

Mako® Robotic-Arm Assisted Surgery

for total
knee replacement

Patient guide



stryker



CHAMPIONS

Official Joint Replacement Products of the PGA TOUR and PGA TOUR Champions

Common causes of knee pain

Your joints are involved in almost every activity you do. Movements such as walking, bending and turning require the use of your hip and knee joints. When the knee becomes diseased or injured, the resulting pain can severely limit your ability to move and work.

The knee is the largest joint in the body and is central to nearly every routine activity. The knee joint is formed by the ends of three bones:

- The lower end of the thigh bone, or femur.
- The upper end of the shin bone, or tibia.
- The kneecap, or patella.

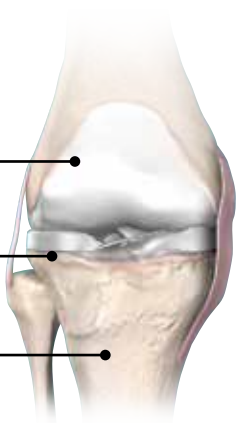
Thick, tough tissue bands called ligaments connect the bones and stabilize the joint.

A normal knee

Femur
(thigh bone)

Healthy
cartilage

Tibia
(shin bone)



A smooth, plastic like lining called cartilage covers the ends of the bones and prevents them from rubbing against each other, allowing for flexible and nearly frictionless movement. Cartilage also serves as a shock absorber, cushioning the bones from the forces between them. Finally a soft tissue called synovium lines the joint and produces a lubricating fluid that reduces friction and wear.

Each patient is unique, and can experience knee pain for different reasons. One common cause of knee pain is **osteoarthritis (OA)**.

OA is sometimes called degenerative arthritis because it is a “wearing out” condition involving the breakdown of cartilage in the joints. When cartilage wears away, the bones rub against each other, causing pain and stiffness.

Another common cause of knee pain is **rheumatoid arthritis (RA)**. RA produces chemical changes in the lining of the joints, or synovium, that causes it to become thickened and inflamed. In turn, the synovial fluid destroys cartilage. The end result is cartilage loss, pain, and stiffness.

If you haven’t experienced adequate relief with conservative treatment options, like bracing, medication or joint fluid supplements, your doctor may recommend total knee replacement.

An **arthritic** knee

Femur
(thigh bone)

Diseased
cartilage

Tibia
(shin bone)



Did you know?

Approximately **27 million Americans** suffer from **osteoarthritis** (OA).¹



Mako Total Knee replacement

Total knee replacement is a surgical procedure in which a diseased or damaged joint is replaced with an artificial joint called an implant. Made of metal alloys and high grade plastics (to better match the function of bone and cartilage, respectively), the implant is designed to move much like a healthy human joint.

A replaced knee

Femur
(thigh bone)

Artificial
knee implant

Tibia
(shin bone)



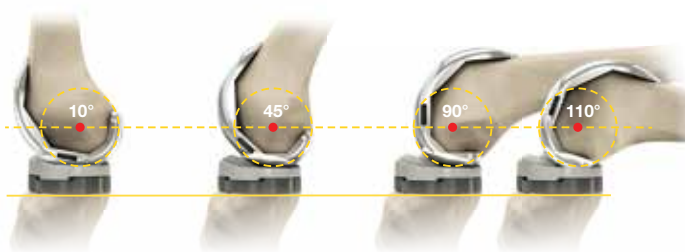
Over the years, knee replacement techniques and instrumentation have undergone countless improvements. **Mako Robotic-Arm Assisted Technology** with **Triathlon Total Knee** implants is an example of how technology is transforming the way joint replacement surgeries are being performed.

When you hear ‘robotic-arm assisted technology,’ it’s important to understand that the Mako Robotic-Arm doesn’t actually perform the surgery. Surgery is performed by an orthopaedic surgeon, who uses the Mako System software to pre-plan your surgery. Your orthopaedic surgeon will guide the Mako robotic-arm to remove diseased bone and cartilage. Then the surgeon will insert a Triathlon Total Knee implant.

Mako Technology was designed to help surgeons provide patients with a personalized surgical experience based on their specific diagnosis and anatomy.

