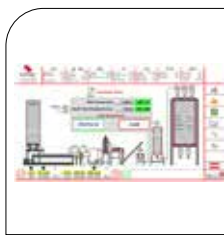




recoSTAR technology is designed for **high automation** and **user-friendliness**. The touch screen enables a simple start-stop procedure, RFID-chip user levels and screenshots (USB port). This ensures **highest efficiency** and consequently **fast ROI**. Features are either standard or can be added according to customer's requirements



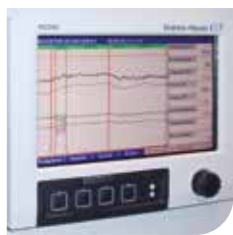
**Automatic food-grade monitoring**  
Food-grade relevant process parameters are monitored; in case of deviations the material is automatically rejected. Consequently, only food-safe material is produced.



**Inline viscosimeter**  
The continuously measured IV of the PET melt during extrusion helps to control quality and indicates any required change of settings.

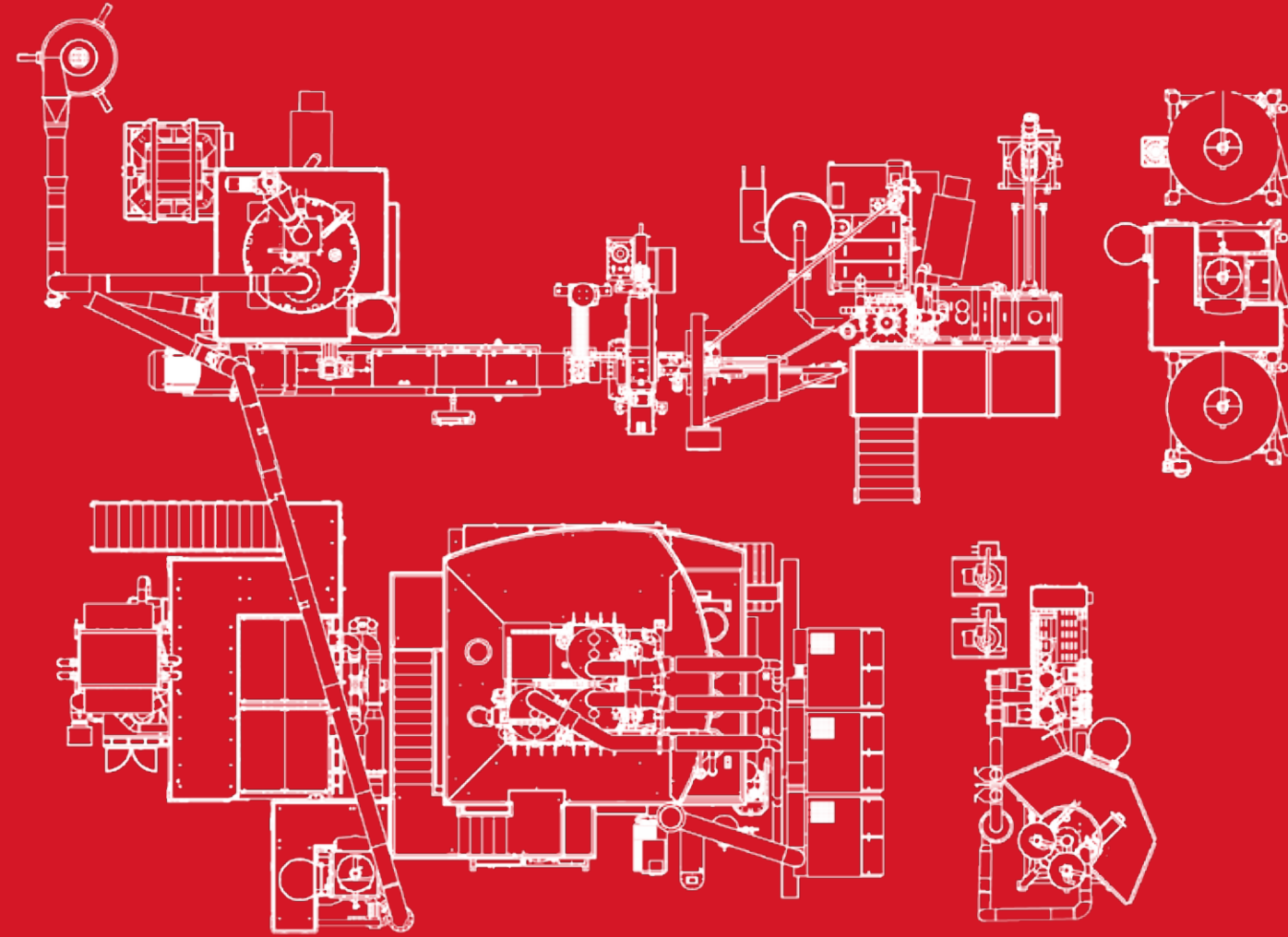


**Online color measurement**  
Colour deviations from a set standard are detected and serve as an inline quality control of the input material. Deviations can be offset by adding additive (either liquid or masterbatch).



**Online writer and archiving**  
The online writer collects all relevant production data for secure traceability. Up to 50 parameters can be stored in short sequences in an internal memory and thus are saved in the event of a power cut.

recoSTAR PET art



We reserve the right to technical modifications. DPR-2494-09V

| recoSTAR PET art                         |               |               |               |               |               |
|--|---------------|---------------|---------------|---------------|---------------|
| Type                                     | 125           | 145           | 165           | 215           | 330           |
| <b>Dimensions</b>                        |               |               |               |               |               |
