

THE FRESH-TEC.  PROCESS OF ZEPPELIN SYSTEMS

EFFECTIVE DEGASSING OF PLASTIC RECYCLATES



 **ZEPPELIN**[®]
WE CREATE SOLUTIONS

zeppelin-systems.com



FRESH-TEC®

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PURITY FOR PLASTIC RECYCLATES

According to EU regulations, the proportion of recycled plastics in products needs to significantly increase. However, odors and impurities often prevent the increased use of recyclates. This applies in particular to use in the cosmetics, household packaging, food and automotive industries.

One example is the stricter regulations of the VDA (Association of the Automotive Industry) regarding volatile organic compounds (VOC) and semi-volatile compounds (FOG) in vehicle interiors. In this industry, FOG levels must be below 500 ppm and VOC levels have to be below 300 ppm – values that can be reliably achieved with Fresh-TEC®. In addition, a Letter of No Objection from the FDA is possible in the food sector.

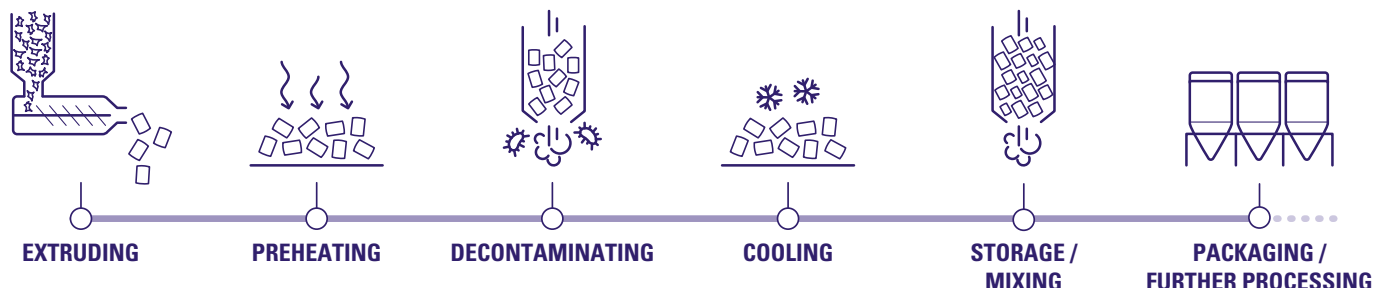
Zeppelin Systems has been manufacturing degassing systems for new plastics for many years with throughputs of up to 70,000 kg/h. This process know-how from hundreds of degassing systems is the basis for the development of our Fresh-TEC® deodorization systems for plastic recyclates.

THE PRINCIPLE: EFFICIENCY FROM THE AIR

The continuously operating Fresh-TEC® deodorization systems remove volatile organic compounds from the heated recycled material by air flushing. Energy recovery and the integration of process waste heat make considerable energy savings possible. In addition, the process guidance optimized with flow simulations ensures maximum effective decontamination.

The Fresh-TEC® process can also reliably remove long-chain compounds. For this purpose, the bulk material is preheated with the patented Zeppelin Systems cross-flow heat exchanger before entering the silo. This prevents VOC condensation in the form of oily deposits in the silo.





THE FRESH-TEC[®] MODULAR SYSTEM

CUSTOMIZED AND MODULAR

Fresh-TEC[®] deodorization systems from Zeppelin Systems are basically built according to a modular concept consisting of several subsystems for the heating, degassing and cooling process steps.

The compact systems can be flexibly adapted to the installation location, your requirements and the incoming bulk material. Parameters that can be changed include the degassing temperature, the degree of dilution, the bulk material mass flow and the residence time depending on the size of the degassing silo. If, for example, an outdoor installation is not possible and the hall height on site is not sufficient, the required residence time can also be achieved via two lower degassing silos.

CONTINUOUS OR DISCONTINUOUS?

Zeppelin Systems offers both continuous and discontinuous systems that remove VOCs from recycled plastics by means of a thermal, physical cleaning process. Discontinuous systems are ideal for starting out in the production of odor-neutral plastics and are particularly suitable for small batch sizes and frequent color changes. However, the continuously operating deodorization systems are much more energy-efficient.

EXPANSION POSSIBLE AT ANY TIME

If an additional degassing silo is required, the output has to be increased or additional infeed and outfeed conveyors need to be retrofitted, the system can be easily expanded. A flexible choice of heating energy is also possible to optimize operating costs.

