



*stabilityinmotion™*

## BALANCING THE PATIENT NEED FOR FREEDOM OF MOVEMENT AND JOINT STABILITY

We began the ATTUNE® Knee project with an important focus in mind: to improve patient performance. Data has shown that 10-20% of patients are not satisfied after knee arthroplasty surgery.<sup>1</sup> Based on patient input, key elements associated with patient dissatisfaction include stability with activities such as stair descent and ascent, walking uphill or downhill, and getting up from a chair.<sup>2</sup>

Our goal was to design a system that would work with you as a surgeon and your surgical team to positively impact patient satisfaction, while improving hospital efficiency.

Working in collaboration with independent scientists, universities, engineers, and opinion leaders from all over the world, the ATTUNE Knee System is the result of the largest-ever research and development program from *DePuy Synthes Joint Reconstruction\**. Novel testing protocols and methods were used during development. Each aspect of knee replacement design and the surgical process was evaluated. It was this rigorous process that has produced patented technologies to address the patient need for stability and freedom of movement.

The system encompasses implants and surgical instrumentation designed to work in harmony with the patient's anatomy to deliver stability and motion.





## What makes the development of the ATTUNE® Knee System different?

*DePuy Synthes Joint Reconstruction* has experience in producing world leading knee systems

Developed using world class research facilities in conjunction with an integrated team of expert orthopaedic surgeons from all the key surgical philosophies

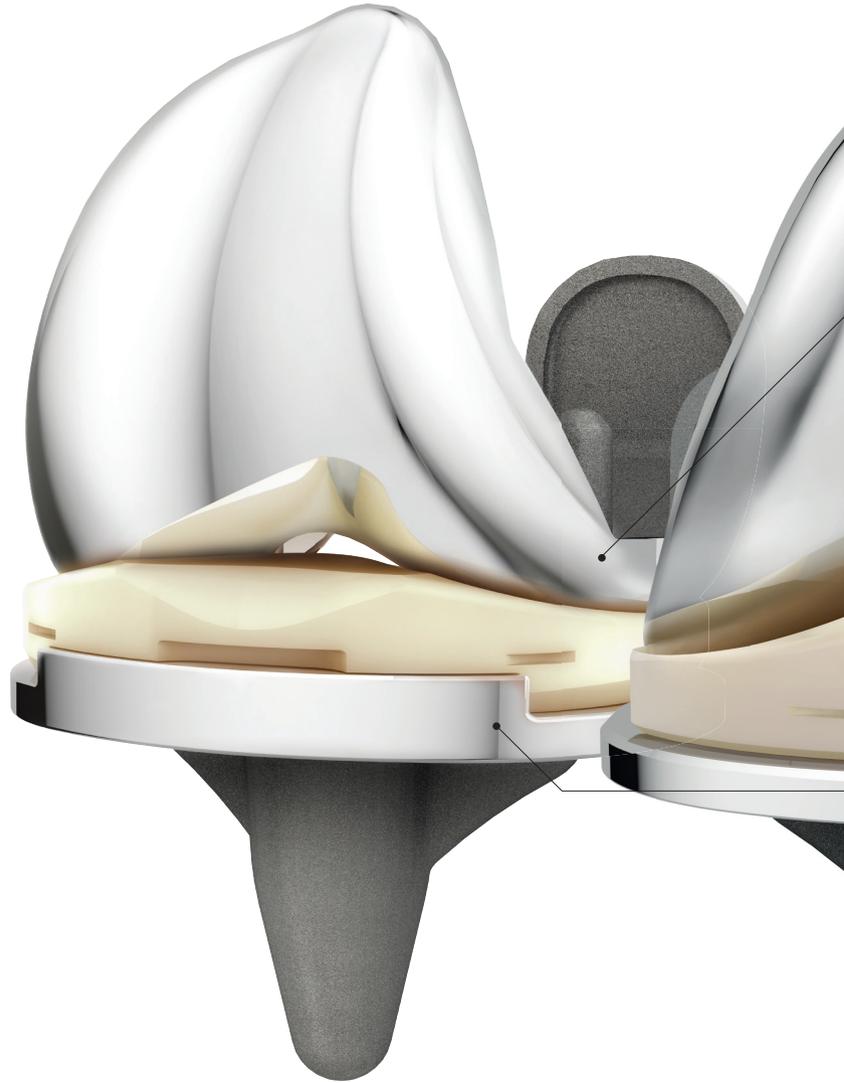
Extensive studies highlighted how implant shape affects patient performance and satisfaction

