

Scorpio NRG The Evolution

Concepts of Scorpio NRG system

- Freedom
- Mobility
- Confidence



Freedom

Freedom is one of the most essential factors in the design of a successful total knee replacement. Freedom of rotation allows the ligaments to govern knee motion, unlike traditional designs that force inhibit functional knee kinematics.



Freedom

The mobility of an active patient has always been a challenge for traditional knee implant designs. Scorpio NRG® improves upon many years of clinical success (Series 7000 through Scorpio) by capturing greater mobility and an earlier return to an active lifestyle.



Freedom

Confidence is critical for the knee surgeon. The Scorpio NRG® knee was designed and tested with the utmost quality in mind, allowing the surgeon to feel confident about their choice in implant for their patients.

Scorpio NRG Freedom

Unlike other modern knee replacement designs, Scorpio NRG® has greater internal and external rotational freedom throughout the full range of motion. Mechanical testing illustrates that the Scorpio NRG® fixed bearing design has comparable rotational allowance to competitive mobile bearing knee systems without sacrificing contact.

The Importance of Rotation

Large degrees of tibial rotation have been reported for the living intact knee. It is also reported that the knee rotates up to 17° after total knee arthroplasty. Insufficient allowance for these rotations can lead to possible polyethylene wear or damage due to stress on the polyethylene.

The Scorpio NRG® Approach

Mechanical testing shows the Scorpio NRG® fixed bearing design maintains low levels of constraint up to $\pm 20^\circ$ of rotation which is consistent with a mobile bearing philosophy.

Traditional insert designs utilize a less functional partial rotary arc that limits the overall kinematic function of the knee. The Scorpio NRG® tibial insert's articulating surface adapts a Spherical Arc in order to realize greater rotational freedom. By meshing a single M/L radius and a Spherical Arc, Scorpio NRG® allows for wider rotational freedom without restricting tibiofemoral contact area.

The Scorpio NRG® knee was designed to accommodate rotations of the intact knee on the articulation surface for both PS and CR systems. Additionally, Scorpio NRG® PS accommodates these rotations as well on the post where possible post wear and damage can occur.



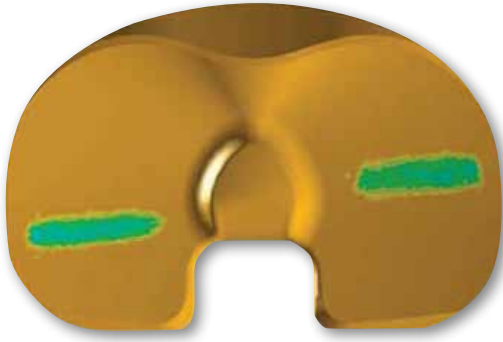
Traditional straight cut designs restrict the knee from achieving increasing amounts of I/E rotation. Rotary arc designs, while accommodating increasing amounts of IE rotation, provide less conformity at these angles.



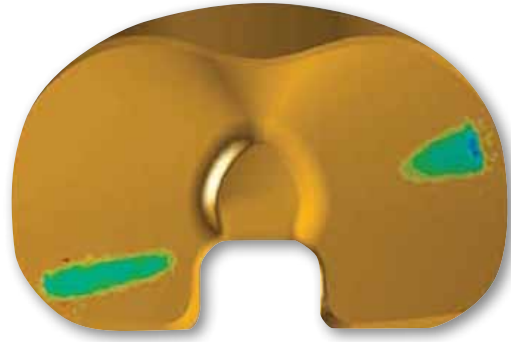
The Scorpio NRG® Spherical Arc design accommodates increased amounts of I/E rotation while still maintaining the single M/L radius.

