

MAINTENANCE OF ROLLERS FOR PAPER INDUSTRY



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Background

If paper machine is considered to be a body, then rollers are the bone and flesh of this body. Maintaining the rollers ensures the smooth health of the paper machine, and also helps in taking the maximum output from the machine.

In this age, the speed of the paper machines is regularly increasing. With high competitiveness in the paper market, the focus is on increasing the production and reducing the costs. This results in higher speeds, and more loads on the rolls than ever before. So, keeping the rollers in good condition has become important, as improper rolls cause unplanned downtime, lower paper quality, damage to other components like felt/wire, more power consumption, higher transportation costs in roller servicing etc. The accuracy and precision of roller machining also helps in smooth and efficient running of the machine.

The points discussed in this paper can help in detecting, preventing and solving the problems arising due to rollers.

Introduction to Rollers

There are different types and numbers of rollers in a paper machine according to the type, size and speed of a paper machine.

The rollers vary from small diameter like Paper Lead Roll, Felt rollers and Wire rollers to big diameter rollers like Press Rolls and Drying cylinders. Each roll has different covering of varied material and hardness, which is suitable for that particular application.

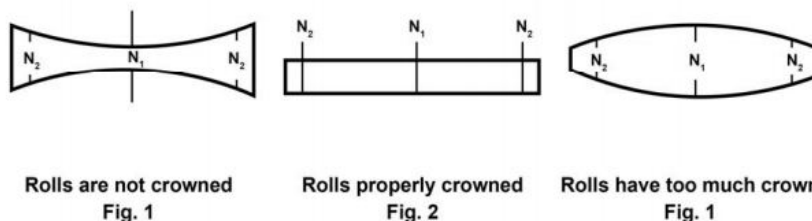
The various points to be taken care for long running life of rolls are:

1. Nip Impression:

This is applicable for Press Rolls, Size Press Rolls, Touch Rolls, which have crowning on their diameters. Nip Impression ensures that the roll crowning is done properly, the loading is uniform on both ends, and roll is under uniform pressure along the length.

The nip impression should be taken without felt. This impression should ideally be taken both at the installation time, and while removing the roll. The details like date, load, position etc should be clearly mentioned on the nip impression, and supervisor should sign the impression. Only after supervisor's approval should the roll be allowed to run.

If the ends of the nip impression are thinner than the centre portion, then either the crowning is high, or the load applied is less. Similarly, if ends of nip impression are thicker than the centre, then the crowning must be increased, or there is more load being applied than required.



Running the roll with improper nip impression results in non-uniform load being applied on the roll, and it can cause delamination of the roll covering due to torque forces. This also results in uneven surface abrasion on the roll. The paper quality is also not uniform as the dewatering is not similar from end to end.

2. Scheduled Grinding

As the coating is generally of rubber material in rollers, there is always some wear and tear on the surface, and also there is uneven profile developed due to foreign material present in the pulp. For high pressure rolls with crowning, with time, the crowning also gradually fades out. Due to this uneven profile, the nip and load is not even throughout the length. Hence, it is advantageous if there is scheduled periodic grinding for each critical roll position. Small cuts and marks developed on the surface are also removed with grinding. The fresh rubber which comes from inside after grinding makes the roll almost like new.

Important: The scheduled grinding also enhances the life of the rubber cover, and saves cost of recoating.

3. Dynamic Balancing

With advanced technologies in paper machines, the speed of the paper machines

is increasing every year. With higher speed, even a little unbalanced roll can cause great vibration in the system. Vibrations in the machine cause more wear and tear in the connected parts, more noise, and can even lead to breakage of journals of rollers.

Image Courtesy: sensorprod.com

It is recommended to always have dynamic balancing in ALL rollers at the time of coating. The dynamic balancing should be done at a speed which is greater than the running speed of the machine.

Important: The balanced roll also saves electricity costs because of smooth running of roll, as well as increases bearing life.

4. Bearing Size

It is a common practice that during maintenance, the rollers are sent for recoating or grinding. However, along with this, the bearing seat should be also be checked for any deformation or size reduction. With improper bearing size, like presence of ovality, the roll will not run perfectly. Defects in bearing size also sometimes result in jamming/siezing of bearings, causing breakage of bearings or damage of rubber cover. Getting the bearing seat checked regularly helps in avoiding downtime also.

Extra care should be taken in taper bearing size, as there is higher chances of bearing size mismatch in taper sizes.

For new rolls, it is advisable to check the bearing size at the roll manufacturing site by fitting the bearing which is to be finally used and doing blue matching. Any errors can be rectified at the site itself.

5. Edge Relieving/Taper

The corners of the roll are most prone to cracks due to heat build up. This is because within the sheet deckle, the heat developed is passed on to the paper, but at the ends which lie outside of deckle, heat gets building up. To avoid this, the portions outside of deckle should be tapered/dubbed. This is done in Press Rolls, except Size Press Rolls.

For MG Touch Rolls, the width outside of the MG length should be tapered off.

6. Storage and Handling of Rolls

As mentioned earlier, rolls are generally covered by rubber/PU. To increase the life of these covers, it is essential that the rolls are stored and handled very carefully.

Some points which should be always followed are:

- a) The rolls should be transported in frames. Keeping multiple rolls on top of each other is not recommended, as the covers should not touch with each other. Also, during transit, jerks and movements can cause the rolls to hit each other or the wall, which might damage the coating.
- b) In the plant, the roll should not be kept on floor directly. There should be support on both journals, so that the roll coating does not touch the floor. In every 2 or 3 months, the roll should be rotated by 180 degrees.
- c) The roll coating should be covered by bubble wrap, corrugated sheet or felt. Preferably, the roll should be stored in boxes to prevent any damage.
- d) Rolls should not be cleaned by petroleum products like diesel, as they react with the rubber and can cause swelling.
- e) When lifting the roll, utmost care should be taken so that the corners of the roll does not touch the sling.
- f) If the roll is kept for long time without use, then it is advisable to get the roll grinding done again as the cover might have developed deformations due to heat or sagging.
- g) The roll should not be stored under sunlight/heat.

7. Maintain roll register

For each and every roll, there should be complete history and maintenance data, mentioning the date of installation, position of installation, date of removal, reason of removal, date of sending it to supplier, date of receiving etc. This helps in better diagnosing of issues related to rollers. Also, each roll should be numbered so that the roll can be uniquely identified.

The supplier should be asked to provide an inspection report, so that the critical data like crowning, final diameter can be checked and mentioned in roll register.

Summary

The above points if implemented, can help in increasing the life of rollers, and also the quality of paper and overall production figures.

Healthy rolls can help in avoiding nonscheduled downtimes, and can save on manpower resources and worries of staff. Hence, it is important to focus on the maintenance of rollers, along with the whole machine.

Brief about the company:

Modinagar Rolls Pvt Ltd is pioneer in industrial rolls manufacturing and servicing in India. Founded in 1995, it has one of the biggest setups in the country for roller manufacturing. The company manufactures rolls upto 10 meter in length, and 2 meter in diameter. It has in-house facility for all types of rubber coating, PU coating as well as Hard chrome plating on the rolls. With advanced grinding, the company takes pride in delivering precision and accuracy at each step of production process. MRL has a technical collaboration with Kraiburg Rubber, Korea, for all types of imported rubber compounding.