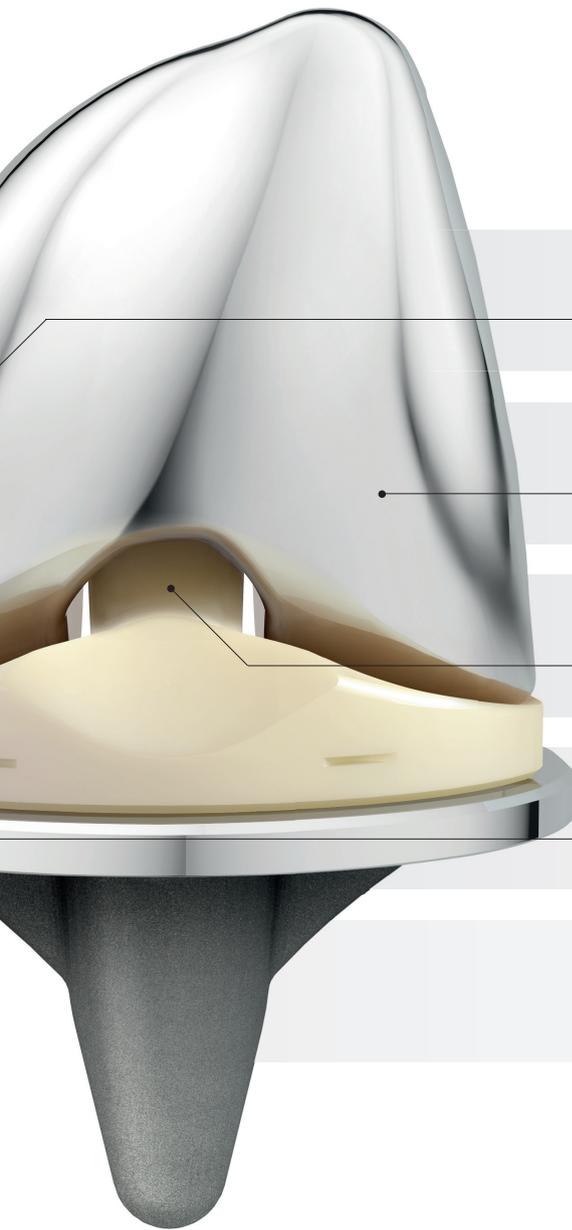
Advanced testing systems and computational models were developed to help understand and optimize kinematics

New proprietary technologies were discovered to address the patient need for stability and motion

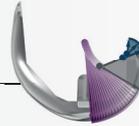
## STABILITY IN MOTION™

The ATTUNE Knee System delivers breakthrough discoveries that make the ATTUNE Knee an advancement for you, your patients, and the hospital you work with. Each aspect of these significant technologies was deliberately designed to provide function for you in the operating room and for your patient after surgery.





