

# Reducing Paper Finishing Loss

## Introduction

A continuous stream of paper coming out from the paper machine calenders is reeled into small rolls for further finishing processes to cater the consumer. As the operations for finishing do not call for any great chemical technology, high powered engineering and spectacular processes, normally little attention is paid to these operations and sometimes they are even neglected. It is complained that these operations are not studied technically or scientifically to as great an extent as the processes involved in Paper and Paper making. The finishing processes involved in converting the paper into reams of flat sheets are ;—

1. Reeling
2. Re-winding or Pre-winding
3. Cutting the web into sheets of specified sizes.
4. Sorting
5. Counting
6. Packing

There is loss of paper in these various operations to the tune of 6-7%. It is intended to discuss the losses due to re-winding or pre-winding and their elimination.

### Reel-winders

The drum reel type reel-winders have become popular because of

*The finishing processes involved in converting paper into reams of flat sheets consist of six operations, entailing a loss of about 6 to 7%. In the present article various steps have been suggested to reduce the paper finishing loss.*

their inherent advantage of giving a hard, tight and even roll. So the roll made on the Drum-reeler makes an ideal one for further handling with little trouble. The tightness shows up paper making defects promptly and thus help machine-man to take prompt action. This results in more level and regular paper roll.

### Re-winders

Re-winding job is basically to slit the wide roll into narrow strips and wind them into tight and even rolls with even edges and rolls of uniform density. The basic design of the re-winder is settled down to the principle of supporting and driving the roll to be re-wound on two drums, driven independently, one faster than the other, and with a roll on the top of the reel to apply controlled pressure. This helps in making tight rolls. At this juncture of making only flats, we are not concerned with slitting operation of the winders.

### Re-winders Operations

The paper reel is placed on a back stand, with the arrangement exert resistance to turning of the paper to be rewound. This consists of a breaking arrangement to facilitate varying the breaking

action to obtain constant tension on the web of the paper.

Paper is reeled on cores, either of steel or paper. For reeling purposes a steel shaft is inserted into the core and held in position with steel 'collars' whose lugs are inserted in slots in the end of the core to prevent the reel from turning on the shaft. This core assembly is placed on the re-winding drums. The paper web is passed over the spreading roll to the core passing round the top roll.

Tension control by correct application of unwinding reel brake determines the quality of winding. After the machine is started: at the start maximum tension that can be taken must be applied. Otherwise, if loose wound in the beginning, paper flattens and the reel will become excentric running. This is a source of trouble in further handling. The speed of the roll should be gradually increased as the wound roll diameter increases, the tension being carefully checked and the brake gradually eased. While maximum speed is maintained as long as the parent roll is heavier than the wound roll, the speed must be gradually and gently reduced by applying brake, so that the sheet is tight till the winder comes to a

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stop. Otherwise the brake cannot be controlled and sufficient tension cannot be maintained; with the result the parent roll over-runs the wound roll causing creases or break.

#### **Pre-winders**

The unit also does the job of re-winders so far as making rolls for feeding the cross-cutter is concerned.

"Here a roll shaft is mounted on two bearings and is driven by a slip belt or friction clutch. This old method is considered by many as being good enough for rough work. This system has, of course the advantage of simplicity and cheapness in the initial cost; but what is saved in machinery is taken out of the coal pile and also added to the pay-roll and to the BROKE pile" The winding operations therefore must be done with utmost care by competent crew; and the equipment must be in the perfect trim.

#### **Defects of Re-winding and Pre-winding**

Some of the winding defects of these operations may be summarised as follows:—

1. To make a firmly wound roll with the pre-winders especially with large diameters, requires an excessive amount of power, because the roll is made compact and firm only by the pull of the web. Starting with too slow speed and too much pull on the web when the roll is small one is apt to end up with racing speed and too little pull on the web when the roll becomes

large. The slippage of the belt or other friction drive eats up power and then all said and done the roll produced is not what it ought to be.

2. Un-level may be caused by substance variation across the sheet, uneven drying, ridges in the wire or uneven calendering.
3. Slack edges—The edge being longer than the middle of the sheet, it will show on the rolls as fluted edges.
4. Soft places—The soft place has less bulk than the surrounding sheet. This gives considerable trouble and causes a lot of broke. This can be minimised by winding slack and using an adjustable camber.
5. Un-reeling and reeling off—The unreeling stand is never driven, since the paper is pulled off the winder. As the roll of the winder grows larger, the roll on the unreeling stand grows smaller; and the tension of the paper is pulled off the paper between the two increases greatly. This tension can be controlled by the Winder-man. If not well controlled and the tension kept uniform, the paper becomes unevenly and softly wound. To get good, hard centre it is necessary to maintain the correct tension and smooth start. When the outside gets hard as the roll builds up there is bound to be trouble of sideways slipped rolls, caused by the soft or loosely wound rolls and

especially if one side of the roll is softer than the other.

6. As the roll grows on the re-winding stand its weight increases. Consequently the pressure on the drum increases in increasing the hardness of the winding. To relieve this the lifting mechanism is provided. But this is not well suited on wide machines, since a pull on either end of the shaft by the lifting mechanism is not sufficient to lift the middle of the roll which slightly sags due to the weight of itself.
7. Wrinkles may originate in the winder itself. So the tension of the rider roll, and the speed should be adjusted in the best possible manner to compensate for the poor reel.
8. Curved edges : In some winders one edge may display a tendency to curl and run higher than the body of the roll. As the reel builds up such an edge will crack. The temporary remedy is to press a plank against the high edge thus retarding increase in the diameter of the roll at this point.
9. Putting the heavy shaft into the core for every new re-winding, and removing the same at the end of every re-winding which are done only manually, are the most cumbersome jobs, making the whole operation look a very hard one.

And there are many little things at this particular stage that can completely off-set the value of a good sheet of paper which had

all the attention and care required in its making. Hence extreme precaution must be taken and severe attention must be paid to these winding operations, if good results are to be expected. As the Mills success depends on the efficient operations of these and other units in finishing department, the responsibility of the personnel here is as great as that of the machine crew.

#### **Is re-winding a necessity ?**

In a mill which sells more than 99% of its paper production in the form of flats, the re-winding or pre-winding operation look not only unnecessary but also unwarranted, particularly when the paper machines are equipped with good pope-reel type reeling drums giving much sought for hard and well wound rolls. Can these good rolls not be easily taken to the cross-cutters for the conversion without recourse to the intermediary re-winding operation ?

#### **Direct mounting and its success:-**

With this as a background, in about 1954 when the author

happened to be the leader in the Finishing Department and when the prewinding was installed for new machine would give generally bad rolls with heavy wrinkles and slipped rolls etc, in spite of the best of the efforts available, he made an effort to eliminate these pre-winding operations with visible improvements.

The bearings on the cross-cutter stands had to be re-designed to take the big Tambour bearings, to mount these Tambours with paper direct from the pope-reel drum. This also involved adopting of many improvised methods for controlling and braking these Tambours on the stand, to start with.

The results were very encouraging as the finishing losses due to these bad rolls, slipped rolls, wrinkled rolls with continuous board makes immediately stopped and the Finisher also felt happy of the new lot supplied to him for sorting etc. This DIRECT-MOUNTING was followed through, in the case of the machine provided with the re-winding unit also.

This required acquiring of sufficient number of Tambour rolls to avoid possible stoppage of machines for want of Tambours.

This was followed in installing of a duplex cross-cutter of 130" for the new machine of 128" deckle and this has been followed by some other mills also.

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