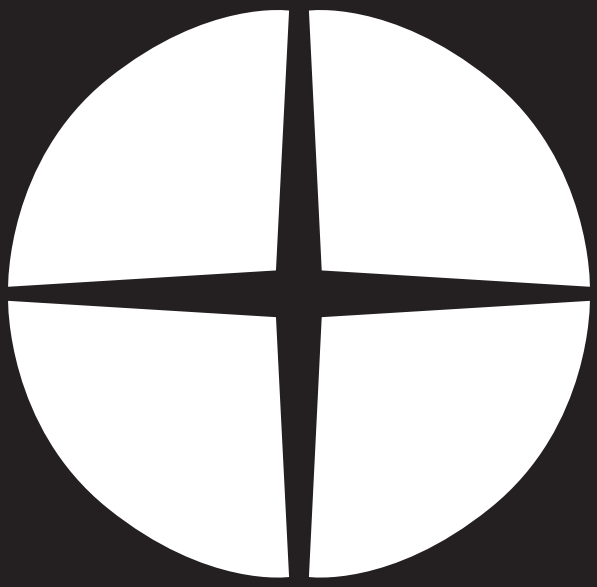
Lantern®

A product of OrthAlign



TOTAL KNEE | DESIGN RATIONALE

Empowering Technology

TOTAL KNEE | REVISION KNEE | PARTIAL KNEE

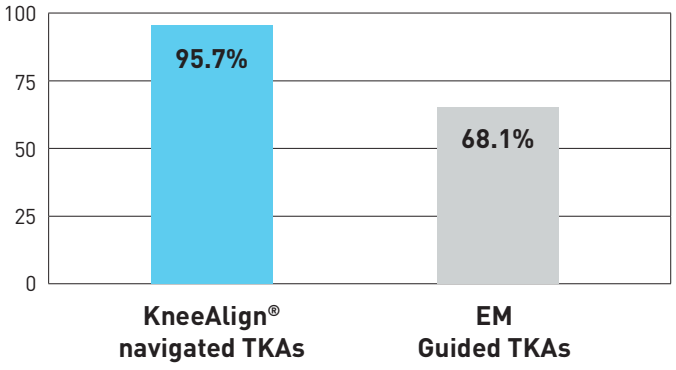
OrthAlign

Design Rationale

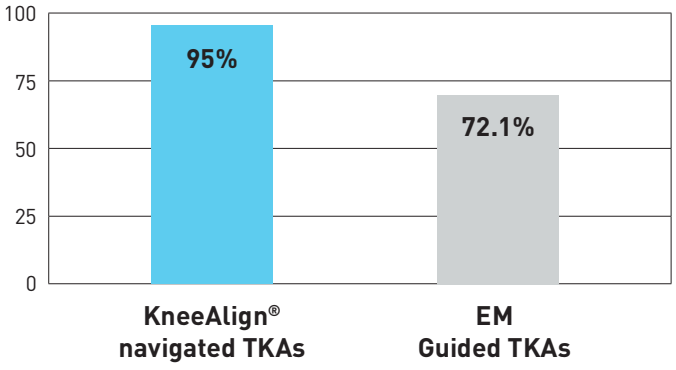
Achieving accuracy in TKA

Accurate implant placement is critical to achieving optimal outcomes for TKA patients. Studies show that navigated TKA results in **better limb and implant alignment and reduces outliers** as compared to conventional TKA.[1] OrthAlign technology has been shown to decrease outliers and accurately assist cut block placement for the primary cuts in TKA.[2,3]

Coronal alignment within 2° of neutral[11]



Posterior slope within 2° of target[11]



Adding clinical value

Correct soft tissue balance keeps the joint aligned in flexion and extension, and therefore constitutes a very important factor for durability of the implant.[4] Lantern's balancing application has been designed to aid surgeons in **achieving the optimal balance** of the knee's soft tissues. Using the handheld digital tensioner, surgeons are now able to capture quantitative measurement of soft tissue balance to ensure their targets are hit.

