Press Section Optimization Through Continuous Felt Conditioning

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ABSTRACT

An optimized press-section is a pre-requisite for a best performing machine. Through continuous felt conditioning program, the performance of the press-section can be enhanced to a great extent. The selection of the right program is critical for success which depends on the type of contaminants, wet-end chemistry, shower water and mechanical aspects like shower design and location. By keeping the felts at or near their original condition for as long as possible increases machine efficiency and provides better quality paper.

INTRODUCTION

The press-section forms an important part of the paper machine for producing consistent quality paper without runnability problems. However, it is also an ignored area where adequate attention and management focus is required for good machine production and quality improvement. A poor press section operation results in runnability and quality problems leading to lower productivity and increased press operating costs. The best performing machines have optimized press section operation and clean wet felts.

Primary purpose of the press section is water removal. It much less expensive to remove the same amount of water in the press section than in the steam dryers (20 times more expensive), so papermakers are always trying to remove the maximum amount of water in the press section. A 1% dewatering in the press section is equivalent to 3.5% increase in speed or steam reduction. In addition to water removal, the press section has two more important roles to play which are transferring the sheet without creating defects and to impart important properties to the sheet. Sheet finish and uniform consolidation are important for printability and strength development which are imparted to the sheet in the press section.

PRESS FELT PERFORMANCE

During pressing, water containing solids, fines, and other contaminants is removed from the sheet and transferred to the felt. Filling is caused when paper fines and chemical precipitates imbed in the felt. This reduces the felt void volume and limits the absorption of water expressed from the web in the nip.

Press felts are seldom removed because they are worn-out. They are generally removed when they start

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giving quality problems like moisture streaks or press-section trouble like crushing. The factors affecting felt life are listed in Table 1.

Filling (Contamination)	Shower Pressure
Compaction (Bulk Reduction)	Process Conditions
Sizing	Water Quality

Table 1: Factors Affecting Felt Life

All these factors contribute towards premature removal of the felt or reduced life. The contamination, and sizing result in the following problems during running of the felts:

- Loss of drainage (ability to receive and give up water is reduced)
- Reduced void volume and permeability
- Crushing
- Compaction
- Picking
- Increased Wear

Chemical precipitates are inorganic as well as organic. Organic or hydrophobic types include rosin size, wet strength resin, pitch, and hydrocarbon oil. Inorganic precipitates include clay, calcium carbonate, titanium dioxide and alum. Table 2 gives the typical deposits which fill up the felts.

Inorganic	Organic
-Clay	-Pitch/Stickies
-Calcium Carbonate	-Oil/Grease
-Talcum	-Adhesives
-Titanium Dioxide	-Inks
-Alum, Insoluble Salts	-Size & other additives

Table 2 : Typical Felt Deposits

FELT CONDITIONING

The objective of felt conditioning is to prevent deterioration of felts physical condition (compaction and wear) and maintain its capability to remain free from contamination (filling and sizing). This objective is achieved by the following functions of felt conditioning :

- Maintain maximum felt absorbency
- Minimize the affects of felt filling
- Reduce the rate of felt compaction
- Prolong the felts useful operating life

An optimum felt conditioning program uses both mechanical and chemical means to keep modern synthetics felts open. Filling, Compaction, and Wear tendency of wet felts can be reduced by proper felt showering and both mechanical and chemical conditioning. All wet felts should be continuously mechanically and chemically conditioned from startup to time of removal.

MECHANICAL CONDITIONING

The mechanical parameters to be considered are type of shower, nozzle design, nozzle-to-nozzle distance, distance from felt etc. This includes correct high pressure showering, good uhle box operation and proper lubricating showers. BetzDearborn (now Hercules) can provide the specific recommendations for the different showers and uhle box dwell time etc. after a Press Section Survey of the machine.

CHEMICAL CONDITIONING

The success of a chemical conditioning program depends on identification of contaminants and proper selection of chemical to enable effective conditioning and cleaning. For this, we at Hercules after conducting a complete press section survey perform an analysis of the felt sample to determine the exact contaminant present in the felt. based on this analysis, we select a chemical from our wide product range suited to different grades and conditions which will address the contaminants most effectively.

