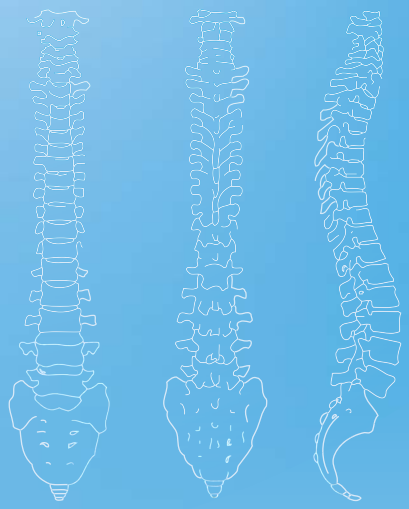
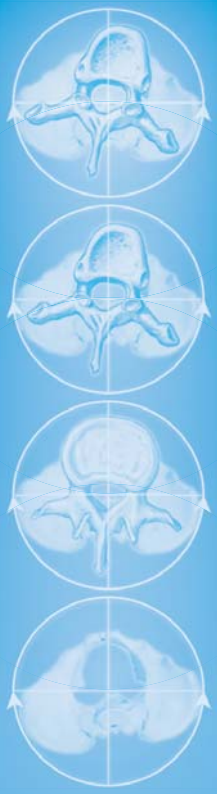
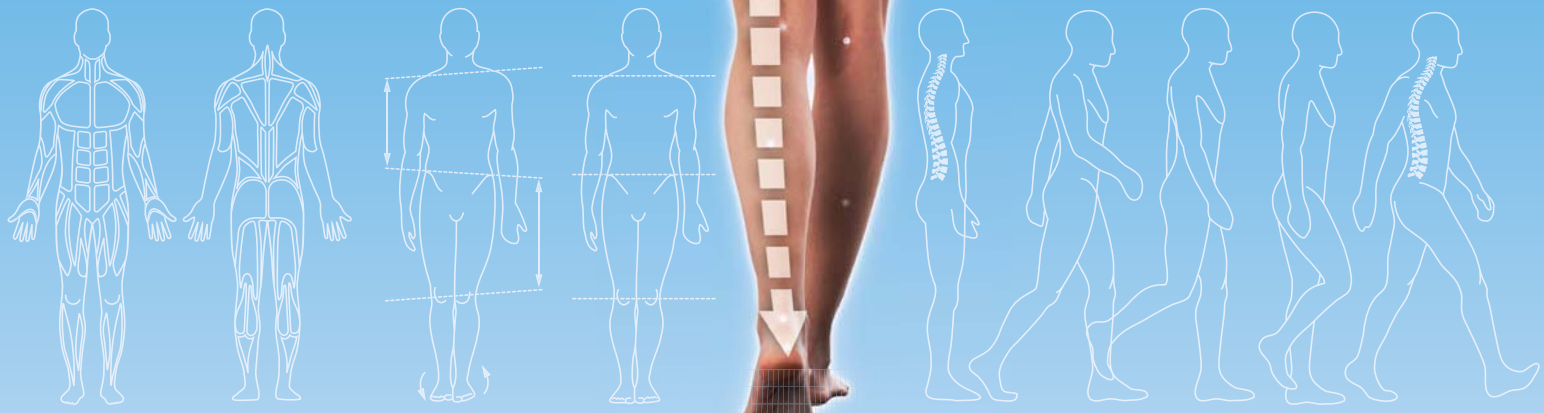
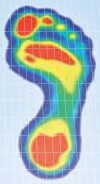
EN

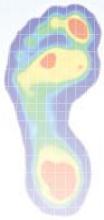
BIOMEDICAL SOLUTIONS







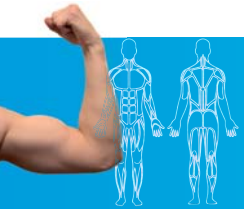




www.diers.de

DIERS®
BIOMEDICAL SOLUTIONS

Content:



About DIERS

DIERS International GmbH is an innovative, family owned and operated enterprise which has successfully designed, developed, produced, distributed, installed and serviced biomechanical measuring systems since 1996.

From the beginning, we have engaged in close scientific cooperation with German and foreign universities to guarantee continuous developments at high technical and scientific levels for our customers.

The objective of DIERS is to offer the market a comprehensive biomechanical product portfolio for complete head to toe analysis of the human body. During the course of product development we place great value on interdisciplinary utilization by various professional groups such as orthopedists, orthopedic technicians, physical therapists, dentists, orthodontists, sports medicine specialists, etc.

All DIERS products pass through a demanding research and development process. Their measuring accuracy and reliability has been proven in multiple clinical studies.

Meanwhile DIERS has emerged as a worldwide market leader in the field of optical 3D / 4D postural and locomotion analysis. With the new product generation, ***DIERS 4D motion***®, a new milestone has been reached in the field of spine analysis.

For the first time it is possible to measure the spine and posture while the patient is walking.

In addition to the development and distribution of high-quality measuring systems we strive to maintain close contact to our customers and to promote the exchange of scientific expertise.

To this aim we regularly organize continuing education courses, e.g. in cooperation with the Academy of German Orthopedists (ADO) which are certified by the German Medical Association .

A competent team consisting of engineers, sport scientists, computer scientists and economists is always available for your questions and suggestions.

With kind regards,

Your DIERS-Team

CE 0535 | CERTIFIED MEDICAL TECHNOLOGY

DIERS International GmbH maintains a complete quality assurance system (TOTAL QUALITY ASSURANCE) according to appendix II of the directive 93 / 42 / EEC and is certified by the Germany BSI Group, also for ISO 9001 and 13485.

3D / 4D Spine & Posture Analysis

- radiation-free
- contactless
- fast & accurate

The **DIERS formetric** measuring technology is the most widespread system for the optical 3D Spine & Posture Analysis worldwide.

The **DIERS formetric** measuring procedures were developed in close collaboration with leading universities and through research projects within the European Union.

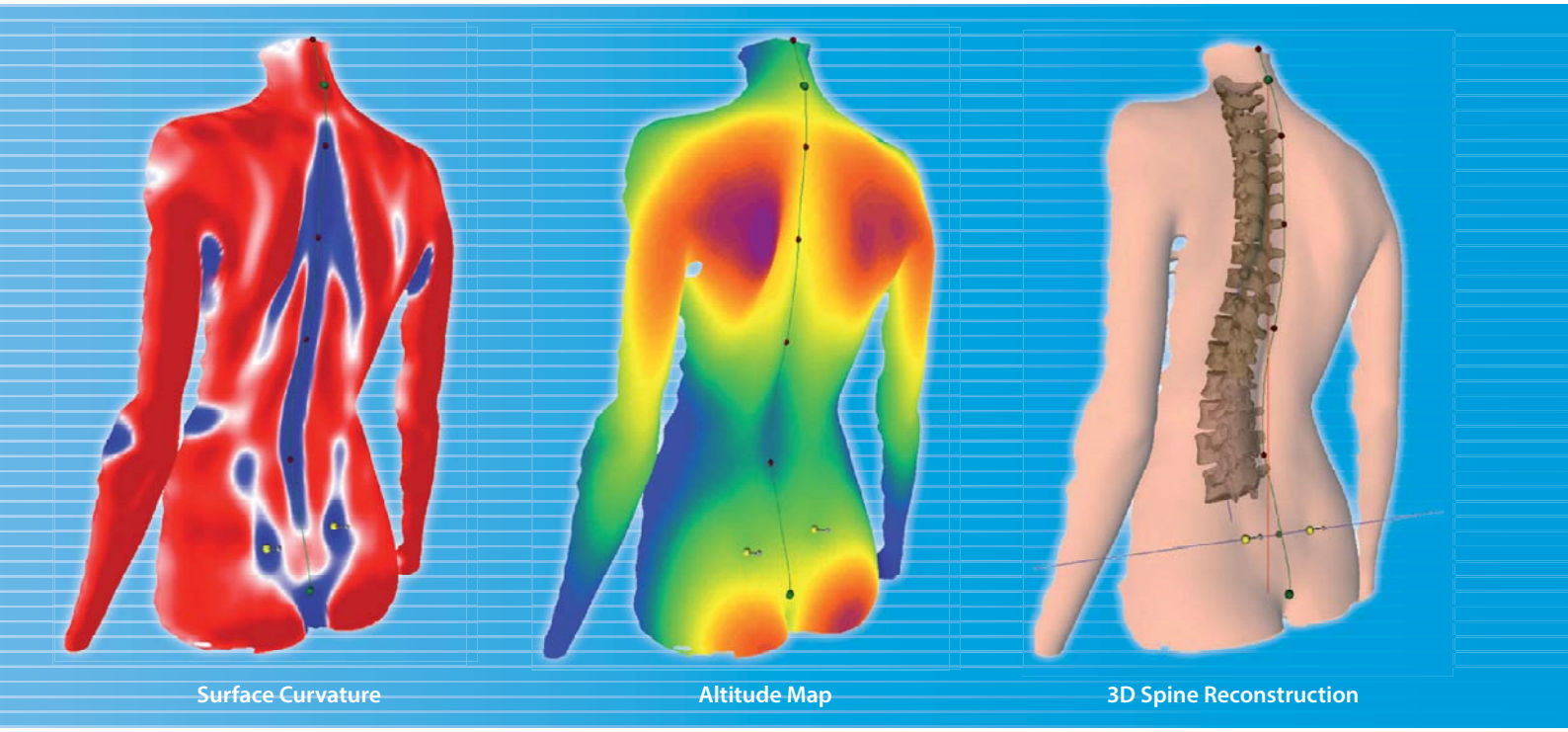
The original clinical objective was the development of a radiation-free spine analysis system to reduce the high x-ray exposure of scoliosis patients during follow-ups.

The **DIERS formetric** allows a radiation-free and markerless surface topography scanning method including a 3D reconstruction of the spine. Varied clinical parameters from the objective and quantitative analysis of the body statics and posture, scoliosis, and various spinal deformities can be shown.

Based on the formetric method of analysis of the back, there is generally no need for markers. The anatomical landmarks (Vertebra Prominens (VP), Dimple Left/Right (DL/DR) as well as the spinal center line and spinal rotation are automatically detected by the system.

