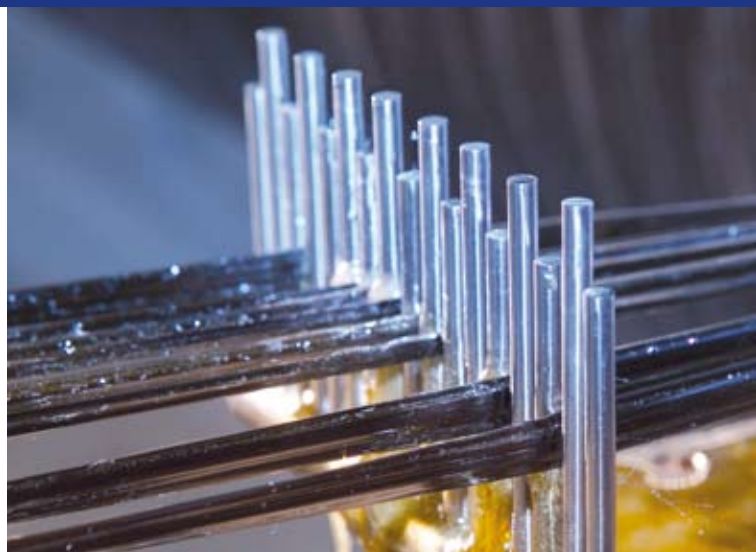




Thomas Maurer standing beside one out of the 100 CarboTec rolls which were produced for the Hainan (China) paper machine.



Special made OCS (oval cross-section) fibers to produce composites with a more precise structure than standard fibers.

Voith develops its own advanced materials for CFRP rolls

Lightweights: Carbon fiber rolls

The new Boeing 787 uses it. And the Airbus A350 does too. Formula 1 cock-pits are even made out of it, as well as tennis rackets. What we're talking about is "carbon fiber reinforced plastic" or CFRP. And Voith Paper also uses this advanced composite in its premium rolls.

For 15 years, Voith Paper has produced advanced "CarboTec" rolls from CFRP in its Wimpassing, Austria facility – and since 2006 they have been made using an ultra-modern production line. The latest installation of CarboTec Rolls was at the Mondi Business Paper plant in Hadera, Israel. There, CarboTec Rolls from Voith Paper are especially admired for their ability to absorb vibrations. Thanks to the structure of their CFRP composite, the paper mill's new dryer fabric rolls have significantly lower vibration levels. When compared to conventional steel rolls, which had serious vibration problems, CarboTec Rolls having the same diameter are now far stiffer. As a result, the paper machines can be run at even higher speeds without the rolls developing critical vibrations.

The reason for these reduced vibrations is the higher dampening ability and stiffness of CFRP rolls. In technical terms, the higher a material's elasticity modulus or >>> e-modulus is (i.e. the relationship between the applied tension and the resultant expansion shown by a material), the stiffer a product becomes. For example, steel rolls have an e-modulus rating of 220 gigapascal (GPa) while carbon composite rolls have ratings from 240 to 700 GPa. CFRP rolls therefore also permit more precise online calibrations during production as well as improved workplace safety.

Multi-Directional Fibers

Fiber composites can now be manufactured with precisely the right material

characteristics to satisfy a particular application. And Voith Paper uses this technology for its CarboTec rolls.

Through precise arrangement of the carbon fibers, CFRP composites can be made with extremely effective dampening characteristics and a specific thermal expansion coefficient. In addition, unlike steel rolls, CFRP rolls do not need to be run-up in advance to reach a uniform operating temperature. As a result, the waste paper associated with production start-ups can now be significantly reduced. CFRP rolls can also be operated at temperatures up to 125°C, and for short periods even up to 140°C. Plus, thanks to their internal structure, CFRP rolls usually have a smaller diameter than steel rolls.

In its CarboTec rolls, Voith uses its own specially made OCS (oval cross-section) fibers to produce composites with a more precise structure than is possible with standard fibers. Thanks to this improved structure, Voith composites reduce air and moisture inclusions and minimize microcracks. This means CarboTec Rolls have a major advantage, especially when operating in moist or humid conditions. CFRP rolls are also comparative lightweights: a cubic meter of carbon fiber composite weighs 1.5 tons, while a cubic meter of steel weighs five times that amount. For that same reason, the CFRP rolls in paper machines are easier to operate and have lower power requirements.