Scorpio NRG

Freedom



Typical contact area for the Scorpio NRG® system during normal gait



Typical contact area for the Scorpio NRG® system during stair climbing

The Importance of Conformity

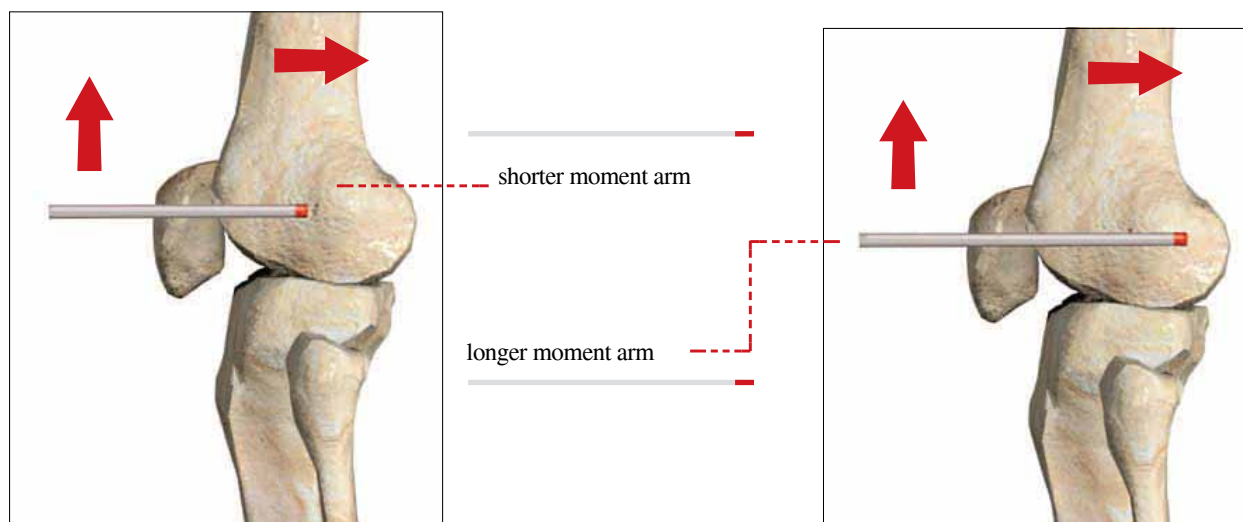
Conformity is an important factor as a wear mechanism of polyethylene. If the contact area between two surfaces is too low, the residual stress will exceed the yield point of the polyethylene, therefore greater conformity is desired to potentially reduce the likelihood of a revision.

On the other hand, increasing conformity of a total knee implant increases the level of rotational constraint. If the contact area is too great, the kinematic motion of the joint will be limited and the rotational torque will be transmitted directly to the locking mechanism of the tibial base plate. This method of knee implant design has been shown to exhibit early clinical failure.

The Importance of Conformity

The clinically successful single M/L radius of the Scorpio NRG® design achieves full conformity at all flexion angles. The increased conformity of the Scorpio NRG® knee design results in decreased contact stresses during increasing rotation.

Scorpio NRG Mobility



Traditional multiple axis moment arm is shorter than the Scorpio NRG® design, requiring more effort to achieve full extension.

The longer moment arm of the Scorpio NRG® design requires less effort to achieve full extension.

The Importance of Conformity

The moment arm is the perpendicular distance from the center of rotation to the point of application of force. In the knee joint, the moment arm is the distance between the flexion/extension axis of the femur and the patella femoral joint.


The patella-femoral moment arm determines the degree of muscle force required to move the joint between flexion and extension. It also determines the patella-femoral joint reaction forces the stress applied to the joint by the combination of muscle force and body weight. These factors influence early patient function as well as long-term implant performance.

The Importance of Conformity

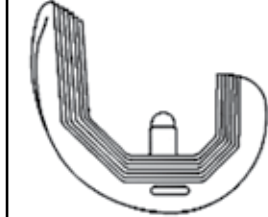
The center of rotation of the Scorpio NRG® femoral component is fixed at the transepicondylar axis. This is considerably posterior to the varying rotational axis of traditional knee design. The length of the patellafemoral moment arm is increased, which can maximize quadriceps efficiency by reducing the amount of force required to achieve full extension. In addition, its longer patella-femoral moment arm decreases the joint reaction force, which can help to decrease the potential for anterior knee pain.

Scorpio NRG

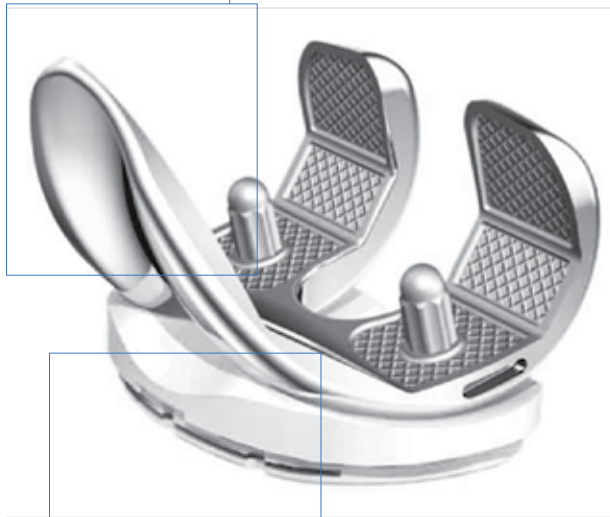
Cruciate Retaining Knees



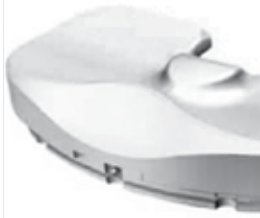

Scorpio NRG® incorporates a thinner anterior flange to reduce the tension on the retinaculum.



