

PULPER RAGS

Important source of raw materials
in waste paper recycling

Material in focus

PULPER RAGS

For a long time, pulper rags have gone primarily to landfill. In the past few years, however, their potential has been identified as a secondary raw material source. This waste from the paper industry largely consists of steel wire, which can be recovered and re-used if the right shredding technology is available. Nevertheless, the difficult-to-handle pulper rags make considerable demands on the machines to be used. ANDRITZ has developed a two-stage process for this application that has already proven successful in many recycling plants.



In many parts of the world, paper is one of the best managed raw materials nowadays, with high recovery and recycling rates of 70% and more. International initiatives aim at optimizing the management of paper throughout the value chain, from paper and board manufacturing, converting and printing, through to the collection, sorting, transportation, and recycling of used paper and board products back into the paper loop.

For paper production based on recycled fibers, waste paper is usually delivered as pressed bales held in shape with binding wires. These tied bales of waste paper are fed into the primary pulper. The plastic films, textile remnants, binding wires, and similar items fed to the plant together with the waste paper are considered contaminants in papermaking. They occur in the form of pulper rags and loose rejects. Especially the rags, however, are also a valuable source of raw materials due to their very high steel wire content.

◀ Pulper rags are a very demanding compound of metallic and non-metallic components, but an important source of valuable raw materials in waste paper recycling.

Hard to handle

Pulper rags form in the vortex center of the pulper from the bale wires and other contaminants and are removed from the pulper continuously by an adjustable ragger. Then the pulper rag is cut into transportable lengths by a rag cutter.

Pulper rags are a very demanding mechanical compound of metallic and non-metallic components. Rope lengths of up to 15 m are not uncommon, and diameters can be up to 800 mm.

Steel wires with a diameter of around 3 mm are the main valuable fraction that can be recovered from pulper rag recycling. Plastic films, textiles, and the residual organic waste are suitable for use as substitute fuels. Possible contaminants are non-ferrous metals in the form of aluminum foil or copper and aluminum wires as well as thick-walled steel parts, chunks of building rubble, and stones.

The wealth of experience gathered in recycling of pulper rags also shows that the material composition and structure of the rags can vary considerably.

Two powerful shredders

For tasks as demanding as the treatment of pulper rags, a two-stage process is recommended. In the first part of the plant, the rags are fed to a coarse shredder. The slow-running, twin-shaft device is ideally suited for powerful and, at the same time, energy-saving pre-shredding of the stringy input material. It is largely insensitive to possible contaminants. The ANDRITZ UC Universal Rotary Shear allows very flexible operation for rags of all lengths and diameters at high throughput rates of up to 15 t/h.

In order to avoid any quality issues in the substitute fuel fraction and other subsequent and more sophisticated separation technologies, manual sorting can be applied after the first stage in order to remove contaminants from the process at an early stage.

In a two-stage process, the UG Universal Granulator is the best choice for post-shredding of the pre-shredded pulper rags. ▶

For reliable post-shredding of the pre-shredded pulper rags, the ANDRITZ UG Universal Granulator is the best choice. The material fed to it is grabbed by the fast-running rotor and shredded in interaction with the fixed stator knives.

An exchangeable screen below the rotor with variable perforation diameters has considerable influence on the throughput and the shredding result. For efficient removal of metal



The rags can have a length of up to 15 m and a diameter of up to 800 mm. ▶





▲ Output material after the post-shredding stage

wires with high cleanliness in the metal fraction, it is important to cut the pre-shredded rags to a size of below 40 mm and to loosen up the material. This task is performed perfectly by the ANDRITZ granulator.

All machines are equipped with a specially controlled hydraulic pusher that reacts quickly to changes in the incoming material. This ensures highest operational safety and maximum throughput.

Normally, an overband magnet is used to remove ferrous steel wires. If a further reduction of the non-ferrous metal content is requested in the substitute fuel fraction, the concept can be extended to include other suitable separation technologies.

Although the properties of the pulper rags as feed material are subject to considerable fluctuation in terms of material composition, dimensions, and moisture content, ANDRITZ's two-stage solution achieves very good results and produces high-quality fractions.

The steel fraction, which originates mainly from the binding wires round the waste paper bales, is uncontaminated and can be marketed very well as a valuable fraction, for example as scrap used in foundries. The remaining fraction with its high calorific value is normally used as substitute fuel.



▲ Pure steel fraction



▲ Residual fraction is used as substitute fuel.