Clinical Applications:

- Scoliosis & scoliotic malpositions
- Leg length discrepancies
- Pelvic obliquity / rotation / torsion
- Posture-related pain symptoms
- Posture variances
- Hyper -/Hypo-Lordosis/-Kyphosis
- Osteoporosis
- Arthrosis
- Temporomandibular joint dysfunction (TMJ)
- Vertebral blockages
- Neurologic symptoms (e.g. Romberg-Test)
- Muscle deficits/imbalances
  (Matthiass-Test, Flamingo Test)
- and many more



Surface Curvature | Altitude Map | 3D Spine Reconstruction

DIERS statico 3D
for static measurement

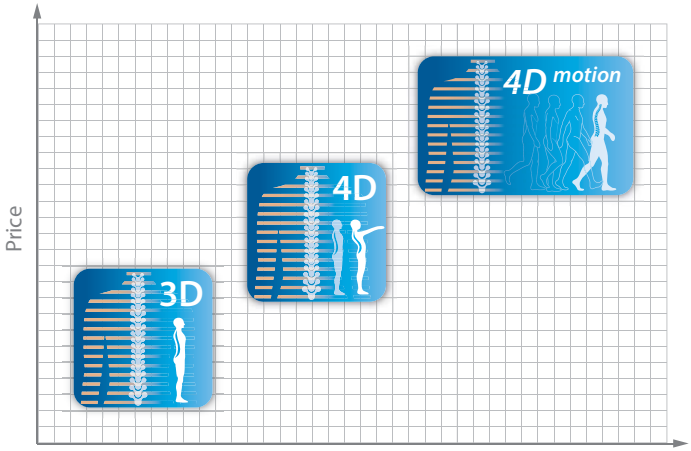
This is the basic system of the formetric series which allows a three-dimensional analysis of the human back. A 3D reconstruction of the spine is also possible (optional).
Only for single captures.

DIERS formetric 4D
for functional measurement

The 4D technology (3D + time) has expanded the clinical field of applications. It allows functional testing and postural analyses up to 1 minute by recording up to 10 frames per second. In addition to the functional analysis it is also possible to gain the average data of a recording to increase measurement precision (4D averaging) needed due to postural sway of the human body.

DIERS 4D motion®
for dynamic measurement

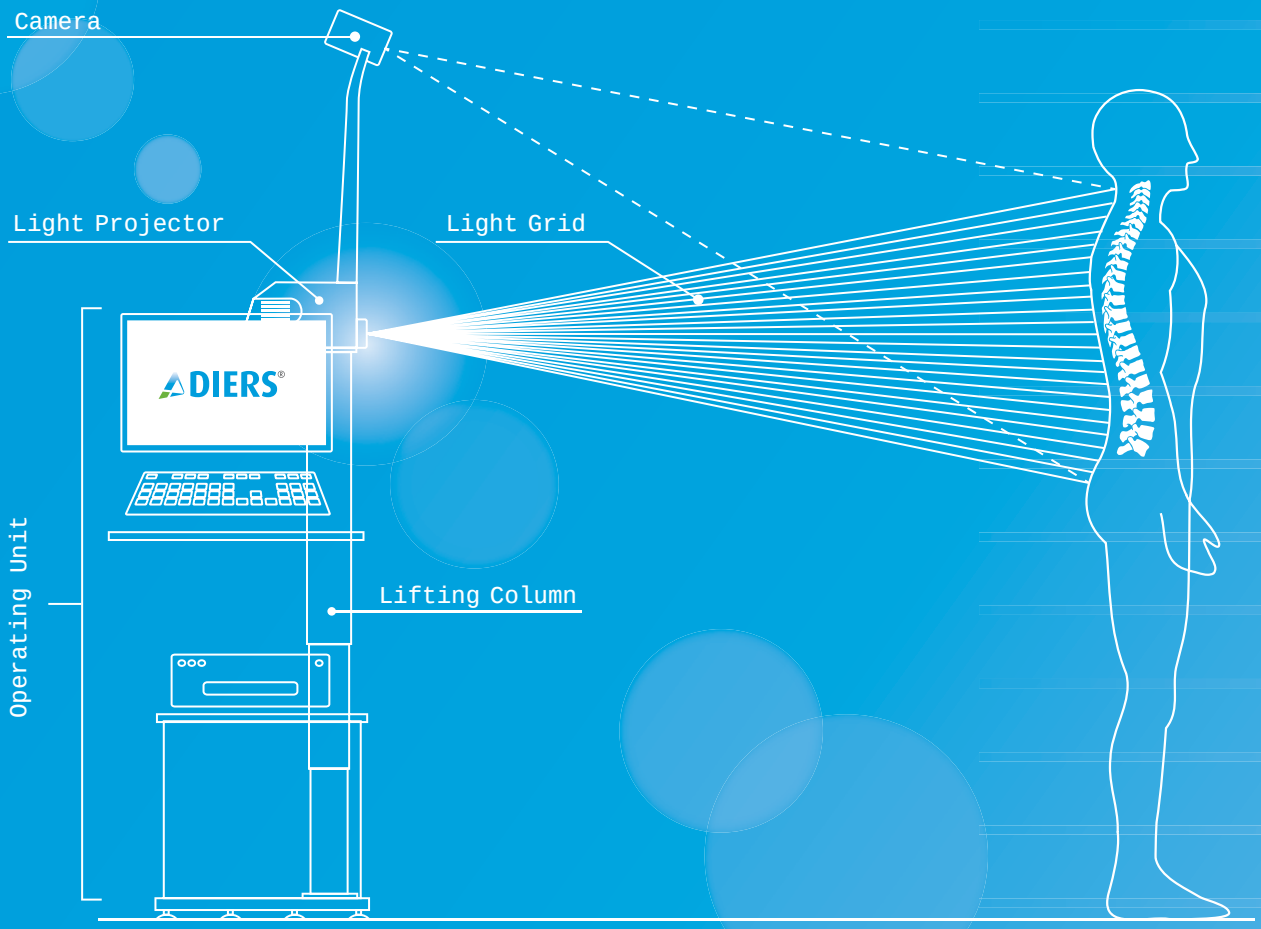
With the new product generation **DIERS 4D motion®** a new milestone has been reached in the area of spine analysis. For the first time it is possible to measure the spine & posture while the patient is walking.



To be able to fulfil individual demands, we offer measuring systems with various performance options at different price levels.

▸ see p.21

Functionality

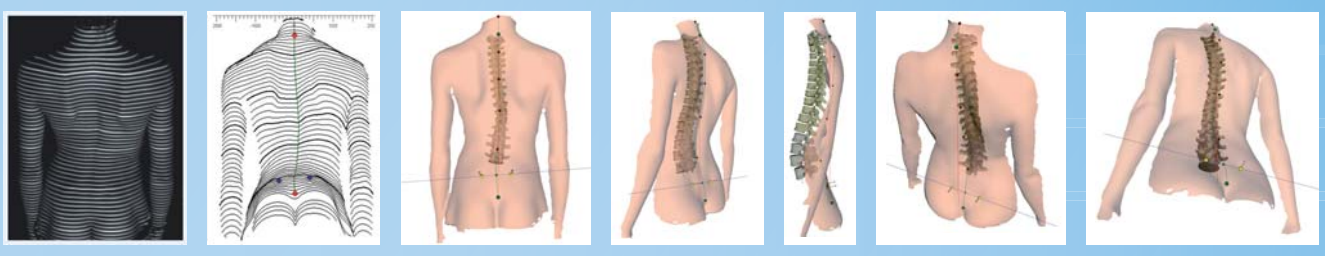


The formetric measurement technology is based on the physical principle of the *Moiré Topography* and *optical triangulation*. The latest solution is called *"video-raster-stereography"* for use in advanced surface topography and spinal analysis.

Accordingly, the system consists of a light projector which projects a pattern of parallel stripes onto the back of the patient, which is then recorded by a camera unit. A software analyzes the line curvature and generates from it - by means of the method of *photogrammetry* - a three-dimensional model of the surface.

Through the *automatic detection of anatomical landmarks* and a scientifically based *correlation model*, which describes the relation between the surface curvature and the orientation of the vertebra, it is possible to reconstruct a 3D-model of the spine.

As opposed to x-rays, the **DIERS formetric** provides comprehensive information about posture, spine and pelvis, e.g. spine curvature (lateral and frontal), vertebral rotation, and pelvic position. In certain cases even muscular dysbalances can be detected based on the curvature analysis of the back surface.

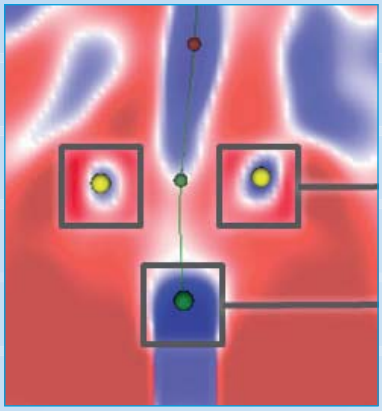


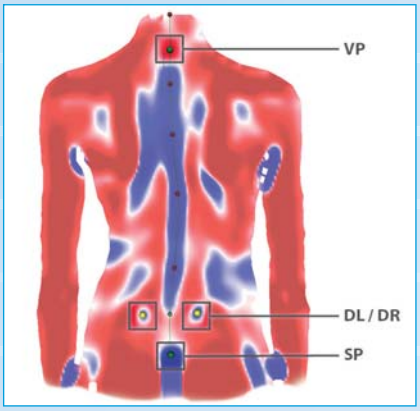
Technological Features:

Automatic Detection of Anatomical Landmarks

Based on the surface curvature analysis the system automatically determines the landmarks which are needed to reconstruct the spinal column.

As a results there is generally no need to place markers.



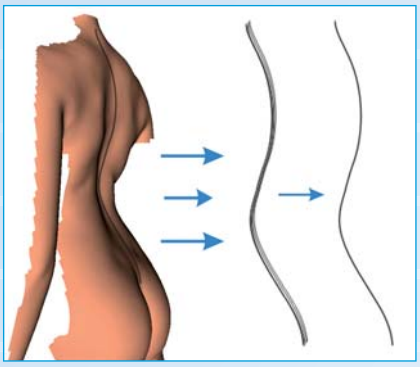


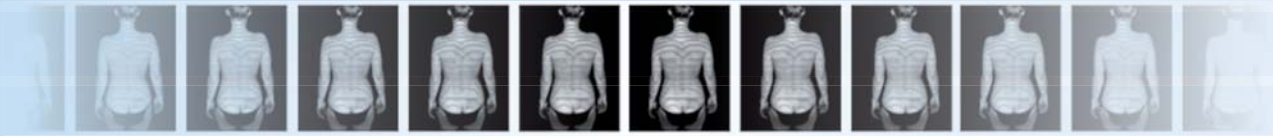
4D-Technology

The development of the 4D-technology (3D + time) has enhanced the quality and reproducibility of the **DIERS formetric** system.

- Extremly short exposure times to avoid motion artifacts
- Compensation for variances due to unavoidable body sway through averaging of a series of images

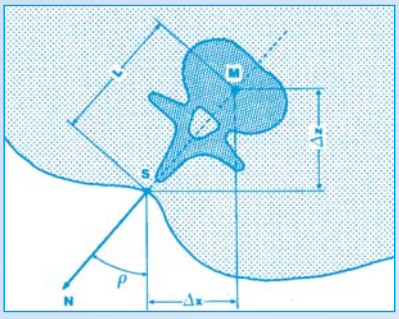
Therefore even posture tests and functional studies can be taken over a period of time (e.g. Matthiass-Test, Flamingo-Test, Romberg-Test).



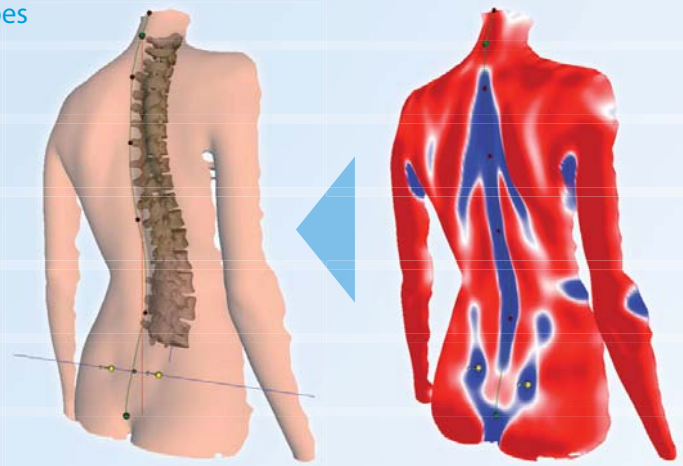


3D Spine Reconstruction

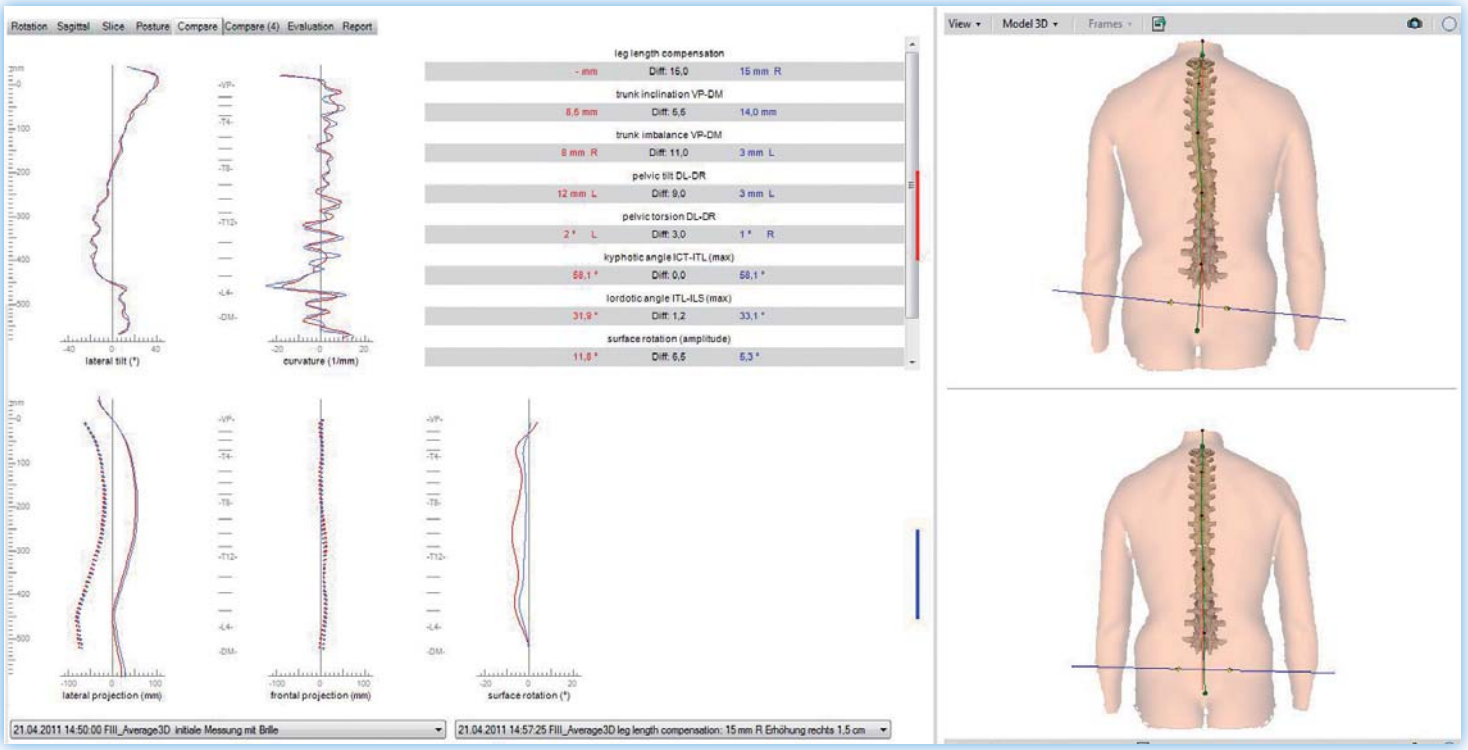
Based on a correlation model, which describes the relation between the surface curvature and the orientation of the vertebra, it is possible to reconstruct the curve of the spine and the rotation of each vertebra of the spinal column.



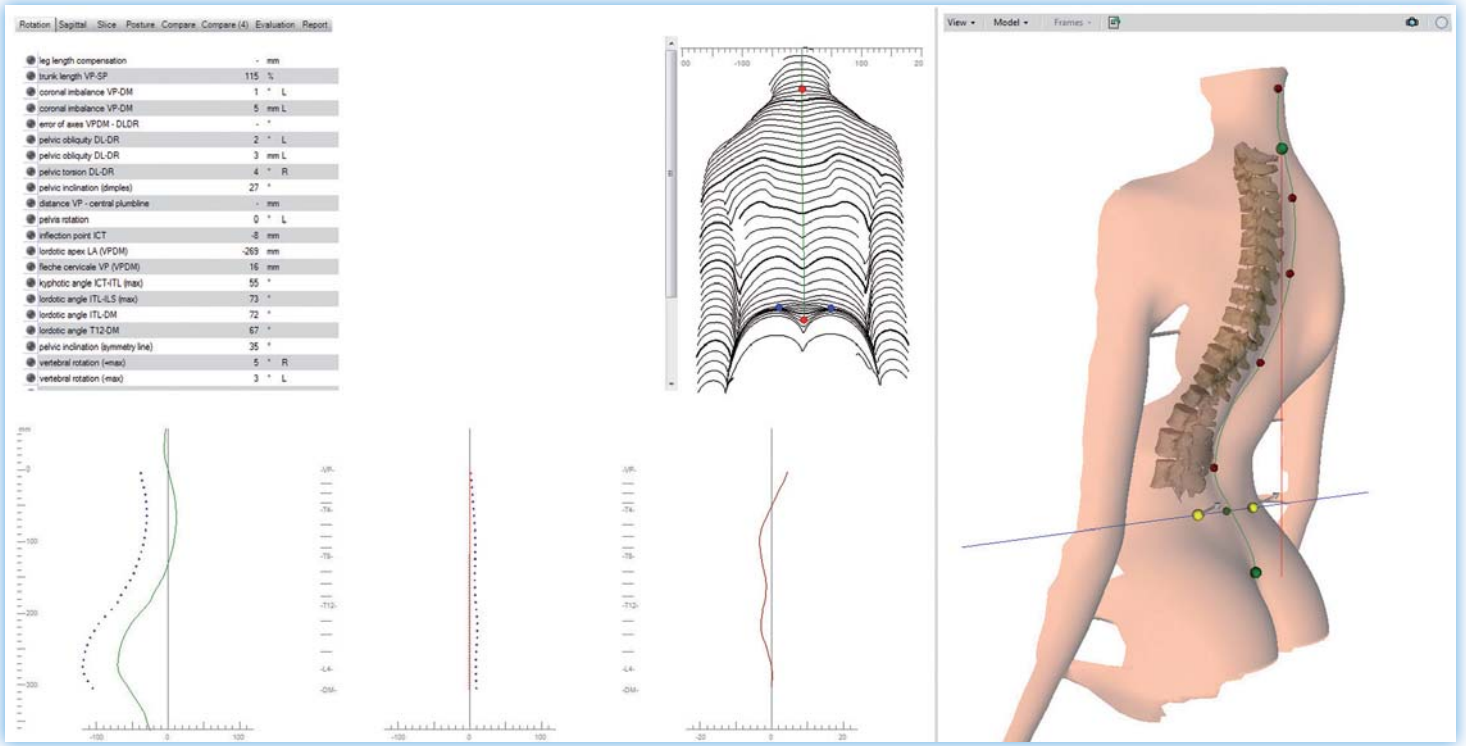
Correlation model by Turner-Smith & Drerup



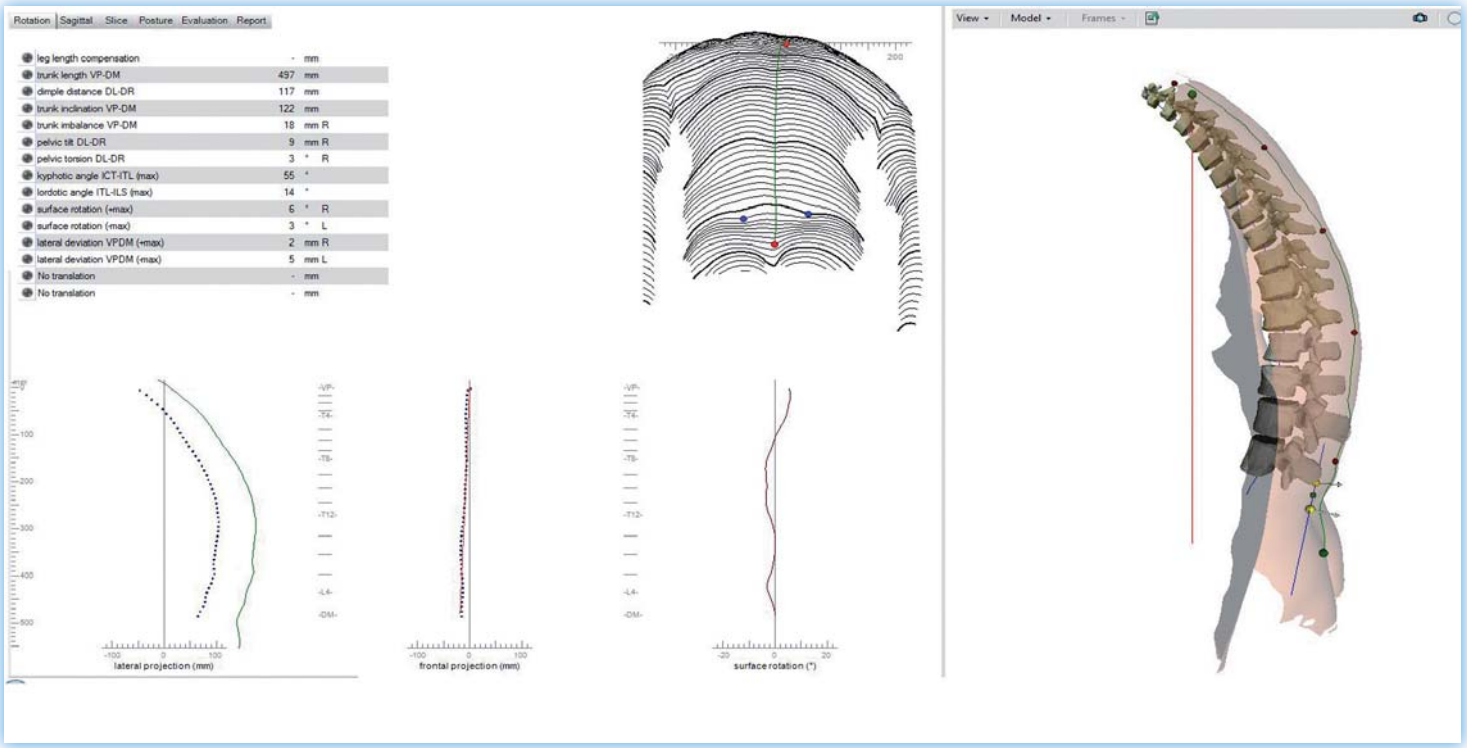
Clinical Examples ...



