

Voith Silent Technologies – SeaLencer



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The starting position

The sound pressure level usual in the vicinity of paper machines confronts the design engineers with the task of taking noise abatement measures. In particular, the legal provisions for employee protection and neighborhood protection require noise reduction measures. The targets set by Voith Silent Technologies are to pave the way for systematic noise reduction in paper machines: By the end of 2005, the suction roll noise is to be reduced by 5 dB, A-weighted, which corresponds to a sound energy reduction of 68%. The noise level reduction to less

The increasing industrialization makes noise a key issue. The industry, in particular the paper industry, often faces the problem that the operation of technical equipment is not, or only to a limited extent, possible if the legal limit values are exceeded. The pioneering solution of the SeaLencer sealing strip system developed by Voith for suction rolls fully satisfies today's demands on noise abatement.

than 90 dB, A-weighted, to be achieved at operator level on a long-term basis is to significantly improve the workplace quality in the vicinity of paper machines. The suction rolls in the wire and press sections are the crucial noise sources of a paper machine. Due to their "noise dominance", the acoustic design process presently focuses on suction rolls.

Voith's acoustic test stand

An acoustic test stand is used to systematically analyze and optimize the acoustic characteristics of suction rolls under standardized conditions. It allows to alter various physical parameters (such as felt speed, vacuum, amount of water, etc.) within wide limits.

In addition to acoustic analyses, innovative technologies are developed in the research fields of "wear-optimized design of seals", "reduced energy consumption" and "reduced vacuum losses". Extensive studies and tests result in innovative sealing materials and new seal geometries. The Voith SeaLencer described below is the result of systematic research and development for low-noise design on the acoustic test stand.

Voith SeaLencer – Seals of Silence

A suction roll comprises, among other things, a perforated roll shell and an evacuated suction box. Sealing strips are used to seal the vacuum against the air in the rotating suction roll and are pressed against the inside of the suction roll shell. When conventional sealing strips are used, the vacuum suddenly collapses after the sealing strip is passed. Impulses of high-frequency sound are emitted due to the abrupt flow of air back into the holes of the suction roll after leaving the suction area and produce the annoying effect of suction roll whistling.

The function of the SeaLencer – patent applied for – (Fig. 1) is determined by its special geometry for optimizing the pressure gradient in the gap above the sealing strip. The gradual, non-abrupt flow of air into the suction holes at the bevelled surfaces results in controlled and uniform pressure reduction in the holes (Fig. 2), which is clearly audible: A "softer" sound with a lower sound pressure level is created.

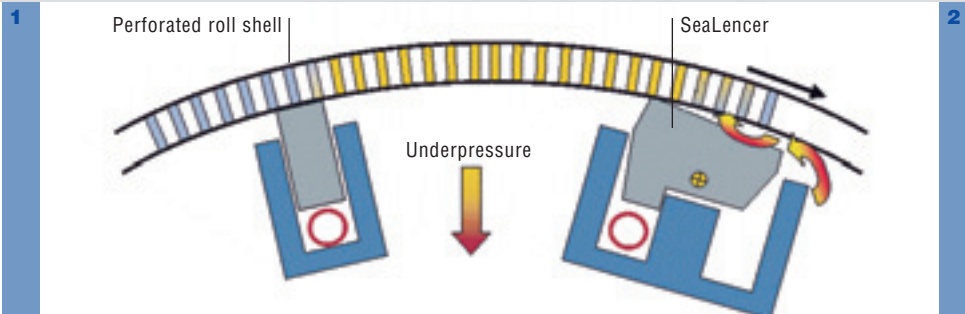
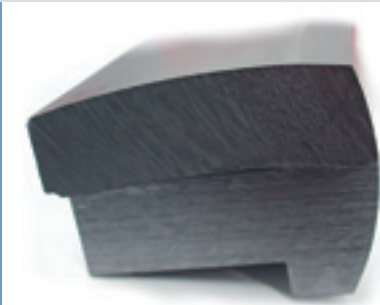
A run-up test from 1,000 m/min to 2,200 m/min on the acoustic test stand demon-

Fig. 1: Optimized geometry of SeaLencer.

Fig. 2: Continuous pressure reduction due to uniform flow of air into the suction-roll holes.

Fig. 3: Fingerprint: Standard sealing strip.

Fig. 4: Fingerprint: Voith SeaLencer.



strates the acoustic effect of the SeaLencer by using acoustic fingerprints (Figs. 3 and 4): The horizontal axis correlates with the frequency, the vertical axis is the speed. The colour denotes the sound pressure level in the relevant frequency band (yellow = very high level, red = high level, blue = medium and low level). The comparison of a conventional sealing strip and the SeaLencer shows a distinct reduction of the emitted sound pressure level and a strong reduction of the disturbing high frequency portions (yellow lines, red areas).

After installation of the SeaLencer, the emitted sound pressure level is usually reduced by up to 5 dB, A-weighted. In individual, psychoacoustically disturbing frequency bands, reductions of up to 15 dB, A-weighted, were often measured.

Increased lifetime and less friction energy

Additional advantages of the SeaLencer are less friction energy and reduced wear of the sealing strip material (increased lifetime). As the sealing surface is reduced, both the friction between sealing strip and roll shell and the thermal stress

of the sealing strip material are substantially diminished. Extensive trial runs are presently made on the acoustic test stand and on running paper machines to analyze the additional advantages of longer service lives and lower drive powers.

The acoustic success of the SeaLencer

The noise reduction effect of the SeaLencer has meanwhile been confirmed on 30 paper machines in operation. Since January 2002, 91 SeaLencer units have been installed in suction rolls. Machine operators describe the noise of rebuilt suction couch rolls to be “softer”, “quieter” and “more pleasant”. Further infor-

mation on the SeaLencer and sound examples can also be found on the Internet at <http://www.voithpaper.com>

The silent future

The development of silent technologies is a key topic of Voith Paper’s research activities. High acoustic workplace quality and increased neighborhood protection in terms of noise are core areas of our R&D activities. Noise is a topic of the future in many sectors – the consistent development of innovative noise reduction technologies helps Voith Paper to further strengthen its position as a pioneer in noise abatement.

