

High Technology on a Roll Part 1

Ceramics, polymers, elastomers and advanced composite materials have experienced considerable growth in paper machinery applications.

Voith Paper Rolls' R&D experts are not limited in working only with materials that have set modulus, strength, and corrosion resistance properties as supplied by vendors, but can instead "design" these materials so that roll covers can have the surface and bulk properties optimal for the process.

The various applications in the paper industry require a high variety of designs and materials for roll covers and coatings. The materials used range from very hard metallic and ceramic coatings to very soft elastomeric covers. The surface geometries range from plain polished to profiled (drilled and grooved to different depths) with high open-surface ratio.

These requirements are reflected in the major activities of the R&D de-

partment. A total of 26 highly qualified employees, working in roll cover R&D worldwide, provide expertise in Polymer, Chemical, Mechanical, and Process Engineering, Chemistry, Material Science and many other areas. This highly specialized field of roll cover and roll coating development is integrated within Voith Paper's overall R&D program.

There are numerous examples of the creative power unleashed by the unique synergy between Voith Paper Rolls, Voith Paper Fabrics and the other Voith Paper divisions. This synergy provides benefits to the customer through both unique products and solutions. For example, a multi-divisional team was formed between the Film press and the Engineering Calculations groups in Heidenheim, and the R&D and Product Management

groups of the Rolls division to analyze and solve self-excited vibrations of elastomer-covered rolls for film presses. As a result of this cooperation, analytical and numerical formulations were developed to model self-excited cover vibrations in film presses. A computer program was then written to accurately predict whether self-excited vibrations will occur, and, if so, at what speeds and with what severity. As a consequence of this, film presses can be designed to be stable at much higher speeds. Also, covers for film presses were invented that enabled operation of film presses at record-breaking speeds without self-excited vibrations.

In another example, the Voith Paper Rolls and Finishing divisions have worked together to use advanced composite materials to create calen-

dering roll covers. These calendering roll covers enable reliable operation of Janus calenders at high speeds with high gloss and surface smoothness and provide the longest running times between cover regrinds in the industry.

The commitment of Voith to innovation and excellence is reflected in investing 5 to 6% of annual sales into roll cover R&D.

Why roll cover R&D?

Depending on specific customer applications, roll covers or coatings in the paper machine have to fulfill various functions. The main objective of roll coverings or coatings may be:

- to provide a longer nip residence time, for greater dewatering (through a wider nip) as compared to a hard (and thus narrow) nip
- to engineer the dewatering of paper and fabrics through a higher open roll cover surface with grooves, blind-drilled holes and suction holes
- to reduce the hydraulic pressure in a press nip (through a wider and softer nip)
- to ensure uniform release from or adhesion of the paper web to the roll (as required by the application)
- to provide uniform coating or sizing of the paper
- to provide elastic support (more closely matching the paper stiffness) for the paper in the calendering process, and avoid the localized high stresses produced by metal-hard nips

- to support the paper in winding operations
- to provide shock and vibration absorption through viscoelastic dissipation
- to transmit driving torque by means of a high-friction surface
- to protect the roll body against corrosion
- to protect the roll against wear from doctors or wires or felts.

The next edition of “twogether” will carry the second part of this article, presenting the Voith Paper Rolls R&D locations and some interesting project details.

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