Densit® wear protection in

The paper industry

- ensures continuous operation of critical components

Photo: K. A. Larsson/BIOFOTO

Continuous operation is essential to maximise return on investment in pulp and paper mills. For economical running, maintenance costs must be minimised throughout the plants, requiring engineering skill and reliable components so that shutdowns can be scheduled.

In particular the heart of the process, the digester in the pulp mill and the paper or board machine in the paper mill, must always run as first priority. Unscheduled shutdowns must be avoided, primarily to avoid production loss but also to minimise maintenance costs. Keeping energy consumption low is also an important factor in running an economical plant, affecting many aspects of process flow and component selection. Compliance with environmental performance legislation is an increasing and vital priority. Densit® wear protection systems is a useful tool in the ongoing battle for continuous improvement and minimum operating costs. Reliable wear linings are essential for effective maintenance planning, and a Densit® solution offers both reliability and long life: less frequent planned maintenance and no unscheduled maintenance. Densit® wear protection systems can be designed to minimise heat loss in components, ducts and pipes.

Densit

DENSIT® ECONOMY WITH SEAMLESS AND FLEXIBLE LININGS

The intrinsic nature of Densit® wear lining systems means that they are completely jointless, and can be formed into any geometry. This flexibility provides the capability for installing seamlessly graduated eccentric linings of variable thickness. In this way the most economical lining solution is achieved, thicker protection being applied where wear is most extreme, and thinner protection where less wear occurs, with smooth graduation in between. This feature is particularly recommended for lining components such as pipes, ducts and cyclones, where wear exposure varies within the component. For the same reason, eccentric linings are especially recommended for pipe bends.

IN-SITU INSTALLATION

Densit® wear protection is applied by casting, trowelling or spraying, depending upon the component size and geometry. Densulate insulated linings are suitable for high-temperature applications where minimising heat loss is critical.

DENSIT® COMPONENTS

Pre-lined Densit® components in any geometry are also available, for situations where in-situ lining is impractical or uneconomical.

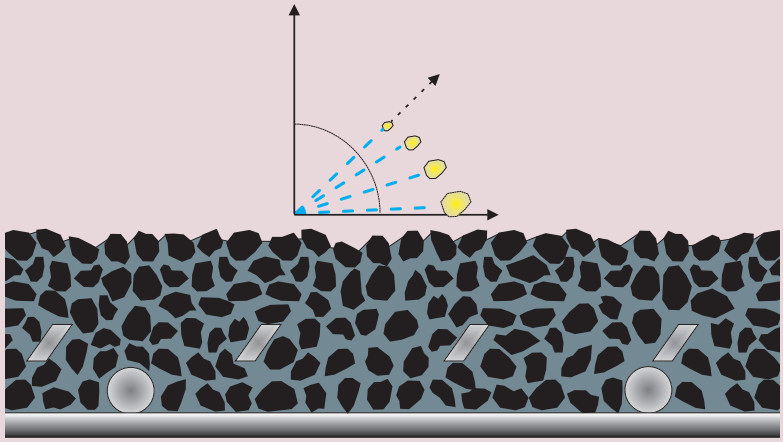
General

Technical Guidelines

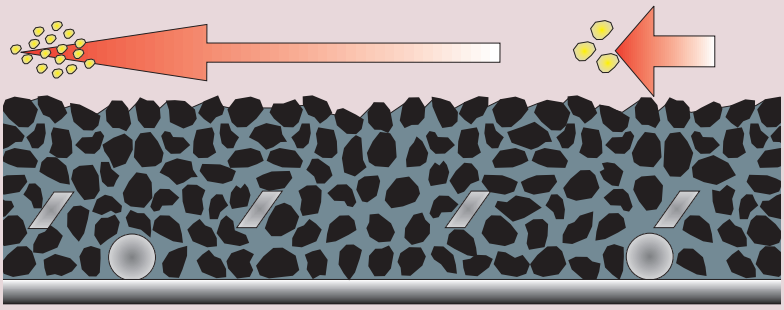
The lifetime of Densit® wear protection increases with reduction in particle size, slower particle velocity, and a smaller angle of particle impact.