ATTUNE **GRADIUS™** Curve



The patented ATTUNE **GRADIUS™** Curve is a gradually reducing femoral radius designed to provide a smooth transition from stability to mobility through a patient's range of motion.<sup>3,4,5</sup>

**GLIDERIGHT™** Articulation



The **GLIDERIGHT™** Articulation encompasses a trochlear groove designed to accommodate patient variation and soft tissue interaction, and patellar components designed to optimize patella tracking while maintaining bone coverage.<sup>6</sup>

**SOFCAM™** Contact



The proprietary s-curve design of the **SOFCAM™** Contact provides a smooth engagement for gradual femoral roll-back and stability in flexion, while minimizing the stresses transferred to the tibial spine.<sup>7,8</sup>

**LOGICLOCK™** Tibial Base



The **LOGICLOCK™** Tibial Base has a patented central locking design that provides the architecture for the fixed bearing system to optimize kinematics, while reducing backside micromotion to the lowest reported levels in the industry.<sup>9</sup>

Rotating Platform



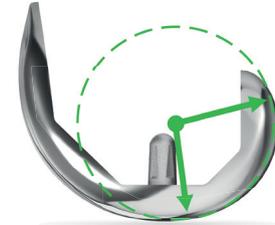
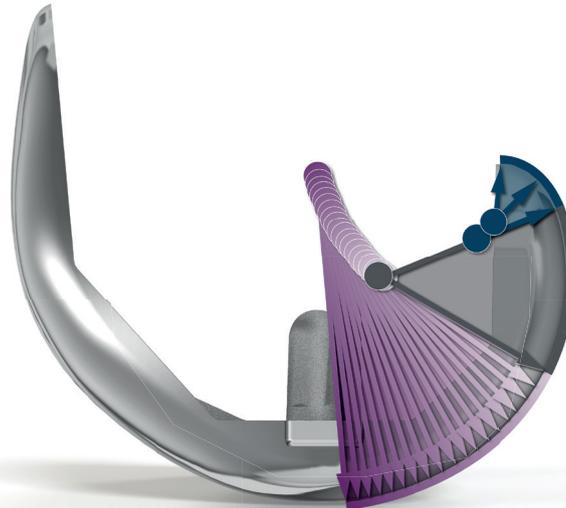
Based on our clinical heritage, the central design of the ATTUNE Rotating Platform Tibial Base allows the tibial insert to rotate as the knee flexes, which allows for a more natural motion and may also reduce the stress and wear on the implant.<sup>10,11,12</sup>

# ATTUNE GRADIUS Curve

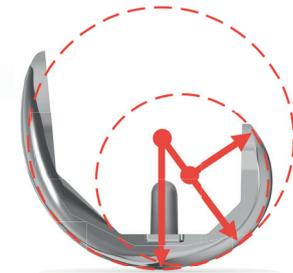
Anterior/posterior (A/P) stability of the knee is determined in part by the geometry of the femoral component and its conformity with the articulation surface of the insert.

The ATTUNE GRADIUS Curve is the gradually reducing femoral radius that provides a smooth transition throughout the gait cycle.<sup>3,4,5</sup> It also enables a gradual reduction in tibio-femoral conformity, providing higher conformity and stability in lower flexion angles with a steady decrease to reduced conformity and increased mobility in higher flexion angles. *This has been shown to minimize the anterior movement seen in other designs.*<sup>4</sup>

Furthermore, careful attention to the unique shape requirements for Cruciate Retaining (CR) and Posterior Stabilized (PS) knees yielded a specific shape for each design.



Single radius designs, such as the Stryker® Triathlon®, have a relatively flat insert curvature to accommodate internal and external rotation, reducing the A/P stability as compared to the ATTUNE Knee.<sup>3</sup>



Traditional multi-radius designs, such as the Zimmer® NexGen® and Persona™, Biomet® Vanguard®, and Smith & Nephew® systems, provide a large distal radius for stability in extension followed by smaller radius for rotational freedom in flexion, but the stability of the construct is adversely affected the moment the knee transitions between the distinct radii.<sup>4,5</sup>

	Tibio-femoral Sagittal Conformity (Conformity Ratio = $R_{\text{femoral}}/R_{\text{insert}}$ ) <sup>3</sup>					
	0°	15°	30°	60°	90°	120°
Single Radius CR FB Knee	0.38	0.22	0.22	0.22	0.22	0.11
Multi-Radius CR FB Knee	0.76	0.76	0.76	0.47	0.47	0.47
ATTUNE CR FB Knee	0.88	0.83	0.77	0.66	0.67	0.35
ATTUNE PS FB Knee	0.88	0.82	0.72	0.59	0.40	0.34
ATTUNE CR RP Knee	0.99	0.93	0.87	0.74	0.76	0.40
ATTUNE PS RP Knee	0.99	0.93	0.81	0.67	0.45	0.38

# SOFCAM Contact

The **SOFCAM** Contact of the ATTUNE PS Knee provides contact mechanics for stability throughout flexion. The ATTUNE GRADIUS Curve introduces the femoral component slowly into engagement with the tibial spine, providing a smooth transition from condylar control to cam/spine control.<sup>7,8</sup> *This smooth engagement also provides gradual rollback of the femoral component and stable motion throughout flexion.*<sup>7,8</sup>

The patented s-shape of the cam and spine provides a large contact area as the cam initially engages the spine, with the cam/spine transitioning smoothly down the spine as the knee moves further into flexion. The low contact position in high flexion directs the forces through the thickest portion of the tibial insert.<sup>7,8</sup>



ATTUNE PS Fixed Bearing Knee



ATTUNE PS Rotating Platform Knee

The curvature of the posterior aspect of the tibial spine differs between the ATTUNE PS Fixed Bearing and Rotating Platform Knee designs.

The Fixed Bearing spine has a smaller coronal radius and is designed to reduce edge loading of the femoral component when the knee rotates in deep flexion. The Rotating Platform spine has a larger coronal radius and is designed to increase the conformity between the cam and spine, decreasing contact stresses and encouraging the tibial insert to remain aligned with the femoral component.<sup>1,3</sup>

# LOGICLOCK Tibial Base

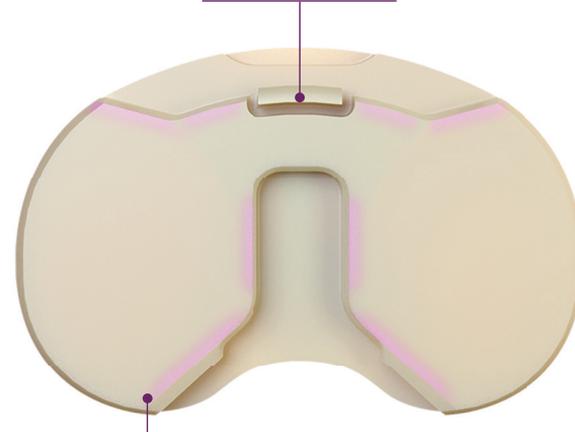
The **LOGICLOCK** Tibial Base is the foundation for optimized stability and motion in the ATTUNE Fixed Bearing Knee. Unlike other knee designs, the femoral component and tibial insert match size to size every time, allowing for optimization of the tibio-femoral contact mechanics, stability, and rotational freedom throughout the range of motion.<sup>4,5,7</sup> This also allows a proportional PS box across the size range, which reduces the amount of bone removed in smaller patients.

The ATTUNE System allows the surgeon to independently size the femur and tibia for each patient. The LOGICLOCK Tibial Base is designed to accommodate 2-up and 2-down sizing between the tibial insert and tibial base. *The unique shape of the lock and an interference fit provides a locking mechanism that leads the industry in reducing backside micromotion.*<sup>9</sup>

Bumpers absorb anterior/posterior, medial/lateral, and rotational forces



Locking tab to secure insert



Interference fit between insert and tibial base

The ATTUNE RP Tibial Base provides the same benefits as the LOGICLOCK Tibial Base by matching the femoral component and tibial insert size to size every time, allowing for optimization of the tibio-femoral contact mechanics and stability throughout the range of motion. Additionally, it features the same central cone location for all sizes, enabling 2-up and 2-down sizing between the tibial insert and tibial base.



