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Improved Strength and better sheet stability with DuoShake

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Abstract :

Formation and sheet properties can be positively influenced by oscillations of the forming wire. Standard shaking units show little to no effect. Only the functional principle of the Voith DuoShake allows for effective adaptation which has been proven as the DuoShake only transmits negligible centering and frictional forces to the foundation. The operating principle of the DuoShake permits shake frequencies that are not achievable with any conventional shake. Through this, distinctly measurable improvements in formation can be reached for machines of all speeds.

Breast roll shaking not only influences formation values, it also improves other paper properties related to paper strength and sheet structure which is influenced by the vibrations brought into the fibre water suspension. Typical applications are the production of Kraft, sack paper, cigarette paper, newsprint, Speciality paper and the middle layer of board. DuoShake can be significantly relevant to Indian context where medium speed packaging machines are prevalent with high raw material cost and the market is demanding improved quality from the existing machines.

1.0. INTRODUCTION

The DuoShake optimizes fiber orientation through high-frequency shaking of the breast roll. The result is good formation with all paper grades and a low tensile strength ratio.

The DuoShake, a reaction force-free shaking unit for all Fourdrinier paper machines, creates a more homogenous distribution of fibers while reinforcing the orientation of the fibers in cross direction. This is accomplished with two rotating imbalance couples arranged on the hydrostatically mounted carriage. The forces released are transmitted by means of a shake rod to the breast roll. Only minimal friction and centering forces are transmitted to the foundation through the system freely oscillating in a horizontal direction, so only the net weight of the DuoShake has to be carried. The imbalances move within an imbalance couple in a counter-rotating direction and through their arrangement cancel out the vertical forces.

Paper quality is increased due to improved formation with the DuoShake in Fourdrinier paper machines. Improvements result in downstream processing, coating, impregnating and printing of the paper.

Fig: 1, DuoShake: The shaking unit free of reaction forces

Sheet formation has considerable influence on paper quality. The DuoShake™ shaking unit for the breast roll contributes to a more homogeneous distribution of fibers and an

Sheet formation has considerable influence on paper quality. The DuoShake™ shaking unit for the breast roll contributes to a more homogeneous distribution of fibers and an increased orientation of the fibers in cross direction. The result is better formation and a lower MD/CD tensile strength ratio, so that an altogether higher level of quality is achieved.

Fig: 2, DuoShake: Improves fiber orientation & formation

Product details and benefits

Perfect physics

Two rotating pairs of imbalance masses are arranged on the hydrostatically mounted carriage of DuoShake. Due to the rotation, forces develop that are transferred with a shaking rod to the breast roll.

The horizontally freely vibrating system only transfers negligibly small friction and centering forces to the base, in contrast to conventional shaking units. The imbalance masses move in opposite directions within a pair of masses and are arranged so that the vertical forces cancel one another out. The stroke results from the position of the mass pairs vis-à-vis one another.

Synchronized start-up

After DuoShake is switched on, the oil supply is initially activated for the hydrostatic system and the oil circulation lubrication. Then the two pairs of imbalance masses are synchronized. After reaching a specified minimum speed of the wire, DuoShake moves to the preset operating values. In case of changes in production conditions or a grade change, the new operating values can be entered at any time via the operator terminal. Adjustment of the values is likewise possible using a process control system via an interface.

DuoShake can be easily integrated in the existing process without any problems.

The electric control unit and power feed of the three phase servomotors is located in a control cabinet. All relevant operating data are entered via an operator terminal and displayed in operating messages, if necessary. Operation by means of the process control system via an interface is also possible.

In dewatering of the suspension, the fibers frequently tend to form flakes and to distribute unevenly. High-frequency shaking with DuoShake substantially reduces this flake formation. For this, two imbalance pairs are put into rotation by servomotors in a carriage that is mounted in a hydrostatic and thus extremely low-wear fashion. Due to the special arrangement of the pairs, the vertical forces are compensated and the horizontal forces are transmitted to the breast roll by the shaking rod. The high-frequency motion of the breast roll without bothersome reaction forces provides for a reinforced crosswise instead of lengthwise orientation of the fibers and thus improves the formation.

