Lokomat®

Functional locomotion therapy with augmented feedback
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Locomotion therapy has established itself as a great way to improve over-ground walking function caused by neurological diseases and injuries. The Lokomat® was created by Hocoma, a company based near Zurich, Switzerland and they are the leader in robotic rehabilitation therapy for neurological movement disorders. The Lokomat® is the first driven gait orthosis that helps improve the walking movements of patients who are gait-impaired. The main purpose of this machine is to help improve the mobility of the individuals following spinal cord injuries, stroke, traumatic brain injury, or multiple sclerosis. The Lokomat® is a versatile machine where all gait-impaired patients whether the cause was spinal, cerebral, neurogenic, osseous, and neurogenic can be trained on this system.

Locomotion therapy is based on updated motoric learning for neurological patients. It is recognized that the higher number of repetitions of a certain movement will improve that movement. The most productive machine will accurately represent these actual movements to be learned by the patients. Through the use of repetition and task oriented training the Lokomat® has been proven to help patients re-learn walking movements.

The Lokomat System is comprised of the robotic gait orthosis which is called Lokomat®, the Lokobasis which is the body weight support system, and the combination of a treadmill. It works by guiding the patient’s legs on the treadmill according to an already programmed physiological walking pattern. The computer allows individual adjustments in walking parameters.

The Lokomat® or the robotic gait orthosis is adjusted to the patient’s anatomy. The more individualized leg cuffs reduce the likelihood of any pressure sores caused from training. Therefore, the hip width, length of the lower and upper leg, size and position of the leg cuffs are adjusted for the patients.

The Lokobasis or the body weight support system is used for automated treadmill and manual assisted training. The Lokomat System includes a novel approach for a body weight support system that better the patient unloading possibilities. The new system is called Levi and it facilitates patients handling and optimizes physiological walking training. There are three main benefits of the Levi system, the first being that it’s easy to operate by facilitating the lifting and unloading of a patient by using an automated system. It also promotes a low inertia suspension system that allows the precise unloading of a patient and a better physiologic vertical movement of the patient. Lastly, the Lokobasis is continuously adjusting to the body weight of any patient.

There is automated locomotion therapy via a treadmill in the Lokomat System. This system ensures an accurate match between the treadmill and the speed of the gait orthosis. This utilizes drives that integrate the specific gait orthosis at the patient’s hip and knee joints. The system’s software constantly monitors for four joints being used and produced a physiological gait pattern achieved by real time software. The interaction between the patient and the Lokomat® is measure by the force transducers on the joints. The treadmill is specifically synchronized with the computer controlled motors. The treadmill has two options; an original soft slat belt treadmill, which is virtually friction free and with a no slip tooth belt. The second option is a flat belt treadmill with smaller dimension that enables a more compact design of the ramp and frame which can be paired with uphill training.

The entire Lokomat System itself is user friendly that allows convenient handling. The therapist can easily operate the Lokomat® and adjust training parameters to suit the patient’s needs at any point during a training session. Patients in a wheel chair are escorted on a ramp that goes onto the treadmill and can easily be set up in the Lokomat®. The Lokomat® can be moved out of the way of the treadmill, which makes is possible to switch between manual or automated therapy.

This form of therapy has established itself into the world of rehabilitation in neuromuscular diseases and this system has exemplified that. The Lokomat® has been a crucial improvement in the art and science of locomotion therapy. It has been on the market since 2001 and more than 100 Lokomat Systems are installed in prestigious clinics worldwide.

Reference: