Fibers and Filaments

Recycling production waste using size reduction and agglomeration

Problem:

Do you also have problems with handling or further processing of fibers / monofilaments?

The common target is to have zero scrap in production, which is for multiple reasons hardly possible.
The recycling of production waste is necessary in order to be competitive as well as in regard of resource saving . At the same time the quality requirements in the industry are high, which results in another challenge.
Therefore it is absolutely important, that the recirculated scrap does not negatively influence the production process.

The below figure 1 shows high amount of filaments which results mostly as waste from production along the process chain. The challenge to use this material again in the production is not easy. The biggest problems are:

- The length of the material is mostly infinite and can hardly be handled, therefore size-reduction is necessary.
- The size reduction is also not easy, as there is the risk that material can wrap around conventional rotor shafts.
- After material is size reduced, there is still the issue of extreme low bulk density with all its problem in dosing, storing, conveying.

Figure 1: PET-Filaments as production waste

Herbold Solution:

In a process combining size reduction and agglomeration using Herbold Granulator of the HB series and Herbold HV Plastcompactor. We can master the challenge.

The design of the Herbold HB Granulator is a combination of a feed hopper and hydraulic ram with a granulator having a true scissor cut. Due
to the special design of the grinding chamber and the high cutting frequency, it is possible to transform bales, fibers/ filaments, straps, cut open film rolls etc. into flakes in one single step with small granule sizes of less then 15mm

The main advantage of this development is its space-saving design since only one size-reduction step is necessary. In addition with the special guillotine rotor model with double cross cutting action there is no risk of a standard rotor blocking due to excessive friction, e.g. bundles of fiber's and other filaments.

After the fibers are size-reduced we improve in the following step with the Herbold HV series Plastcompactor the bulk density and flow characteristics of the material.
The bulk density increases up to 8x times due to the agglomeration process. At the same time a material homogenization takes place during the agglomeration. The agglomerate can be further processed in extrusion plants to new material. This inline solution with a Plastcompactor improves the energy balance as well as throughput of the extruder.

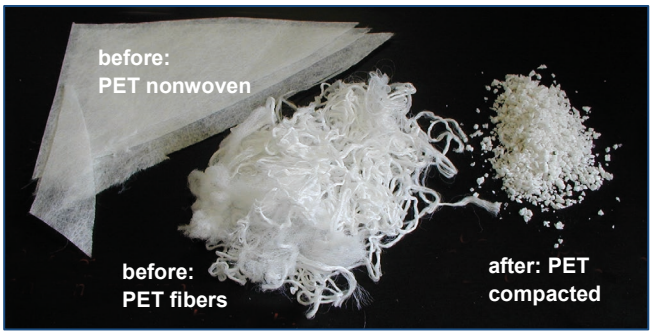
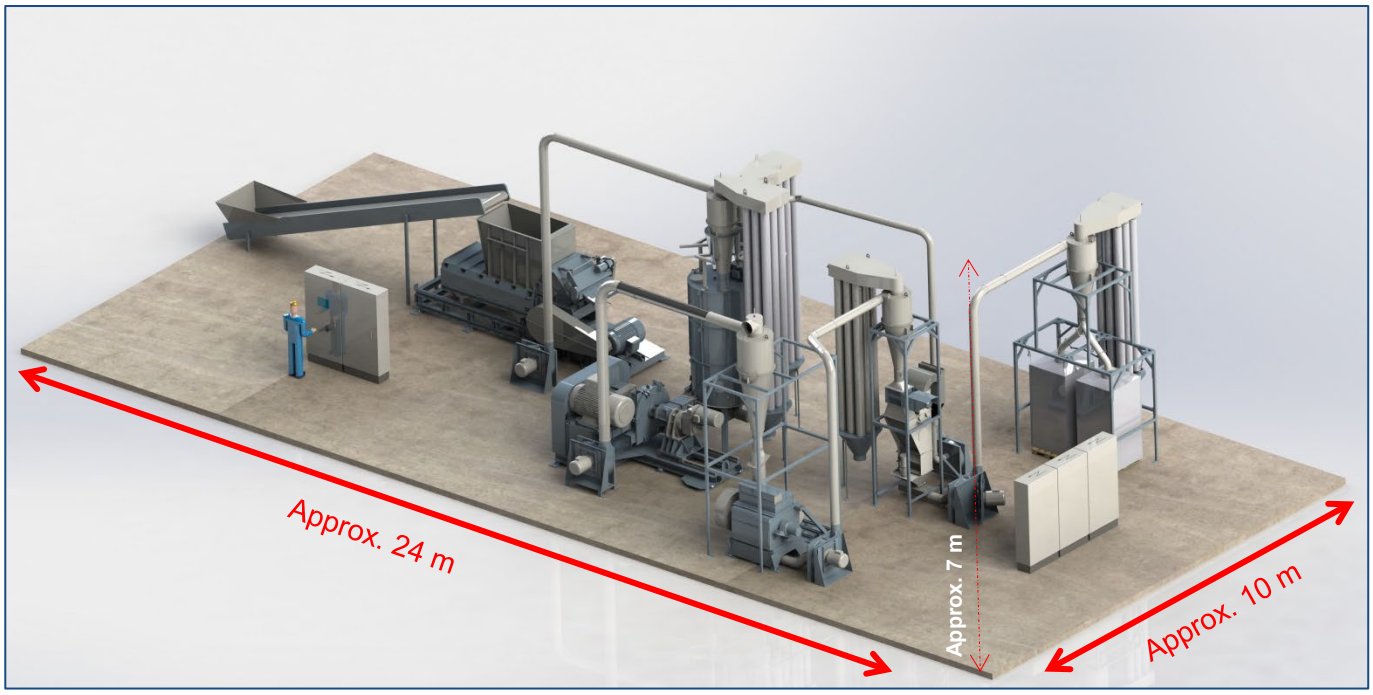


Figure 2: PET fibers agglomerated

Some test results with different material:

Material	Input density	Output density	Comments
PET fibers	61 g/l	469 g/l	Approx. 7,7x increase of bulk density, smaller amount of oil (< 1%) has vaporised during the agglomeration process.
PE monofilaments	60 g/l	321 g/l	Approx. 5,3x increase of bulk density, with capacities up to 3,0 t/h for the SML 60/100 HB.
PE fibers	60 g/l	326 g/l	Approx. 5,3x increase of bulk density for material with varying fiber thickness.

Example installation drawing:



Customer benefit:

- Large feed hopper for feeding whole bales or bundles of fibers.
- One-step size reduction to the desired final flake size
- Flakes ideal for agglomeration which is a low temperature process with minimum IV impact
- The flow properties of the agglomerate reduce the risk of bridge formation and thus increases availability
- With the agglomerate the specific energy demand for extrusion is lower and the capacity of the extruder can be maximized