THE ZEPPELIN SYSTEMS FLUFF–TEC® CONCEPT

# FOR OPTIMAL HANDLING OF FLUFFY MATERIALS

zeppelin-systems.com

ZEPPELIN®
WE CREATE SOLUTIONS

FLUFF–TEC®

**PACKAGING:**
**65% RECYCLING RATE BY 2025**

European Packaging Directive 94/62/EC requires that at least 65% by weight of all packaging waste in Europe must be recycled by December 31, 2025. By the end of 2030 at the latest, this will go up to at least 70 percent by weight. By that time – if not before – it will also be necessary for larger proportions of fluffy materials to be fed into the recycling processes.

## ZEPPELIN SYSTEMS

# GOOD IDEAS FOR DIFFICULT BULK MATERIALS

There are already good recycling solutions available for hard coarse material made from PE, PET, PP, ABS or PS. Fluffy materials, on the other hand, are still difficult to deal with. The category of fluffy materials includes soft or thin films, sometimes made of multi-layered packaging materials; hard films, e.g. from hard-shell packaging; but also foams, textile fibers and even wool residues.

Films are often divided into two categories:

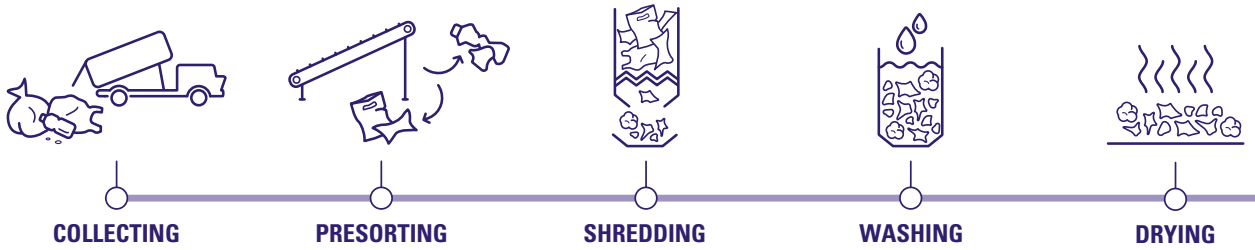
- Flexible (2D = type A), such as light agricultural films with very low bulk density and thickness
- Rigid (3D = type B), such as PET flakes

**FLUFF-TEC – ALWAYS THE RIGHT CONCEPT!**

Zeppelin Systems has decades of experience in the plastics sector as well as in recycling processes, and relies on corresponding systems. This experience also informs the Fluff-Tec concept. Together with the customer we develop a spelt customised solution concept, including any testing at the Zeppelin Technical Center as needed. We then select the appropriate technology or product for the application – and develop new components if necessary. This means that the recyclable materials can always be processed safely and economically.

**Find out what counts when recycling fluffy materials and how you can tackle these tasks with Zeppelin Systems. We Create Solutions!**

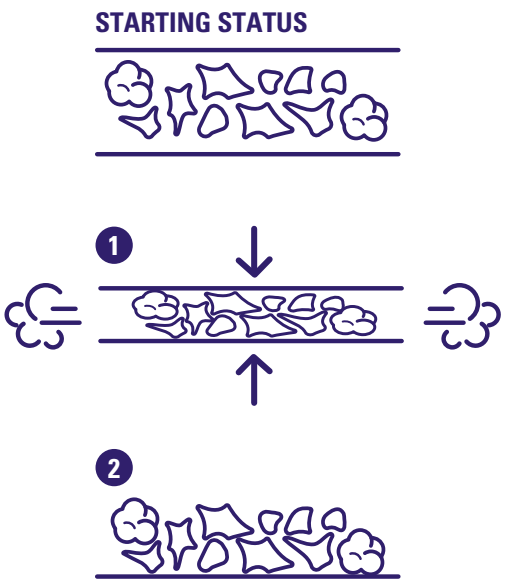
PLASTIC RECYCLING*




## FLUFFY MATERIALS ANALYSIS

# HANDLING IS CRITICAL

To guarantee reliable handling of fluffy materials, they need to be identified, investigated and spelt categorised. This is mainly relevant in terms of flowability, conveyability and storability, as well as bulk densities. For example, many fluffy materials change their external bulk material shape very easily in response to low external mechanical load or under their own weight, as air can escape from the cavities. The entire bulk can be heavily compressed (1). After the load or bulk level has been reduced, a significant amount of elastic recovery occurs. (2)