FRESH-TEC® IS ENERGY-SAVING

REDUCING COSTS – INCREASING EFFICIENCY

The energy-saving thermal insulation of all system components and energy recovery via recuperators (air-to-air heat exchangers) considerably reduce heat or energy losses. The waste heat, e.g., after the degassing silo or from the cooling unit, is fed back to the heaters. The result: energy and operating costs are reduced by more than 30 percent.

In general, the energy content of the preheated granules (after the extruder) in the system is taken into account. Thanks to the compact and highly efficient cross-flow heat exchanger, higher inflow speeds to the granulate are also possible compared to a silo fixed bed. This ensures a larger and thus faster heat transfer during heating and cooling.

FIRST IN – FIRST OUT: FOR CONSISTENT GRANULATE QUALITY

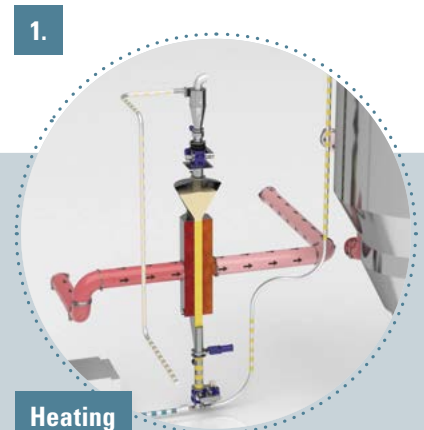
During deodorization, there must be no changes to the bulk material or the formation of bulk material agglomerates. We achieve this through the first in – first out principle, i.e., the residence time in the heater or cooler is the same for all granules.



Fresh-TEC® relies on direct heat transfer from air to granules instead of contact heat exchangers during heating. This ensures gentle heating and avoids hot spots and damage to the granules. In the event of a brief interruption during acceptance, the bulk material is moved “in a circle”. This prevents the formation of agglomerates and allows the discharge of the granules from the silo at any time.



**Continuous deodorization
process flow**



**1.
Heating**



Zeppelin Systems Technical Center in Friedrichshafen

BULK MATERIAL LABORATORY AND ZEPPELIN SYSTEMS TECHNICAL CENTER TESTING FOR OPTIMAL CONDITIONS

Preliminary bulk material inspections in our in-house bulk material laboratory will help you find the optimal system configuration. If you are working with new types of plastic granules, it may also make sense to carry out tests in the Zeppelin Systems Technical Center before creating your degassing system. With these extensive tests, the achievable odor reduction depending on the degassing temperature, residence time and degree of dilution can be reliably determined during the project planning phase of a new system.

In addition to compaction tests, there are also numerous deodorization tests, ranging from five liters to large-scale tests with 1.5 cubic meters of volume, that are accompanied by extensive sample analyses. In further tests, the maximum permissible degassing temperature can be deter-

mined to avoid particle agglomerates, or the flow behavior can be assessed visually.

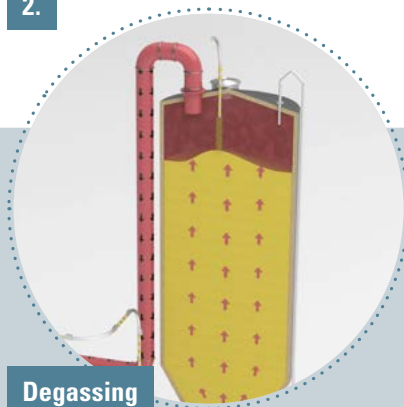
HIGH PROCESS RELIABILITY

Based on our tests, it is not only possible to avoid product carry-over but also the formation of fine hair that accumulates in the pipeline, e.g., during the pneumatic conveying of batch A (low melting point) and becomes detached again during the conveying of batch B (high melting point). This ensures high process reliability and reduces the operating costs of the system.

Conclusion: Fresh-TEC® makes it possible to produce recycled granules that have practically virgin material quality.

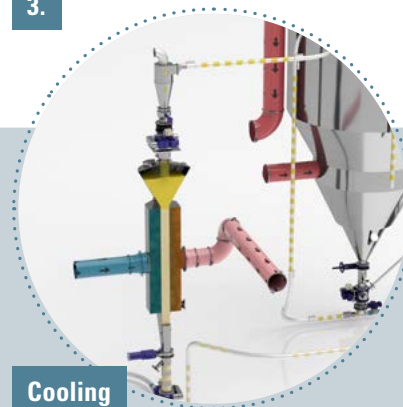
We Create Solutions!

2.



Degassing

3.



Cooling

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