ANDRITZ
Pulp & Paper

Reject Systems after Conventional Pulping

From trash to treasure

Reject Systems
Turning waste into cash

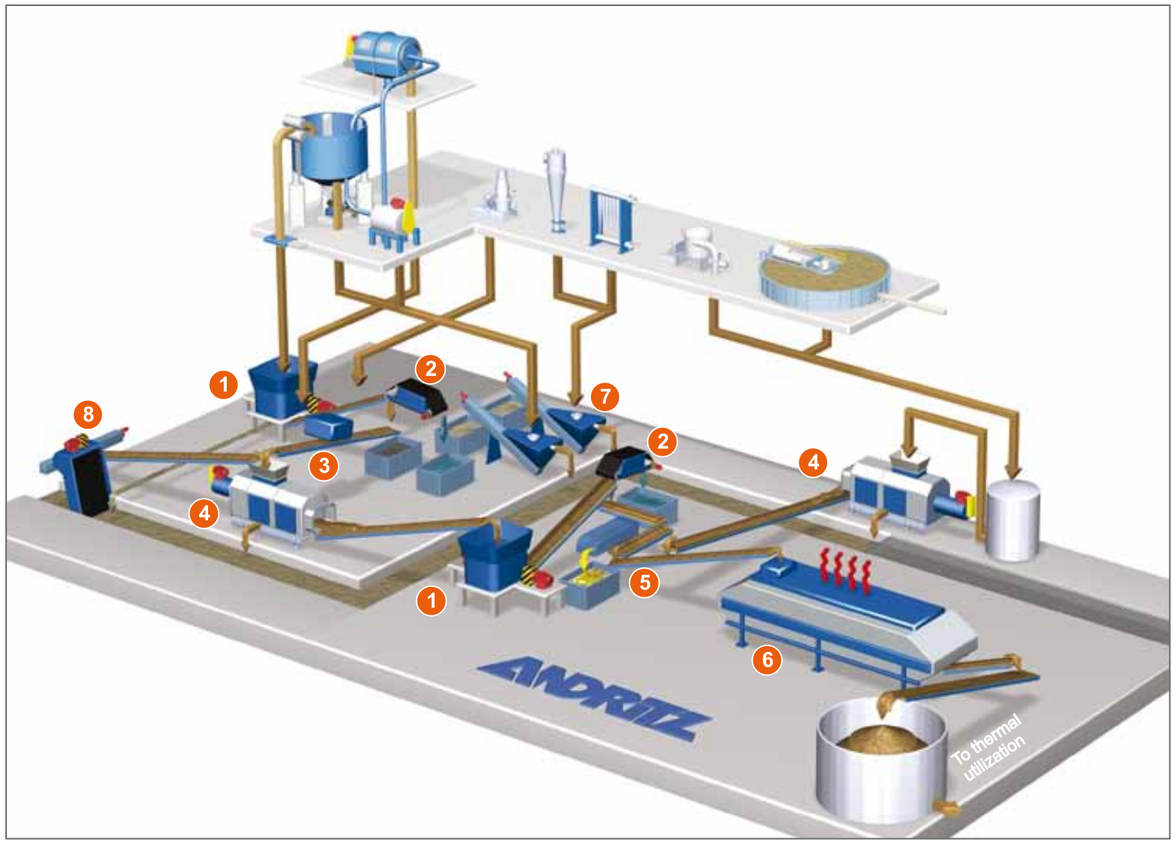
Every recycled fiber line needs a proper water, sludge and reject system in order to operate economically. The first and obvious goal is to minimize costs for resources (water, energy) and disposal.
In addition, rejects are valuable and generate income, for example metals as raw materials and plastics as a source of energy. For this purpose, rejects from the recycled fiber process require optimum and properly adapted treatment. This process must be cost-efficient and simple, as well as fulfilling certain requirements to ensure that the rejects or their component parts can be utilized thermally (e.g. combustion or gasification), can be sold or re-used (e.g. after pelleting), or can be disposed of at minimum cost and effort.
All this requires careful handling of the reject and a thorough knowledge of the individual process steps. Major unit operations, such as shredding, metal and heavy particle separation, sludge dewatering, compacting, drying, and either pelleting and combustion or gasification have to be combined and arranged correctly to achieve a maximum benefit depending on the final intended purpose.

