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**ProTec Polymer
Processing GmbH**

**PET Recycling Process -
From Flake to "food-grade" PET Pellets**





OHL Stands for Innovative System Engineering

ProTec Polymer Processing GmbH with its world-renowned brands SOMOS® and OHL has been known for many years as a reliable and experienced partner to the plastics industry.

Our customers value our innovative solutions and our excellent quality products combined with a superior cost-benefit relationship.

The OHL brand is well known for its innovative engineering of post-condensation plants for plastics as well for turn-key PET recycling plants.

PET bottles are the ideal packaging for a large variety of beverages. PET (polyethyleneterephthalate) is an “indestructible”, formable thermoplastic which is ideally suited for the production of bottles.

A further advantage: PET bottles can also be easily and completely recycled – from bottle to bottle. This saves large amounts of new PET product, conserves resources, saves energy and CO₂ emissions and, in doing so, protects our environment.

We apply our expertise and our ideas to the process of recycling PET. This helps lower the consumption of raw materials for new products and enables our customers to produce more efficiently overall.

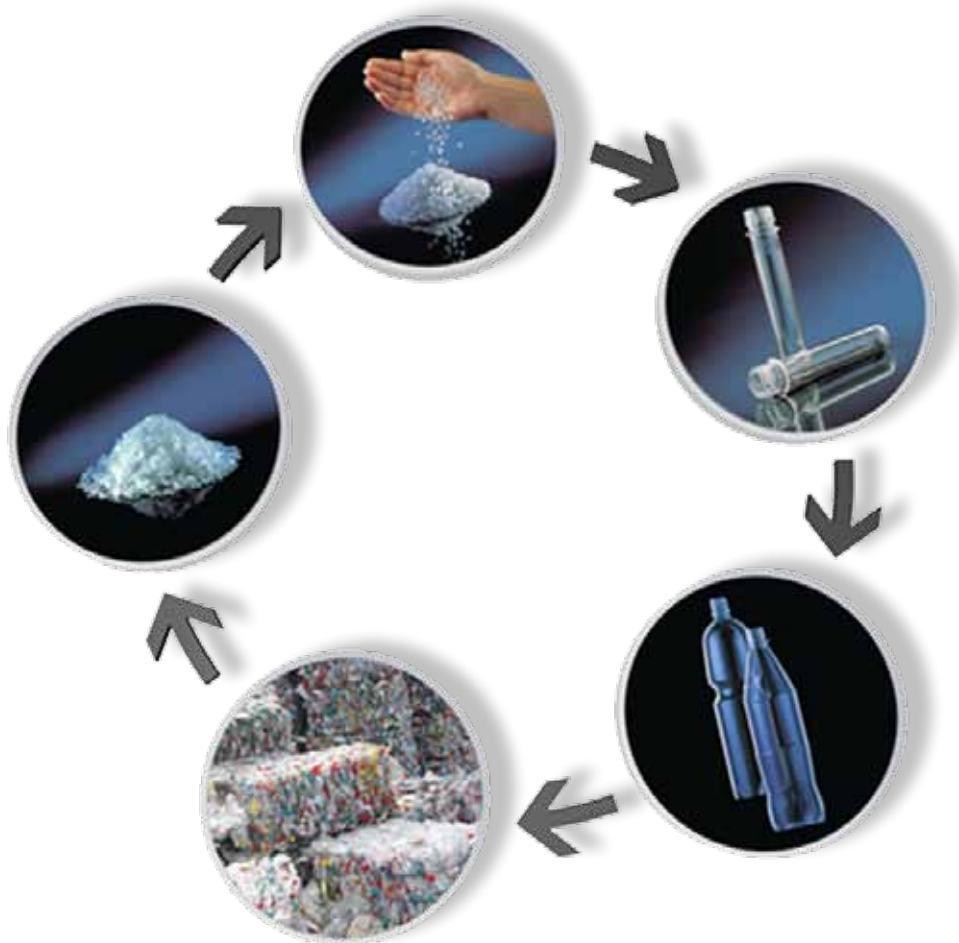
We act as partners to our customers and advise them from the concept and planning stages all the way to the installation and commissioning of their system. We are also available after that for servicing and maintenance once the system is up and running, thus guaranteeing our customers' satisfaction with their ProTec Polymer Processing system.

Lay your PET recycling task in our hands and be amazed at the quality of our products - and the quality of yours! We support you from start to finish in finding a solution for your specific application!

Call us! Our team will be happy to support you.

ProTec Closes the Loop with the OHL Process

The **OHL PET recycling process** is a tried and tested procedure that converts washed PET bottle flakes into PET pellets of a quality approximating that of the new product.



The benefits to you at a glance:

- Patented process based on proven components
- Highly efficient decontamination of the PET pellets, acetaldehyde content below 1 ppm
- The process have inter alia FDA non-objection letters (also for hot-fill and non-food containers), EFSA-compliant challenge tests and Anvisa approval
- Flexible viscosity increase - even high viscosity for technical applications can be individually specified
- Flexible production tailored to the needs of your customers
- Consistent viscosity values for the end product even with varying PET input materials
- Maximum product consistency and reproducibility
- Simple and reliable quality supervision
- Simple tracing during production
- High profitability thanks to low energy consumption (< 0.4 kWh/kg)
- Process handles product gently

The OHL Process

From washed flake to crystalline pellet



The pre-dryer

Since the flakes have varying moisture contents depending on their previous storage conditions, a hot-air dryer is used to pre-dry the flakes. This process conditions the flakes, thus ensuring that the subsequent extrusion process operates under reproducible conditions.



