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Mechanical recycling using homogenization technology hot topic at ITMA 2023

Recycling technology celebrates success at Indonesian yarn manufacturer

It is already operating at PT. Kahatex – one of Indonesia's largest manufacturers of woven and circular-knitted fabrics: Oerlikon Barmag Huitong Engineering's homogenization technology for mechanically recycling prepared polyester (PET) waste such as post-industrial waste (popcorn), bottle flakes and films. This key component ensures an evenly-homogeneous melt, influences the increase in viscosity and hence enables the production of defined rPET preliminary products for further processing such as melt, chips and fiber materials for direct spinning.

Reusing waste is increasingly becoming a trend within the textile industry as well: in May 2022, PT. Kahatex commissioned a system with a daily capacity of 25 tons for recycling popcorn and bottle flakes into textile-quality chips for manufacturing POY and DTY. Traditionally, Southeast Asia's largest family-run business is committed to ecological responsibility and is focused on manufacturing high-end textiles for the Asian, US and European markets. Here, the Indonesian fiber manufacturer is utilizing the homogenization technology provided by Oerlikon Barmag Huitong Engineering (OBHE), a joint venture between Oerlikon Barmag and Yangzhou Huitong Chemical Engineering Technique Co., Ltd.

Using the corresponding thermomechanical recycling process, the waste material is extruded and the larger, more solid components filtered out before the homogenizer swings into action. It is in this reactor that the actual mechanical recycling and polycondensation take place. The technology generates a high surface area and – in conjunction with the precisely-defined dwell time – provides more options for influencing the melt. This creates an even, homogeneous melt, while the technology also simplifies the removal of volatile components. In turn, this enables targeted adjustment of the viscosity, which is necessary as the waste material to be processed does not always have the same viscosity. In this way, spinning system yarn waste – in the form of knotted balls or tangled threads, for instance – is processed into popcorn-shaped agglomerates for extrusion. This popcorn can have viscosity values of 0.6, but also lower values of 0.4. No problem: the homogenizer's increase in viscosity adjusts this.

Also operating in China

After exiting the reactor, the melt is once again filtered and finer, gel-containing components are removed. Subsequently, it can be further processed as required: in the form of chips or – using a direct-spinning process – in the manufacture of filament yarns, staple fibers and nonwovens. Applicable to all applications: the recycling result can only be as good as the processed starting material, as mechanical recycling processes are unable to improve the starting materials. And chemical recycling is still in its infancy.

For this reason, the homogenization technology remains attractive and is already being utilized by both Kahatex and Chinese fiber manufacturers recycling bottle flakes and yarn waste into staple fibers and filament yarns by means of direct-spinning processes. And the more the industry focuses on recycling systems, the greater the interest: "We are currently registering enquiries from Bangladesh, but also from China", states Michael Mächtig, Product Manager at Oerlikon Barmag. For the purpose of more intensive global marketing, the OBHE technology has therefore been integrated into the Oerlikon Polymer Processing Solutions product portfolio.

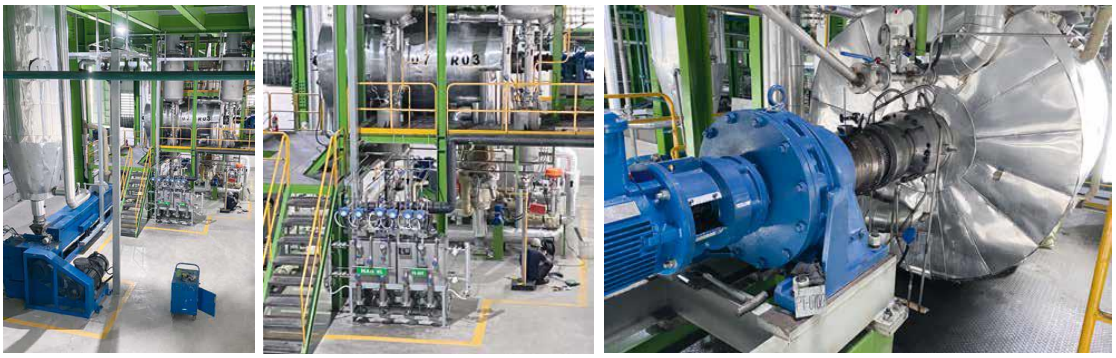
Technical Details:
Homogenizer

- Viscosity for textile & film = 0.64 – 0.69*[dl/g]
- Temperature ~ 283 [°C]
- Viscosity adjustment up to 0.2 [dl/g]

Vacuum Jet System

- ~ 150 [Pa]

*acc. GB/T14190-2017 / 5.1.1.3.1 (phenol/tetrachloroethane=1:1)



The homogenizer showcases its potential at PT. Kahatex in Indonesia.