

ProRelease – gentle web run

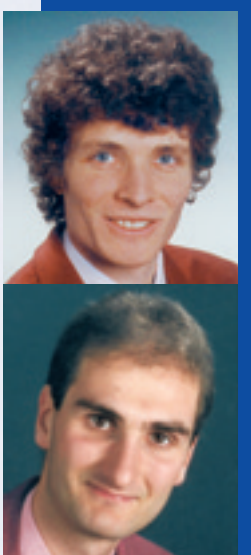
Since its introduction, the single-tier dryer section – equipped with DuoStabilizers and ropeless tail threading technology – has proven extremely successful. The complete single-tier TopDuoRun is now the preferred dryer section configuration, especially for high-speed paper machines and lightweight paper grades. Furthermore, in combination with double-tier dryer groups – the CombiDuoRun – for heavy grades and at somewhat lower speeds, it permits high runnability through stable web run and reliable, fast tail transfer.

The newly developed and already successfully installed ProRelease Stabilizer now offers further optimization potential in the particularly sensitive area of the first dryer groups by reducing the required tension of the still wet and weak paper web during detachment from the dryer.

Web release at the dryer

The detachment, or release, of a paper web from a plain dryer surface is affected by a number of forces. *Fig. 1* shows schematically the main forces that occur at that release point. Because there is a lack of ventilation to the opening nip, which has to act against the running of the cylinder and the web, a negative nip force is created, which holds the paper on the dryer surface. In addition there are centrifugal forces, which have no loading effect while the web is in contact with the dryer, but act after detachment due to the sharp deflection of the web.

Adhesion forces also apply, which are dependent on temperature. These forces must be overcome by increasing tension in the paper web, preventing the web



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Graphic

Fig. 1: Forces during web detachment from a plain dryer.

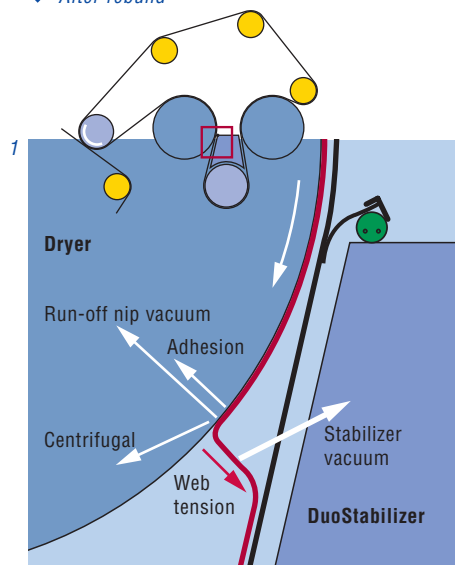
Fig. 2: Schematic arrangement of the ProRelease Stabilizer.

Fig. 3: Tension reduction and speed increase by the installation of a ProRelease Stabilizer on Eltmann PM 3.

Newsprint, 45 g/m², 100 % DIP

◆ Before rebuild

◆ After rebuild



from following the dryer away from the separation point. Insufficient tension will result in web wrinkles or sheet breaks. This tension is built up by differential speeds, or draws, between the drive groups. The maximum possible web tension is limited by the initial wet strength of the paper.

With increased production speeds, the forces on the web increase. At the same time, the web must continue to be picked up reliably and trouble-free regardless of small fluctuations during production or after felt changes in the press section. The operating window available between the minimum necessary web tension for good web running and the initial wet strength, therefore, diminishes and, in many cases, limits the production speed. Vacua introduced by web stabilizers can relieve the effect of the forces on the paper web, allowing for reduced tension.

Mode of operation of the new stabilizer

To improve the situation, the web should be fixed on the fabric as close to the release point as possible and the forces holding the web to the dryer should be countered by increased stabilizer vacuum. To avoid negative effects due to increased air leakage or intense fabric deflection, the increased vacuum must be limited to the pick-up area.

The new ProRelease Stabilizer (Fig. 2) optimally meets these demands, while still drawing on the proven advantages of the DuoStabilizer. The release zone offers a high vacuum targeted in the pick-up area with a reliable and non-contacting seal