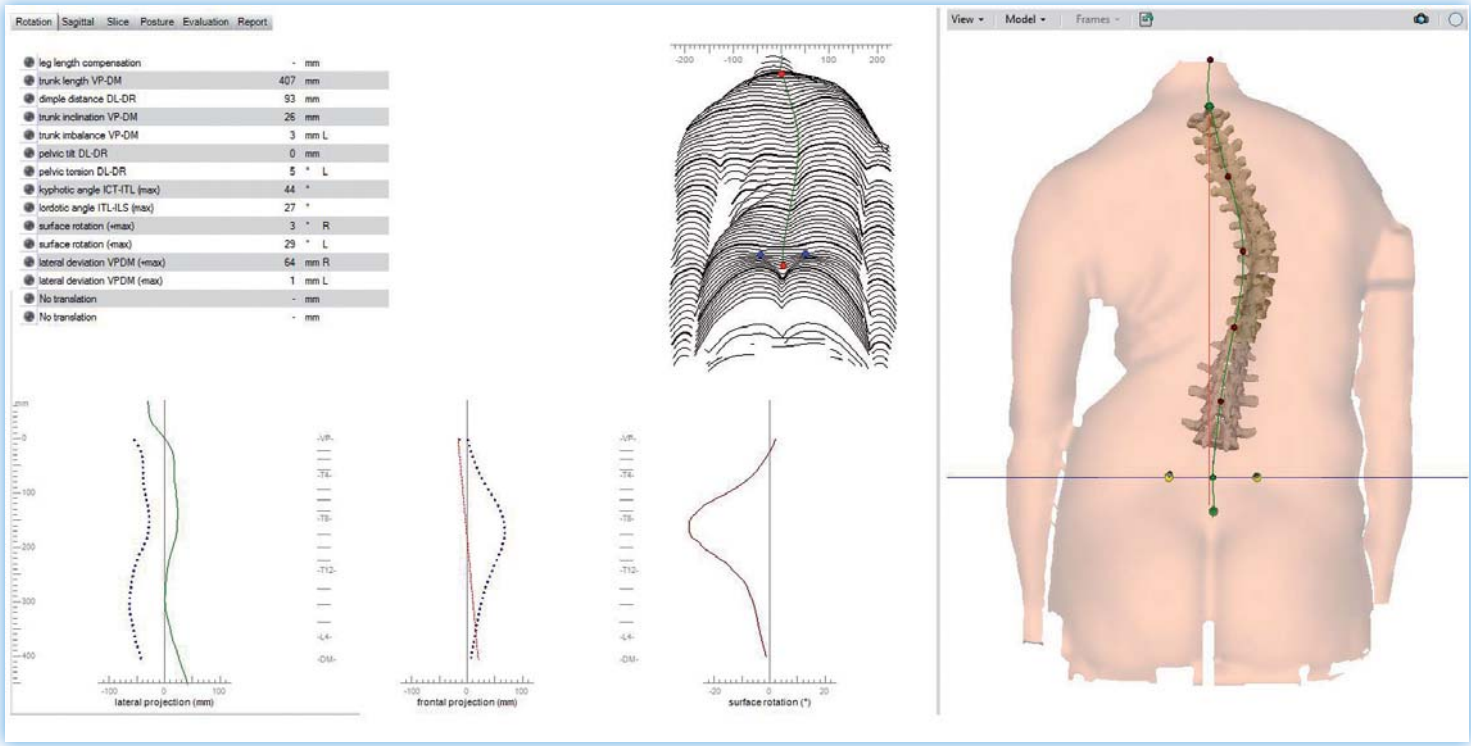
Pelvic obliquity : pre and post therapy (insoles)



Hyper Lordosis



Osteoporosis



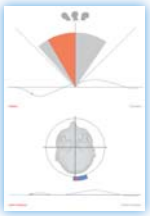
Scoliosis

Additional Components:

The **DIERS formetric 4D** can be combined with the following products to extend the range of applications on the whole musculoskeletal axis.

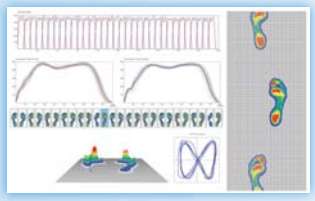
Benefits:

- *Extended range of applications*
- *Time saving through simultaneous measuring*
- *High economic efficiency*



DIERS cervical spine

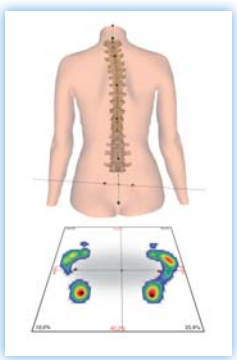
DIERS leg axis
(lateral)



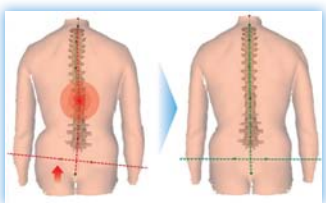
DIERS pedogait

DIERS leg axis
(posterior)

DIERS pedoscan



3D simulation platform

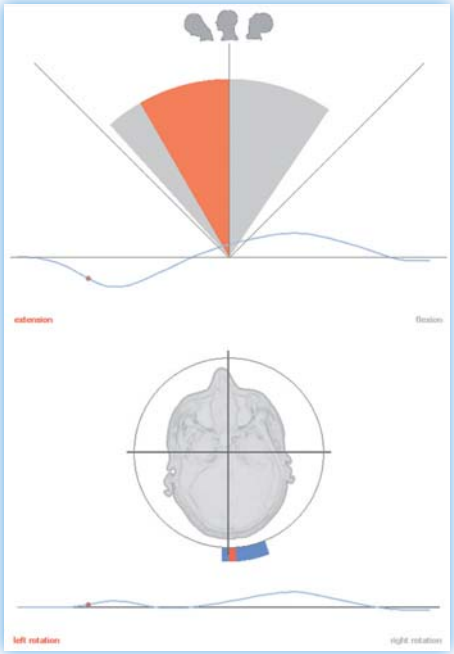


Example: Simulation of leg length compensation

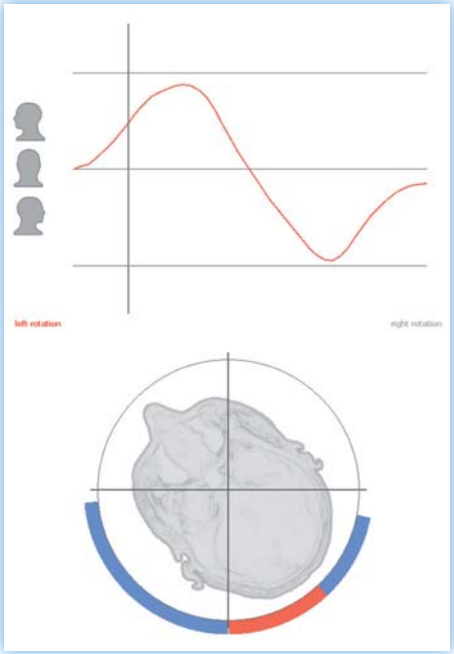
DIERS formetric 4D
+ cervical spine

Additional
Camera Module

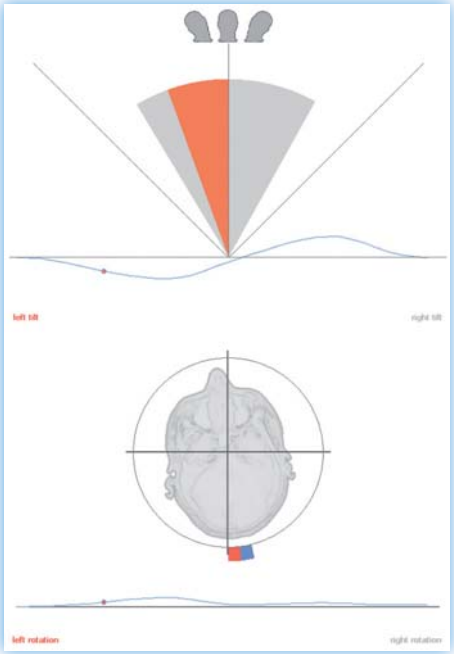
Using the cervical spine module the mobility of the cervical spine (range of motion) can be three-dimensionally recorded. The movement directions of flexion, extension, lateral flexion left and right, and rotation to the left and right are measured. The measurement data and asymmetries are graphically shown and can be analysed. The measurement process takes place using a light, specialized head hood. The **DIERS formetric 4D** system requires an additional camera system for the cervical spine module.