| Height [mm]                              | 13300         | 13300         | 14000         | 16200         | 14000         |
| Height [inches]                          | 524           | 524           | 551           | 638           | 551           |
| Footprint [mm]                           | 22000 x 20500 | 23000 x 20500 | 23000 x 20500 | 25500 x 20500 | 35000 x 32000 |
| Footprint [inches]                       | 866 x 807     | 906 x 807     | 906 x 807     | 1004 x 807    | 1378 x 1260   |
| Output [kg/h]                            | 1000 - 1200   | 1300 - 1500   | 1900 - 2100   | 3000 - 3200   | 3800 - 4200   |
| Output [lbs/h]                           | 2204 - 2646   | 2866 - 3306   | 4189 - 4630   | 6614 - 7055   | 8377 - 9259   |
| <b>Plant energy consumption [kWh/kg]</b> |               |               |               |               |               |
|  | 0.34-0.39     |               |               |               |               |
| <b>Extruder</b>                          |               |               |               |               |               |
| Screw Diameter (L/D) [mm]                | 125 (24)      | 145 (24)      | 165 (24)      | 215 (24)      | 2x165 (24)    |
| Screw Diameter (L/D) [inch]              | 4.9 (24)      | 5.7 (24)      | 6.5 (24)      | 8.5 (24)      | 2x6.5 (24)    |
| <b>Downstream equipment</b>              |               |               |               |               |               |
| Underwater pelletiser                    | x             | x             | x             | x             | x             |
| Automatic strand pelletiser              | Alternativ    | Alternativ    | Alternativ    | Alternativ    | Alternativ    |
| <b>Solid State Polycondensation</b>      |               |               |               |               |               |
| IV increase [dl/g/h]                     | 0.01-0.02     |               |               |               |               |

