Wilson Launches New Series H Racquets with Isogrid

By Crawford Lindsey

Wilson has launched three new Hammer frames with a difference. Series H incorporates the well-known Hammer design and Hyper Carbon material with a new construction technology called Isogrid. Isogrid forms an internal ribbing system that is bonded to the graphite tube, thereby producing more strength and stiffness.

There are four racquets in the new line. The H2 is nine ounces strung and has a 115 square inch head and is 28 inches long. It retails for $189.99. The H5 is available in 102" and 113" head sizes, weighs 9 and 10 ounces, and retails for $159.99. And last, the HTour is 95' and retails for $149.99.

Isogrid was developed by Vyatek in Scotsdale, Arizona. It has been applied in golf shafts, arrows, bike frames, kayak paddles, ski poles, bats, hockey sticks, and now tennis racquets. Its primary application is to strengthen thin-walled tube structures. A tube is "thin-walled" if the ratio of the diameter to the wall thickness is greater than 10. The benefits of Isogrid become significant when the ratio is above 20. The typical ratio of a tennis racquet is about 75, making it an "off-the-chart" candidate for Isogrid.

The Isogrid material is a tow (continuous fiber bundle of graphite composed of thousands of fibers) with an overbraiding of kevlar. This overbraiding keeps the bundle from collapsing in the molding process, and thereby preserves the ribbing. If you look inside an H Series frame, you can see the ribbing on the interior wall of the handle (See Figure 1).

Figure 1

During manufacturing, the ribbing is applied in a three-step process. First, the air bladder is inserted over the mandrel (see March 2003 Racquet Tech for racquet manufacturing photos). Next, the Isogrid is wrapped around the bladder in a criss-cross pattern. The graphite layup is then wrapped around the Isogrid. During molding, the bladder expands, the frame takes its shape, and the Isogrid is bonded to the inner wall of the frame.

Whenever a thin-walled tube is loaded by bending, the compressed side is the real stress point. This is where the frame can buckle. This is especially true if there are any deformities, discontinuities, or geometrical anomalies at that point. Buckling occurs first, and then delamination and fiber breaking can follow. The tube will always buckle at the defect, and graphite materials always have natural discontinuities.

The best demonstration of how Isogrid ribbing supports a frame and adds to its stiffness is to take a piece of paper and stand it on end on your desk. It wants to bend and buckle somewhere in the middle and collapse. If you put two pieces of tape across the paper in an "X" going diagonally from corner to corner and then do the same experiment, the paper is much less prone to buckling. The tape acts like a raised rib, and the effect is increased if you put another layer of tape on top of the first.

This works similarly in a rolled tube. In the H Series, the Isogrid is wrapped around the tube at plus and minus 45 degree angles. Forty-five degrees is the optimum angle to increase the frame's torsional rigidity, and Wilson claims a 10 percent improvement as a result.

Strategic use of Isogrid allows either a lighter frame at the same stiffness or a stiffer frame at the same weight. Wilson's four H Series racquets use both of these principles to locate and swap Isogrid and graphite layers to maximize the specific performance features of each racquet. The location of the Isogrid will therefore be different in each model.

Editors note: For more information on Isogrid Technology, go to http://www.isogridtechnology.com