Flexion / Extension
(+Rotation)

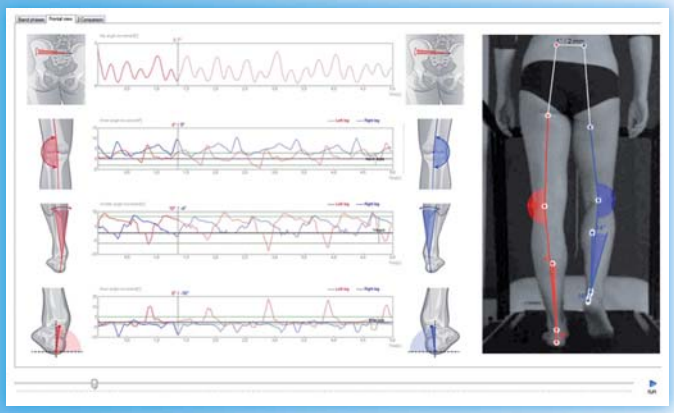


Rotation



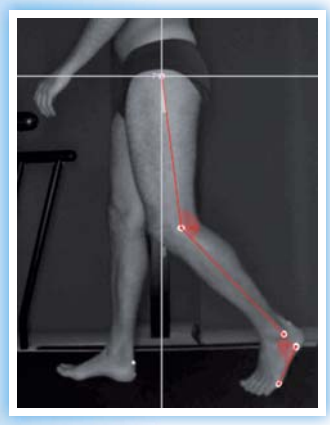
Lateral Flexion (Left/Right)
(+Rotation)

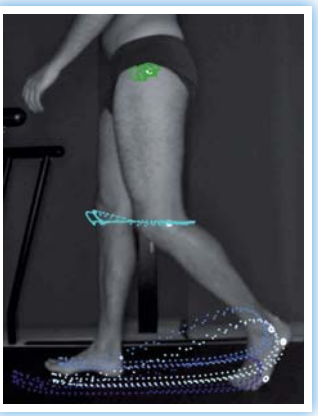
DIERS formetric 4D + DIERS leg axis (posterior)



Using the additional leg axis module it is possible to provide two-dimensional documentation of leg axis geometry (posterior view) in addition to spinal and postural analysis. This allows the user to directly include the effects on the leg axis when correcting foot malpositions. The **DIERS formetric 4D** requires an additional camera system for the leg axis module.

DIERS leg axis (lateral)



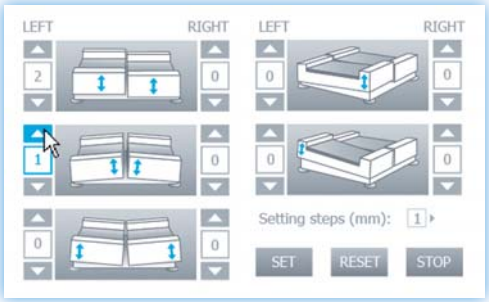


An additional camera module to complete the motion analysis system **DIERS 4D motion® Lab**

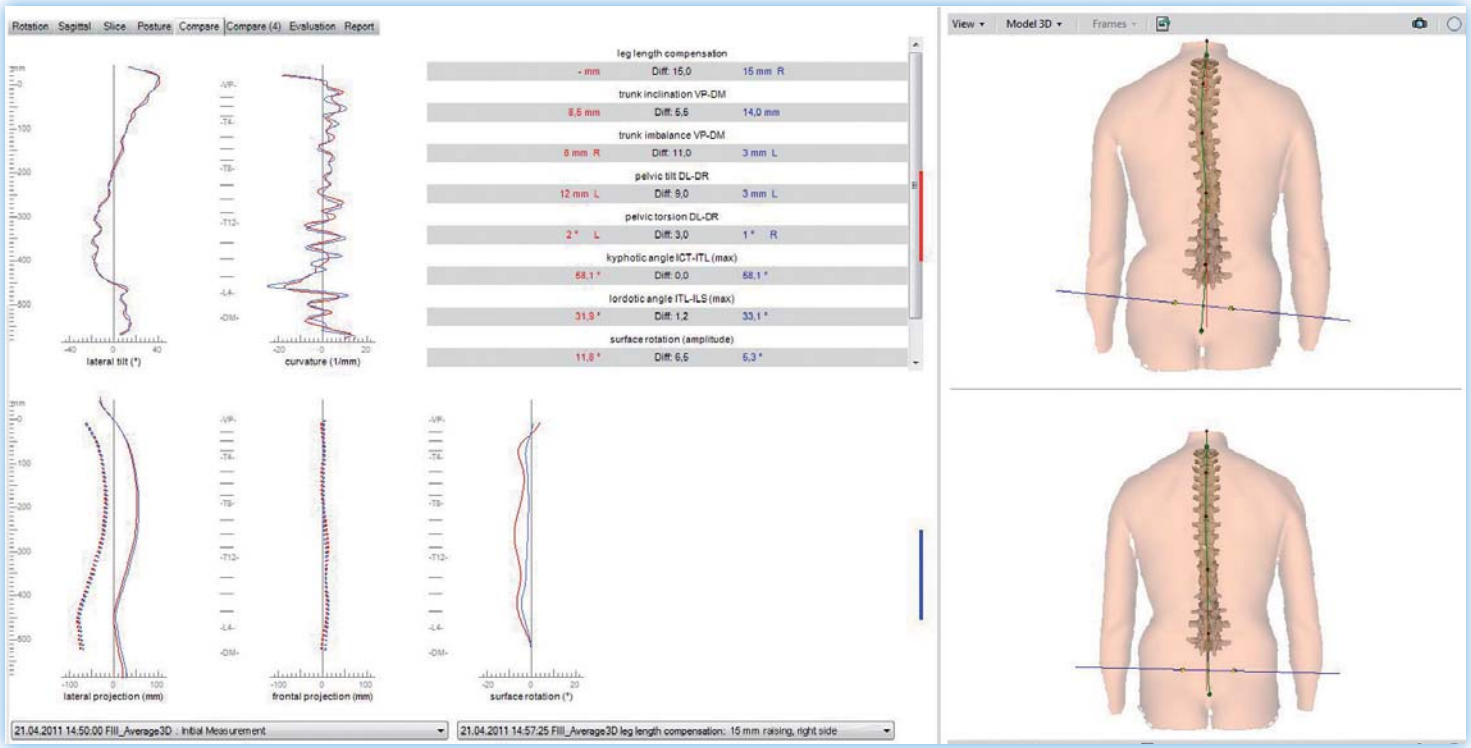
▸ see p.21

DIERS formetric 4D

+ 3D simulation platform



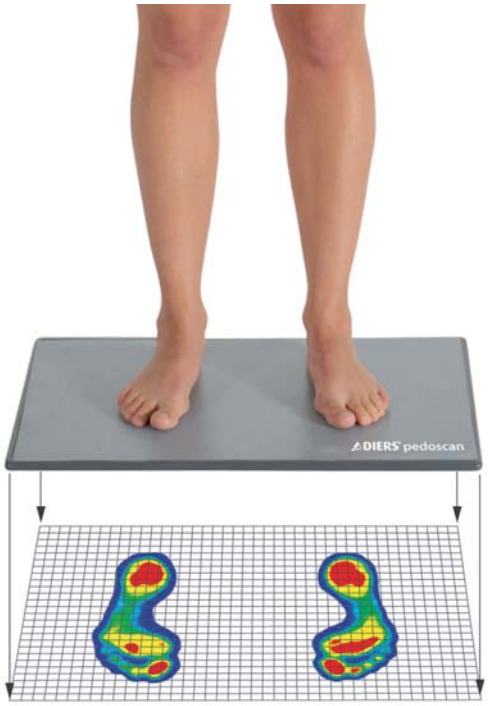
The simulation platform can be used to evaluate leg length discrepancies and foot malpositions. The effects of treatments on the spine, pelvis and posture can be simulated. During the examination the patient stands on two separate surfaces which can be adjusted in three directions. Correctional parameters – e.g. for insoles which are to be made – are determined with millimetric precision.



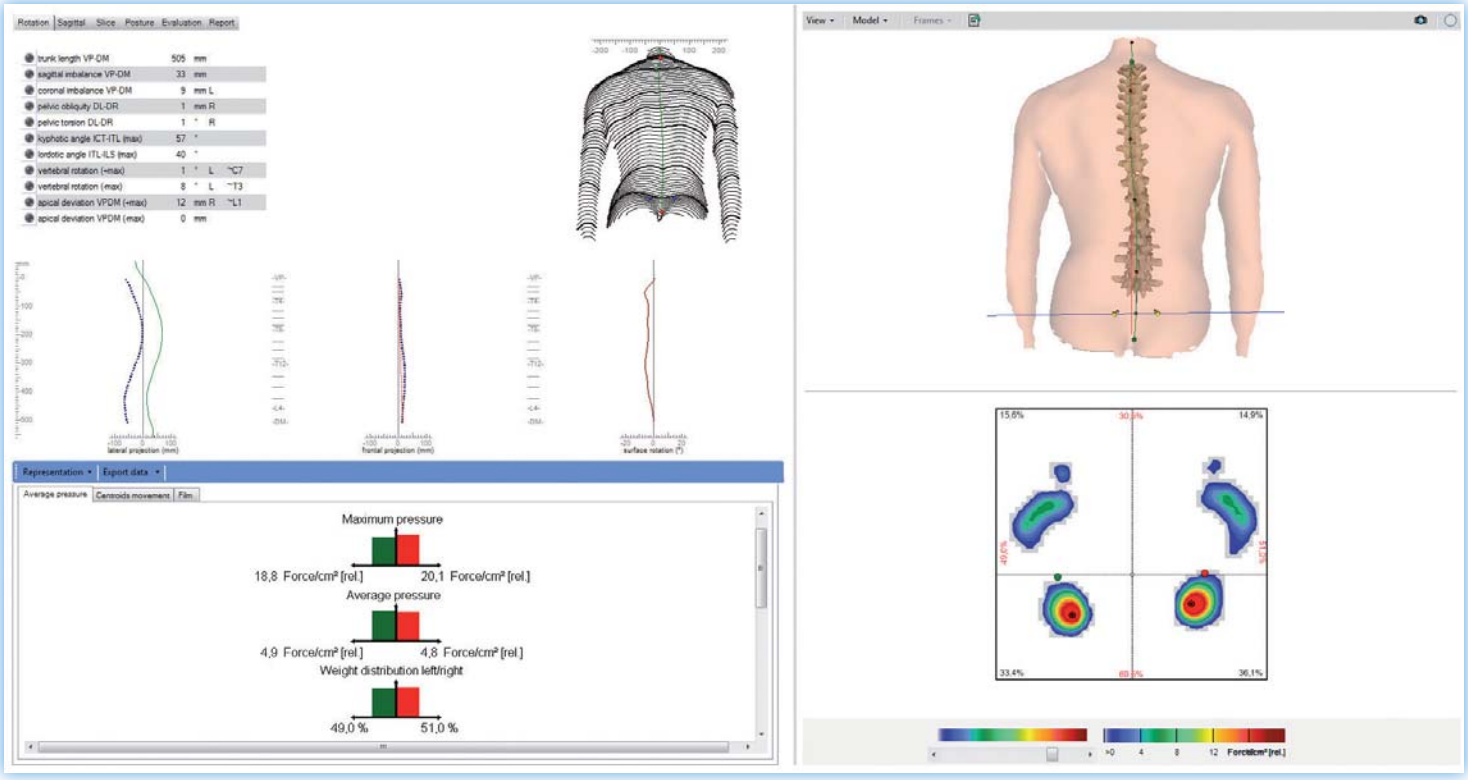
Leg length compensation (comparative measurement)

DIERS formetric 4D

+ DIERS pedoscan



Combining the two measuring systems **DIERS formetric 4D** and **DIERS pedoscan** enables simultaneous analysis of the spinal form, the pelvic position, the pressure conditions under the feet and the body's center of pressure.
This synchronized measurement is a valuable feature in determining optimal treatment (e.g. with posture-correcting insoles).



2 in 1
Podoscope + Foot Scanner

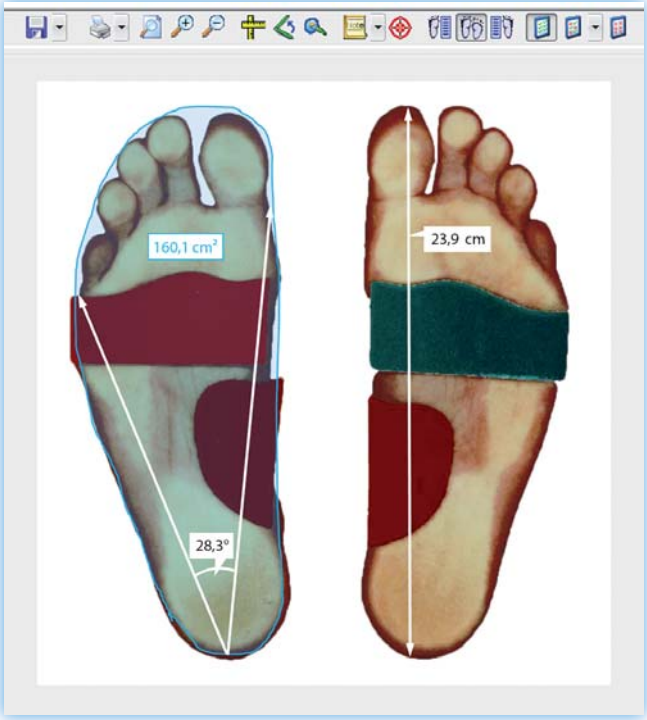
DIERS digiscan

The **DIERS digiscan** system is conceived for static foot analysis using a mirror system, for controlled foot treatment (e.g. in proprioceptive insoles), for immediate documentation using a foot scanning device and to link to **DIERS DICAM** with the option of electronic data transmission.

Aside from diagnostic procedures users have the option of employing a system for documentation of treatment.

Clinical Applications:

- Static foot analysis while standing
- Asymmetries in foot pressure distribution
- Foot malpositions and foot corrections
- Conventional and proprioceptive/ sensomotoric insole treatment



Measurement of
Longitudes / Angles / Area sizes

DIERS pedoscan

The foot pressure recording and gait analysis system **DIERS pedoscan** allows the pressure distribution on the human foot to be captured and displayed quickly and precisely while standing or while walking.
Many clinical issues concerning the objective and quantitative analysis of pressure distribution, pressure peaks, and movement asymmetries as well as the roll over behavior are recorded to help diagnose foot malformations or functional limitations of the lower extremities.
The precise, high-frequency measurement technology allows all users to record and document even rapid movements of the body's centre of pressure and load changes.
For a time-saving dynamic measurement in both directions the walking direction is automatically identified by the software.
The high-frequency measurement of the body's centre of pressure (min. 100 Hz) provides additional information about neurological issues and extends the range of application to (competitive) sports.

Pressure plates are available in the length:
0.5 / 1.0 / 2.0 / 4.0 m

Measuring Parameters:

- Foot pressure reaction forces
- Foot roll over characteristics of the feet
- Foot rotation
- Foot pressure distribution in the different phases of walking
- Stride length, stride time, stride width, step length
- Movement of the body's center of pressure

Clinical Applications:

- Foot malpositions and foot corrections
- Diabetic foot treatment
- Insole treatment
- Gait imbalances / Gait disorder
- Postural analysis
- Treatment with orthotics or prosthetics
- In combination with TMJ treatment

DIERS pedofeedback
see p.31

DIERS pedogait

The **DIERS pedogait** system allows the functional representation of the foot pressure reaction forces while walking.
The integrated measuring platform is 1.0 m long with 5.376 sensors for an exact capture of the pressure values. The admission frequency is 100 Hz, which corresponds to a tact frequency of 10 ms. Measurement precision is gained and needed due to postural variances of the human body. The treadmill can also be used for static measurements of foot pressure as well as for stabilometry.

The **DIERS pedogait** is ready for simultaneous measurement with the **DIERS 4D motion®** (dynamic spine analysis) as well as with the module **DIERS leg axis** (video gait analysis). These three measuring devices can be integrated to the compact motion analysis system **DIERS 4D motion® Lab**:

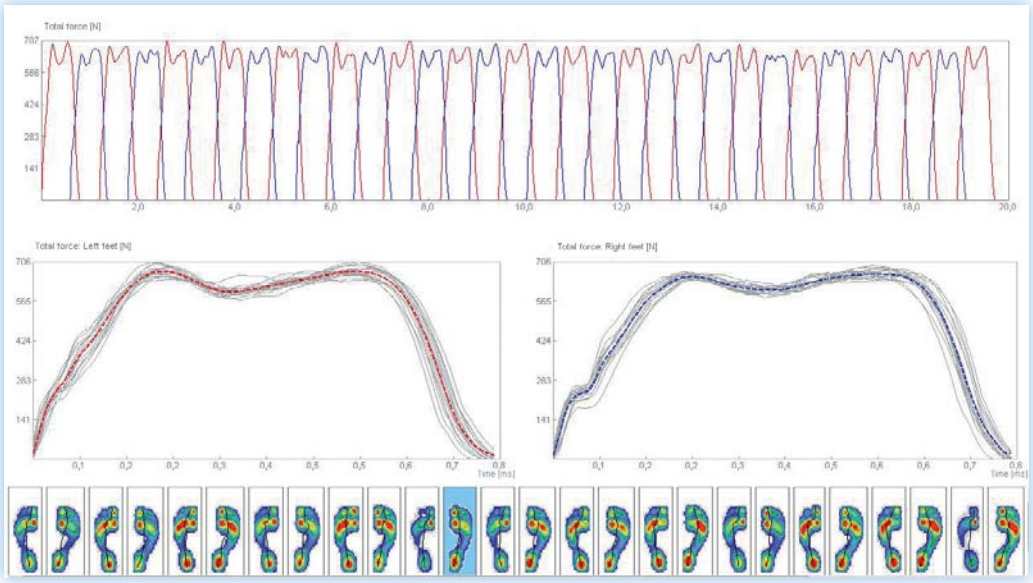
▸ see p.21

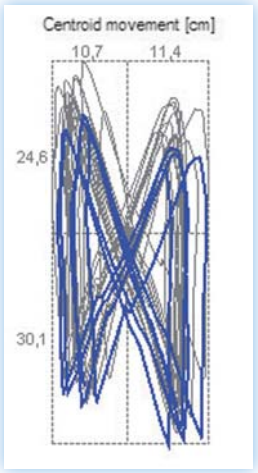
Measuring Parameters:

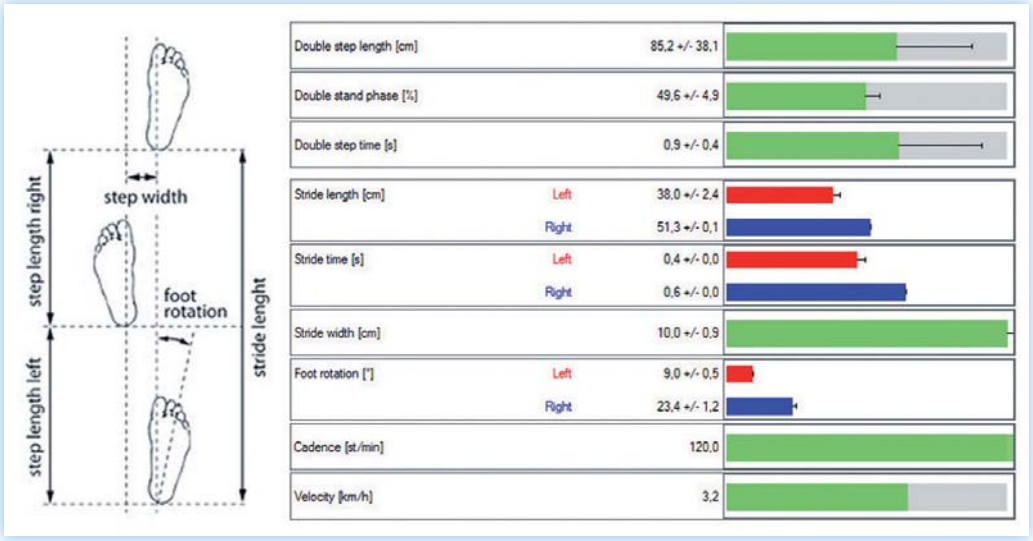
- Foot pressure reaction forces
- Foot roll-over characteristics of the feet
- Foot Rotation
- Foot pressure distribution while walking
- Stride length, stride time, stride width, step length
- Cadence (steps/min)
- Movement of the body's center of pressure

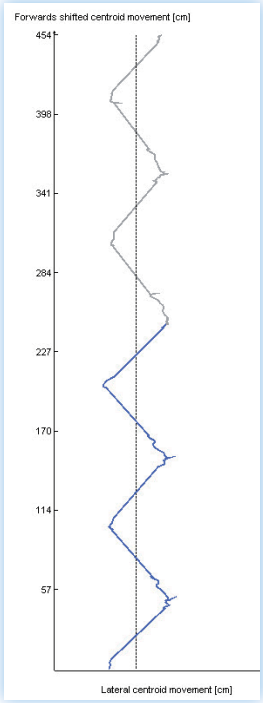
Clinical Applications:

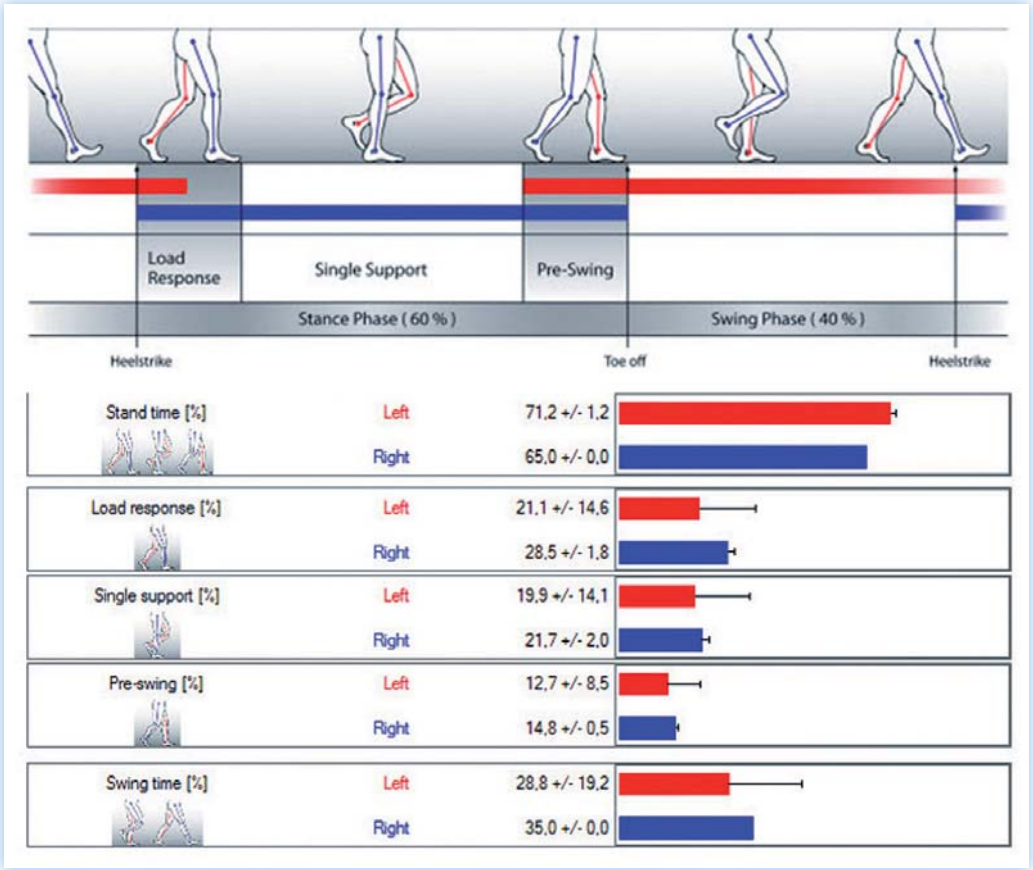
- Foot malpositions and foot corrections
- Diabetic foot treatment
- Insole treatment
- Gait imbalances / Gait disorders
- Postural analysis
- Treatment with orthotics or prosthetics
- In combination with TMJ treatment

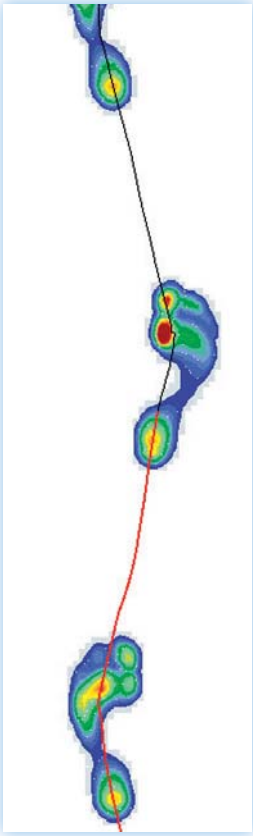

Total force [N]
Total force: Left feet [N]
Total force: Right feet [N]
Time [ms]


Centroid movement [cm]
10,7
11,4
24,6
30,1

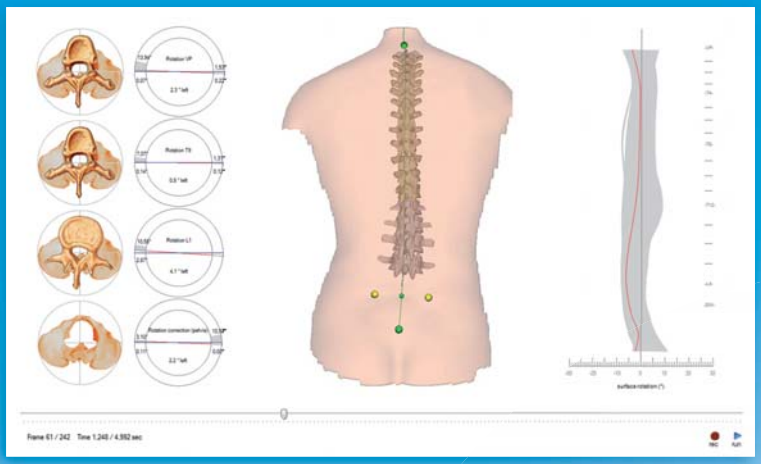

step width
step length right
step length left
foot rotation
stride lenght
Double step length [cm] 85,2 +/- 38,1
Double stand phase [%] 49,6 +/- 4,9
Double step time [s] 0,9 +/- 0,4
Stride length [cm] Left 38,0 +/- 2,4
Right 51,3 +/- 0,1
Stride time [s] Left 0,4 +/- 0,0
Right 0,6 +/- 0,0
Stride width [cm] 10,0 +/- 0,9
Foot rotation [°] Left 9,0 +/- 0,5
Right 23,4 +/- 1,2
Cadence [st/min] 120,0
Velocity [km/h] 3,2


Forwards shifted centroid movement [cm]
Lateral centroid movement [cm]


Load Response
Single Support
Pre-Swing
Stance Phase (60 %)
Swing Phase (40 %)
Heelstrike
Toe off
Heelstrike
Stand time [%] Left 71,2 +/- 1,2
Right 65,0 +/- 0,0
Load response [%] Left 21,1 +/- 14,6
Right 28,5 +/- 1,8
Single support [%] Left 19,9 +/- 14,1
Right 21,7 +/- 2,0
Pre-swing [%] Left 12,7 +/- 8,5
Right 14,8 +/- 0,5
Swing time [%] Left 28,8 +/- 19,2
Right 35,0 +/- 0,0



Step into a new dimension ...



CLINICALLY PROVEN
PATENTED & CERTIFIED

European Patent No.: EP 1718206
United States Patent No.: US 7,899,220 B2

DIERS 4D motion®
Dynamic Spine & Posture Analysis

The ***DIERS 4D motion®*** system is the leading technology in the field of 3D spine and surface topography. For the first time it is possible to visualize the complex motion pattern of the spine and pelvis while walking and to monitor the results.
This technological breakthrough is based on the innovative software and an advanced camera system (60 frames/second).

Clinical Applications:

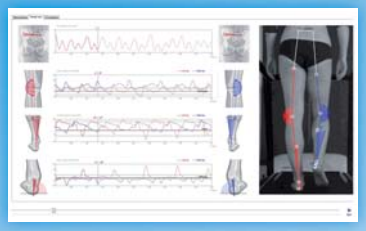
- Postural Deficits: Scoliosis, hyper/hypo kyphosis, hyper/hypo lordosis, blockades, pelvic obliquities, leg length discrepancies, …
- Motion Asymmetries
- Foot & Gait Deficits (4D motion® Lab)
  Customized orthopaedic and proprioceptive insoles
- Medical based Training Therapy
- Follow-up Measurements:
  Scoliosis, pre-& post surgery, posture correcting insoles etc.
- Physiotherapy / Rehabilitation
- Sports Medicine & Professional Clinical Diagnostics
- and many more

The Compact Solution for Motion Analysis

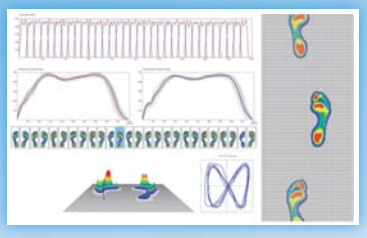
Components:

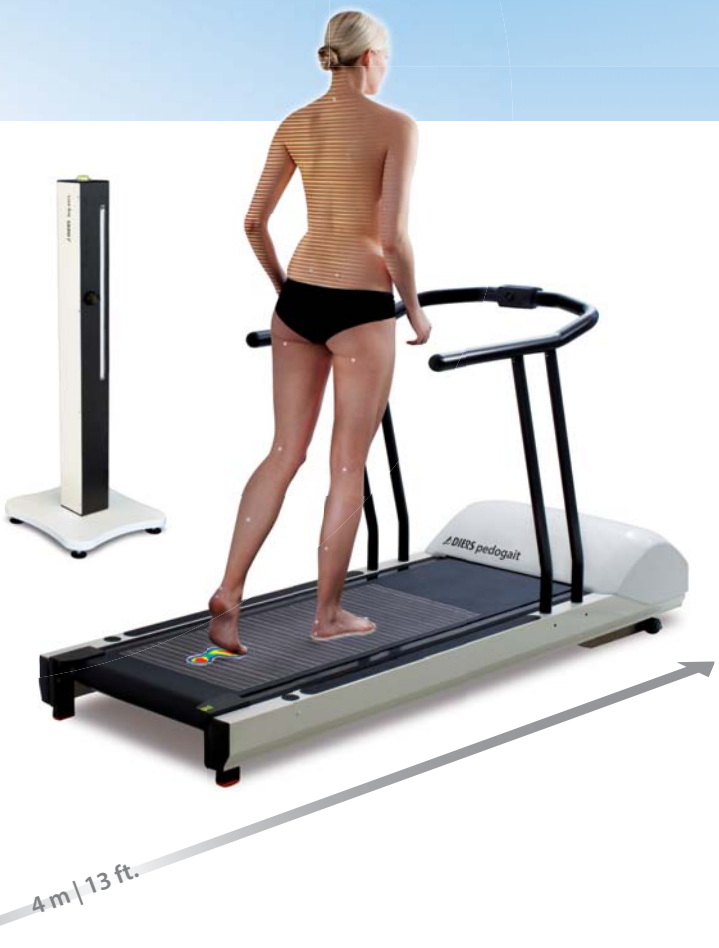
DIERS 4D motion®
Dynamic measurement of the spine, vertebra and pelvis

DIERS leg axis
Video gait analysis for the detection and measurement of leg axis



DIERS pedogait
Treadmill with integrated pressure plate





DIERS 4D motion® Lab

Dynamic analysis of the whole musculoskeletal system with small space requirement (8m²)

The ***DIERS 4D motion®*** system for dynamic spine measurement is the key technology for the development of the ***DIERS 4D motion® Lab***.

This motion laboratory allows a synchronized measurement of the whole skeletal system and opens new fields of clinical applications: ranging from medical diagnosis via training therapy to sport sciences.