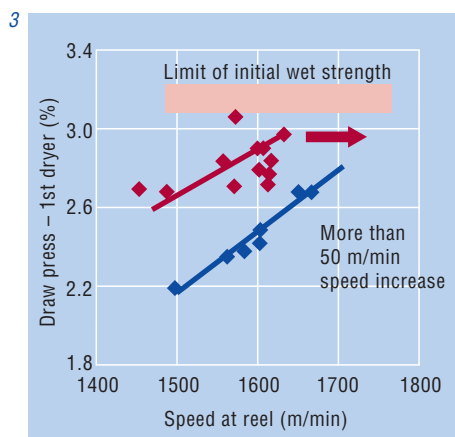
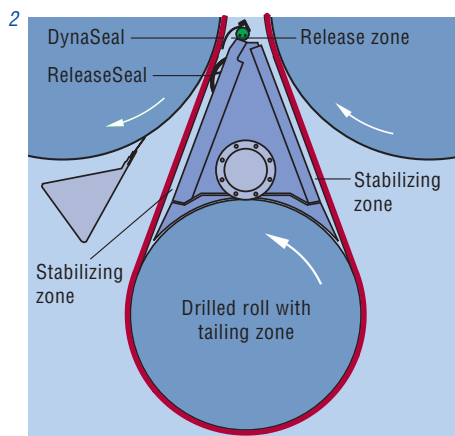
against the stabilizing zone. The stabilizing zone continues to work at a low vacuum level, which is sufficient to hold the web fixed on the fabric even at a high production speed. The drilled roll continues to be subjected to suction by the stabilizer. The vacuum in the release zone and that in the stabilizer can be adjusted and optimized independently from each other.

Successful in operation

Following extensive trials on our pilot paper machine, the first ProRelease Stabilizer was put into operation at the end of August 2001, on Palm Papier Eltmann PM 3 (newsprint, 100% DIP). Despite starting with four new press felts, a speed increase of over 50 m/min was reached immediately (Fig. 3). At the same time, the web run in the first dryer groups became less sensitive to fluctuations in the moisture profile or to minor disturbances in the edge areas, which led to smoother running and fewer sheet breaks.

Also, the installation of four ProRelease Stabilizers in October 2001 in the first two dryer groups of PM 2 at Soporcel, Portugal (copy paper, 80% eucalyptus) was very successful. The reduction in draw of 0.4% achieved after the press, combined with the more gentle web pick-up and the improved web run in the press due to the installation of a transfer belt, increased the speed over 100 m/min, bringing the machine up to world record level.

Fig. 3 shows how the increase of the ProRelease vacuum on PM 3 in Eltmann



positively affects the required tension after the press. At a negative pressure of 800-1000 Pa (standard ProRelease operating range), the tension can be reduced by 0.5% (Fig. 4). The maximum negative pressure reached was even higher, at 1300 Pa. On the pilot paper machine, the effect was successfully tested for numerous stocks and paper grades (Fig. 5). To the extent that the initial wet strength allowed, trials were run up to 2,000 m/min. This impressively demonstrated the stabilizer's abilities, particularly that of the seal, even for maximum production speeds.

The greatest effect occurs on paper machines with a tandem NipcoFlex™ shoe press or other presses without a center roll. Here the paper web does not need to be pulled off a smooth press roll. The improvement of the web run at the first dryers can, therefore, be fully utilized. To achieve the maximum potential, three to six ProRelease Stabilizers are necessary, making a 0.4% to 0.7% reduction in draw possible.

On machines with a center roll and possibly a fourth press, the ProRelease Stabilizers can also provide some runnability enhancement. However, in this case the improvement potential is somewhat less, as the tension required to detach the web from the press roll is not directly influenced, but only the percentage of tension that is required for a good web run in the first dryer groups is reduced.

Proven functionality and reliability

The heart of the stabilizer is the cross-machine sealing. Both the well-known DynaSeal at the top of the stabilizer and the new ReleaseSeal, work with an air gap and without contact during operation and, therefore, do not cause any wear on the dryer fabric. Nevertheless, they seal very effectively and permit, through the adjustability of the pre-tensioning and the distance, optimal sealing even at maximum speeds and high negative pressures. Both seals are flexible and can give way when paper wads or broke come with the fabric.

These innovative seals provide a much more energy efficient alternative to machine wide air knives, since the consumption of supply air is minimized. Through the flexibility of the seals, the distance between the wire and the fixed elements of the stabilizer can be large enough that fabrics can be pulled on without any problem and there is no risk of fabric damage in the event of a dryer wrap or paper jam. Both the supporting and the sealing blades can be changed without removing the box, even if they are located behind framing supports.

Lateral sealing on the front and drive sides is done with bolted-on air knives extending over the entire height of the stabilizer. Therefore, the release zone – operating at high negative pressure – is also sealed laterally against air leakage.

Fig. 4: Draw reduction on Eltmann PM 3 in relation to vacuum increase. Tandem NipcoFlex Press Newsprint, 45 g/m², 100 % DIP, 1,560 m/min

Fig. 5: Draw reduction for various stocks on the pilot paper machine at 1,550 m/min.

- SC (100 % DIP, 28 % AiP)
- Newsprint (100 % DIP, 18 % AiP)
- Copy Paper (80 % eucalyptus, 12 % AiP)
- Newsprint (100 % TMP, 11 % AiP)
- Newsprint (100 % TMP, 4 % AiP)

Fig. 6: Schematic cross-section with patented transfer zone.