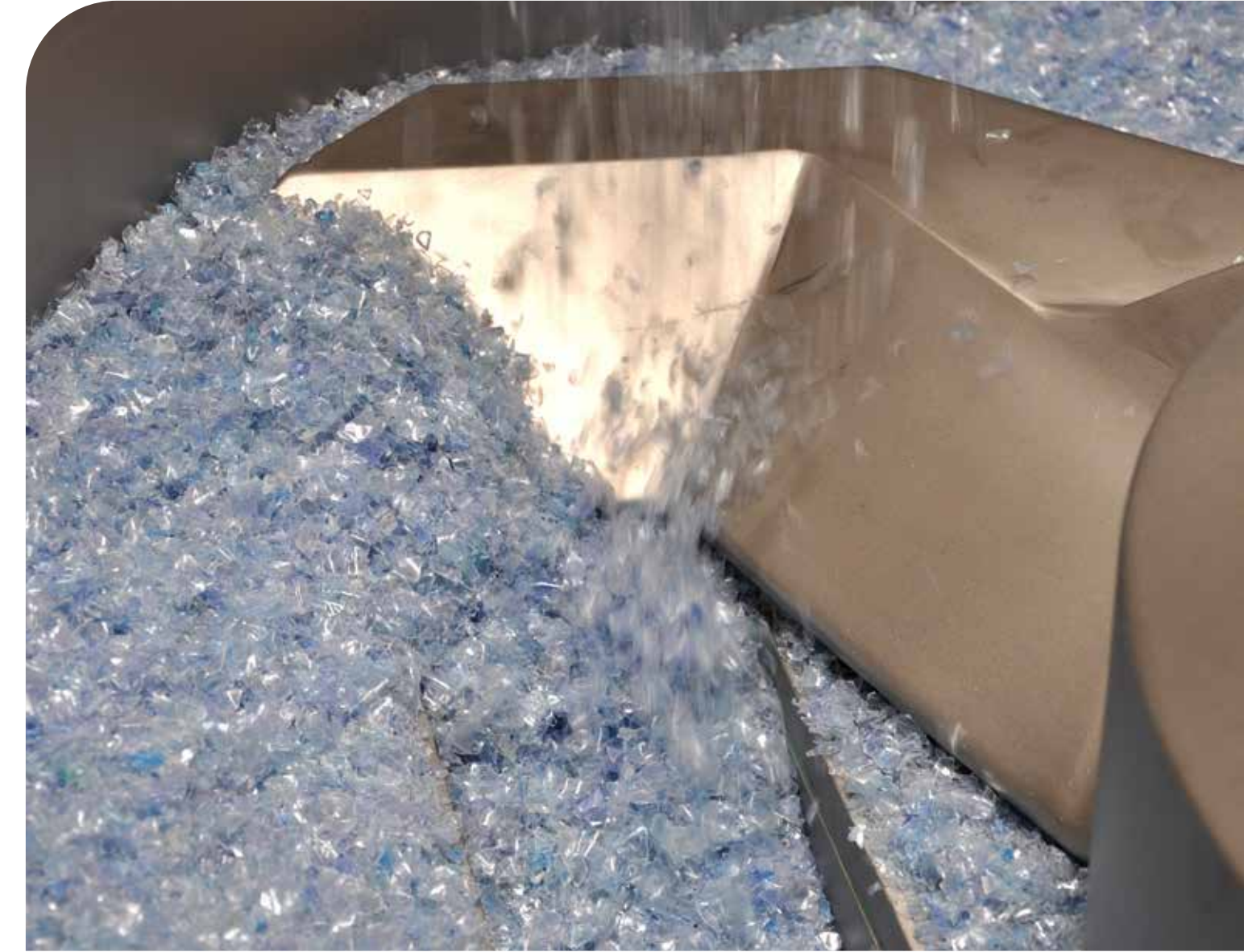
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A member of Starlinger Group

All data depending on design!

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**RECYCLING LINE recoSTAR PET art**

for post-consumer PET bottle flakes, FIFO pre-drying, single screw extrusion, FIFO Solid State Polycondensation, high-end bottle-to-bottle recycling, automatic food-grade monitoring

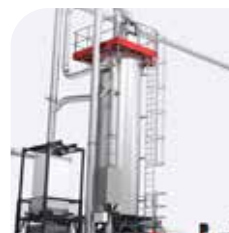


Starlinger





**High-end bottle-to-bottle recycling line** for the recycling of post-consumer bottle flakes after the washing process. The end product is melt-filtered, uniform granulate of highest purity and lowest VOCs.



**FIFO pre-drying** of the PET bottle flakes ensures optimal preparation for subsequent extrusion. Single-stage drying with hot, desiccant air according to the First-In First-Out principle.



**Single-screw extrusion** with short melt phase. The melt pump increases the overall output, stabilizes the melt pressure and ensures a consistent process and melt quality.



**Backflushing melt filters** remove solid contaminants. They are designed for straight melt flow and work with an automatic self-cleaning procedure triggered by melt pressure. Cartridge filters are an option for increased filtration surface in a compact housing.



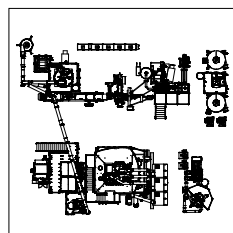
**The underwater pelletiser** produces spherical pellets. The downstream inline crystallizer takes advantage of the embedded melt energy and crystallizes the pellets without the need of external heat. Pellet size and bulk density are adjustable.



