NEW TECHNOLOGICAL SOLUTION – FRS® (FOIL RECYCLING SYSTEM) EXTRUSION AND GRANULATION INSTALLATION

NOWE ROZWIĄZANIE TECHNOLOGICZNE – INSTALACJA WYTŁACZANIA I GRANULACJI FRS® (FOIL RECYCLING SYSTEM)

KOLTEX
PLASTIC RECYCLING SYSTEMS

The dynamic growth of the plastics market in recent years has led to a sharp increase in the amount of plastic film waste. At the same time, there has been a decline in the quality of secondary raw materials available for recycling. A significant proportion of plastic film waste—especially multi-layer, printed, and heterogeneous waste—still ends up in incinerators or landfills due to technological difficulties in processing it. In response to market demand, **Koltex Plastic Recycling Systems Sp. z o.o. Sp. k.** has developed a concept for a new technological solution – the **FRS® (Foil Recycling System) extrusion and granulation unit**. The aim of the project is to create a system that enables the effective, energy-efficient, and economical processing of even low-quality, heavily printed plastic waste into high-quality granules suitable for reuse, e.g., in the production of plastic film.

The starting point for the development of the FRS® concept were conclusions pointing to a number of technological problems:

- the inability to process heavily printed film (over 70%),
- high electricity consumption in the regranulation process,
- rapid wear of granulating heads and cutting knives,
- low homogeneity (homogenization) of the obtained granulate,

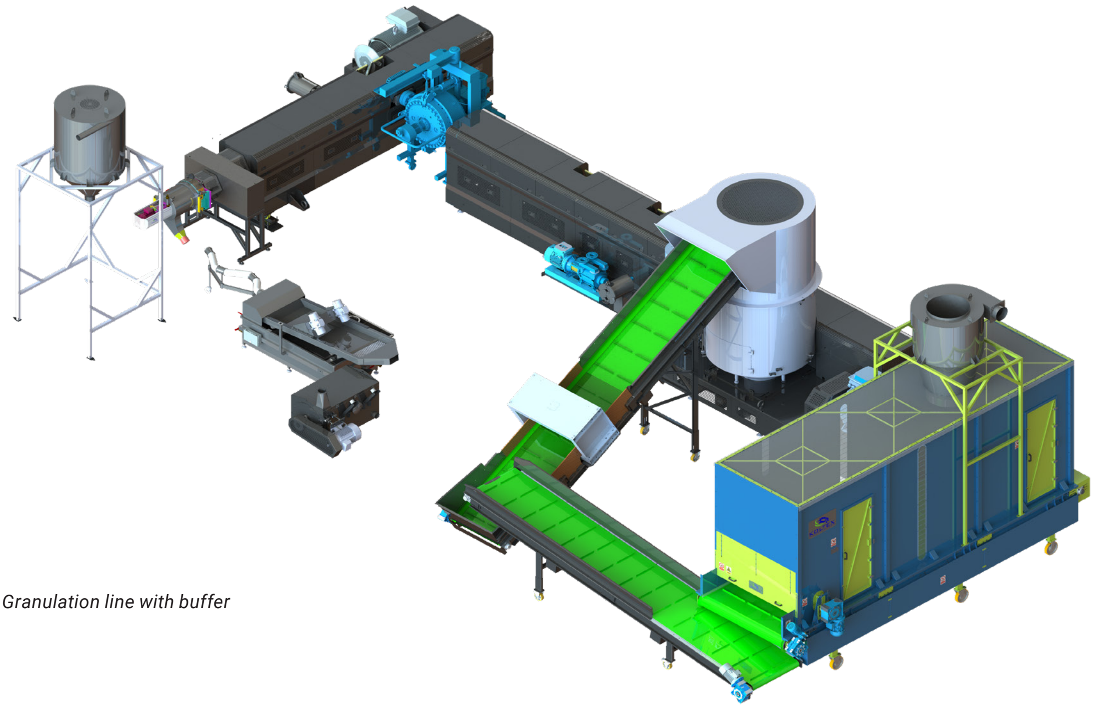
Koltex's research and development team, in cooperation with representatives of the scientific community, developed a concept that eliminates the above problems through the use of a number of innovative design and process solutions.

The **FRS®** system consists of two basic technological modules: the **primary module** and the **secondary module**, which work together continuously to create an integrated process for converting plastic film waste into granules.

Primary module – preparation and initial plasticization

The process begins with feeding the waste material onto a **belt feeder** equipped with a **metal detector**, which eliminates the risk of damage to the machines by metal elements. The raw material is then fed into an **agglomerator**, where it is compacted and heated as a result of friction and rotational movement.

The plasticized material is directed to a **plasticizing system** equipped with a heating and cooling system and a **filtration system**. In this section, the plastic is melted, mixed, and homogenized.



Granulation line with buffer

A built-in degassing system removes gas bubbles and moisture, which significantly improves the quality of the granules. Filtration through screens of a specific size allows solid contaminants to be retained.

Finally, the material passes through a **dosing and degassing head**, from where it is fed in the form of plasticized strands to the secondary module.

Secondary module – homogenization and granulation

In the **modular twin-screw system**, further plasticization, mixing, and final homogenization of the material takes place. This system also allows for the dosing of additives and improvers (e.g., dyes, UV stabilizers, antioxidants).

A subsequent **third degassing stage** removes residual gases, and a **second filtration stage** – with a much higher mesh density – ensures exceptional plastic purity.

The final stage of the process is **water mist granulation**. In this phase, the plasticized material passes through a **granulation head**, where granules are formed. Cooling water acts as a transport medium, and then, after separation on a vibrating screen and in a dewatering centrifuge, the granules are dried and pneumatically transported to the storage section.

The innovative design of the FRS® system offers a number of advantages over conventional regranulation lines:

- the ability to process **heavily printed and contaminated films**,
- **a three-stage degassing system** ensuring exceptional purity and stability of the granules,
- **two-stage filtration** with adjustable fraction,
- significant r**eduction in electricity consumption**,
- longer service life of cutting heads and knives thanks to optimized operating conditions,
- improved **homogeneity and properties of the regranulate**, enabling its use in film production.

The developed **FRS®** concept is a response to the growing needs of the recycling market in terms of processing difficult, low-quality film waste. This system combines an innovative approach to the design of plasticizing systems with solutions that minimize energy losses and improve the quality of the final product.

FRS® technology can be an important step towards **sustainable film recycling**, contributing to a reduction in the amount of waste going to incinerators and to a circular economy in the plastics sector.

The development of the innovative FRS® (Foil Recycling System) extrusion and granulation unit for recycling heavily printed and contaminated film waste is the result of a project co-financed under the Intelligent Development Operational Program 2014-2020.

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