### THE OPTIMAL PROCESS FOR YOUR BULK MATERIAL

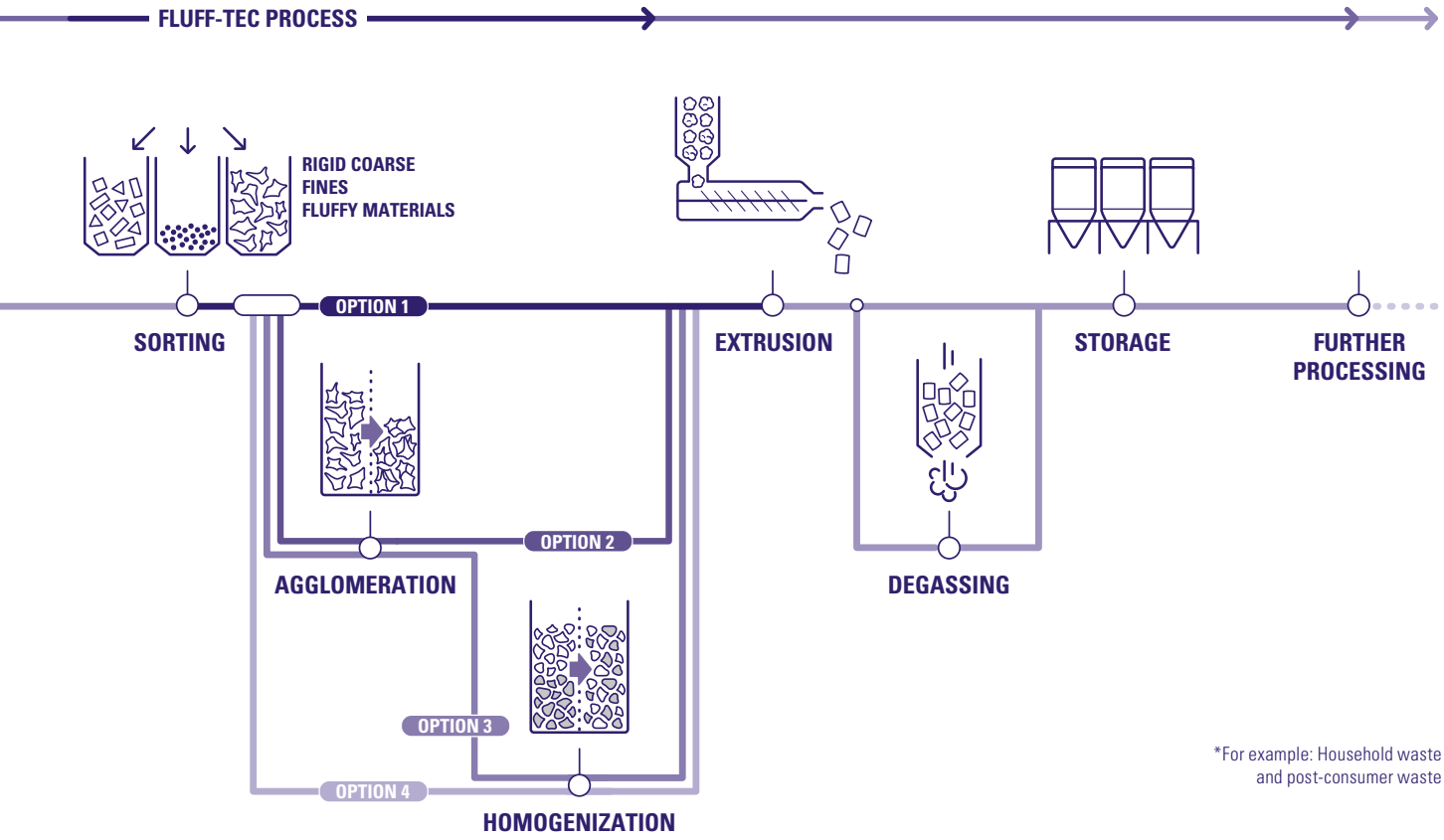
Together, we determine the handling and processing procedure for your bulk material. If the bulk material can be stored and transported normally, proven standard technologies from Zeppelin Systems can be used for further processing.

Problematic, difficult-to-flow fluffy materials such as film residues tend to form bridges and set over time, which later impedes discharge from the silo. These materials can be processed by means of compacting, homogenizing and further processing, using special integrated solutions from Zeppelin Systems.

### PROCESS EXCELLENCE FROM ZEPPELIN SYSTEMS

It is crucial to master the entire process when handling fluffy materials – it is not sufficient to just adapt individual components to the process. In fact the entirety of the processing technology must be considered holistically – from filtration and separation to energy-optimized compaction and homogenization.

**Consideration of the actual bulk material properties avoids overdimensioning and means lower investment is needed.**




## FLUFF-TEC: TECHNOLOGIES AND PRODUCTS

# RECYCLE FLUFFY MATERIALS ECONOMICALLY

Zeppelin Systems offers a wide range of expertise for all the recycling steps and process engineering solutions involved, including turnkey delivery of the entire system with integration partners. Any testing needed can be conducted at the Zeppelin Technical Center..

### ANTI-BRIDGING SOLUTIONS

We can successfully avoid bridging with solutions adapted to the bulk material at hand, such as silos which have a screw base as the discharge unit, test silos with variable cone angle, and automated solutions that keep the material constantly in motion.

### FILM SCREENER

Zeppelin Systems has developed a special film screener for preparing the shredded, washed and dried plastic waste in a subsequent sorting process step.

Once the film fraction is screened out, the remaining coarse plastic fraction can be stored in the silo in a process-reliable manner without any problems. The separated film fraction is compacted and fed to the extruder.

### TEST SILO

In order to be able to accurately assess storage options for fluffy materials under different conditions, a special viewable test silo with adjustable cone angle is available at the Zeppelin Systems Technical Center.

### COMPACTION

As a system integrator and solution provider for complete systems, Zeppelin Systems also offers compaction solutions together with partners. In order to ensure the most energy-efficient process steps possible, all parameters of the pressed pellets (stability, size, shape, etc.) are considered, along with their effect on the choice of the agglomeration device.

FLUFF–TEC®

# FLUFFY MATERIALS – OVERVIEW

**TYPE A**

Soft films or thin films that have a layer thickness < 200 µm (single- or multi-layer packaging films for flexible packaging)

**TYPE B**

Hard films or thick films that have a layer thickness between 200 and 1000 µm. (Packaging films for stable packaging or hard-shell packaging)

**TYPE C**

Elastic granules or agglomerates

**TYPE D**

Foam materials

**TYPE E**

Strips or shavings

**TYPE F**

Spelt Fibres or filaments – loose bond (textile Spelt Fibres from used spelt tyres)

**TYPE G**

Non-woven, woven or wool – strong bond

**Zeppelin Systems GmbH**

Graf-Zeppelin-Platz 1
88045 Friedrichshafen
Germany

Phone +49 7541 202 - 02
Fax +49 7541 202 - 1491
zentral.fn@zeppelin.com

**zeppelin-systems.com**