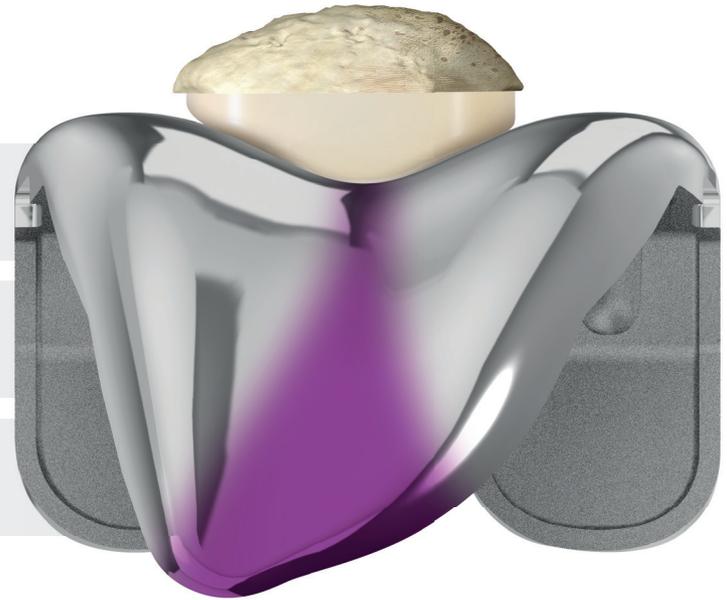
# GLIDERIGHT Articulation

The stability and motion of the patello-femoral joint involves a complex interaction between muscles, ligaments, and articular geometry. The **GLIDERIGHT** Articulation is designed to achieve the optimal balance between accommodating the natural soft tissues and providing the appropriate amount of stability.

The trochlear angle varies by size to accommodate variable patient Q-angles.

A funnel shape from 0-45 degrees allows the patient's soft tissues to drive the position of the patella in extension and provides a smooth transition into the center of the groove.

The narrower anterior flange is designed to provide an optimal fit for each patient while minimizing overhang and the opportunity for soft tissue irritation.

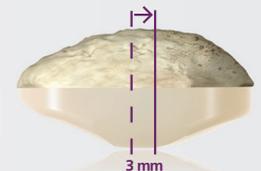


To address different surgical preferences, the trochlear groove is designed to articulate with both the native patella as well as a resurfaced patella. The oval shape of the ATTUNE Medialized Dome Patella provides optimal bone coverage of the resurfaced patella, while the medialization provides improved tracking when compared to a central dome design.<sup>6</sup>

In addition to these benefits, the ATTUNE Medialized Anatomic Patella component also provides a reduction in flexion/extension tilt of the patella due to the increased contact area between the patella component and the trochlear groove, as well as, increased extensor mechanism efficiency in flexion.<sup>14</sup>



Medialized Dome Patella



Medialized Anatomic Patella

# intuition™

INSTRUMENTS

The INTUITION™ Instrumentation combines the surgical process with intuitive and efficient instruments that enable you to balance the soft tissues and precisely control the implant position and fit for each patient.



