

## moments of motion

### MEDICINE AND BIOMECHANICS 2D/3D MOTIONANALYSIS – WITH KINETICS AND 2D/3D KINEMATICS

#### Dynamic Gait and Posture Analysis

Simi Motion is an analysis system for the dynamic, noninvasive diagnosis and monitoring of disorders of the musculoskeletal system.

The video-based software system enables a very accurate diagnosis of disorders and the continuous monitoring and documentation of a patient's progress without any side effects for the patient.

The software calculates and compares joint angles, accelerations, axial symmetries, joint forces and moments.

It is possible to synchronize the results from other measuring instruments such as force plates, foot pressure distribution measurement systems and EMG devices with the video-based motion capture.

The comparison with in medical literature approved biomechanical data and values assist in compiling a diagnosis.

#### Gait analysis as an example

Patient data can be compiled quickly and easily. The access to the linked videos is available at any time.

Due to the fact that the system only has to be calibrated once, examinations can be carried out quickly and simply. The captured videos can afterwards be analyzed with the help of easy-to-use tools.

Angles, distances and symmetries can be measured very accurately in freeze frames (2D/3D).

Gait cycles, for example, can be examined exactly in the videos. Joint angles, translations, rotations, velocities, accelerations, axial symmetries, joint forces and moments can be displayed with graphs within each cycle.

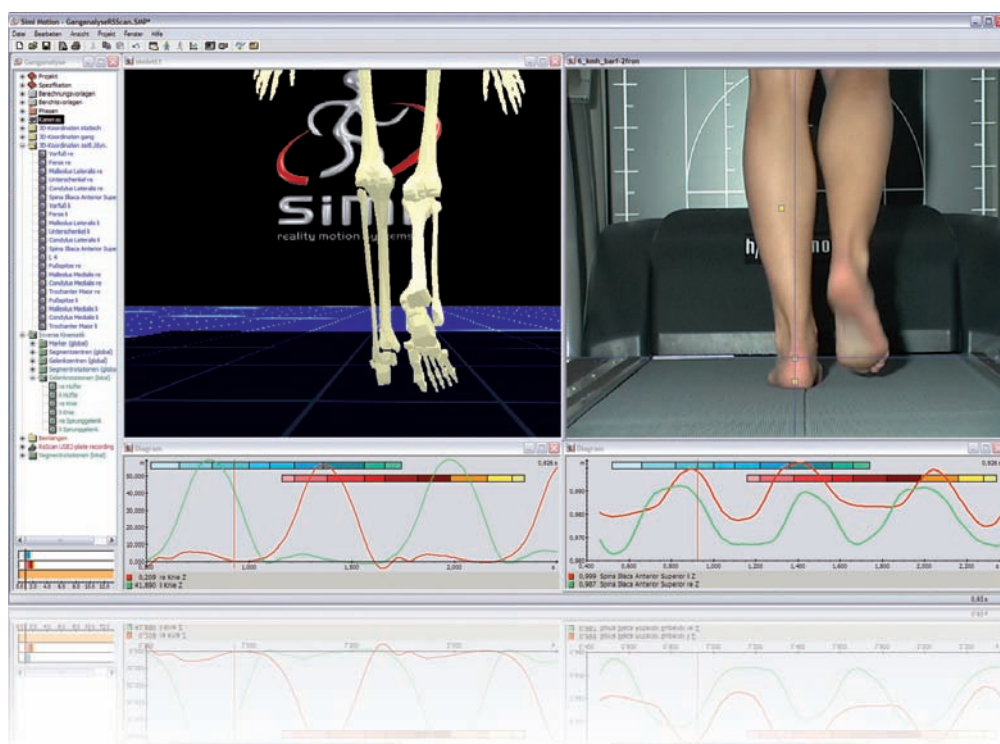
Various comparisons, such as pre- and post-operative monitoring, prosthetic and orthotic fittings, can be made very easily, as graphs from different examinations can be overlaid. By this means it is possible to document improvements exactly.

Literature values are available for various parameters of a gait cycle which can be compared with the values measured for a patient. This means that a faster and easier diagnosis is possible.

With the help of these information a suitable treatment approach can be selected and tailored to the individual needs of the patient.

Reports with informative diagrams and linked videos can be generated and exported as automatically and interactive text documents which also can be printed out or emailed.

#### Identify disorders – Observe healing process – Validate diagnosis.



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#### Calculations

- Inverse dynamics/kinematics calculates joint centers, segment orientations as well as joint forces and momentums from the 3D motion and force data
- Center of gravity
- Angles and distances can be freely defined (velocities, accerlations, etc.)
- Movements can be divided into separate phases as required
- Automatic display of graph characteristics (min, max, etc.)
- Simi Motion provides various filters for processing the data, such as root mean square, median and mean frequency as well as automatic and interactive onset and offset determination
- And many more ...

#### Visualization

- Video data from DV or high-speed cameras
- 3D views gained from the motion data (line drawings, skeletal diagrams)
- Trajectories of points and segment
- Graphs of the motion data (e.g. coordinates, acceleration, velocity)

#### Capabilities

- Mobile (laptop)
- Stationary (laboratory)

#### Measuring Instruments

Simi Motion allows to synchronizes all external made measuring data with the video pictures from triggered cameras.

- Force plates from AMTI, Bertec and Kistle
- EMG device
- Foot pressure measurement systems from RSscan, Tekscan, Novel, Paromed, Medilogic, etc

#### Result

The result is a high-quality static and dynamic analysis in which all required data, such as EMG and pressure distribution measurements, can be displayed, evaluated and documented synchronously with the video pictures. Simi Motion enables the detailed analysis of movements step by step.

#### System requirements

- Microsoft Windows 2000 or Windows XP
- Intel-compatible PC with min. 256 MB RAM and FireWire-Interface (IEEE-1394a)
- Big hard disk for recording of video data
- DiDigital video cameras with current interfaces (USB / IEEE-1394 / GigE / C-Link)

**Investigate causes – Detect dependencies – Understand relationships.**