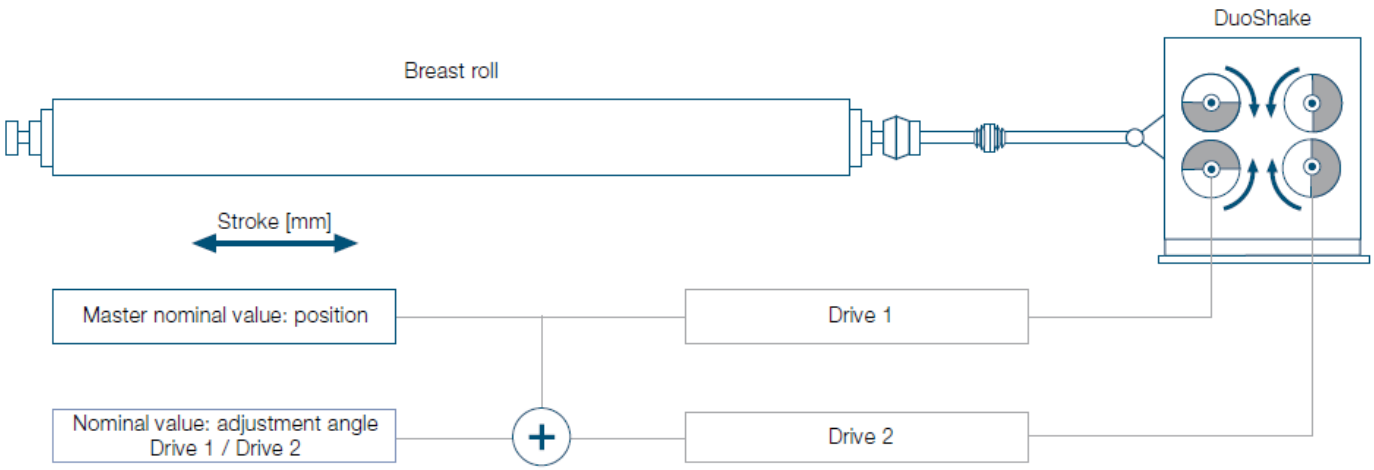


Fig: 3, DuoShake: Schematic diagram

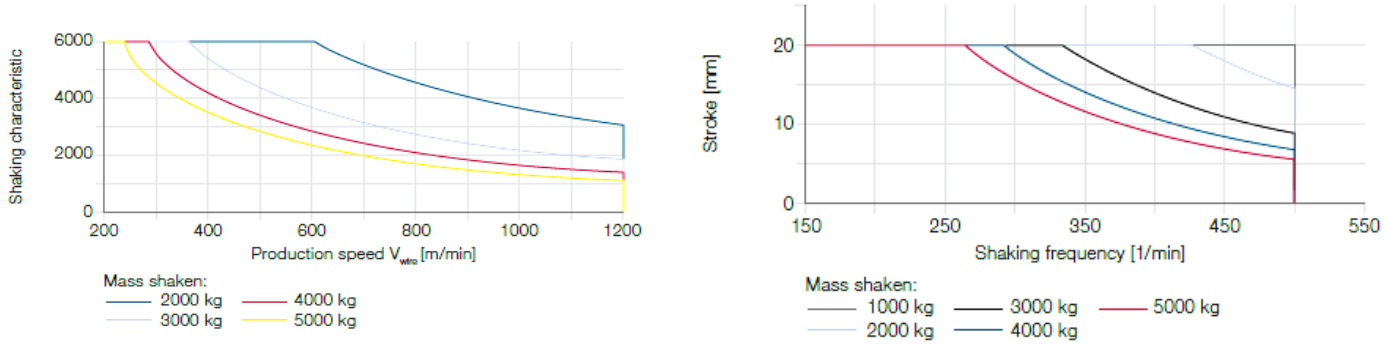
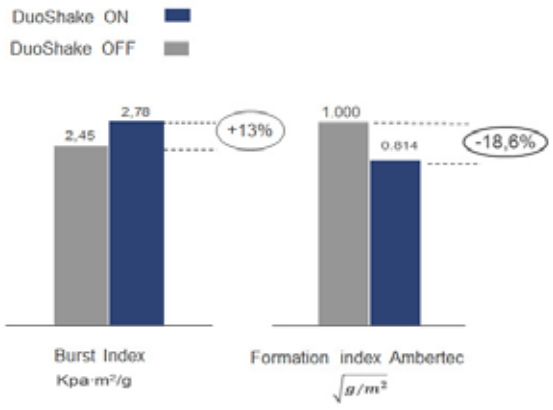


Fig: 4, DuoShake shaking characteristics: operates well in wide machine speed range

Conclusion

Voith's DuoShake is an innovation to save resources, improve quality and help paper mills to gain competitiveness. With the installation of DuoShake better paper quality is achieved due to better paper formation. Higher strength values, a reduced tensile ratio and better printability of the paper are also achieved.

DuoShake: Success Story Lee & Man:



Customer conditions - Technical Data	
Wire width	4200 mm
Machine Speed	800m/min
Grade	Corrugated Medium
Grammage Top 50/m², Filler 50g/m², Back 100g/m²	200g/m²

Results and Benefits for Trial with DuoShake		
• Formation (Ambertec)	18,6%	improved
• Burst	13%	improved
• RCT-CD index	11%	improved
• MD/CD Tensile Ratio	> 25%	reduced

Value Added

- Better paper quality
- Starch and steam savings

Fig: 5, DuoShake success story

Potential benefits of DuoShake can be summarized in following four categories.

Enhanced Quality / Performance

The DuoShake can lead to:

- increased CD strength
- better sheet stability
- improved formation / appearance

Raw Material

The DuoShake can lead to:

- reduction of basis weight at same strength level
- reduction of strength generating chemicals
- flexibility in the furnish mix ratio or fiber substitutions

Efficiencies

The DuoShake can lead to:

- reduction in breaks due to stronger, more dimensionally stable sheet
- wider sheet at reel due to less shrinkage
- speed increase

Energy

The DuoShake can lead to:

- reduction in refining power
- improved dewatering means less vacuum load
- reduction in steam load

Fig: 5, DuoShake: best in class due to its ability to transmit highest frequency