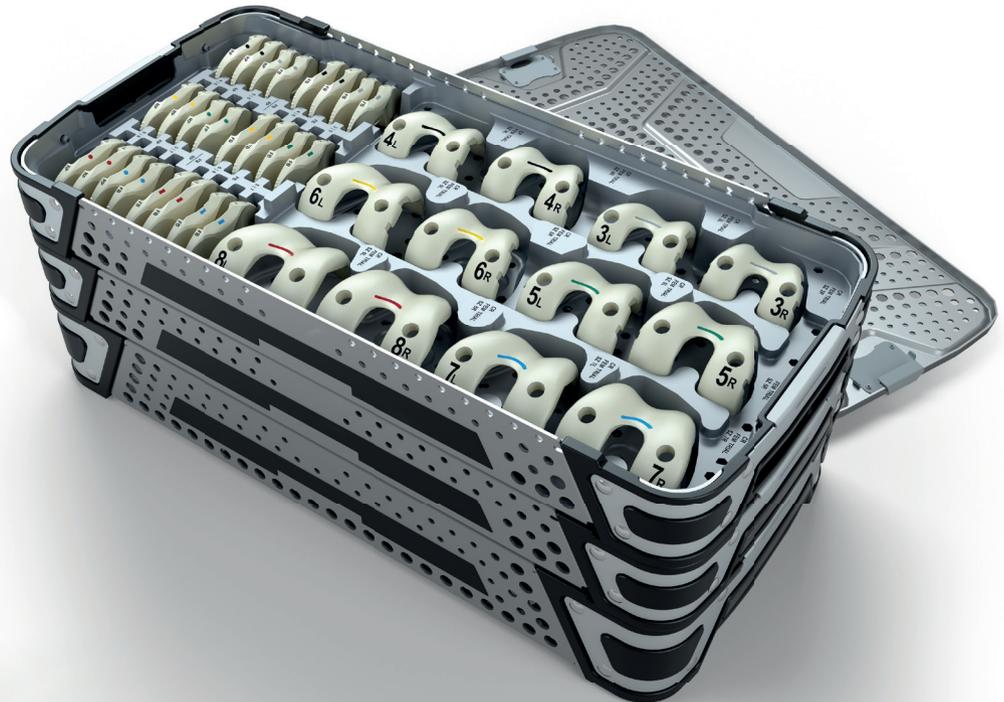
## Precise Control

Intuitive instrumentation combined with a comprehensive range of sizes gives you precise control over the implant fit and position.



## Designed Clarity

Reduced learning curve, more certainty. Design features that include red actuators, high-contrast markings and quick set/release functions make the INTUITION Instruments clear and easy to use from the moment you pick them up.



## Efficient Path

Single layer instrument cases, lightweight, and fewer instruments are just a few efficiencies that reduce your effort from start to finish.

# intuition™

INSTRUMENTS

Confident implant positioning is the combination of multiple instrument options to give you the intra-operative flexibility that you desire. The INTUITION Instruments combined with a comprehensive range of sizes are designed to give you precise control over the implant fit and position.

## Femoral Size Options

The ATTUNE Knee System offers 10 standard and 4 narrow femoral sizes. Small and consistent 3 mm A/P increments between sizes minimizes the effect on the flexion gap in the case of up or down sizing.



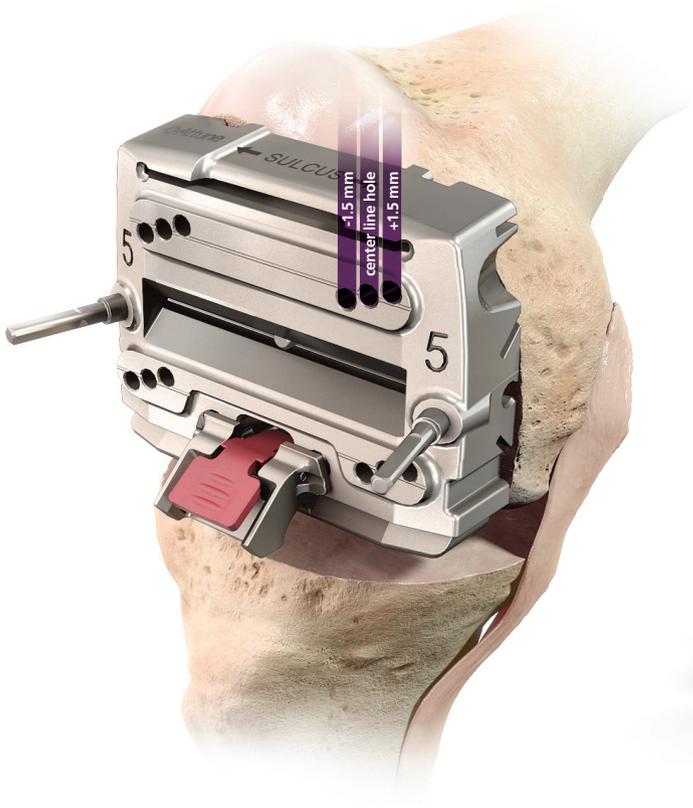
## Femoral Sizing and Rotation

Depending on your preference, femoral size and rotation may be set with reference to either key anatomical landmarks using the Measured Sizer, or by balancing the soft tissues in flexion and extension using the Balanced Sizer.



## Femoral A/P Position

The 4-in-1 Cutting Block provides precise control to fine tune the implant position, including 1.5 mm A/P adjustments and a removable posterior saw capture for flexion gap assessment. Medial/Lateral (M/L) cutouts indicate the width of the narrow size of the implant without changing blocks.