Triathlon® Total Knee

With over a decade of clinical history, Triathlon single-radius knees are different than traditional knee replacements because they are designed to work with the body to promote natural-like circular motion.²⁻⁵ This is due to the single radius design of the knee implant. Single radius means that as your knee flexes, the radius is the same, similar to a circle, potentially requiring less effort from your quadriceps muscle.^{4,6,7}



Since the thigh muscle (the quadriceps) is attached to your knee, it is unavoidably involved in the surgery. Therefore, the quadriceps muscle can become a source of discomfort or pain during your recovery period. The quadriceps muscle plays an important role in your ability to move your legs so it also has a major impact on your recovery and how quickly you can get back to living your life.⁸

Did you know?

2 million Triathlon Total Knees implanted worldwide since 1996.⁹



How Mako Technology works

1 Before **surgery**

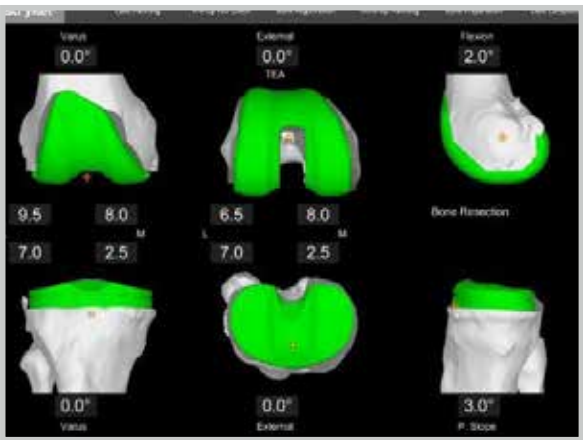
It all begins with a **CT scan** of your knee joint that is used to generate a 3D virtual model of your unique anatomy. This virtual model is loaded into the Mako System software and is used to create your **personalized pre-operative plan**.

2 In the **operating room**

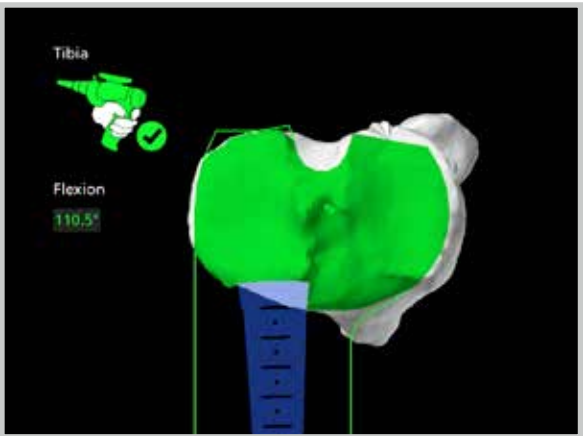
In the operating room, your surgeon will use the Mako System to assist in performing your surgery based on your **personalized pre-operative plan**. When the surgeon prepares the bone for the implant, the surgeon guides the robotic-arm within the predefined area and the Mako System helps the surgeon stay within the planned boundaries that were defined when the personalized pre-operative plan was created. The Mako System also allows your surgeon to make adjustments to your plan during surgery as needed. In a laboratory study, Mako Technology demonstrated accurate placement of implants to a personalized surgical plan.¹⁰ This study also showed that Mako Total Knee replacement demonstrated soft tissue protection to the ligaments around the knee.¹⁰

3 After **surgery**

After surgery, your surgeon, nurses and physical therapists will set goals with you to get you back on the move. They will closely monitor your condition and progress. Your surgeon may review a **post-operative x-ray** of your new knee with you.



1 Personalized pre-operative plan



2 Bone preparation



3 Post-operative x-ray

Back on course

Robert Malitz

Mako Total Knee patient



"I've been active my entire life." For Robert, spending time with his two children, traveling, playing golf, tennis and hiking are just a few of his favorite activities. Over the years, all of this activity started to take its toll on Robert's body. "My initial injury dated back to my high school football days. I tore my ACL and I didn't get treated. I just kept pushing forward with my activities." By the time Robert was 25, he had numerous knee scopes and an ACL reconstruction surgery.

"I knew I had a problem one day when I was playing basketball with my son. The next day I could barely walk. I could no longer ignore the pain." A visit to an orthopaedic specialist confirmed that Robert had arthritis in his knee and that he was a candidate for total knee replacement.