Keep it simple

Lantern provides a technically straightforward method for **quick integration into the surgical workflow** with significantly less blood loss compared with a conventional intramedullary guides.[5] Lantern technology simplifies the process of precise component positioning through its user-friendly design and straightforward application. The handheld device integrates cutting-edge sensors to provide real-time, intraoperative feedback to surgeons.

Accessible to All

TOTAL KNEE | REVISION KNEE | PARTIAL KNEE

OrthAlign

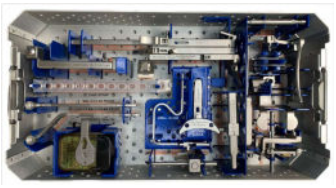
Design Rationale

Simple to use

Saving surgical time in the OR is critically important and can substantially reduce hospital costs.[1,2] Lantern technology is used with familiar mechanical instrumentation and an intuitive user interface. This allows you to incorporate powerful technology into your standard surgical workflow. No extra time,[5] equipment, or processes.

Distal Femur Instrumentation

Proximal Tibia Instrumentation



Easy to adopt

Technology adoption can add additional expenses and labor requirements.[6] Lantern does not require pre-operative imaging or capital investment. Simply pull the disposable package off the shelf, unwrap a single instrument tray, and follow your standard workflow. The perfect fit for any hospital or ambulatory surgery center.

Open implant

A surgeon's choice of implant should not be determined by the technology they use. Lantern is compatible with most standard implant systems. This gives you the freedom to choose the most appropriate implant for each individual patient.

Persona

Triathlon

Attune

Journey

Klassic

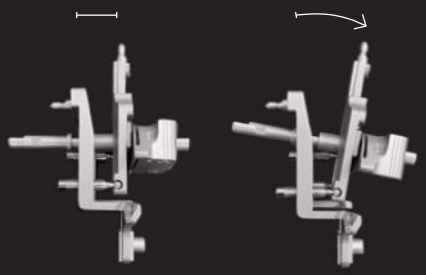
Distal Femur

OrthAlign

Design Rationale

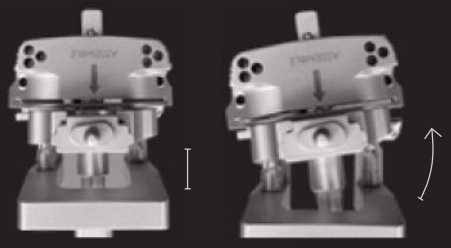
Accuracy in the sagittal plane

The sagittal component of the cut is displayed relative to the mechanical axis. To adjust the angle, turn the dial labeled F/E.



Accuracy in the coronal plane

The coronal component of the cut is displayed relative to the mechanical axis. To adjust the angle, turn the dial labeled V/V.



A/P offset

This will be the first of two registrations on the femur. Ensure the hash marks on the scale are aligned with Whiteside's line and the TEA to establish coronal and sagittal planes.

Once angles have been set, insert the depth resection guide onto the distal post to set desired depth.

Use of optional drill guide to assist in proper placement of starter pin. Drill guide should align with the long axis of the femur.

Accuracy Matters

DISTAL FEMORAL RESECTION

OrthAlign

Design Rationale

Implant alignment is an important factor and impacts clinical results following TKA.[2] Lantern is where accuracy meets simplicity. The use of Lantern's simple navigation decreases outliers in coronal alignment of the femur.[2] The features of Lantern's femoral instrumentation highlighted below were designed to allow surgeons to gain accuracy while remaining efficient and saving valuable time in the OR.

Establishing the mechanical axis

Whatever your alignment goals, Lantern can help achieve them. An initial pin inserted in the distal femur will represent the distal endpoint to the mechanical axis after registration. A simple femoral maneuver to locate the center of the femoral head will represent the proximal endpoint to the mechanical axis of the femur. Angles presented on the screen will be measured relative to the mechanical axis.

Figure 1

After registrations of the starter pin and hip maneuver, the mechanical axis has been found (Figure 1).

