ALIGNING ROLLS in a Paper Machine Winder

Proper alignment of rolling elements can prevent breakage, poor product quality and uneven rolls

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A paper machine winder converts large jumbo rolls into sizes convenient for shipping. The most popular type is the two drum winder which winds rolls on a single axis with all the rolls being wound on a single axis. Two drum winders are typically used for standard newsprint, fine papers (tablet or copy papers, board grades, tissues, towels). Another type is the duplex winder which is used to wind paper that is more difficult to wind (magazine stock, high gloss specialty papers, enhanced newsprint). The surfaces of these papers are smooth and glossy. Individual rolls are supported and wound at separate winding stations.

The winder is considered a batch operation. It operates at speeds two- to two-and-a-half times faster than the paper machine to stay ahead of production. Winders must also rapidly cycle massive components to reduce down time. It is not unusual for a jumbo roll to accelerate from zero to 7,500 RPM in one to two minutes, run and then decelerate to a stop. This can be repeated up to 160 times a day which requires strict controls to produce uniform rolls and prevent lost time from breakage.

POTENTIAL PROBLEMS

The very nature of the winding section—speed, weight, timing—makes it a critical part of the paper process. Some of the
potential problems caused by roll misalignment are:
- Uneven roll tension
- Edge problems
- Shortened knife life
- Uneven winding after slitting
- Breakage

All of these problems can lead to cost increases due to down time, loss of production and poor paper quality.

A WINDER ALIGNMENT CASE STUDY

Recently, a manufacturer of fine paper contacted American Industrial Metrology (AIM) because they were experiencing issues in their two drum winder including high vibration at full run speeds. In addition, they had a multi section dancer roll that was not maintaining its profile.

The initial survey on a winder involves establishing benchmarks relative to the slides that carry the core chucks. This is critical and is done by installing permanent brass monuments in the floor. All rolls and components are measured to this reference, which makes it possible to produce a strip chart that maps the theoretical path of the paper through the winder. Figure 1 shows potential problem areas with paper tracking.

Slitting Section:
- The first roll is -.057” to the entry on the drive side and -.017” low on the drive side.
- The second roll is -.039” to the entry on the drive side.
- The third roll is -.054” to the entry on the drive side and -.019” low on the drive side.
- The fourth roll is -.050” to the entry on the drive side and .002” high on the drive side.

Bed Rolls:
- The Rear Bed roll is -.057” to the entry on the drive side and -.018 low on the drive side.
- The Front Bed roll is -.051” to the entry on the drive side and -.013 low on the drive side.

In addition to this, AIM produced a log diameter gauge that measured the diameter of the log coming off the paper machine on both the tending side and drive side, and compared them. It also measured log eccentricity. By combining eccentricity with vibration data coming off the winder, caliper issues, loose wind issues and run speeds could be determined.

Figure 1. Roll mapping result. Source: American Industrial Metrology.

Figure 2. The Rider Roll is out low in the center. Source: American Industrial Metrology.

ACTIONS TAKEN

The back bed roll was corrected parallel to the front bed and to the rest of the rolls on the winder. The relationship between the Rider roll and the Bed rolls would be expected to affect product quality and cause runability issues. The correction resulted in the bed rolls being parallel to the slitting section. The vibration issues were dramatically reduced and the alignment of the rolls allowed the winder to be operated at optimum speeds without loss of product.

The measurement and alignment in this case study was conducted using lasers. This ensured the data could be repeated at unrelated time intervals—over the course of the entire measurement and alignment. Because laser measurements offer “live” data, moves can be made in real-time which saves time and money as it eliminates the need to move, recheck and then repeat until the desired alignment is achieved.

Proper alignment of rolls to a single baseline is critical to the operation and maintenance of all sections in a paper machine. The laser measurement techniques presented here can be applied to all sections and/or rolls—whether you are measuring and entire section or just replacing individual rolls.

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