

EXACTECH | HIP

Technical Brief



NOVATION[®]

Crown Cup[®] XLE Liner



Novation® Crown Cup® XLE Liner

Crown Cup XLE highly crosslinked vitamin E enhanced acetabular liners provide low wear while maintaining mechanical strength, reducing free radicals and oxidative degradation.³

The XLE liners are manufactured using Ultra High Molecular Weight Polyethylene (UHMWPE) blended with vitamin E prior to consolidation and crosslinking. This provides a uniform distribution of the vitamin E and minimizes the elution effect found in diffused vitamin E liners.¹ The gamma crosslinking and annealing process, developed in conjunction with Massachusetts General Hospital, grafts the vitamin E to the polyethylene molecule, resulting in a highly crosslinked material with excellent oxidative stability.³

Features/Benefits

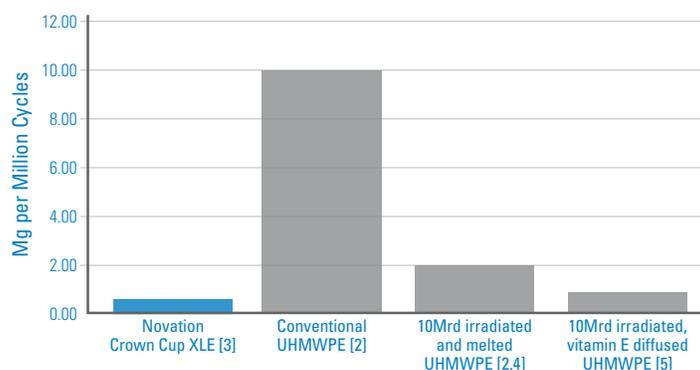
Low Wear

A patented gamma irradiation and mechanical annealing process, tailored to the vitamin E content, is used to achieve the desired crosslink density. An irradiation dose of 10 Megarad (Mrad) or 100 KiloGray (kGy) is imparted to the material prior to final gamma sterilization. This highly crosslinked polyethylene yields a reduced wear rate compared to conventional polyethylene.³

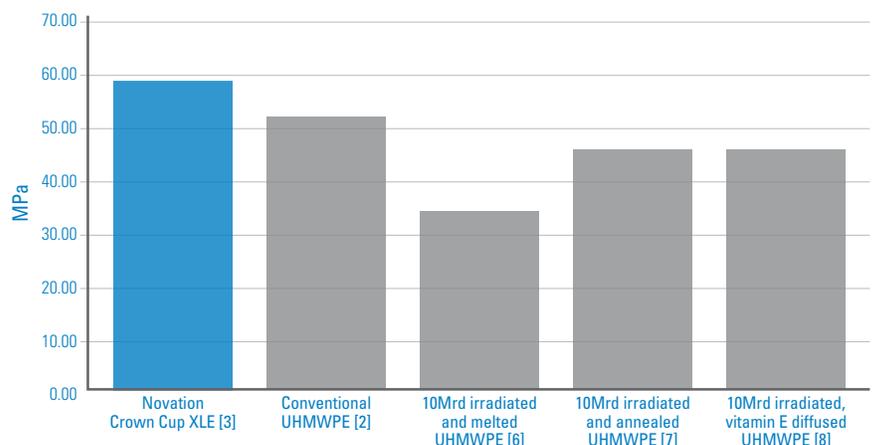
Mechanical Strength

The mechanical annealing process quenches free radicals below the melt temperature, which maintains the crosslink density and provides improved mechanical strength over conventional polyethylene.^{1,3}

Hip Simulator Wear Rate*



Ultimate Tensile Strength



*TEST PARAMETERS:

Novation Crown Cup XLE [3]: Test parameters: 40mm diameter CoCr head; 4.4mm thick liner; 5 million cycles; 90% bovine serum; 1.1Hz; 2kN peak load; Wear rate: Slope of the linear regression for corrected mass change in the steady-state cycles

Conventional UHMWPE [2]: Test parameters: Not specified

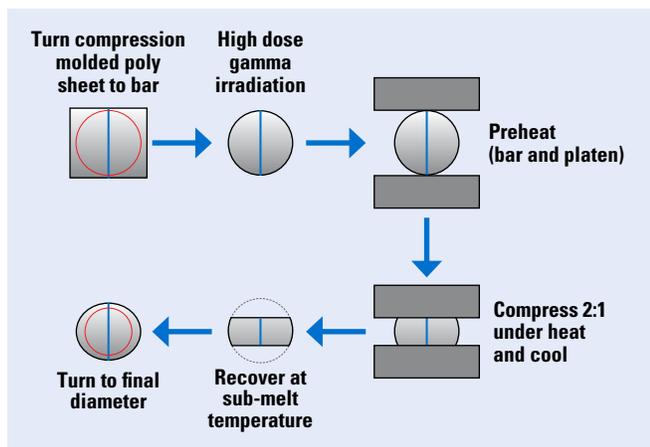
10Mrd irradiated and melted UHMWPE [2,4]: Test parameters: 46mm head; 3mm thick liner; 11 million cycles; 100% bovine serum; 3.3kN peak load; Wear rate: Slope of the linear regression for corrected mass change over the full number of cycles

10Mrd irradiated, vitamin E diffused UHMWPE [5]: Test parameters: 36mm CoCr head; 4.9mm thick liner; 5 million cycles; 100% bovine serum; 2Hz, 3kN peak load; Wear rate: Slope of the linear regression for corrected mass change over the full number of cycles



Oxidative Stability

Blending the vitamin E prior to consolidation allows the antioxidant to distribute uniformly throughout the material. Gamma crosslinking grafts the vitamin E molecules onto the polyethylene chains. This minimizes the elution effect found in diffused or doped vitamin E liners.¹ The mechanical annealing process further quenches free radicals.^{3,9,10} The cumulative result is a material with oxidative stability that reduces oxidative degradation.³



Manufacturing Process

Developed by Massachusetts General in conjunction with Cambridge Polymer.³

1. Compression molded, vitamin E blended polyethylene sheet is turned into bar stock
2. Bar stock is gamma irradiated at 10Mrd
3. Preheat bar and platen
4. Compress 2:1 under heat and cool
5. Recover at sub-melt temperature
6. Turn to final diameter

Size Offerings

Offered in neutral, extended coverage, face changing, and lateralized offset options designed to allow the surgeon to optimize the femoral head size and restore patient anatomy.

Liner Options (mm)

Liner Grouping	Neutral	Extended Coverage	+5mm Lateralized	10-Degree Face Changing, +5mm Lateralized
Group 00 (Orange)	22	22	N/A	N/A
Group 0 (Yellow)	28	28	N/A	N/A
Group 1 (Brown)	28, 32	28, 32	28, 32	32
Group 2 (Blue)	32, 36	32, 36	32, 36	36
Group 3 (Gray)	36, 40	36, 40	36, 40	36, 40
Group 4 (Purple)	36, 40	36, 40	36, 40	36, 40
Group 5 (Green)	36, 40	36, 40	36, 40	36, 40

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