A well-designed treatment program allows wet felts to be cleaned, flushed, and rinsed in a uniform manner, minimizing felt filling. A diagram of an

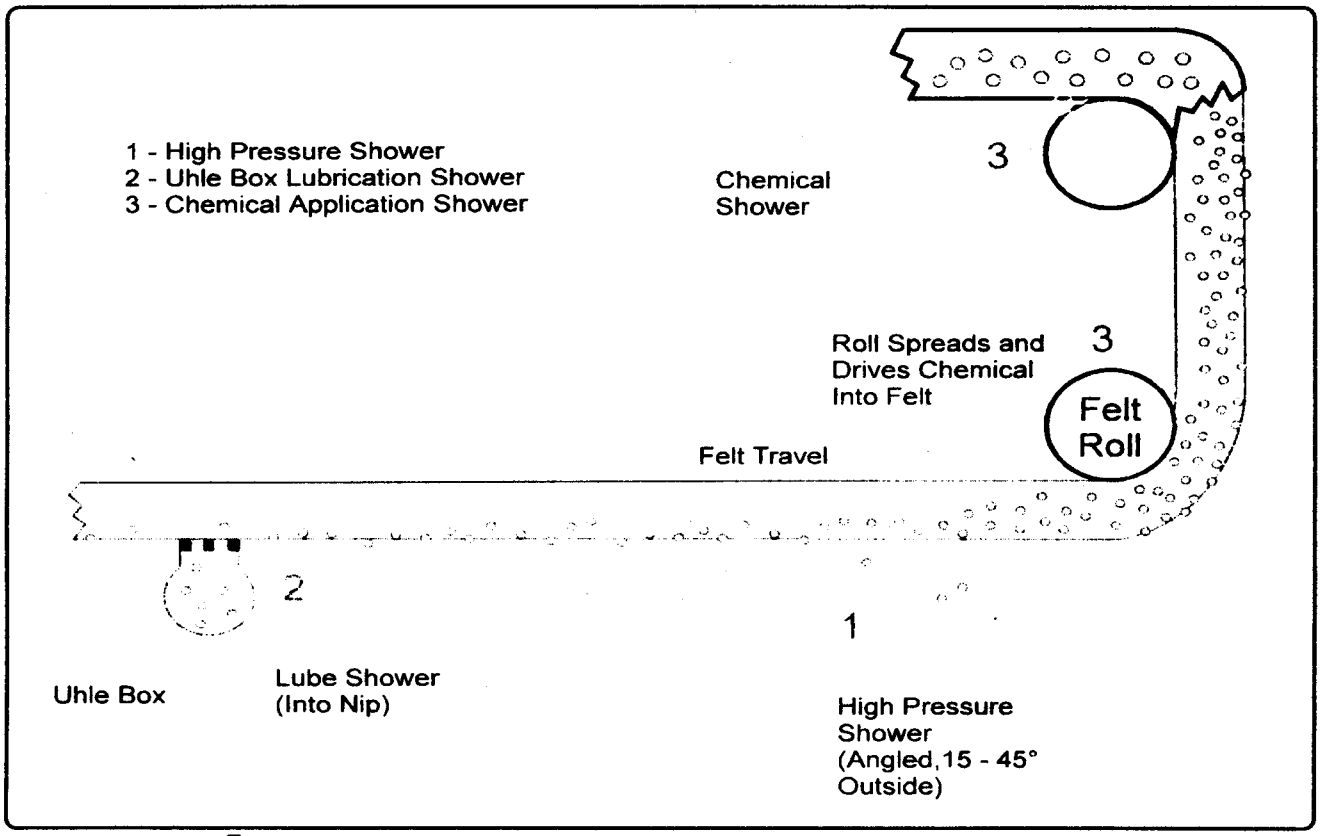

Figure 1-Wet Felt Showering

effective conditioning system, complete with showers and Uhle boxes is shown in Figure 1.

BENEFITS OF FELT CONDITIONING

A carefully designed wet-felt conditioning program can increase productivity by affecting :

- Machine Speed
- Sheet Dryness
- Breaks
- Quality

The benefits of felt conditioning program can be summarized as:

- Reduced down batch washes
- Reduced press section breaks which improves runnability and production
- Increase water removal over felt life providing speed/production increase
- Steam savings
- Reduced Cull tonnage due to moisture variations at the reel

CASE STUDIES

Neutral Fine Paper Mill. This neutral fine paper mill producing lightweight writing and printing grades was experiencing press-section breaks resulting in frequent batch-washes and production loss. The objective of the felt conditioning program were to reduce the number of breaks at the press and to improve the sheet moisture profile. After surveying the wet end and press section of the paper machine, a continuous felt conditioning program was implemented to keep the felts operating at their optimum level of performance and to improve moisture removal at the press. An improvement in moisture removal was observed immediately. The press sections breaks were reduced considerably providing a direct Return On Investment (R.O.I.) of 283%.