

New Systems, Performances and Applications

K 2022 – A Showcase for Plastics Recycling

The K 2022 showed that circular economy and recycling are #1 topics for the plastics industry. This was apparent in the exhibition halls and also in the outdoor area. Here, in various live demonstrations, the companies showed the enormous advances made by industry in the past years in terms of sustainability.

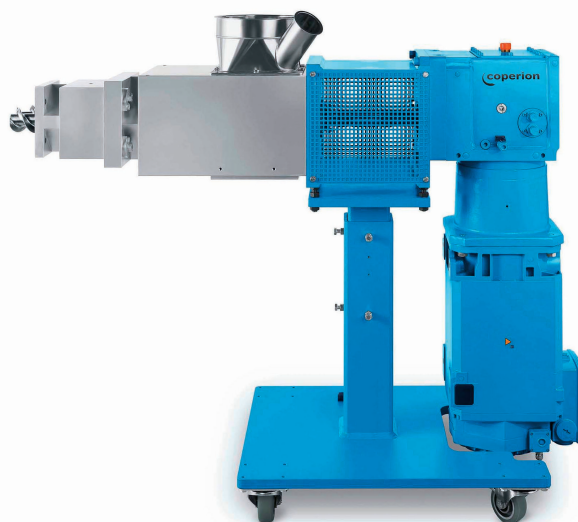
Like a green thread, the topics of recycling and circular economy were visible at practically every booth at the K2022. Once again, the central contact point for critical exchanges of information, ideas, and opinions was “Plastics shape the future” in Hall 6. The official special exhibition hosted by the plastics manufacturing association Plastics Europe Deutschland and Messe Düsseldorf was centered on the three game-changing topics of the K2022: climate protection, circular economy, and digitalization. Guests from politics, science, industry and also NGOs engaged in lively discussions on economical, social, and ecological challenges as well as possible solutions involving the K’s central themes.

Also the VDMA’s Circular Economy Forum is a well-known contact point to make recycling and circular economy perceptible – considerably larger this year. On the outdoor area between Halls 10 and 16, the association as well as 13 member companies demonstrated how important technology is for the implementation of circular economy in the plastics industry. Machines in operation enabled visitors to see how high-grade regranulate is produced from plastic waste, or how different processing methods are used to convert recycle into attractive, highly functional, and recyclable products. In addition to their own booths in the exhibition halls, all the participating companies were also represented in the Circular Economy Forum.

Complete Plants From a Single Source

One of these companies was **Coperion**, a Stuttgart/Germany-based machine builder. Just recently in September, Coperion took over Herbold Meckesheim, and integrated it into their new Recycling Business Unit. “The unit is now able to offer modular systems and plant solutions, which combine the complementary technologies of both companies for the benefit of our customers. The jointly developed plants cover the entire complete processing chain involving plastics recycling – from mechanical preparation, bulk goods handling, dosing and extrusion up to compounding and granulation”, explains Massimo Serapioni, head of Coperion’s Recycling Business Unit. Based on an example from PET recycling, the company showed how it will be able to build a complete plastics recycling plant in future. Throughputs up to ten tons per hour are possible.

Another highlight in the pavilion was the new ZS-B Megafeed side feeder. It permits plastic recycle with a bulk density of less than 200 kg/m³ – previously seen as intake-limited and



The new ZS-B Megafeed side feeder greatly increases the feed volume of fibers and flakes in the ZSK twin-screw extruder, so that many plastics recycling processes become more efficient or even possible. © Coperion

thus not worth recycling – can now be fed reliably into the ZSK twin-screw extruder in large quantities, where it is recycled and simultaneously compounded with high throughputs. The side feeder permits very high feed rates with fiber and flakes from widely differing plastics and therefore significantly higher throughputs – both in mechanical and in chemical recycling processes. “With a ZSK 58 Mc18 twin-screw extruder, the throughput increase and thereby the potential of the new ZS-B Megafeed becomes very clear”, says Serapioni. Previously, throughputs of 70 kg/h were achieved when recycling polyamide fibers with a bulk density of about 40 to 50 kg/m³ using conventional equipment. “If these fibers are fed into the ZSK extruder via the ZS-B Megafeed, throughputs increased 14-fold to 1000 kg/h”, he added. Similar results are achieved when recycling carbon fibers. According to the company, throughputs were increased from 50 kg/h to 2500 kg/h.

