivered to the exterior of a drum screen with millions of conical laser drilled holes. The contamination stays on the outside, the cleaned polymer flows through to the inside and then through channels in a supporting shaft to the downstream equipment such as a pelletizer or to direct inline processing. The servomotor driven filter rotates slowly (up to 15 rpm) and moves the filtered contamination together with a small amount of melt to a stationary scraper blade that feeds it into a discharge screw located directly beneath it. "This means that after one turn of the screen the contamination is removed so that the full filter capacity of the screen is continuously and automatically maintained without back flushing," explained Karsten Bräunig, Sales Manager at Ettlinger. Provided that the material is relatively clean it is also possible to run the filter in discontinuous mode where for example the screen is rotated only every three minutes. "Depending on the application the filter capacity does decline over time requiring a screen change," added Bräunig and went on to explain that the filter could, however, be easily removed and reused many times over after pyrolytic treatment to clear the blocked holes. The screen change interval was said to be two to three weeks for heavily contaminated material and with less contaminated feed it could be as much as six months. The scraper blade can also be resharpened several times before it has to be replaced. What is important is to always keep the edge sharp so that the filtered contaminants can be cleanly lifted rather than being pressed into the screen openings. In most applications the typical contaminants are paper, wood, aluminum, and elastomers as well as polymers with higher melting points.

Automatic Operation via Pressure Control

The speed of rotation of the supporting shaft (screen support) and the discharge screw can be varied independently from one another. Reference values for temperature and pressure are determined at the beginning of the filtration process. In automatic continuous mode the

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Volker Neuber, CEO of Ettlinger, sees a large demand for systems in the reprocessing of highly contaminated polymer waste

speeds of rotation are then controlled so that the melt discharge pressure displays a high level of uniformity. At the same time it is important to optimize the initial settings so that the contamination is removed with the lowest possible levels of melt loss. Volker Neuber, CEO of Ettlinger, highlighted the following: "What sets our system apart from many other filter systems is that our filter works with very low melt losses. Naturally the type of contamination plays a role, but the rule of thumb for the ERF melt filter is: Separating one percent of contamination requires less than one percent of melt. This value will, however, be lower for very high levels of contamination. For example with 18 percent aluminum around 10 to 12 percent of melt are lost."

Due to its high level of pressure stability – plus/minus 2 bar – the melt filter can be integrated into an extrusion line for the production of semi-finished stock or film without the need for a melt pump.

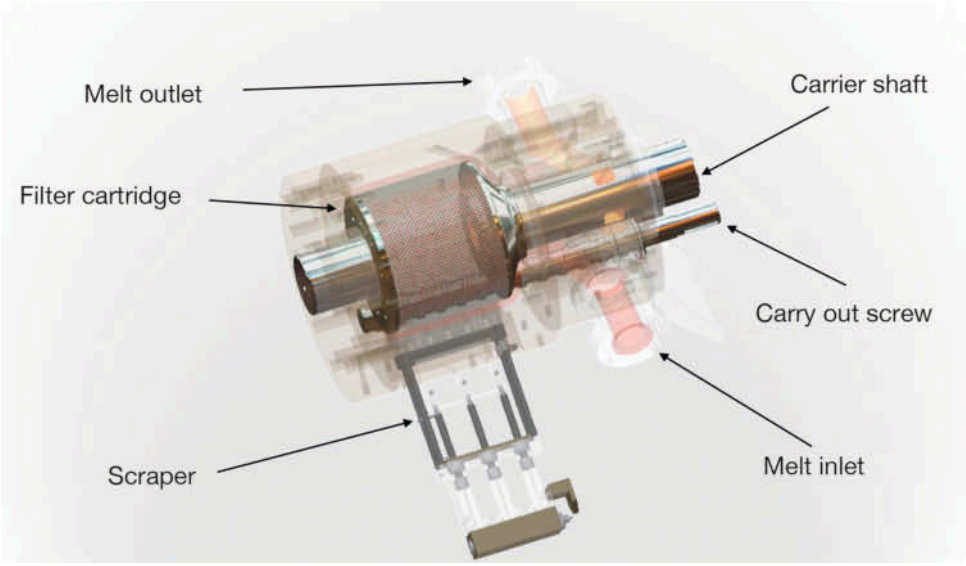
The drum filter principle also shows advantages with elastomeric contamination: The permanent cleaning means that particles are not pressed through the holes.

The primary application is industrial production scrap, waste with paper labels, dairy packaging, washed agricultural film as well as waste from film manufacture, electronic and electrical recycling and even post consumer Green Dot trash with every conceivable kind of contamination. Limits with the system are only seen when there is a high proportion of abrasive substances of mineral origin or glass, where high levels of abrasion are to be expected.

Flexibility Enables a Wide Range of Applications

The two models, ERF 200 and ERF 250, cover a range of throughputs from 300 to more than 2500 kg/h with a maximum filtration fineness of 80 µm.

Throughput is, however, inevitably dependent on the properties of the material and the degree of filtration. Individual trials with customer materials can be conducted in the technical center.



Schematic of the ERF melt filter

Generally the filter can be combined with all extruders typically found in the market and is connected via a suitable flanging system. The location of the filter is also not fixed and can for example be mounted in the middle of the extruder before the degassing section. According to Volker Neuber the filter has in some individual cases even been integrated into an injection molding machine. In such cases the injection molding machine configuration is a single screw extruder with a melt reservoir (shooting pot), where the filter is mounted between the two components.

! Company Profile

Ettlinger GmbH, Königsbrunn, Germany, was established in 1983 and specialized initially in the design and construction of low pressure injection molders with a high shot volume of up to 120 liters and large platens with comparatively low clamping forces. One of many typical examples of applications for its injection molders is the manufacture of plastic pallets.
In the past few years melt filtration has been expanded to form a second core product range.
www.ettlinger.com

The main business for Ettlinger at present is predominantly the replacement of older and existing systems, also those from other manufacturers, with the ERF melt filter. According to Neuber the amortization due to productivity and efficiency gains is often less than a single year. Around a third of the systems delivered go into new plants where the manufacturers either do not have their own range of filters or where other filter systems cannot cope with the type of contamination.

An additional reason for the strong growth in demand for the ERF system is seen by Volker Neuber in the enormous increase in the use of recyclate over the past few years and the fact that not enough lightly contaminated material is available, which has led to the recycling of more waste with high levels of contamination. The ERF melt filter now allows the use of resources that could previously only be thermally recycled. ■

Gerhard Gotzmann, Editor