

## Rehab Tech Practitioners Help Patients Select the Right Knee

The knee is one of the most important joints in the human body. Knees are essential to movement. They give support when standing, allow for smooth movement in walking, and let people sit, bend, or kneel. Keeping this in mind, it's understandable that prosthetic knee systems are extremely complex. Even the simplest of systems consists of multiple moving parts, all designed to help the wearer achieve their highest level of functioning.

With more than 100 types of knee systems to choose from today, Rehab Tech practitioners consider an amputee's age, health, activity level, and lifestyle before making a recommendation on the most suitable knee for a patient, whether computerized or non-computerized.

For a more active wearer, a computerized, or microprocessor knee, might be best with his or her activity level, since it provides the correct resistance at the proper time in the gait cycle. While computerized knees may be more expensive when compared with mechanical knees, they take less energy to operate and provide an unmatched level of stability to eliminate falls.

### HOW MICROPROCESSOR KNEES WORK

Microprocessor knees feature sensors that detect real-time movement and timing, and then adjust the control mechanism/cylinder accordingly. The microprocessor-controlled knee lowers the amount of effort wearers must use to control their timing,

resulting in a more natural gait.

Continuous technological advancements are being made with prosthetic knees, and researchers continue to improve upon the selection available in the marketplace with hopes of eventually developing bionic, or neuroprosthetic technology.

### MICROPROCESSOR SYSTEMS

An upgraded version of the **C-Leg®** microprocessor-controlled knee was introduced by prosthetic and orthotic manufacturer **ottobock** in 2011. The new C-Leg features improved swing phase control, enhanced stumble recovery, a higher weight limit of 300 lbs., and increased splash protection. These changes make the technology accessible to more wearers. It is considered by many to be among the safest, most energy-efficient and cost-effective devices when compared to other prosthetic knees.

The C-Leg was introduced in 1997 and has transformed above-knee prosthetic care around the globe. Since then, dozens of studies confirm the C-Leg's position as the Standard of Care for very active transfemoral amputees, including those with bilateral limb deficiencies or hip disarticulation amputations. It is ideal for wearers needing high stability and reliability in everyday life.

The C-Leg's multiple sensors relay data, including the precise angle of the knee joint and the loading of the foot and ankle, at a rate of 50 times per second. Its on-board microprocessors adapt

and compensate for stairs, slopes and irregular terrain to allow the wearer to walk naturally and without thinking about compensating for different surfaces. With a few taps of the toe, or by pressing a button on the remote, C-Leg wearers can change resistance settings for alternative activities, such as biking or skiing. The C-Leg uses easy-to-charge lithium ion batteries that hold 40 to 45 hours of power.

**The Ossur Rheo Knee®** promises its wearer less fatigue and more confidence. It has been called the first artificially intelligent knee system that uses a microprocessor to sense the knee's position and load 1,000 times per second. The computer also determines the user's gait and responds with the proper amount of resistance.

The Ossur Rheo Knee's lithium ion battery lasts up to 48 hours without needing to be recharged. It has a power switch to allow the user to conserve the battery power when it is not in use. Recharging time is two to four hours. It has the ability to learn and adapt to its user's individual walking styles and keeps pace with changes in speed, load and terrain. The result is continually improved and optimized performance. The user can walk longer with less fatigue and gain increased stability and confidence.

### NON-COMPUTERIZED KNEES

**Ossur's Mauch®** Knees operate with progressively designed hydraulic systems that provide wearers with well-controlled ambulation on varied terrains and in sports activities. Its design helps to conserve energy for the wearer.

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## HELPING OUR PATIENTS REACH THEIR GOALS

From running to walking step over step down stairs, Mauch Knees offer a smooth, natural gait and a high level of flexibility for more active lifestyles. A new design, introduced recently, includes a heavy-duty aluminum frame and mechanical extension stop. The Mauch SNS hydraulic knee control unit

is designed to provide swing control, stance control, and a lock against flexion. The stance resistance is a high yielding resistance designed to assist the amputee in stumble recovery. The Mauch Knee is engineered for a 300 lb. weight limit. Its Plus version offers a 365 lb. weight limit. The new advanced connection method

between the cylinder, frame and bracket features spherical bearings to protect the cylinder twisting from forces, reducing the chance of failure. Side stability is improved with specially designed bushings of all moving parts in the knee.

For a moderately active lifestyle, the **Ossur Total Knee® 2000** is suitable for light-duty work, walking on level and uneven ground and ramps. Its three-phase hydraulic swing control accommodates changes in walking speed from walking to stopping to light work. It imitates true knee motion with its natural and fluid movement. A

geometric lock prevents collapse and its low-build height reduces protrusion of knee when sitting and contributes to a more symmetric, natural gait. This lightweight knee is ideal for patients whose physical abilities may rule out heavier devices.

**Ottobock's 3R60** features Ergonomically Balanced Stride (EBS) and is smaller and lighter than its predecessor. The knee offers proximal connections for various amputation levels and an innovative hydraulic system to control knee behavior during swing phase. The knee is easily adjusted to suit the user's individual needs and to initiate swing phase at various walking speeds. Individual adjustments can help to avoid hip hiking and other compensatory movements during the gait cycle minimizing hip and back discomfort.

Its **3R60-PRO** is an even slimmer version of the popular 3R60 and offers progressive damping characteristics and more dynamic swing phase hydraulics. The knee's hydraulic cylinder allows it to better adapt to different walking patterns. It compensates automatically for larger or faster steps by delivering less stance flexion or provides less damping to facilitate knee flexion when small, slow steps are taken. With its

165 lb. weight limit, this knee offers dynamic functions in a smaller package ideal for adolescents or adults who meet the weight limit.

**The 3R90** features a mechanical extension assist and an innovative, load-dependent brake mechanism, which creates a more secure and fluid gait. This knee offers stability and security to wearers of various activity levels. The brake mechanism engages when the heel is loaded, and it stabilizes and secures the prosthesis during the entire stance phase. The brake releases automatically and the swing phase engages easily when the forefoot is loaded.

Ottobock's 3R93 is ideal for amputees with low to moderate mobility, such as indoor walkers and restricted outdoor walkers. This knee is often worn as the first post-amputation knee and is perfect for initial standing and walking exercises as well as for permanent fitting. With a versatile design, it can convert from a manual lock to a stance control knee joint. It features adjustable stance flexion to customize function for the patient with an up-to 275 lb. weight limit.

Schedule a personal consultation with your Rehab Tech practitioner today to discuss the functional characteristics of these and other prostheses, to discuss the model that's most appropriate for you, and to learn the proper way to use prosthetic knees. Call us at 315-426-9920 for more information.



Ossur Mauch® Knee



ottobock 3R60 Knee