Bottle-to-Bottle Recycling Plant Cuts Production Costs

Making the recycling process as efficient and energy-saving as possible has been a major topic for **Starlinger** since many years. Amongst other things, the Austrian plant manufac- »



Compared with the previous model, the recoStar PET art recycling plant permits production cost savings of some 21 %. © Starlinger

turer showcased the newly designed PET bottle-to-bottle recycling plant recoStar PET art in Düsseldorf. It not only convinces with 25 % energy savings compared with the previous model, but also with 46 % lower maintenance costs, a 21 % smaller machine footprint, plus a simultaneous 15 % increase of output. In total, bottle-to-bottle recyclers can cut production costs by up to 21 % with the new plant.

“For the new machine concept, we investigated the PET recycling process and our corresponding technical solutions from start to finish, and searched for improvement possibilities”, explains Paul Niedl, Commercial Director at Starlinger Recycling Technology. The results were implemented mainly in energy consumption, but also a few processing steps could be shortened and simplified. While the new combined pre-drying unit with the newly designed extruder was exhibited in Hall 9, visitors were invited to see a plant with an output of more than 2 t/h in operation during the “Dynamic Days” in the company’s factory in Schwerin, Germany, after the K 2022.

“In spite of the pandemic during the past two years, the K 2022 as well as our Dynamic Days in Schwerin were particularly successful”, sums up Niedl. The readiness to invest in recycling solutions continues to be high, and an increasing number of processors are using regranulate.

Artificial Intelligence Changes Service and Maintenance

How important the topics of recycling and circular economy are, was also apparent in the exhibition booths. For example, **Sesotec** increased their booth area to 120 m². “We address the important global issues of sustainability, circular economy, and CO₂ reduction, and show which contribution can be made by our foreign object detectors, material analysis and sorting systems as well as services for meeting the challenges”, said Dietmar Dieing, Vice President of Plastics Sales at Sesotec.

In order to optimally meet customer requirements for higher plant availability, transparency, automation, and profitability, Sesotec has also expanded their competence in the field of artificial intelligence, and showcased the new features at their K22 booth. Several new activities have been created in the service field, which will help customers to raise efficiency, productivity, and connectivity of plastics plants to a new level.

Shredders from a Modular System

Recycling of plastics is not only important for climate protection. It also permits valuable resources and the environment to be saved. Therefore, a wide range of fields in the plastics industry is currently changing. “We see a clear trend towards a higher demand for high-grade plastic recyclates. Consequently, many manufacturers are implementing their own circular economies, because that is how they can ensure their reliable operation”, explains Martina Schmidt, Head of the Recycling | Waste Division at **Vecoplan AG**.

In Düsseldorf, the company presented e.g. the VAZ 1700 shredder. Users can operate the shredder for a very wide range of completely different materials. For this, the development team has designed the shredders on a modular basis. Throughputs range from 2000 to 25,000 kg/h. In the pavilion within the VDMA Circular Economy Forum, visitors could experience how powerfully these units as well as other products in the portfolio are able to shred different plastics, thereby permitting resource-saving recycling.

Higher Efficiency and Better Recyclate Quality

Whether post-commercial or post-consumer – films account for a large part of global plastic waste. Varying degrees of contamination require suitably adapted washing and drying processes. This is the only way to produce a high-grade recyclate.