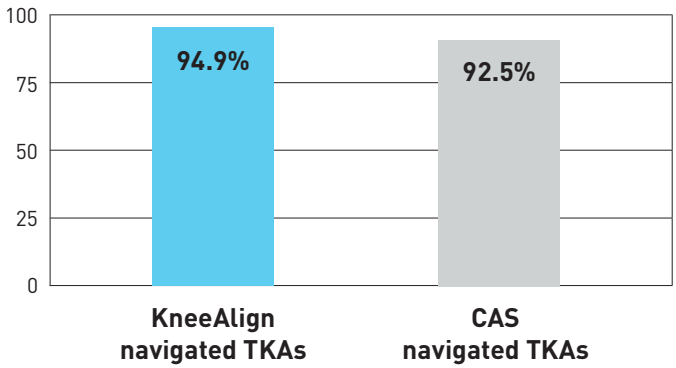
Defining the planes of the femur

The microblock was designed to be aligned with anatomic landmarks. To orient the system, align the horizontal hash marks with the trans-epicondylar axis and the vertical hash marks with Whiteside's line. The system is programmed with these as references to the coronal and sagittal planes of the femur.

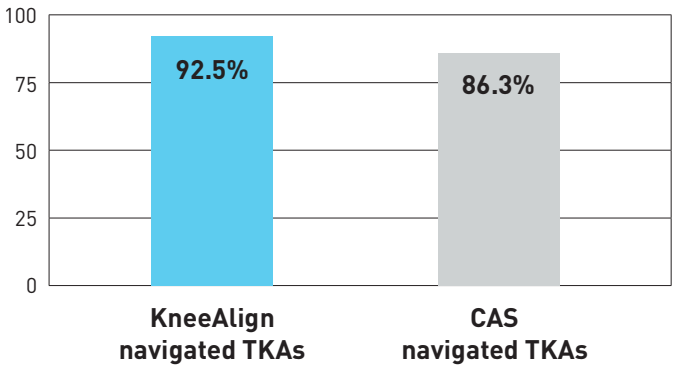
Clinical results

OrthAlign versus large console accuracy

Femoral component coronal alignment within 2° of neutral[13]



Overall Limb Alignment within 3°of neutral[13]



Proximal Tibia

OrthAlign

Design Rationale

Accuracy in the coronal plane

The coronal component of the cut is displayed relative to the mechanical axis on the bottom left side of the screen.

Once desired coronal angle is found, lock the V/V wing by pressing the lever downward into a locked position.

Accuracy in the sagittal plane

The sagittal component of the cut is displayed relative to the mechanical axis on the bottom right side of the screen.

Once desired sagittal angle is found, lock the PS wing by pressing the lever downward into a locked position.

To set your VV and PS angles, adjust the angle of the KAT body and malleolar probe and lock down the associated wings.

The angle of the tibial cut block will reflect registered coronal angles (V/V).

Coronal View

The angle of the tibial cut block will reflect registered sagittal angles (Slope).

Sagittal View

Accuracy Matters

PROXIMAL TIBIAL RESECTION

OrthAlign

Design Rationale

The use of Lantern's simple navigation was shown to accurately establish the mechanical axis of the tibia without increasing surgical time.[7] The features of Lantern's tibial instrumentation highlighted below were designed to allow surgeons to gain accuracy while remaining efficient and saving valuable time in the OR.

Establishing the mechanical axis

Whatever your alignment goals are, Lantern is designed to achieve them. By aligning the midline probe to the posterior aspect of the ACL insertion, the system registers the proximal endpoint to the mechanical axis of the tibia (Figure 2). After registering the most prominent point of each malleoli (Figure 3), the system calculates the center of the ankle which represents the distal endpoint to the mechanical axis of the tibia.[8,9] With these 3 landmarks now registered, the system bases cut block orientation off the mechanical axis of the tibia (Figure 4).

Figure 2

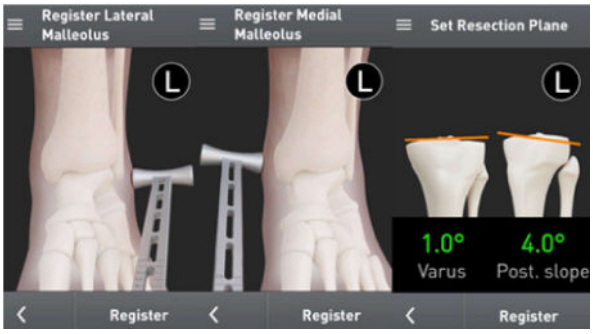


Figure 3

Defining the planes of the tibia

The tibial jig was designed to be aligned with anatomic landmarks. To orient the system, align the hash mark on the tibial drill guide with the medial 1/3 of the tibial tubercle. The midline probe should rest at the posterior aspect of the ACL insertion. Once aligned, pin the jig using headed screws, this will set rotation in reference to the Insall line.[9]

Proper jig position is set when pinned and reference the Insall line (Figure 5).

