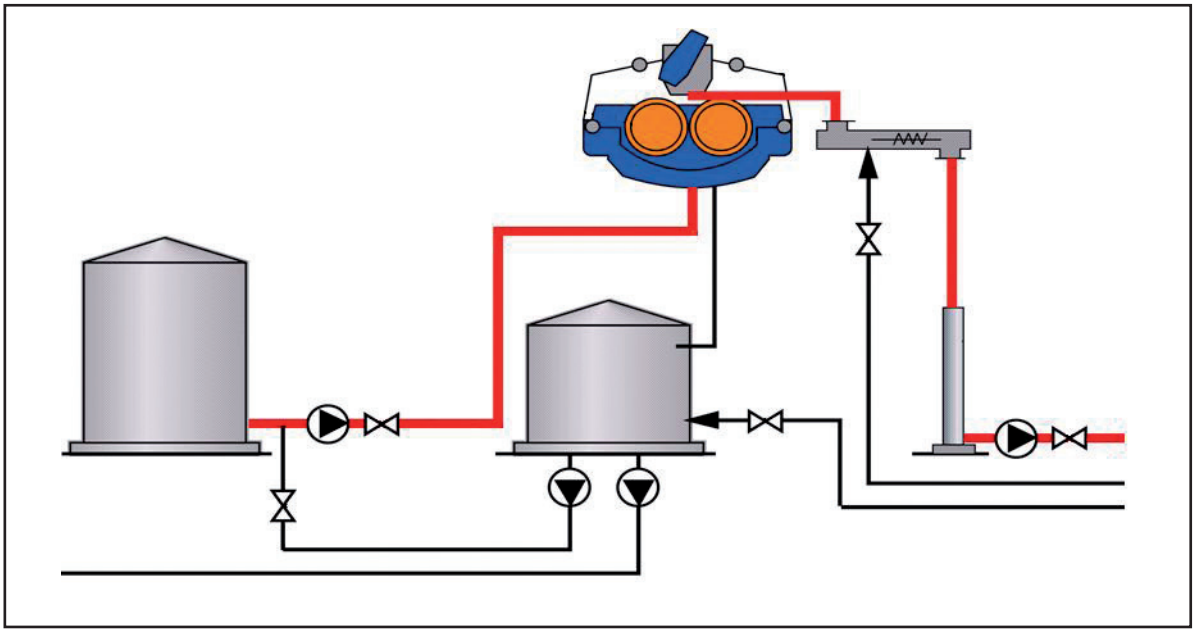
Washing



Picture 1. Washing system

Introduction

Pulp washing is the most common unit operation in pulp mill fiberlines. It is used in brown stock washing after cooking, after oxygen delignification and in bleaching. The object of brown stock washing after cooking and post oxygen stage is to recover the dissolved organic material (dissolved wood components, especially lignin) and inorganic material (cooking chemicals) by a minimum amount of dilution.

Washing between bleaching stages, in turn, is carried out to minimize the carryover of substances harmful in the next bleaching stages and substances that consume bleaching chemicals. Washing may also be used to adjust the temperature, pH and consistency of the pulp for the following process stage.

The process

The most important mechanisms of washing are dilution, dewatering, displacement, diffusion and flotation, though flotation is not usually used in washing due to the difficulties to administer foam. Also mechanical forces with these functions help pulp washing. In practice, these functions can occur simultaneously.

The most significant factor affecting the washing result is washing equipment. Different washers work by different mechanisms. Diffusers work by the displacement principal. In washing filters washing is done by mechanisms of dilution and dewatering and displacement. A wash press uses initial dilution and dewatering, displacement and ends with press washing. Washer in the picture 1 is a wash press.

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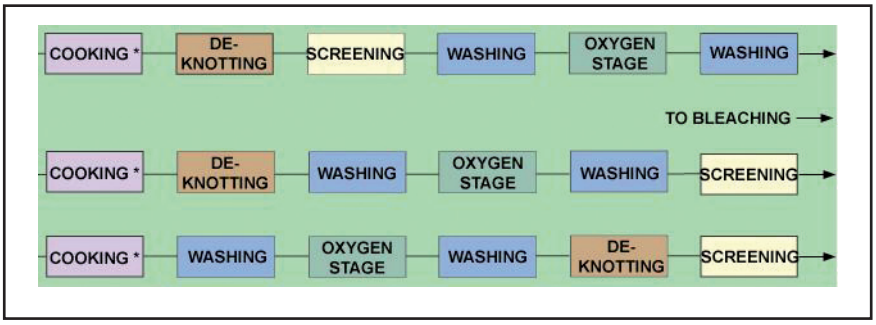


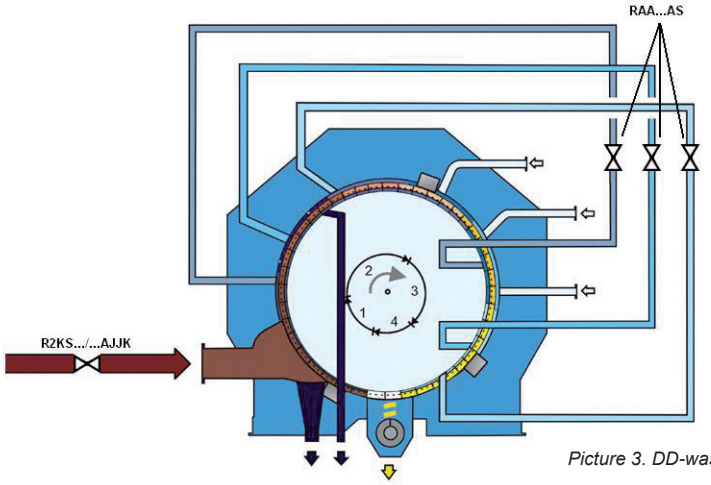
Picture 2. Examples of possible locations of washing, screening and oxygen delignification

The traditional washing-screening-bleaching sequence has changed due to a higher degree of process closure. The whole fiberline can now be thought of as a series of delignification stages, between which reaction products are washed from pulp. Picture 2 shows possible locations of washing in a pulp line.

Valves

Washing equipment and washing conditions define what kinds of valves are used in a washing stage. Often washing inlet consistency is so high that segment valve or medium consistency segment valve is required (Pressure diffuser stock inlet consistency is usually up to 10 – 12 %, DD-washer 10 – 12 % and wash press 6 – 10 %). However for example in a suction drum filter stock inlet consistency can be as low as 1 % whereupon also butterfly valve can be used.

Picture 3 shows a DD-washer and typical valves in the application. Since the inlet stock consistency is 10 – 12 % at its highest, medium consistency segment valve R2 is used. Countercurrent washing liquid flows are controlled with standard RA segment valves. Other valves in the washing line are typically standard segment and butterfly valves. However in some places some special materials, such as titanium, should be used due to the corrosive flow media.



Picture 3. DD-washer and its typical valves

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