Defining normal

Advanced technology should lead to extraordinary outcomes. Using cutting edge computer simulation, JOURNEY II TKA is designed to restore the function of the normal knee; replicating anatomic shape, position and motion resulting in higher patient satisfaction.¹
The JOURNEY™ II Total Knee System has been designed to do what no other total knee replacement currently does, restore normal position, shapes and motion.2-5
Normal shape

Accurate replication of anatomic, asymmetric femoral profile

Ligament centers restored in both compartments

Jointline and profile matched

Medial concavity and lateral convexity of the tibial geometries restored

Prominent posterior medial lip designed to provide stability in mid-flexion

Convex lateral surface designed to promote native rollback

Medial concavity designed to promote anatomic medial pivot
The JOURNEY™ II knee is designed with an anterior tibial sulcus to restore the native knee’s normal starting AP position, preventing paradoxical motion.

The JOURNEY II knee is designed with an anterior dwell point and 3° varus jointline which restores the natural patellar tendon angle and improves patella track.
**Normal motion**

**Full extension: 0°**
- The anatomic position in full extension reduces paradoxical motion in the early gait cycle.

**Mid-flexion: 1-90°**
- Concave medial tibial plateau provides anatomic stability while proprietary convex lateral plateau drives external rotation.
- Asymmetrical posterior cam promotes femoral external rotation and aligns anatomic patella femoral angle.

**Deep-flexion: 90+°**
- External rotation is maximized to reduce stress in the knee.
- Mimicking the normal knee, JOURNEY® II TKA translates bilaterally posteriorly with lateral plateau relief to maximize deep flexion.

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**No Femoral Overhang**
Enhancing the Design Process

The JOURNEY II Knee System is designed with state-of-the-art computer simulation and optimization techniques utilized in aerospace and automotive design processes. To incorporate this technology into total knee design, Smith & Nephew virtually implanted parametrically controlled Computer Aided Design (CAD) models into a computer knee simulator (proprietary, enhanced version of LifeMOD/KneeSIM™) to analyze implant design and its impact on multiple knee activities; including deep knee bend and gait simulation.
Key measures including kinematics and ligament strain, which have been correlated to *in vivo* and *in vitro* data respectively, were collected throughout flexion to characterize the biomechanic performance of the design. This allowed targeted advancements over previous total knee designs, including JOURNEY BCS to further close the gap between total knee arthroplasty and normal healthy knees. Output from LifeMOD/KneeSIM was processed using the following:

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**Characterize**

Design of Experiments to characterize implant behavior and identify the most influential design parameters

**Optimize**

Response Surface Methodology to optimize the implant shapes

**Analyze**

Monte Carlo Simulations to evaluate surgical sensitivity on multiple patients compared to conventional knee designs

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During development of the JOURNEY II Total Knee System, hundreds of thousands of combinations of implant designs, patient anatomy, and surgical positioning were simulated, which is impossible to accomplish using conventional implant design methods. The resulting optimized design maintains the anatomic shapes of the original JOURNEY BCS design and uses subtle enhancements to expand the benefits of PHYSIOLOGICAL MATCHING™ Technology to more surgeons and patients.
For detailed design information please reference the JOURNEY™ II TKA Design Rationale.

For detailed product information, including indications for use, contraindications, precautions and warnings, please consult the product’s applicable Instructions for Use (IFU) prior to use.

References