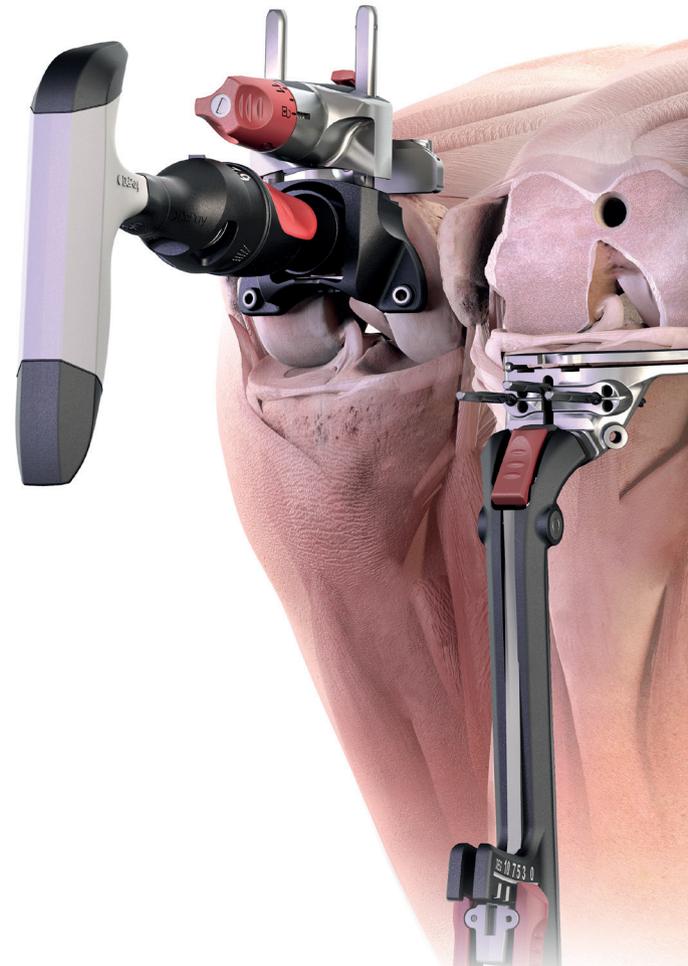


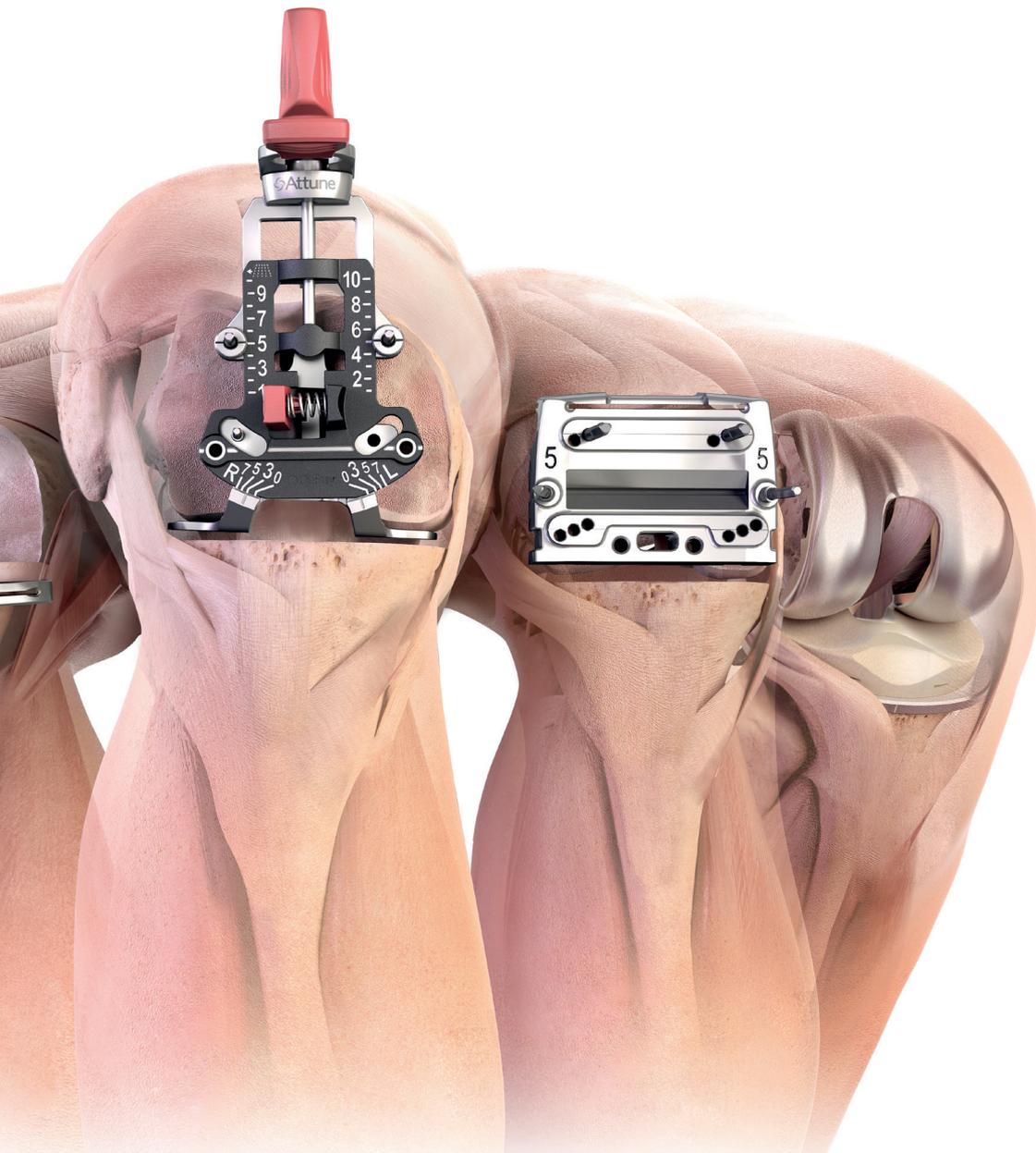
## Tibial Insert Increments

1 mm increments in tibial insert thicknesses allows you to fine tune the balance of the flexion and extension gaps.



A FULLY INTEGRATED TOTAL KNEE SYSTEM





The ATTUNE Knee System implants and INTUITION Instruments were developed together to allow you the flexibility to fine tune the placement of each component. This includes the opportunity for flexion and extension gap balancing, maintaining adequate posterior condylar offset, and maintaining proper extensor mechanism tension, all of which contribute to delivering the stability and motion of the ATTUNE Knee System.

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