ANDRITZ
Pulp & Paper

Reject systems for conventional pulping

From trash to treasure

ANDRITZ Pulp & Paper

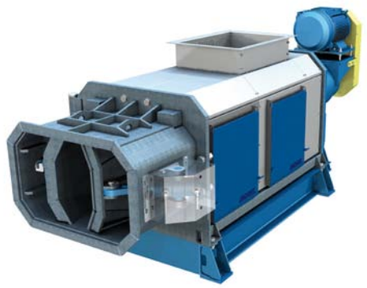
The challenge: Turning waste into cash

Every recycled fiber line needs a proper water-, sludge-, and reject treatment 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. The 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 rejects and a thorough knowledge of the individual process steps. Major individual 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.

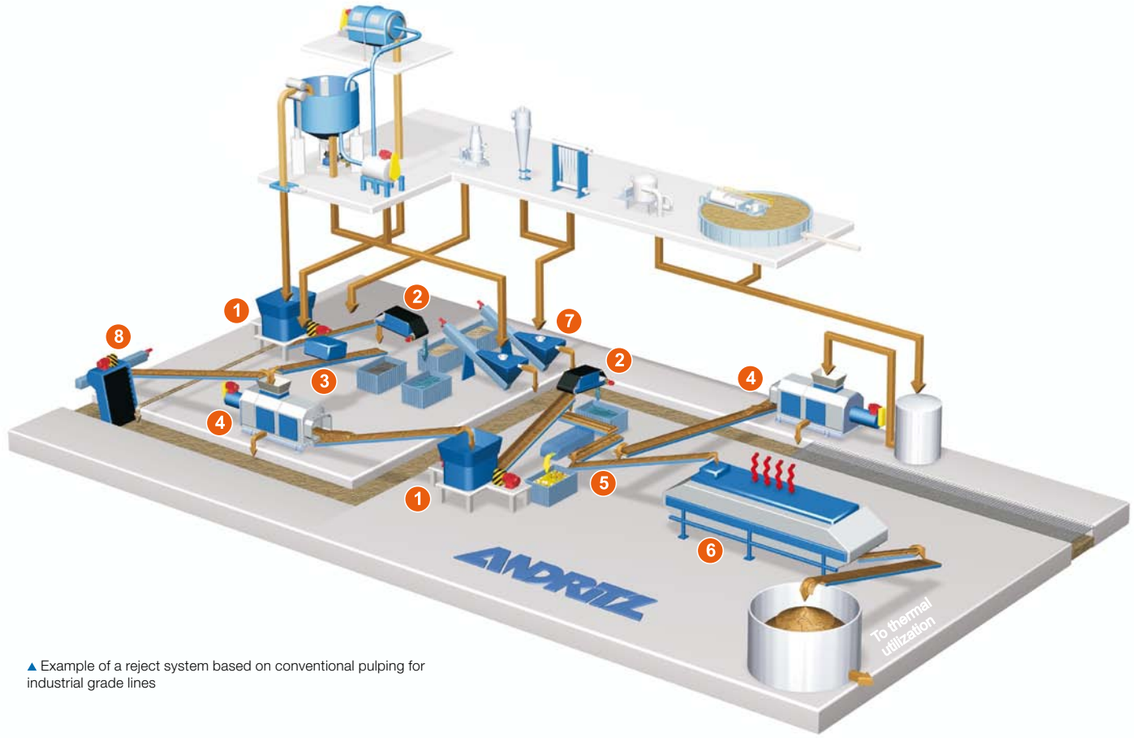
Benefits

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

▼ RejectCompactor – one of the key components



The solution: ANDRITZ reject systems



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

1 Shredding. Sets the correct particle size. The coarse shredder cuts the lengths of pulper rag for subsequent 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 like 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. Removes 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. Large pieces of ferrous metal are removed from the process at an early stage in order to protect the subsequent equipment. Small metal pieces and non-ferrous metals 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 a change in an electromagnetic field and the metal pieces are thus detected. A signal to the conveying system control unit secures immediate ejection from the system.

4 Compacting. Dewaters coarse and fiber rejects mechanically 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 filtrate flows through the holes in the baskets and is collected in a tray. The final dryness depends on the type of reject material and its fiber content.

5 Separation of unwanted components. Removes 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 (e.g. chloride from PVC is critical for corrosion in boilers), one or several detected components can be ejected by compressed air nozzles. The separator requires a certain dryness and particle size distribution.

6 Drying. Makes use of waste heat for sludge and reject drying. 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.) makes the dryer highly cost-efficient.

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

8 Sewage water screening. Protects the effluent treatment system. A protection system is required ahead of sewage treatment 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 size of the high-strength filter elements determines the water quality. The units can be installed quickly into any type of channel, as well as being reliable in operation and easy to maintain due to their compact, robust design.

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Converting rejects into valuable resources and energy

As a globally operating technology leader with environmental responsibility, supplying waste-to-power systems is an important mission for us.

System integration and concepts

By developing components for each process step, we also gain an understanding of how individual equipment performs best 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 — a technology to provide renewable energy. ANDRITZ has many years of experience in woodyard and fuel preparation processes, drying of biomass, refining and grinding, pelleting, and with biomass boilers and gasifiers. Reject systems complete the chain of sub-systems to produce energy from pulp and paper mill waste.

Major driving forces

- No landfill permitted in the EU as from 2011
- Costs for landfill are steadily increasing
- Transport costs are extremely high for low specific weight or wet material
- Energy costs are rising steadily
- Rejects are an energy source with high calorific value
- Recovery of internal mill waste increases independency in terms of energy and costs

ANDRITZ AG
Vienna, Austria
Phone: +43 50805 0

ANDRITZ (China) Ltd.
Foshan, Guangdong, China
Phone: +86 (757) 8202 7602

ANDRITZ Ltd.
Lachine, QC, Canada
Phone: +1 (514) 631 7700

ANDRITZ Oy
Kotka, Finland
Phone: +358 (20) 450 5555

ANDRITZ K.K.
Tokyo, Japan
Phone: +81 (3) 3536 9700

ANDRITZ Brasil Ltda.
Curitiba, Brazil
Phone: +55 (41) 2103 7601

ANDRITZ AG
Stattegger Strasse 18
8045 Graz, Austria
Phone: +43 316 6902-0
fiber.prep@andritz.com
www.andritz.com

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