The extruder

When it comes to selecting the extruder, great importance is attached to effective decontamination and low energy consumption. Constant initial moisture of the flakes combined with efficient vacuum degassing also achieves a low IV drop.



The melt filter

A melt filter is used to separate out solid contaminants. The melt filter is equipped with a backflush system that increases the lifetime of the screens used.



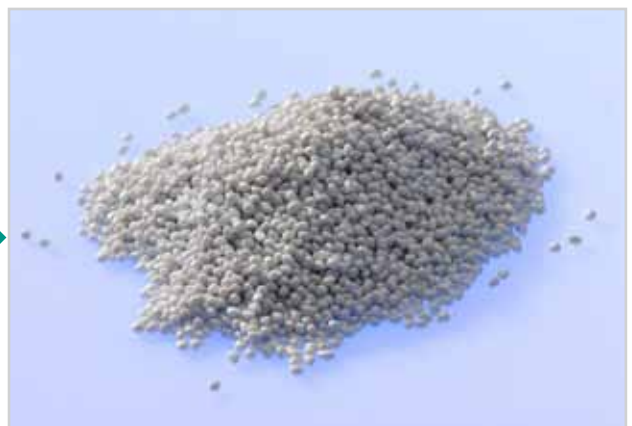
The pelletizer

Depending on customer requirements, both underwater strand pelletizing and underwater die-face pelletizing can be used. ProTec prefers the second option as it can be combined with in-line crystallization, which results in a significantly more energy-efficient process.



The crystallizer

Depending on the choice of pelletizing type, either an external crystallizer or inline crystallization is used. Both processes produce a hot crystalline granulate as an end product. This is then further processed at high temperature in the subsequent tumble reactor.



The core component - the tumble reactor

From crystalline to "virgin-like" PET pellets



The tumble reactor (SSP)

The use of the tumble reactor results in numerous advantages that quickly pay off for the customer. The installation of the reactor between storage silos allows the entire process to be operated continuously and seamlessly combined with the upstream process stages.

The use of the tumble reactor enables a reproducible and high level of product safety. Inside the tumble reactor, the selected reaction conditions (temperature and vacuum) cause post-condensation (IV increase) and a highly efficient decontamination process to occur simultaneously. Volatile substances, such as acetaldehyde and flavors from the bottle's "previous life" that could possibly or may have migrated into the PET, are removed.

The batch process ensures that each pellet is subjected to the same reaction conditions and therefore exhibits the same characteristics (viscosity and decontamination). This is invaluable in situations that call for full documentation with the relevant quality tests.

The batch system is particularly recommended for recycling applications because it enables you to deliver consistent product quality despite the fact that input materials (bottle flakes) are never uniform.

The fact that the viscosity of every batch can be individually set is advantageous when it comes to ensuring continuous capacity utilization of your system. This allows you to target a broader customer base and reduces your exposure to cyclical fluctuations.

To find out more about the tumble reactor, please also refer to our brochure "Tumble reactors for post-condensation (SSP) of polycondensation synthetics (polyesters and polyamides) and drying plastic pellets"



Other Factors you Should be Aware of

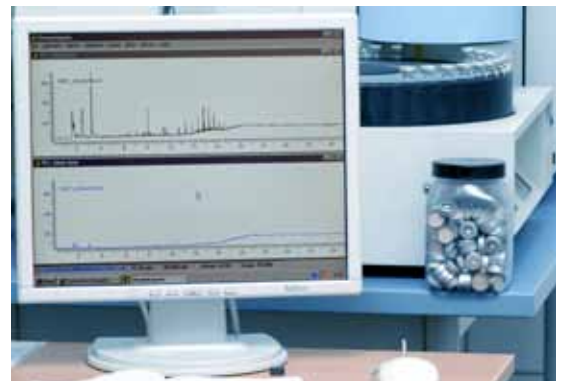
The OHL process is based on modular system technology using compact individual units, which facilitates the installation of recycling plants in existing buildings. This can achieve significant savings in terms of the investment required.



We would be delighted to show you how the recycling process can be incorporated into your existing systems for processing the recycled PET (e. g. pre-form injection molding machines). This provides you with another opportunity to save energy and boost efficiency.

Recycled PET from the OHL process can be re-used up to 100 % in beverage bottles.

Efficient decontamination has been verified by range of investigations and challenge tests - FDA/EFSA. The process offers this quality not only under laboratory conditions, but under day-to-day operating conditions as well.



Individual specification of viscosity during batch post-condensation means that recycled PET from the OHL process can also be used for technical applications that call for high viscosity.

Additional Services

- We can also supply customized silo and conveyor systems on request
- Delivery of turn-key plants
- Our service personnel can provide comprehensive training for your staff
- Advice during concept development
- Support in creating feasibility studies
- Support in marketing the pellets produced
- Support in selecting the necessary laboratory equipment and in implementing laboratory tests
- After Sales Service



ProTec Polymer Processing - Always at Your Side

Worldwide sales and service network

Our philosophy is not only to supply customers with sophisticated products of the highest quality, but also to ensure that these products are operated efficiently and that production conditions are optimized. We offer advice and carry out evaluations in advance, but our responsibility does not end at the commissioning stage. Rather it is transferred to our thoroughly trained service personnel, whose presence on the ground ensures that the devices and systems are maintained and adjusted to the highest standards.

This service is not confined to Germany, but is available worldwide. A network of company employees augmented by suitably trained personnel at our highly regarded representative agencies can be swiftly deployed to help, both in an emergency or for regular maintenance.



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