

**ENGINEERING SUSTAINABILITY**

# RECYCLE PLASTICS WITH MAXIMUM EFFICIENCY.

Discover successful concepts for a professionally industrialized  
circular economy.



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**ZEPPELIN**  
WE CREATE SOLUTIONS

# PLASTIC RECYCLING ON AN INDUSTRIAL SCALE? JUST ASK US!

How to increase your share of recyclates – economically and efficiently.

A world without plastics is inconceivable. However, there is a scarcity of fossil raw materials, the basic material for plastic production. We show you how to process and reuse a higher proportion of recyclates to lower their consumption. This is because high throughputs, efficiency and quality make recycling more competitive compared to producing new material.



### MAKING MORE USE OF RECYCLATES ...

Recyclates currently make up only 15% of today's plastics production. The reason: The recycled material often has an unpleasant odor, which is why it can only be fed into the manufacturing process to an extremely limited extent, especially with high-quality products. In addition, storage, homogenization as well as the precise dosing of flakes or fluffy materials already pose a major challenge in recyclate production. The volume of products to be recycled is also growing steadily, pushing many plants to their capacity limits.

### ... WITH INNOVATIVE SOLUTIONS FROM ZEPPELIN SYSTEMS.

We have the right answer to all of these challenges: Zeppelin Systems Plants. We convey high throughputs of up to 30 t/h over a distance of up to 1,000 m. Our discharge modules ensure continuous material flow, and our storage systems are able to reduce material fluctuations through homogenization while also removing odors with high energy efficiency, continuously or in batch operations. Here, the spotlight is particularly on quality, energy efficiency and cost-effectiveness.

### DECADES OF EXPERIENCE AND ADVANCED TECHNOLOGIES.

As one of the leading plant manufacturers, we have decades of experience in handling various bulk materials. Whether PE, PP and PS, PET or PVC, your raw materials are in the best hands with us. At our test centers at the Friedrichshafen and Kassel locations, we test the behavior of your raw materials and design your plant precisely for optimized processes and high productivity.

### WE INDUSTRIALIZE YOUR RECYCLING PROCESSES.

From small plant concepts to large-scale plants – we scale your processes and adapt them to the requirements of your markets. We will provide you with a customized overall concept with our own components and technologies from network partners as well as safeguarding via tests.





## THE TECHNOLOGY FOR MAXIMUM, ENERGY-EFFICIENT ODOR REMOVAL.

Deodorization systems tailored to your needs.

Deodorization plants from Zeppelin Systems will significantly increase your recycle content by completely neutralizing unpleasant odors. This opens up completely new application possibilities using recyclates: Beyond packaging, they can also be used for high-quality end products, such as in the home, automotive, design and lifestyle sectors.

### PREHEATING THE MATERIAL PREVENTS VOC CONDENSATION.

Our continuously operating deodorization systems remove volatile organic compounds (VOC) from the recycled plastics using a thermal-physical cleaning process. While short-chain odorous substances are removed in the extrusion process, our process can also reliably remove long-chain ones. The advantage of our systems is that the material is preheated before it enters the silo. This prevents VOC condensation in the form of oily deposits.

### THE CONFIGURATIONS - AS VARIED AS YOUR REQUIREMENTS.

The deodorization systems can be designed in various configurations. On the one hand, there is a range of alternatives for preheating the material, and on the other

hand, energy-efficient exhaust air concepts that use the process heat for heating the product and the rinsing air. In addition, we also offer more cost-effective deodorization systems for discontinuous operation - ideal for starting up production of odor-neutral plastics. No matter what your requirements and which recycled plastics you process: Our solution fits the bill.

### AHEAD OF THE GAME THROUGH TESTING

Zeppelin Systems has been manufacturing deodorization systems for virgin plastics with throughputs of up to 70,000 kg/h for many years. With the process know-how from over 100 degassing systems, we adapt the systems to your requirements and the behavior of the corresponding bulk material - through comprehensive testing on an industrial scale in our test center in Friedrichshafen. This ensures very high process reliability and premium quality granules. The basic material for premium products.





# OPTIMAL PROCESSING OF POORLY FLOWING BULK MATERIALS.

We have the expertise – for fluffy materials as well.

To ensure high throughputs and economical processing of fluffy materials, it is important to know the preparation processes in detail. Our experts assess and characterize the materials, for example with regard to flowability and conveyability. This is the only way to guarantee the optimal interaction of the plant's components.

As poorly flowing bulk materials, fluffy materials and flakes tend toward bridging when stored in silos. This can bring the flow of material to a standstill. Solution: Storage silos from Zeppelin Systems that ensure a reliable, continuous material flow - with intelligent discharge devices, such as vibratory discharge bottoms or discharge screws.

Did you know? Our storage silos with a volume of up to 800 m<sup>3</sup>, can handle even large quantities of PET flakes.

## OPTIMAL HOMOGENIZATION THROUGH CENTRO-BLEND AND MULTI-CHANNEL BLENDING SILOS.

Mechanical mixers are commonly used to homogenize the flakes. However, the mixing screws installed there

generate fine particles during the mechanical processing of the flakes and are subject to heavy wear. This results in repairs and downtimes. In addition, due to limited size, several mixers are used, which prevents an optimal mixing result, as the mixing contents remain separated from each other by different batches.

With blending silos such as the Centro-Blend and the Multi-Channel from Zeppelin Systems, you make use of a low-maintenance and low-wear alternative. The thoughtful constructions are consistently designed for mass flow and guarantee a high mixing quality for a volume of up to 300 m<sup>3</sup>.

## RECYCLING KNOW-HOW FROM A TO ZEPPELIN.

With solutions from Zeppelin Systems, you are ready to face the growing demands on plastics recycling. We ensure perfectly scalable production and are your partner for both the individual process steps and the entire process chain.



## TESTING AT THE ZEPPELIN TEST CENTER.

We always create an individual solution concept. If necessary, we test the fluffy materials in the Zeppelin pilot plant on an industrial scale before selecting the appropriate technology for the application.