Wear rates increase exponentially with particle velocity.

Wear rates increase with hardness and angularity of particles, determined by media mineralogy and physical form.



Relation of particle size to angle of incidence



Relation of particle size to air velocity

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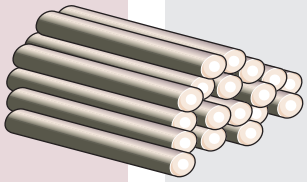
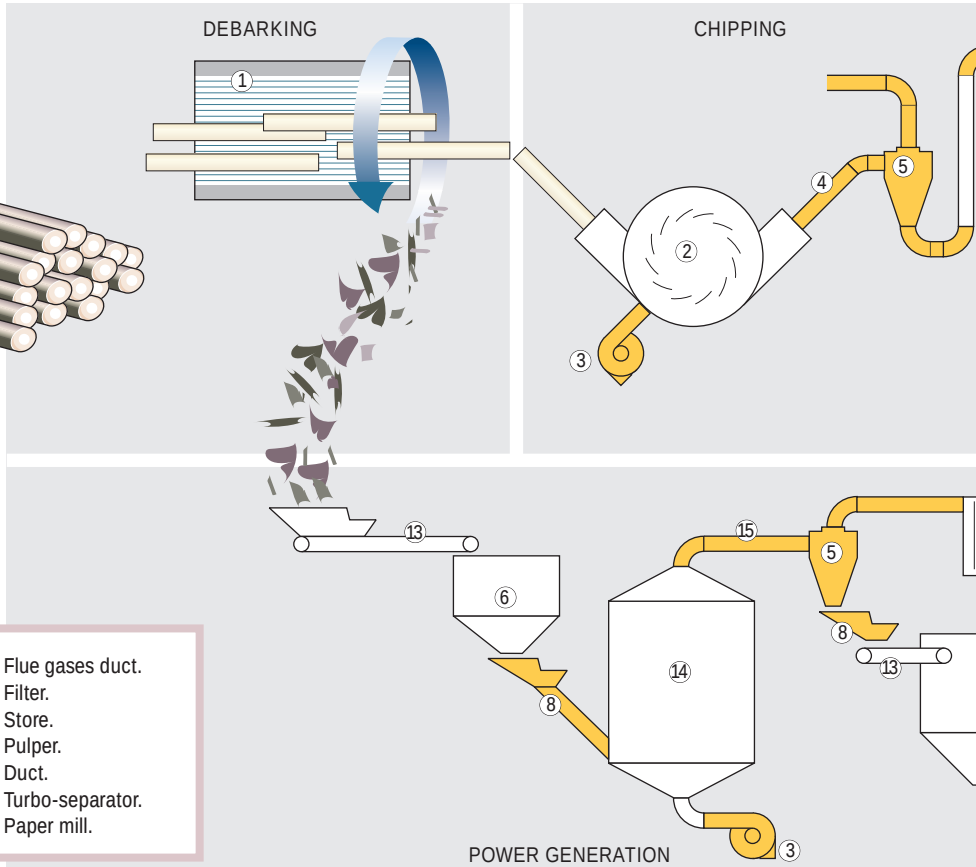
FLOW SHEET

