



Roundwood Debarking

Roundwood is debarked prior to its industrial use in pulping or at sawmill and veneer mill. Bark is a component that causes problems during processing and reduces product quality and decreases value. The force needed to remove the bark from wood depends on the wood species and the time of the year. The debarked roundwood is in general used for further processing immediately after debarking. Drum debarkers and ring debarkers are typically used in industrial debarking in Nordic countries.

BARK CAUSES PROBLEMS IN INDUSTRIAL USE

Roundwood is debarked prior to its industrial use in pulping or at sawmill and veneer mill. In pulp and papermaking, bark is a component that causes problems during processing and reduces product quality.

The maximum bark content allowed among chips delivered to a pulp mill is typically less than 1 % but may be even smaller than 0.5 % especially if mechanical pulp is manufactured. High bark content reduces the value of chips and is typically compensated in the price paid of chips. Thereby, efficient debarking is a must for the material delivered to a pulp mill.

Pulpwood logs contains approximately 12-14 mass-% of bark of which 1-2 %, on average, is lost in logging operations and transportation. Losses can however be significantly higher in the growing season. Thus 90-95 % of the bark has to be removed to reach pulp mill quality requirements.

SEVERAL WAYS TO REMOVE THE BARK

The force needed to remove the bark from wood depends on the wood species and the time of the year. For example, bark is more strongly attached for hardwoods such as birch and aspen, compared with conifers. Debarking is easier in the growing seasons, compared with dormant season in wintertime. In addition, drying increases the force needed to debark the roundwood.

Drum debarkers

Drum debarkers are used specially at pulp mills. They are typically stationary equipment but a mobile version is also available. The smallest top diameter of the roundwood these debarkers can handle is in the range of 5-8 cm. The debarked roundwood is usually used for further processing immediately after debarking.

The advantage of a drum debarker is that it can process multiple logs at the same time. Roundwood is fed to a

receiving deck that conveys them through the slasher deck to a debarking drum. In the debarking drum, roundwood travels along the slowly rotating drum and the bark is separated by abrasion when logs rub and hit each other. Loose bark passes slots in the drum and is collected using a conveyor located beneath the drum.

De-icing prior to debarking is needed in wintertime when the adhesion of bark to wood is strong. De-icing is performed using hot water sprinkled on the logs. Loose sand and bark are released in de-icing and collected beneath the de-icing line. The de-icing unit can also be used in summer time to wash loose sand from the log surface and to wet the bark to loosen adhesion between bark and wood.

After debarking, washing is performed to remove loose bark. Some amount of wood is released and lost in debarking too. Wood losses are typically 1-3 % in drum debarking. When processing high amount of roundwood, wood losses may constitute significant economic losses.

Small diameter trees can also be delimited and debarked in a drum debarker. However, wood losses up to 10 % may occur in this case unless debarker is correctly designed for this purpose.

The loose bark is typically used in energy production. Before combustion, the bark is comminuted and loose sand and water are removed at the bark handling system. The system contains a sand separation unit, a bark shredder and a bark press that is used to reduce the content of water in bark. In addition, screens can be used to control particle size and dryers to decrease moisture content.

A water treatment system for waste waters originated from debarking and bark processing is also needed. Some amount of bark is also released at the wood yard. This bark contains high amounts of impurities such as sand and stones. If a suitable sand separation system is installed, this loose sand containing bark can be

processed at the same time with bark originated from debarking. Otherwise, sand containing bark has to be processed as waste.

Rotor debarkers

Sawmills and veneer mills use rotor debarkers (also referred to as the cambial shear barker or the ring debarker) in Nordic countries. In that procedure, individual logs are debarked one by one and bark is separated from xylem by mechanical peeling: Blunt knives pressed against the log peel the bark off at the cambium producing long strings of bark. De-icing is not needed when rotor debarkers are used. Mobile ring debarkers were used at terminals for pulpwood before debarking at a pulp mill become general practice. Log wetting by water is not needed in rotary debarking.

King debarker

In a king debarker, logs are fed onto rotating cylinders. Abrader plates mounted on cylinders rip the bark off the log. De-icing or log watering is not needed in this debarker type.

Flail-chain debarker

Flail-chain debarkers can be utilized in the delimiting of trees and in the debarking of roundwood. It can also process small diameter trees from first thinning. In this debarking unit, chains mounted in a rotating drum are used to hit the log surface to remove the bark. The combination of flail-chain debarking and gentle drum-debarking has been shown to be capable of producing debarking degree fulfilling the low residual bark requirements at a pulp mill.

AMOUNT AND PROPERTIES OF BARK

Debarking one solid cubic meter of fresh softwood produces approximately 60 kg of fresh loose bark having loose volume of ca 0.35 m³. The amount of bark in birch is slightly higher and the density is higher compared to bark in softwoods and thus debarking one solid cubic meter of birch pulpwood produces approximately 120 kg of fresh bark having loose volume of ca 0.43 m³.

The moisture content of bark varies between tree species and changes along the annual cycle and thus

the mass of the bark produced changes too. The basic density of the pine and spruce bark is 300-400 kg/m³ and of birch 500-560 kg/m³.

Bark presses are used at pulp mills to remove loose water and they can decrease the moisture content down to 55 % but thermal drying has to be used to get lower moisture content. High moisture content decreases the bark value in energy production.

USE OF BARK

The use of bark formed as an industrial by-product is limited by EU-legislation. The bark is not the primary product of a pulp mill or sawmill but it can be processed as by-product when its properties are similar to the bark in a living tree.

The sand containing bark collected from a wood yard has to be processed as a waste unless other use for that material is demonstrated. Studies to utilize the sand containing bark in different end products are currently ongoing.

Typical uses for the clean bark are to utilize it as a mulch, in landscaping and in energy production. Future biorefineries will use bark as a raw material in the production of various specialty chemicals.



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