Figure 5

Figure 4

Gap Balancing

OrthAlign

Design Rationale

Your technique. Your way.

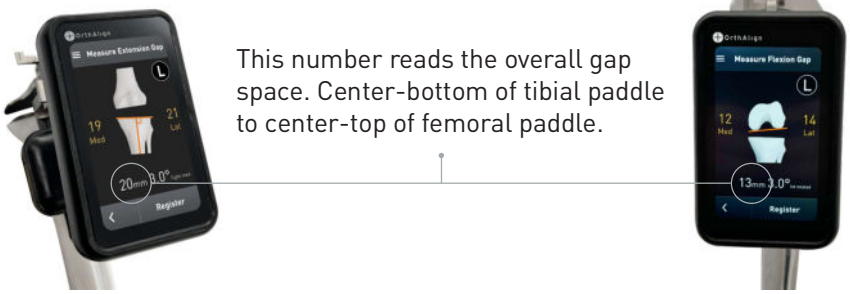
There are many ways to successfully balance a knee. Lantern allows you to accomplish your goals, regardless of surgical technique or alignment philosophy by giving you live gap measurements, rotation adjustment, and posterior condylar depth adjustment.

A correct soft-tissue balance keeps the joint aligned in flexion and extension, and has shown to be a critical aspect to an implant's durability.[4] The Lantern balance application was designed to measure the soft tissue balance in the knee's medial and lateral gaps in both extension and flexion.

Measuring the gaps

Size

As torque is applied to the tensor, the femoral paddle is distracted from the tibial paddle. Distance is measured from the bottom of the tibial paddle to the to top of the femoral paddle.



Extension Flexion

Shape

When torque is applied to the tensor, the ligaments respond by elongating, in some instances asymmetrically. The tensor is designed to measure the difference in angle between the paddles in both extension and flexion.

Sagittal View
Asymmetric Shape

Coronal View
Symmetric Shape

Coronal View
Asymmetric Shape

Force

The Lantern Balance instrument tray comes with a 30 inch-pound torque limiting driver. A 25 inch-pound torque limiting driver is available upon request.

Accurate Gap Balancing

OrthAlign

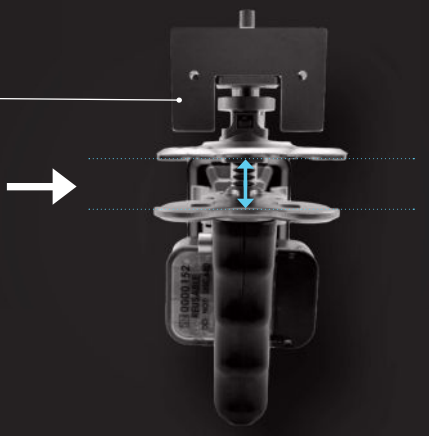
Design Rationale

Rotation

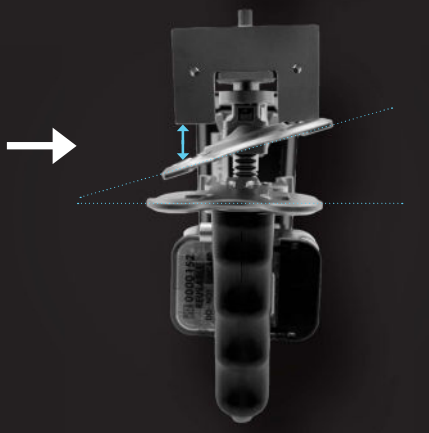
Debate continues regarding the optimal amount of rotation of the femoral component during TKA. The use of the implant specific drill plate with the Lantern tensor allows surgeons to pin internal or external rotation for the 4-1 cut block. The features below explain how this is performed.