Finding a reputable hospital and a surgeon he could trust was important to him, so Robert didn't commit to surgery right after his first appointment. He decided to get a second opinion and searched for hospitals offering Mako Robotic-Arm Assisted Surgery. "When I first heard of Mako, I thought that it was great that a surgeon could use a robotic-arm to help perform my surgery. It was important to me that my surgeon use the latest technology."

Now, Robert is back to walking the golf course rather than driving the golf cart. He's also back to doing light yoga and hiking. "If you are limited in your day-to-day activities and it's starting to affect you both mentally and physically, research your options. Technology has advanced so much over the years and I am so happy I got my knee replaced with Mako Technology. It was a great choice for me."

Frequently asked questions

Did you know?

Knee replacement patients may **return to driving** in **4-6 weeks**.¹¹



Q: Is Mako covered by health insurance providers?

A: We understand that making sure your total knee replacement is covered by health insurance is important to you. Check with your health insurance provider to verify your specific coverage.

Q: How long has the Mako procedure been available?

A: The first Mako procedure was a partial knee replacement performed in June of 2006. Since that time, over 83,000 Mako hip and knee replacement procedures have been performed around the world.¹²

Q: Does the Mako robotic-arm actually perform surgery?

A: No, the robotic-arm doesn't perform surgery, nor can it make decisions on its own or move without the surgeon guiding it.

Q: How long do knee implants last?

A: Individual results vary and not all patients will have the same postoperative recovery and activity level. The lifetime of a knee replacement is not infinite and varies with each individual.

Individual results vary. Not all patients will have the same post-operative recovery and activity level. See your orthopaedic surgeon to discuss your potential benefits and risks.

Preparing for surgery

Preparing for partial knee replacement surgery begins weeks before the actual surgery. The checklist below outlines some tasks that your surgeon may ask you to complete in the weeks prior to your surgery date.

- ☐ Exercise under your doctor's supervision
- ☐ Have a general physical examination
- ☐ Have a dental examination
- ☐ Review medications
- ☐ Stop smoking
- ☐ Lose weight
- ☐ Arrange a pre-operative visit
- ☐ Get laboratory tests
- ☐ Complete forms
- ☐ Prepare meals
- ☐ Confer with a physical therapist
- ☐ Plan for post-surgery rehabilitative care
- ☐ Fast the night before
- ☐ Bathe surgical area with antiseptic solution

Did you know?

Realistic activities following knee replacement include **walking, biking, swimming** and other low impact activities.¹³



Important information

Knee Replacements

General Indications: Total knee replacement is intended for use in individuals with joint disease resulting from degenerative, rheumatoid and post-traumatic arthritis, and for moderate deformity of the knee.

Contraindications: Knee replacement surgery is not appropriate for patients with certain types of infections, any mental or neuromuscular disorder which would create an unacceptable risk of prosthesis instability, prosthesis fixation failure or complications in postoperative care, compromised bone stock, skeletal immaturity, or severe instability of the knee.

Common Side Effects of Knee Replacement

Surgery: As with any surgery, knee replacement surgery has serious risks which include, but are not limited to, peripheral neuropathies (nerve damage), circulatory compromise (including deep vein thrombosis (blood clots in the legs)), genitourinary disorders (including kidney failure), gastrointestinal disorders (including paralytic ileus (loss of intestinal digestive movement)), vascular disorders (including thrombus (blood clots), blood loss, or changes in blood pressure or heart rhythm), bronchopulmonary disorders (including emboli, stroke or pneumonia), heart attack, and death.

Implant related risks which may lead to a revision include dislocation, loosening, fracture, nerve damage, heterotopic bone formation (abnormal bone growth in tissue), wear of the implant, metal sensitivity, soft tissue imbalance, osteolysis (localized progressive bone loss), and reaction to particle debris. Knee implants may not provide the same feel or performance characteristics experienced with a normal healthy joint.

The information presented is for educational purposes only. Speak to your doctor to decide if joint replacement surgery is right for you. Individual results vary and not all patients will receive the same postoperative activity level. The lifetime of a joint replacement is not infinite and varies with each individual. Your doctor will help counsel you about how to best maintain your activities in order to potentially prolong the lifetime of the device. Such strategies include not engaging in high-impact activities, such as running, as well as maintaining a healthy weight. Ask your doctor if the Triathlon knee is right for you.

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