**Solid State Polycondensation** enables consistent and adjustable IV increase with the FIFO principle. Outstanding decontamination for bottle-to-bottle application. Acetaldehyde and other VOCs are reduced to the levels of virgin resin.



**Energy efficiency** is ensured by various design features. Energy recovery is available for the pre-heater of the SSP and the final pellets. Alternative energy sources such as natural gas or steam can be used as a cost-friendly alternative for heating.



**Compact design:** The set-up of the recycling line is flexible, most popular options are L, U, or line shape. Each layout option utilizes minimal foot print while maintaining access to relevant operation and maintenance points.



**Easy Maintenance** High up-time and machine availability are key for low production costs. Smart solutions such as dry vacuum pumps or open loop desiccant air flow reduce maintenance requirements to a minimum.

**Advantages**

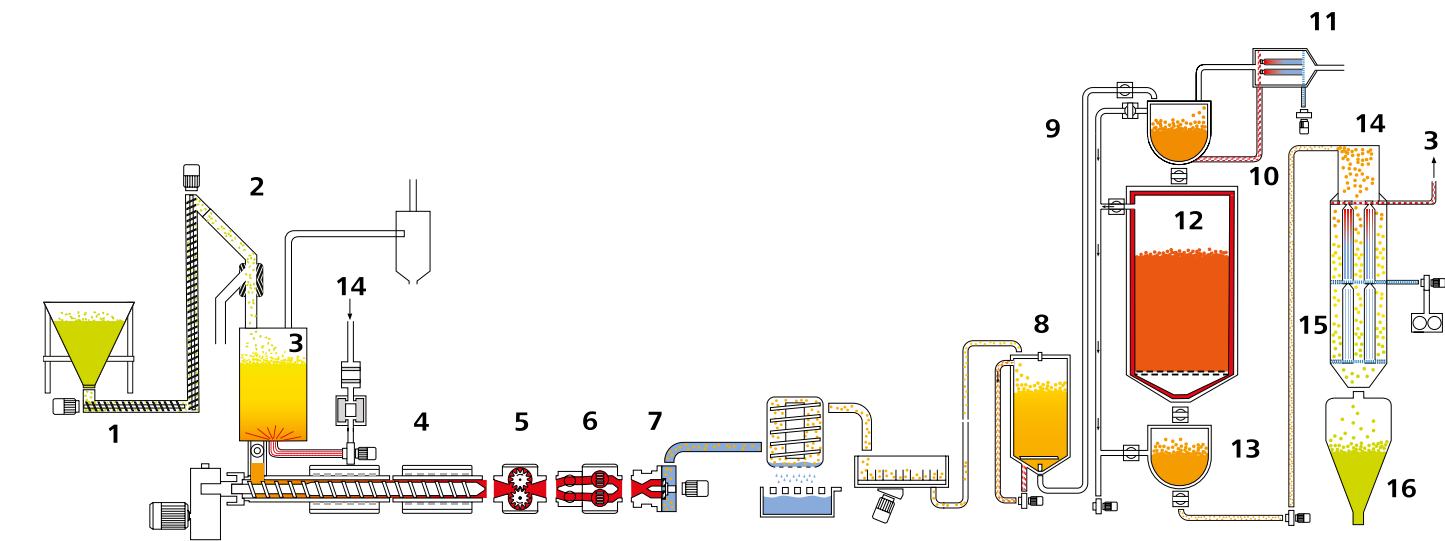
- Outstanding food-contact decontamination
- Adjustable IV increase
- FIFO ensures uniform treatment
- Low energy consumption
- Small footprint
- Convenient operation & maintenance