The Scorpio NRG® Femoral component has 9 sizes for improved patient fit and better control of the fixation gap.



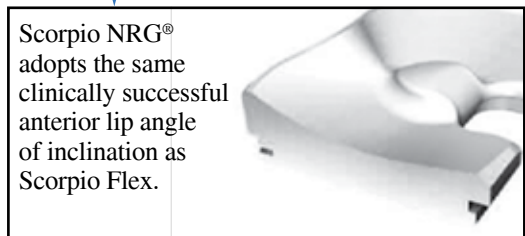
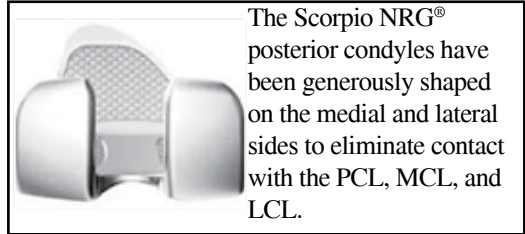
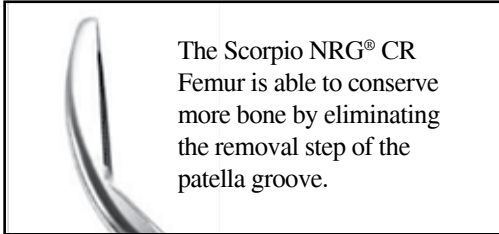
The Scorpio NRG® tibial insert provides a deep cutout on the anterior, to reduce the stress on the patella tendon during higher flexion angles.

The Scorpio NRG® bearing insert utilizes a spherical arc to promote rotation and a relaxed posterior lip to significantly reduce femoral rise during rotation.

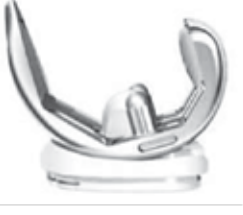
Scorpio NRG

Cruciate Retaining Knees

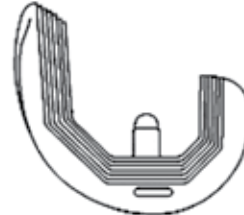


Scorpio NRG


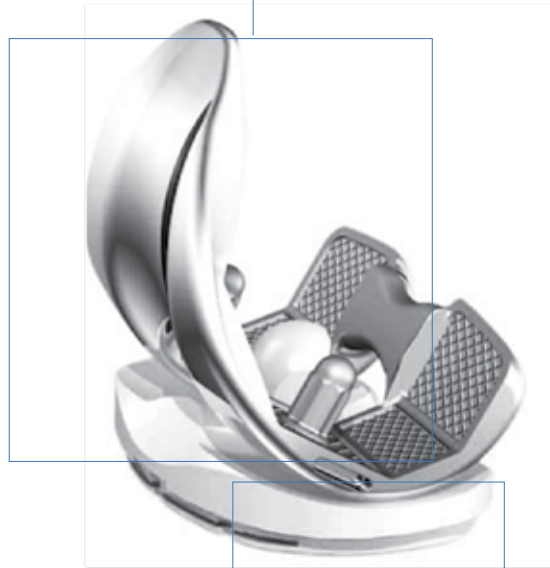
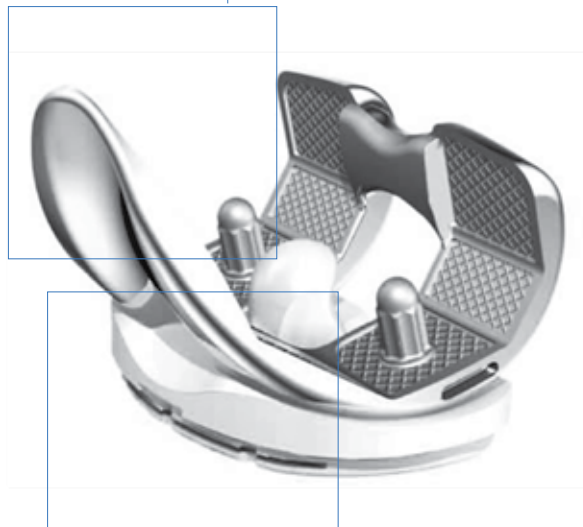
Posterior Stabilized Knees



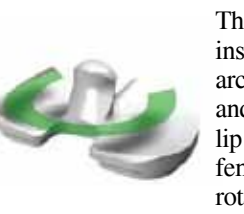
Scorpio NRG® has been carefully designed to allow beyond 15 degrees hyperextension without anterior impingement on every size combination.