For example, the specific features of **Lindner’s** new Jupiter BW series ensure higher efficiency and quality. The new shredder setup is designed specifically for film recycling. “With the Jupiter BW we have managed to reduce the amount of fines produced during shredding by 44 %. As a result, the bad fraction that must be disposed of by the recycler is greatly reduced, and more material remains in the recycling stream”, explains Stefan Scheiflinger-Ehrenwerth, Head of Product Management at Lindner Recyclingtech. Moreover, the precise cutting shreds films to an optimal size of A4/A3 for downstream NIR systems. “This makes the downstream sorting processes far more productive and efficient”, adds Scheiflinger-Ehrenwerth.

Novelty at the 2022: the Micromat HP series. According to the company, these shredders impress with a powerful, gear-less direct belt drive, an adjustable safety clutch that protects



Shredder in action: in various live demonstrations, Vecoplan showed their expertise at the K 2022. © Messe Düsseldorf

against non-shreddables, and the unique adjustable knife system. The new model has enabled throughput to be increased, resulting in the improved productivity demanded by the market – for example, the throughput for processing recyclable bales was raised from 3 t/h to 5 t/h. Also new is the automatic belt tensioner, which ensures an optimum working point, making the process more energy efficient and almost eliminating the need for maintenance.

As a member of the VDMA Circular Economy Forum, Lindner was again present in the outdoor area of the K2022, this time with three live demonstrations daily. As a special highlight, the shredding of post-consumer plastics, so-called dolly pallets provided by Engel, took place daily. Together, Lindner and Engel showed how homogenous and clean plastic flakes with a residual moisture of <1 % and a uniform particle size of 8 mm can be further processed directly in a two-stage injection molding process. “This will open up many different possibilities for our clients”, says Michael Lackner, Managing Director at Lindner Recyclingtech. Until now, injection molders had to buy granulates. Now they also have the option of purchasing and processing clean plastic flakes – provided that the parameters fit. “Apart from the specific particle size, a low residual moisture content is decisive. Requirements that we fulfil with our recycling solutions”, Lackner points out.

Circular Economy for PET Fibers

The textile industry is the 3rd largest consumer of plastics. Growth rates in the production of fibers and textiles are high, but circular economy has hardly become established in this segment. With its new “Fibers and Textiles” business unit, the **Erema Group** has intensified the development of recycling solutions also for this application. Currently, focus is on PET fiber materials originating from fiber production and subsequent processing steps. Technologies for recycling mixed fiber textiles from classical collection sources will be pursued in a subsequent project phase.

“With the Vacurema and Intarema technology and Pure Loop’s Isec evo technology, we already have an extensive range of machines for fiber and PET recycling applications”, says Wolfgang Hermann, Business Development Manager Application Fibers & Textiles at Erema Group GmbH. However,



Waste from the fiber filament production was recycled into high-grade regranulate. Using filament technology, the regranulate was used to produce a fiber with 3 dtex, which in turn was processed into knitted fabric for clothing or technical textiles. © Erema



Also Lindner made recycling experienceable. Different post-consumer hard plastics were shredded live in three daily demonstrations – and also wet-washed for the first time. © Lindner

for ecologically and economically sound recycling, new technological solutions are needed to use the recycled fibers in higher-value end applications, and to implement a functioning circular economy. Hereby, the initial focus will be on PET, which is regarded as a key material for the production of synthetic fibers. The aim is to find recycling solutions that allow PET fiber materials to be prepared for reuse in PET fiber production processes.

“This is a significant step for the circular economy because PET fibers in textiles account for about two-thirds of the total volume of PET. Packaging applications account for only one-third of the PET material stream”, explains Hermann. In this development work, the company can build on existing know-how. Established recycling technologies have been combined with a new IV-Optimizer. This extends the residence time of the PET melt, which is particularly necessary in fiber recycling to efficiently remove spinning oils. „In addition, our recycling process also increases the PET melt’s IV value after extrusion back to the specific level that is essential for production of the fiber”, adds Hermann. The quality of rPET produced using this method is so high that it can be used to manufacture ultra-fine fibers up to 2 dtex with an rPET content of 100 %. PET fiber wastes, e.g. from production processes, can therefore be further processed into rPET filament fiber, carpet yarn, and staple fiber. ■

Melanie Ehrhardt, editor

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