Synthetic fabrics in pulp mill applications : A mill experience

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ABSTRACT

Metal Wires were used in pulp mills for filtration, thickening and washing. The problems faced while using metal wires in chlorination stage and thickeners have been explained. The reasons to use synthetic fabrics and the advantages obtained as a result have been put forth.

In TNPL for chemical bagasse chlorine washer, intitally SS : 316 deck wire and metal wire clothing were used. The draw backs were wire cloth damage due to corrosion, soldering joints weakening and poor cake releasing due to wider clearance of doctor blade on repaired wire mesh to avoid frequent peeling out on acme band and joints. Patching of chlorine washer wire mesh causes lot of down time and higher degree of interruption in smooth running of bleach plant. These problems demanded suitable alternatives and the usage of synthetic wire clothing was thought of as one such alternative. In Chlorination stage wire cloth should be resistive to Chlorinated solvents, Acids (both dilute and concentrated) and Strong oxidizing agents. All these conditions are satisfied by Polyvinybidene Flouride (KYNAR) material. Even if one prefer to use hot water in washing sprays, this material can be used as its melting point is high (156°C). KYNAR is resistant to most Chemical attacks (See Table 1). The KYNAR synthetic fabric besides tackling the aforesaid drawbacks provides additional advantages in the following manner :

1. Installation of the fabric is fast and easy. In addition its exceptional circumferential shrinking capacity guarantees the fabric to be firmly fastened on the drum surface.
2. The double layer structure gives the fabric an even surface giving good cake formation, effective water removal and complete cake release.
3. Sturdy structure gives the fabric long mechanical and chemical running life.

After changing over to kynar the downtime regarding wire maintenance had become practically nil. The wire life is exceptionally high i e. 3 years. Installation of synthetic fabric is less cumbersome and it takes just six hours. The installation of conventional metal wires takes as long as 24hrs. with all inherent defects in joints and the required size is not available in one piece. (size 24', 16'1")

The tailor ma le fabric is wound around the drum and its seam is connected sewed)by a synthetic filament. The hot water at 80°C is sprayed on the fabric through washing sprays makes it to shrink and give a tight fit without any bagginess. The shrinkage is irreversible. The different types of seams available are Loop seam, Spiral seam and Multifilament seam, Synthetic seams are thin, flat and non-protruding in nature besides being strong.

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Patching can be done by using an adhesive applied wire cloth piece over the damaged area and by ironing it over with a hot plate at 177°C. The adhesive melts to form a firm bond between the patch and fabric.

Although the existing needle type cover showers are performing well, fan nozzles are preferable for efficient cleaning of the fabric.

Table—1
Physical and chemical properties of some monofilament materials

Properties	Poly-ester	Poly-propylene	Kynar	Poly-amide
Melting point °C	257	160	156	216
Density gm/sq.m	1.38	0.90	1 78	1.13
Hydrolysis resistance	3	5	5	3
Resistance against acids diluted/concentrated	4/3	4/4	4/4	2/1
Resistance against alkalis diluted/concentrated	2/1	4/4	4/3	4/3
Resistance against chlorinated solvents	3	I	5	3
Resistance against aromatic solvents	3	2	5	3
Resistance against strong oxidizing agents	4	3	5	2

1 = poor 3 = satisfactory 5 = excellent

The cost benefit of change over from metallic to synthetic wire for Chlorine washer are shown in Table – 2.

Table 2 – Cost Analysis of Metallic and Synthetic wires in chlorination washer.

	Metal Wires	Synthetic Fabric
Cost of wire (24' " 11'6" dia)	: Rs. 60000	Rs 200000
Installatioa time	: 24 Hrs.	6 hrs
No of hours of cowntime in one life period	: 300 Hrs.	2 hrs
Maintenance cost	: Rs. 60000	Nil
Life period	: One year	Minimun of 3 years

The other area where the synthetic fabric found its application is Chemical bagasse decker (thickener). The main disadvantage of using metallic wire was frequent jamming of wire by formation of scales. The scale removing by acid washing has consumed considerable time, caused interruption in production. Moreover the frequent acid washes were causing great damages to other parts of the filter drums.

The synthetic fabric used for deckers is POLY-PROPYLENE, (oxidation stabilised) and is highly resistant to alkali medium. After starting the use of the synthetic wire the alteranate day cleaning schedules of one hour each has been reduced to just two hours a month.

The synthetic fabric life is extremely high compared to metal wire. Even the cleaning of scales formed on the synthetic wires are much easier than that of the metal wires Besides avoiding the scaling the other benefits derived out of synthetic fabrics is its improved drainage due to its angular flow weave pattern. giving high discharge consistency than the metallic wires.

The scale formation is mainly on the surface of the winding wires. By using the double layor fabrics the winding wires can be removed and thereby a large scale forming area can be totally eliminated. Instead of using cleaning agents by filling them in the vat, cirulating through cover showers will greatly enhance cleaning in lesser time.

Synthetic fabric also being used in second stage of conventional 3 stage brown stock washing of bagasse systems. The advantages are improved fabric life and reduced maintenance.

Synthetic fabrics were viewed in a limited scope here and the additional facility of treating the materials suitably to the end uses makes it an ideal choice. With the fast developing technical innovations in this field leave one with no other choice but to use the synthetic wire clothing.

REFERENCE

Product and technical information from NORDISKAFILT

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