Benefits

- **Compliance with the legal requirements for protection of the environment, e.g. landfill directives**
- **Reduction of disposal and transportation costs of up to 30%**
- **Pre-treatment of rejects for fuel generation**
- **Reduction of greenhouse gas emissions (CO_2) by 25% to over 40%**
- **Additional income from recycling of raw material (e.g. metals or plastic)**

▼ Reject compactor – one of the key components

▼ Example for a reject system based on conventional pulping for industrial grade lines



1 Shredding. Sets the correct particle size. The coarse shredder cuts the rag for the following coarse metal separation. Large particles are reduced to the desired size by slowly rotating shafts fitted with wear-resistant cutting devices. A screen plate determines the particle size. The fine shredder is typically applied before process steps as fine metal or PVC separation. The machine is easy to install and has good accessibility, and its robust design ensures reliable operation with low maintenance requirement.

2 Metal separation. Enhanced separation of ferrous and non-ferrous metals. Ferrous metals are separated by a magnetic, over-belt separator, whereas non-ferrous metals are ejected by an eddy current separator. Ferrous metals are removed from the process at an early stage in order to protect the subsequent equipment. Non-ferrous materials are typically separated after fine shredding to achieve higher separation efficiencies.

3 Metal detection. Detects any kind of metallic material. Large particles can cause malfunctions and damage machinery. This is prevented by means of effective metal detection. Bulky metal pieces cause an electromagnetic field to change and the metal pieces are thus detected. A signal is sent to the conveying system control unit which ejects the larger metal pieces immediately.

4 Compacting. Mechanical dewatering of coarse and fibrous rejects to highest dryness. The reject material fed to the compactor is conveyed by a rotating screw and compressed in a counter-pressure unit by two hydraulically actuated pressure flaps. Wear-resistant, heavy-duty baskets retain the solids, while the water flows through the holes in the baskets and is collected in a filtrate tray. The final dryness depends on the type of reject material and its fiber content.

5 Separation of unwanted components. Separation of material containing PVC. A comprehensive and highly diverse range of plastic materials (PP, PE, PVC etc.) can be detected and classified by means of near infrared technology (NIR). Depending on the end use of the raw material recovered (PVC constitutes a health hazard when incinerated, for example), one or several detected components can be ejected by means of compressed air jets. The separator requires a certain dryness and particle size distribution, and is color-sensitive.

6 Drying. Sludge and reject drying making use of waste heat. The pre-dewatered material is distributed evenly over a permeable belt. Hot air is blown onto the reject material from above and extracted by suction on the underside of the belt in counter-current to the reject material flow (through-air-drying). The low temperature level and long residence time ensure effective drying. Flexible use of low-grade energy (waste heat recovered from hot water or from the combustion plant, etc.) make the dryer highly cost-efficient.

7 Sand and heavy-particle sedimentation. Low-energy dewatering of sand, glass and other heavy rejects by gravity. Low-consistency rejects with a high content of heavy particles – typically coming from cleaning and pulper and pulper detrashing stages – need different treatment. Such flows are treated in a gravity sedimentation chamber. The heavy particles that settle are lifted by an inclined spiral screw conveyor into a container. Sufficient retention time and optimum machine design ensure high filtrate quality and low maintenance.

8 Sewage water screening. Protecting the effluent treatment system. A protection system is required ahead of sewage clarification plants, biofilters and similar plants; and for recovery of suspended solids. A revolving, endless filter belt with specially designed hooks is submerged into the sewage channel and collects contaminants. The mesh sizes of the high-strength filter elements determine the water quality. The units can be installed quickly into any type of channel and are easy to maintain due to their compact, robust design.

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Reject Systems

Converting rejects into valuable resources and energy

As a globally operating technology company with the major target of environmental responsibility, we accept the challenge of supplying waste-to-power systems.

System integration and concepts

By developing components for each process step, we also obtain an understanding of how individual equipment performs most efficiently within the overall system. As a result, ANDRITZ reject systems are designed to be as lean as possible, but as strong as necessary. Installations worldwide give us the foundation on which to improve and customize equipment for each new application.

An essential part of the whole

ANDRITZ reject systems can be implemented into waste-to-power systems - an energy recovery technology to provide renewable energy. ANDRITZ has long experience in woodyard and fuel preparation processes, drying of biomass, refining and grinding, pelleting, and biomass boilers and gasifiers. By including reject systems, this complete chain of sub-systems is utilized to produce energy from pulp and paper mill waste.

Major driving forces

- No landfill allowed in the EU as from 2011
- Costs for landfill are steadily increasing
- Transportation costs are extremely high for materials low in specific weight or wet
- Energy costs are rising steadily
- Rejects are an energy source with high calorific value
- Recovery of internal mill waste makes the facility largely or entirely independent in terms of energy and costs

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