100 CFRP Rolls for Hainan, China

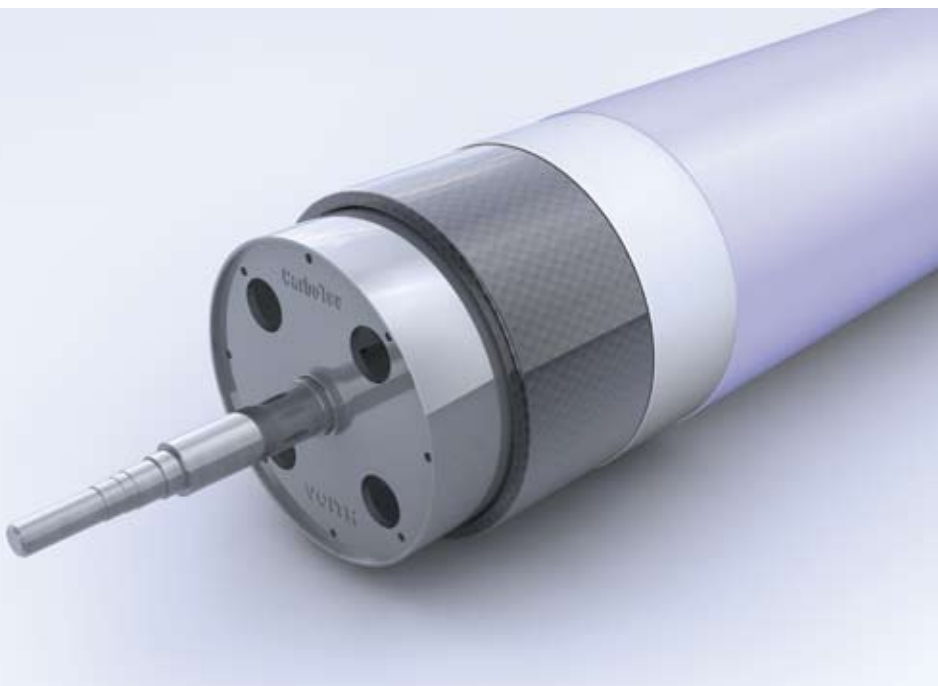
Voith also uses specially developed materials for its roll covers, such as

>>> Information: E-Modulus

The e-modulus (also called: elasticity modulus, coefficient of elasticity or Young's modulus, being named after the physicist Thomas Young) is a characteristic value of solid materials. In the material sciences, e-modulus values describe the relationship between the applied tension and the resultant expansion of a solid object when it is deformed. Simply put - the e-modulus measures elasticity. The term "elasticity modulus" is often abbreviated as "e-modulus" or "E." Large e-modulus values for a material indicate a high resistance to deformation. For example: Construction materials with a high e-modulus value, such as CFRP, are stiff. Materials with a low e-modulus value, such as rubber, are flexible.

special epoxy resins. These resins further strengthen the roll and absorb vibrations. This is particularly important in the drying section of a paper mill, where aggressive steam is part of the operating environment and rolls need to be both heat as well as hydrolysis resistant. In the prospective world's most productive fine paper machine in Hainan, China for instance, Voith Paper supplied a press section with

100 CFRP rolls – all of which have special coatings made from composites, polyurethane or rubber. Even the re-coating of a CFRP roll is simple. Seeing the stiffness of a CFRP roll doesn't change after use and practically no bending occurs – an old coating can be easily removed and renewed using special TLT (thermo layer technology) coatings.



Schematic illustration of a CarboTec roll with composite cover.

On Focus: CFRP rolls

ProSafety	+			
ProEnvironment	+	+		
ProRunnability	+	+	+	+
ProQuality	+	+	+	+
ProSpeed	+	+	+	+
ProSpace	+	+	+	+

Section: total paper machine

Width: all

Paper grade: all

Contact



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