The Scorpio NRG® Femoral component has 9 sizes for improved patient fit and better control of the fixation gap.



The Scorpio NRG® tibial insert provides a deep cutout on the anterior, to reduce the stress on the patella tendon during higher flexion angles.



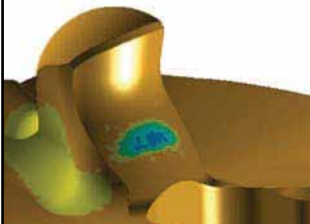
The Scorpio NRG® bearing insert utilizes a spherical arc to promote rotation and a relaxed posterior lip to significantly reduce femoral rise during rotation.

Scorpio NRG

Posterior Stabilized Knees




The Scorpio NRG® PS Femur is able to conserve more bone by eliminating the removal step of the patella groove.



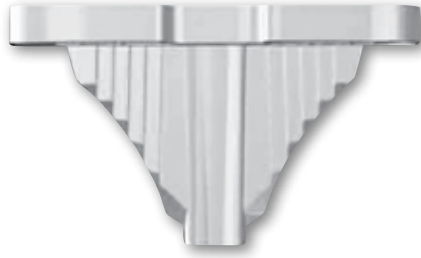
Scorpio NRG® has been designed to maximize contact area on the post during rotation to improve joint stability and potentially reduce wear of the post during deep flexion.



Scorpio NRG® was designed for deep flexion by allowing sufficient rollback to avoid bony impingement without increased resection.



Scorpio NRG
Confidence



Deltafit Keel designed to reach dense cancellous bone and improved stability

Tibial Tray

Clinically Proven Delta Fit Keel

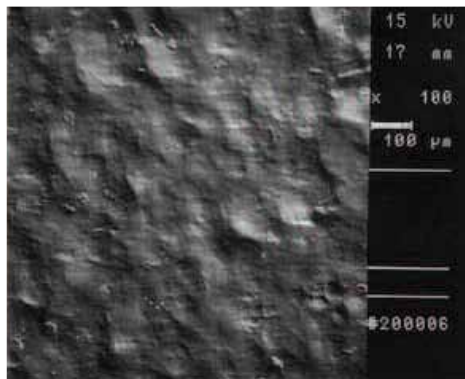
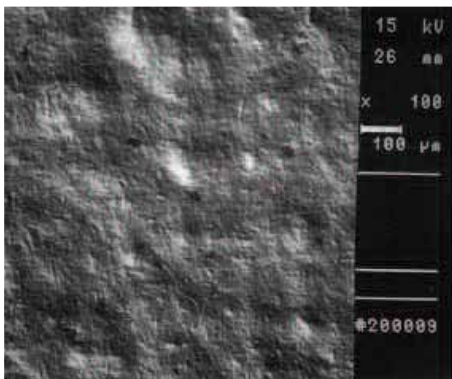
Patented Deltafit Keel is designed to reach dense cancellous bone to optimize fixation. Large projected area distributes load over a wider area to increase load carrying ability and resistance to lift-off. Normalizations on the keel are designed to convert shear forces to compressive force, maximizing stability.

Preventing Micromotion

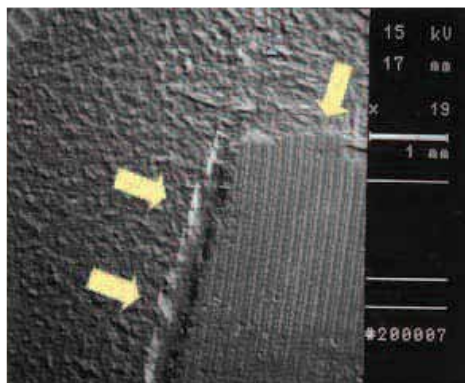
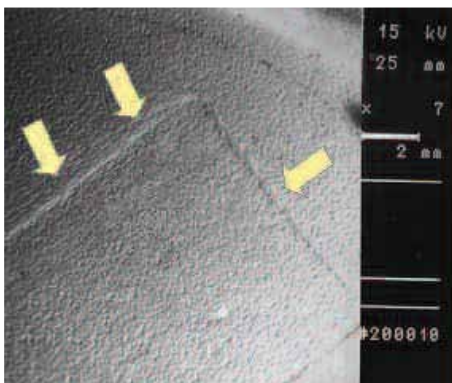
Peripheral locking mechanism is designed to minimize potential for micromotion that causes poly wear.