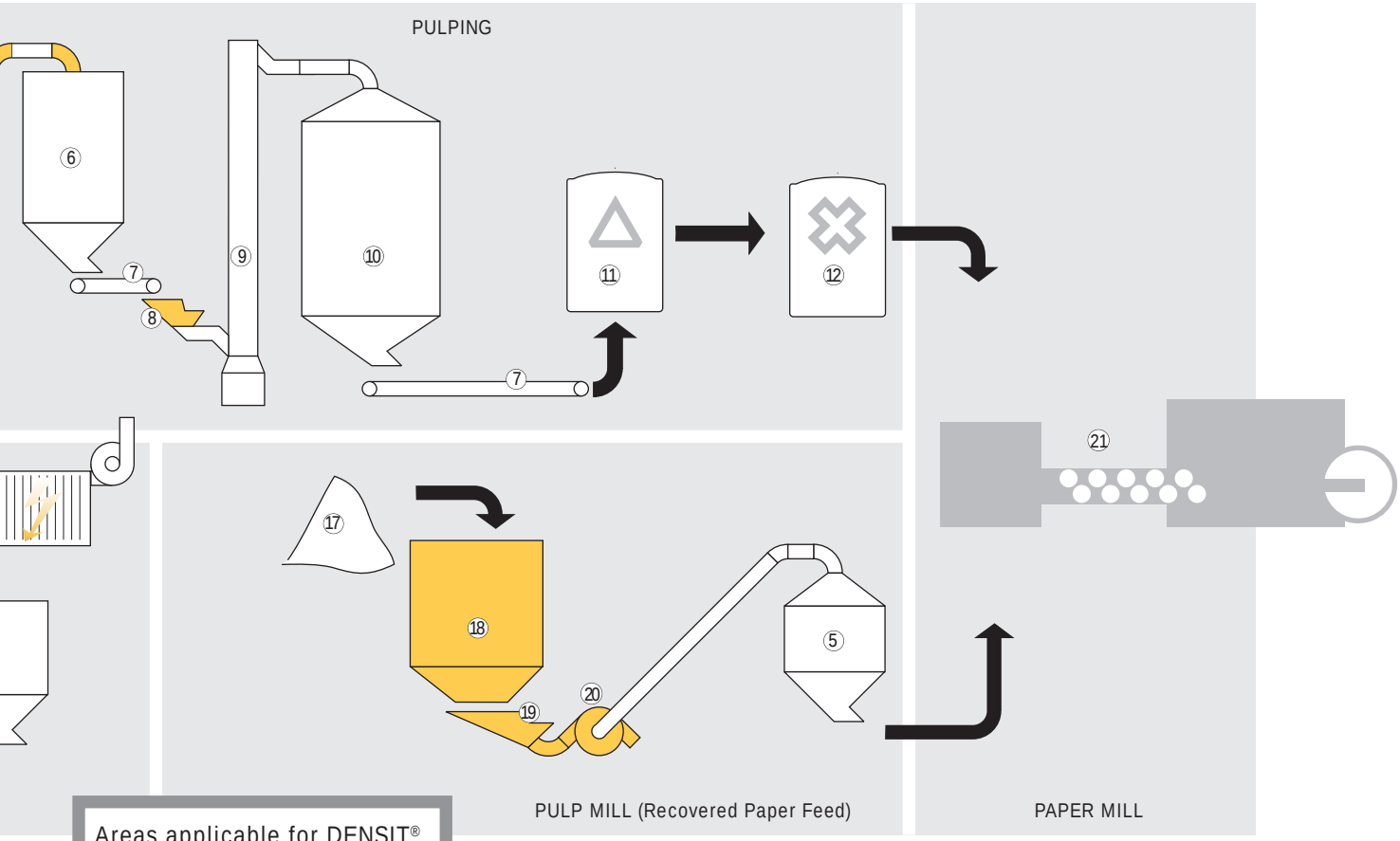


Typical process flow in the paper industry, showing components where Densit® wear-resistant lining solutions are installed.



1. Debarkning.
2. Chipper.
3. Fan casing.
4. Duct.
5. Cyclone.
6. Hopper.
7. Conveyor.
8. Chute.
9. Elevator.
10. Digester.
11. Bleaching.
12. Chem. additiues.
13. Chain conveyor.
14. Boiler.
15. Flue gases duct.
16. Filter.
17. Store.
18. Pulper.
19. Duct.
20. Turbo-separator.
21. Paper mill.