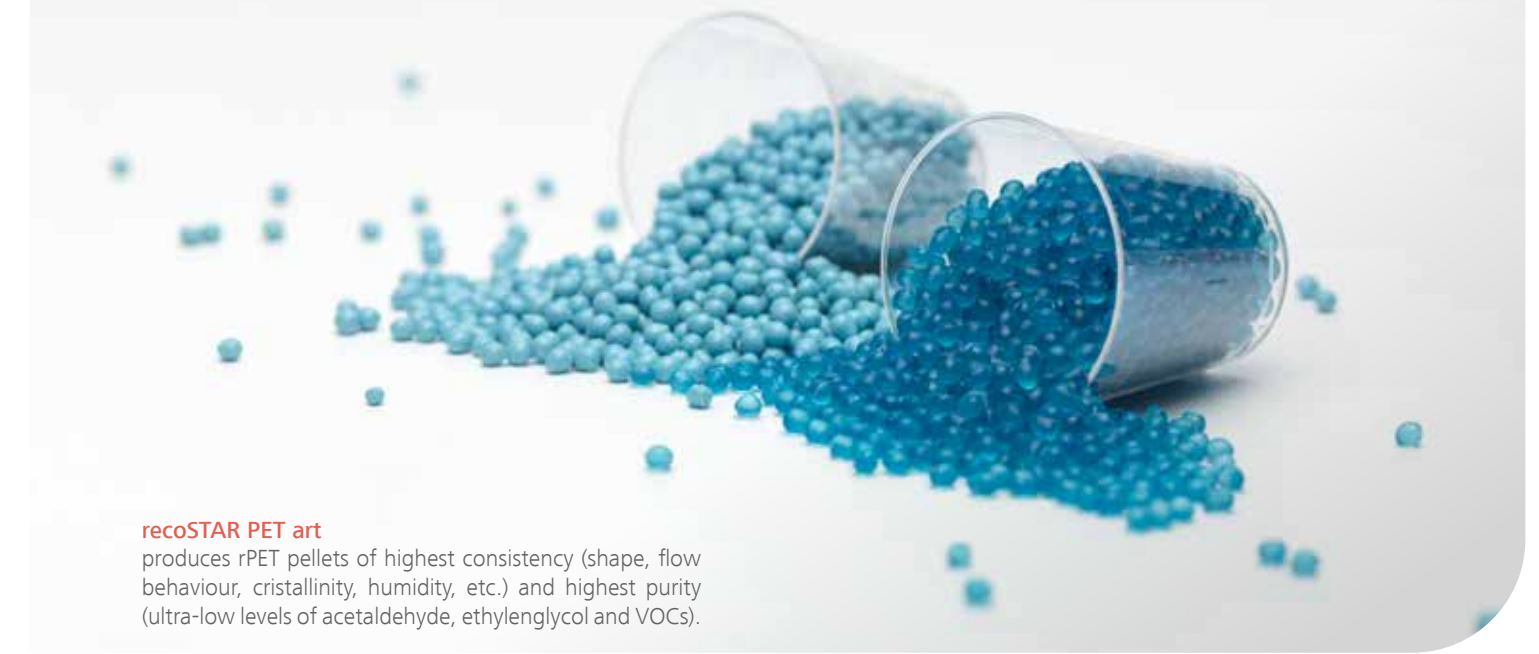
**Starlinger recycling technology** allows **utmost flexibility** for the customer and adjustment to the ever-changing requirements in the market or applications through **modular design**.

| recoSTAR PET art | Food contact | FDA/EFSA | Decontamination/ VOC | Brand owner approved | Low AA level | IV increase          |
|------------------|--------------|----------|----------------------|----------------------|--------------|----------------------|
|                  | ✓            | ✓        | ✓✓✓                  | pending              | ✓✓           | ✓✓✓ with full output |

PET flakes are heated and dried in a single-stage process with hot desiccant air. The special design of the dryer outlets results in center flow prevention, consistent residence time and FIFO processing, ensuring ideal preparation for the extrusion process. A choice of filtration and pelletising systems are available. The downstream inline vacuum SSP reactor uses the energy of the previous step. Special FIFO design ensures consistent reaction parameters, adjustable IV increase as well as highly effective decontamination (ultra-low VOC, AA < 1 ppm) for food contact applications.



- |                         |  |                                   |                         |
|-------------------------|--|-----------------------------------|-------------------------|
| 1. Feeding screw        | 5. Melt pump   | 9. Separate vacuum feeding system | 13. Discharge unit      |
| 2. Metal separator      | 6. Melt filter with backflush                        | 10. SSP preheater                 | 14. Energy recovery kit |
| 3. Combined drying unit | 7. Underwater pelletiser with inline crystallisation | 11. Heat exchanger for preheater  | 15. Pellet water cooler |
| 4. Extruder             | 8. Post-crystallisation unit                         | 12. SSP reactor                   | 16. Storage silo        |



**recoSTAR PET art** produces rPET pellets of highest consistency (shape, flow behaviour, crystallinity, humidity, etc.) and highest purity (ultra-low levels of acetaldehyde, ethylenglycol and VOCs).