Tibial UHMWPE Insert Backside

Microscopic Images



SEM Images



The textured surface finish and the central rectangular recess (arrows) on the metallic tibial tray can be seen. The image of the backside of the PE tibial insert had preservation of the original machining marks in the center of the component, corresponding to the recess in the center of the metallic tibia tray. The periphery of the PE surface has a textured pattern without machine marks. The textured pattern on the backside of the PE components is an impression of the surface finish of the metallic tibia tray .

Benefits of Scorpio system

- Greater Bone Conservation
- Tibial Stability
- Improved Patello-Femoral Tracking

Scorpio NRG

Benefits

Greater Bone Conservation

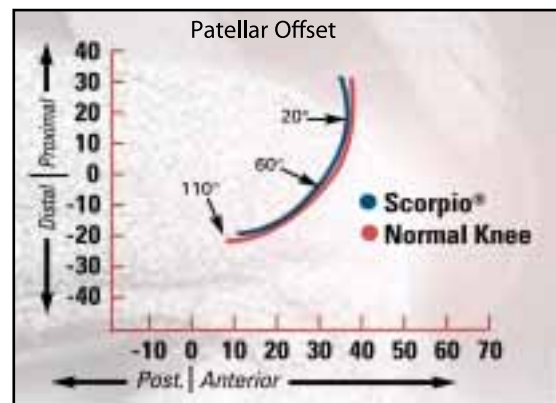
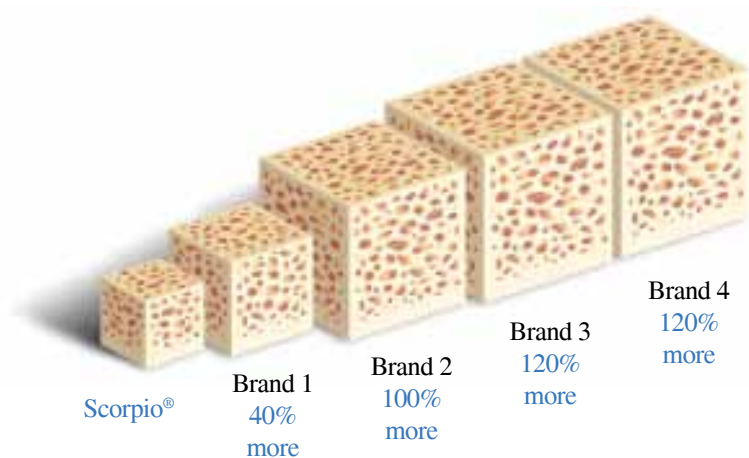
- The Scorpio® PS femoral component preserves up to twice the volume of bone at the intercondylar notch compared to other implants.

Intercondylar Volume

Volume - Comparison Based on Percentage of Scorpio® knee

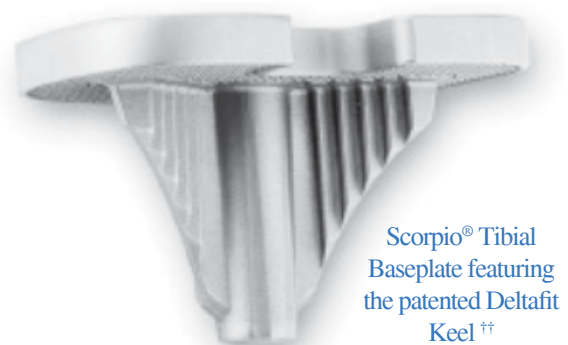
Improved Patello-Femoral Tracking

- Scorpio® knee femoral components feature a deepened, extended trochlear groove, designed to maintain optimal contact throughout single axis rotation.
- Scorpio® knee patellar tracking is designed to closely follow normal knee kinematics.



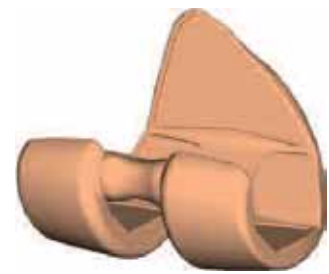
Tibial Stability

- Patented Deltafit Keel is designed to reach dense cancellous bone to optimise fixation.
- Large projected area distributes load over a wider area to increase load carrying ability and resistance to lift-off.
- Normalisations on the keel are designed to convert shear forces to compressive forces, maximising stability.



Scorpio NRG
Size options

Scorpio NRG® PS / CR Interchangeability Chart



Tibial Tray

3
4

5
6

7

9

11

Tibial Insert

3

5

7

9

11

Femoral Component

4
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