COMPONENT	PROCESS PARAMETERS	MEDIA TYPE	TYPICAL SERVICE TEMP.	RECOMMENDED DENSIT® SOLUTION
Pipes, ducts and bends	Transport of raw materials, pulp, dust in variable concentrations.	Bark, woodchips, waste paper, pulp, sand, sawdust, fly ash, plastic and metal.	Up to 50°C (120°F)	WearFlex/Cast 500 or WearFlex/Cast 2000 depending on media type.
Chutes	Transport of raw materials, pulp.	Bark, woodchips, waste paper, plastic and metal.	Up to 50°C (120°F)	WearFlex/Cast 500 or WearFlex/Cast 2000 depending on media type.
Conveyors	Transport of raw materials.	Bark, peat, woodchips, waste paper, plastic and metal.	Up to 50°C (120°F)	WearFlex/Cast 500 or WearFlex/Cast 2000 depending on media type.
Fans	Transport of process air, dust in variable concentrations.	Sand, sawdust, fly ash.	Up to 50°C (120°F)	WearFlex/Cast 500 or WearFlex/Cast 2000 depending on media type.
Cyclones	Separation of dust from process streams, including separation of PFA[1)] from flue gases.	Woodchips, sawdust, fly ash, sand, plastic and metal.	Up to 200°C (390°F)	WearFlex/Cast 500 or WearFlex/Cast 2000 depending on media type.
Turbo-separator	Centrifugal cleaning of recovered paper pulp.	Bark, woodchips, waste paper, pulp, sawdust, fly ash, sand, plastic and metal.	Up to 50°C (120°F)	WearFlex/Cast 500 or WearFlex/Cast 2000 depending on media type.
Pulper	Critical continuous operation component.	Woodchips, waste paper, pulp, sawdust, fly ash, sand, plastic and metal.	Up to 50°C (120°F)	WearFlex/Cast 500 or WearFlex/Cast 2000 depending on media type.
Electrostatic filters	Separation of PFA[1)] from flue gases.	Sand, sawdust, waste paper, fly ash.	Up to 50°C (120°F)	WearFlex/Cast 500 or WearFlex/Cast 2000 depending on media type. Lining for inlet and outlet only.



Areas applicable for DENSIT®

Shade matches operating temperature:

- 0 – 400°C (32-750°F)
- 400 – 1200°C (750-2190°F)

CHIPPING

General process parameters relevant for wear:

Processing of wood chippings, sawdust, bark.
Low temperatures.

COMPONENTS

Chipper fan: Fan casing.

Chutes: Chute lining.

Screw conveyor: Conveyor plates.

De-dusting: Cyclones, filter inlet and outlet.

Hoppers and silos: Hopper/silo lining.

POWER GENERATION

General process parameters relevant for wear:

Processing of bark, woodchips, PFA[1], sand.
Low temperatures.

COMPONENTS

Chutes: Chute lining.

Conveyors: Conveyor bed plates, de-barking to grinder.

Hoppers and silos: Hopper/silo lining.

Boiler: Boiler fan casing.

Flue gas de-dusting cyclones.

Ducts: Bends (cyclone to filter). Filter inlet and outlet.

PULP MILL (virgin feed)

General process parameters relevant for wear:

Processing of wood chippings, sawdust, pulp.
Low temperatures.

COMPONENTS

Chemical pulper.

Mechanical pulper.

Hydra-pulper: Digester lining.

PULP MILL - Recovered paper feed

General process parameters relevant for wear:

Processing of paper, various metal and plastic, pulp.
Low temperatures.

COMPONENTS

Digestion: Pulper lining.

Turbo-separation: Turbo-separator lining.

Ducts: Ducts, bends (digester to turbo-separator).

PAPER MILL

General process parameters relevant for wear:

Processing of paper and pulp.
Low temperatures.

COMPONENTS

Stock blending and preparation: Hopper and silo linings, pipe, chute and duct linings including bends.

Centrifugal screening: Pipes ducts and chute linings including bends.

[1] *PFA = pulverised fly ash.*