Drill holes on the drill plate correlate to the implant specific 4-1 guide.

Distance measured from bottom of tibial paddle to top of femoral paddle.



The bottom of the drill plate can be used as a reference for resection level from either condyle. Depth results from the distance of top of femoral paddle to bottom of drill plate.



The drill plate positions pins for the 4-1 cutting block parallel to the tibial resection. This positioning is designed to rotate the femoral component to create a rectangular gap. The resulting rotation relative to the PCA is therefore the inverse angle of what is displayed on the screen (Figure 6).

Figure 6

Note: Rotation of the PCA relative to the tibia is measured after torque is applied and soft-tissues have been tensioned when the knee is positioned in flexion.

Depth

Based on measured gap sizes, a different resection depth may be needed to balance your gaps other than the standard ~9mm cut that manual posterior referencing sizers offer. The Lantern tensor was designed to allow adjustment of the depth of the posterior cut to ensure proper coronal and sagittal balance. Medial and lateral resections may differ dependent on depth and rotation. The amount of bone resected from both medial and lateral posterior condyles differs significantly across different implant systems.[11] Be sure to understand implant thickness prior to making this posterior resection.

Depth is set using the drill guide and adjusting the dial clockwise or counter-clockwise to resect pre-determined depth for the posterior condyle cut to achieve a balanced flexion and extension space.[14]

Typical gap balancing:
Extension – Flexion = Resection Depth

Note: This workflow is only applicable to posterior referencing systems. If using anterior referencing cut blocks, please skip this step and manually size and pin the femur for A-Ref cut blocks.

*Utilize the Pre-Cut Planning screen to display resulting flexion gap after resection depth has been inputted.

Driven by the belief that everyone deserves
exceptional healthcare,
we are committed to making empowering technologies
accessible to all.

OrthAlign

Design Rationale

Navigation made simple

Total knee arthroplasty

At OrthAlign, we believe everyone deserves exceptional healthcare. It is our mission and commitment to make empowering technologies accessible to all.

Total knee arthroplasty has evolved significantly over the past few decades, becoming one of the most successful procedures in orthopedic medicine. The modern era of knee replacement began in the 1960s and 1970s with the total condylar knee prosthesis, which represented a major advancement in terms of design and technique, offering better stability and range of motion. Over the years, improvements in biomaterials, surgical techniques, and understanding of knee mechanics have dramatically enhanced the efficacy and longevity of knee implants.

The introduction of technology to TKAs demonstrates the continuous innovation and desire to improve precision and outcomes for patients everywhere. This is why we created our technology, with the mission to provide everyone with exceptional healthcare, regardless of geography or site of service.

2004

Original concept from Vitruvian

2007

Concept 2 from newly formed OrthAlign

2011

KneeAlign2 received FDA clearance

2014

OrthAlign Plus launch

2021

Lantern launches in US

2009	KneeAlign launches in US
2011	KneeAlign 2 received FDA clearance
2014	KneeAlign launched in Japan
2015	OrthAlign Plus launches in US for total hip
2016	UniAlign® launches in US for partial knee replacement
2021	Lantern Total Knee launches in US
2022	Lantern adds gap balancing feature cleared for Revision Knee
2023	OrthAlign's handheld technology hits 300,000 cases
2024	Lantern Total Knee launches in Japan
2024	OrthAlign moves into new HQ, served 350,000+ patients, Over $50MM in Global revenue. April 2024

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Rx Only.
The Lantern® Surgical Assistant is only to be used by a trained licensed physician. Please refer to the Lantern Surgical Assistant Instructions for Use for complete important safety information. The Lantern Surgical Assistant is a computer-controlled system intended to assist the surgeon in determining reference alignment axes in relation to anatomical and instrumentation structures during stereotactic orthopedic surgical procedures. The Lantern Surgical Assistant facilitates the accurate positioning of implants, relative to these alignment axes. Example orthopedic surgical procedures include but are not limited to: Total Knee Arthroplasty, Unicompartmental Knee Arthroplasty: Tibial transverse resection.