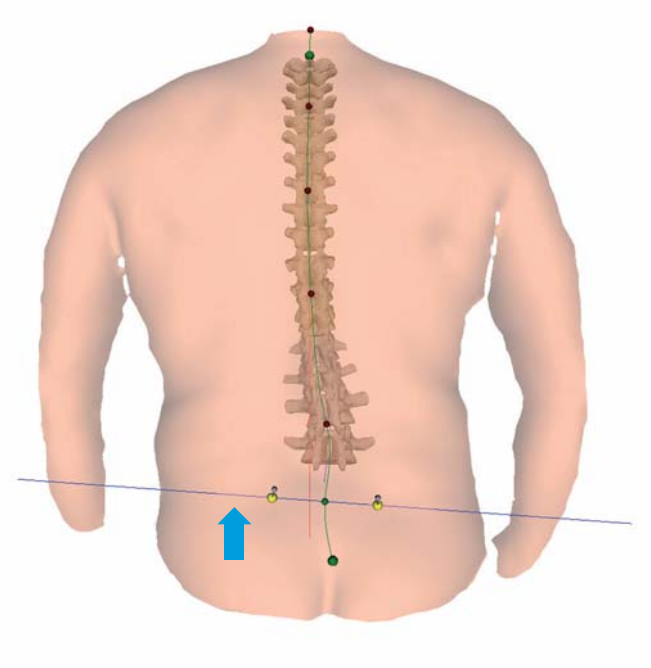
The dynamic spine analysis is a key measurement modality in clinical diagnostics, research and further studies.

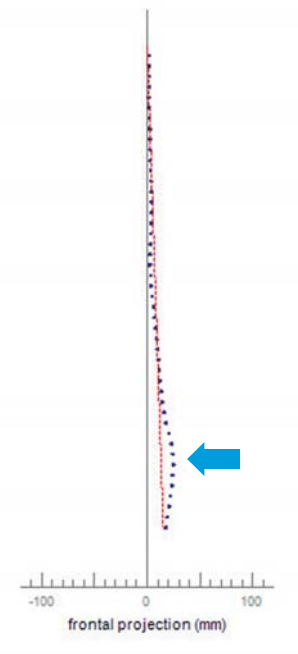
DIERS 4D motion® Lab | Holistic Motion Analysis

Clinical Example:

Patient: male, 46 years
Diagnosis: Osteoarthritis of the hip (left)

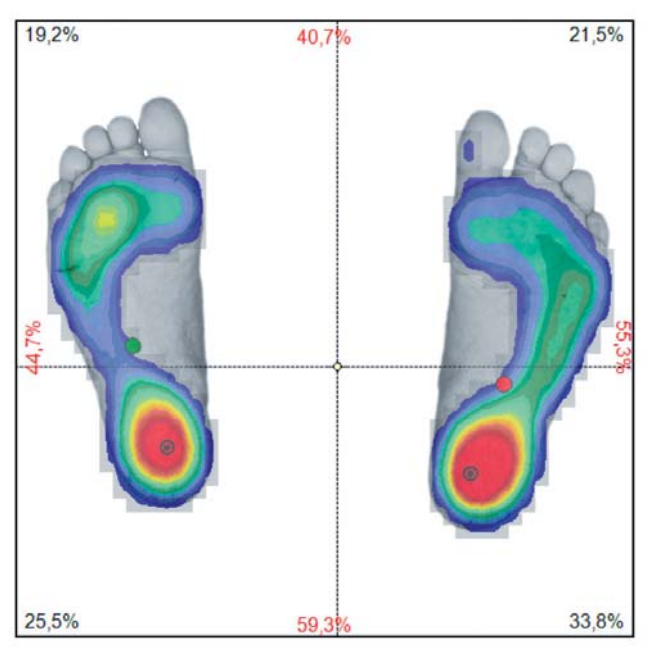
DIERS 4D motion® | Static Measurement

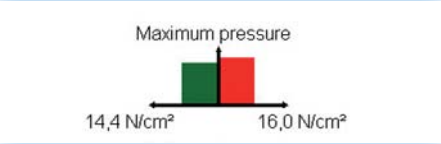


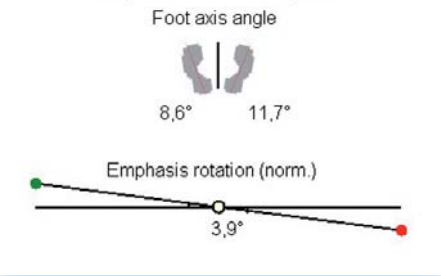


- Pelvic obliquity left (Indication for discharge position of the left leg)
- Compensation by a local lateral deviation in the lumbar spine
- Plumb alignment up until thoracic vertebrae T10

DIERS pedogait | Static Foot Pressure Measurement

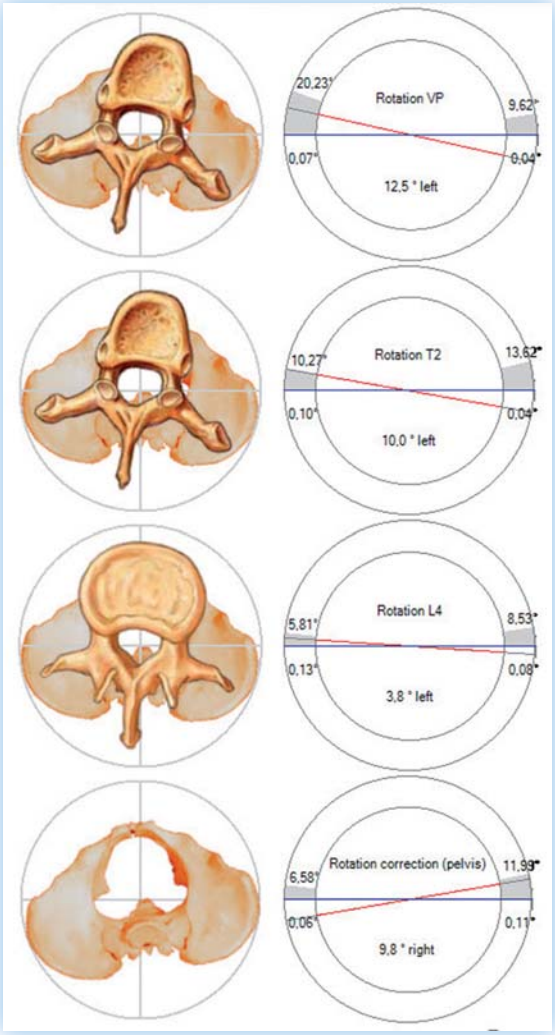




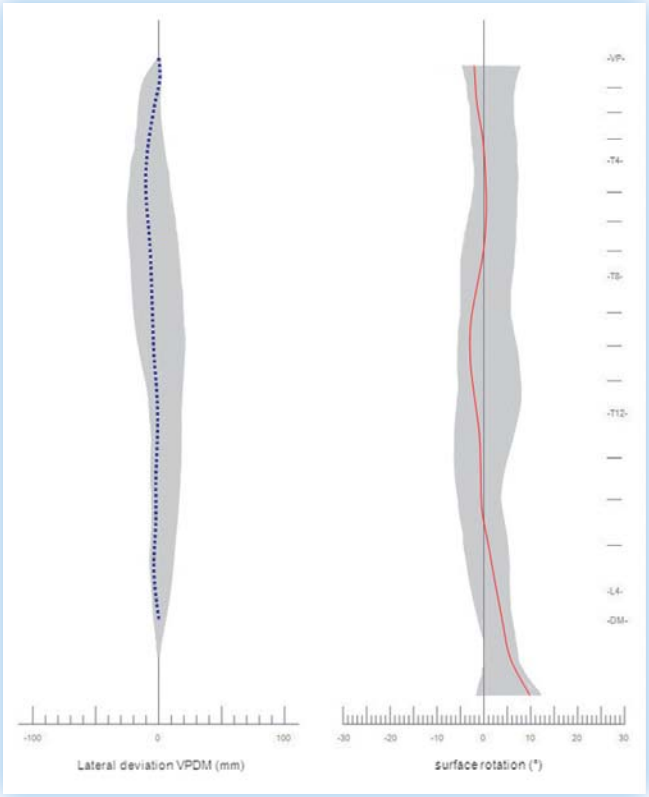


- COP-Displacement right- and rearwards.
- No toe pressure

DIERS 4D motion® | Dynamic Measurement



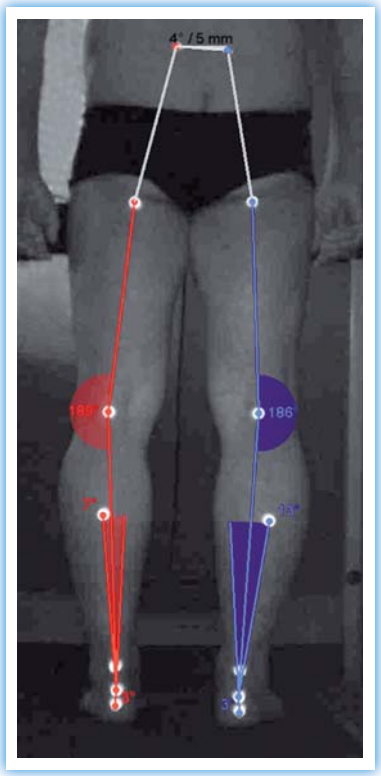
Significant asymmetry in pelvis rotation
(continuing in the rotation of the vertebral bodies)



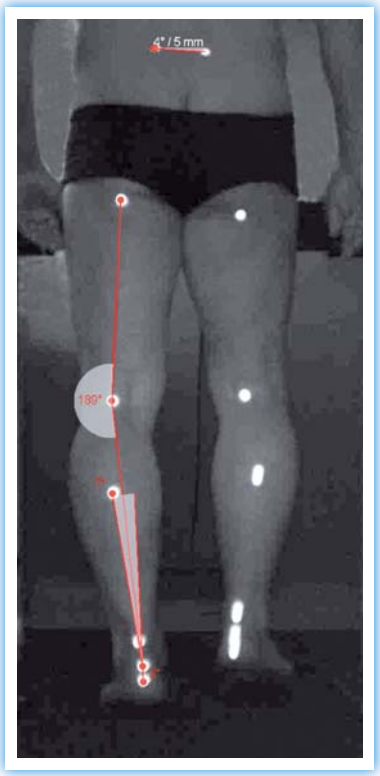
Significant lateral deviation of the thoracic spine

High rotation of the vertebras

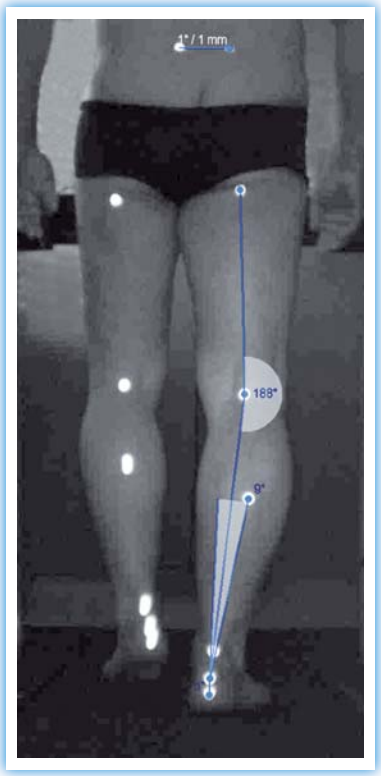
DIERS leg axis (leg axis geometry): Suspicion of relieving posture (leaning to the right)



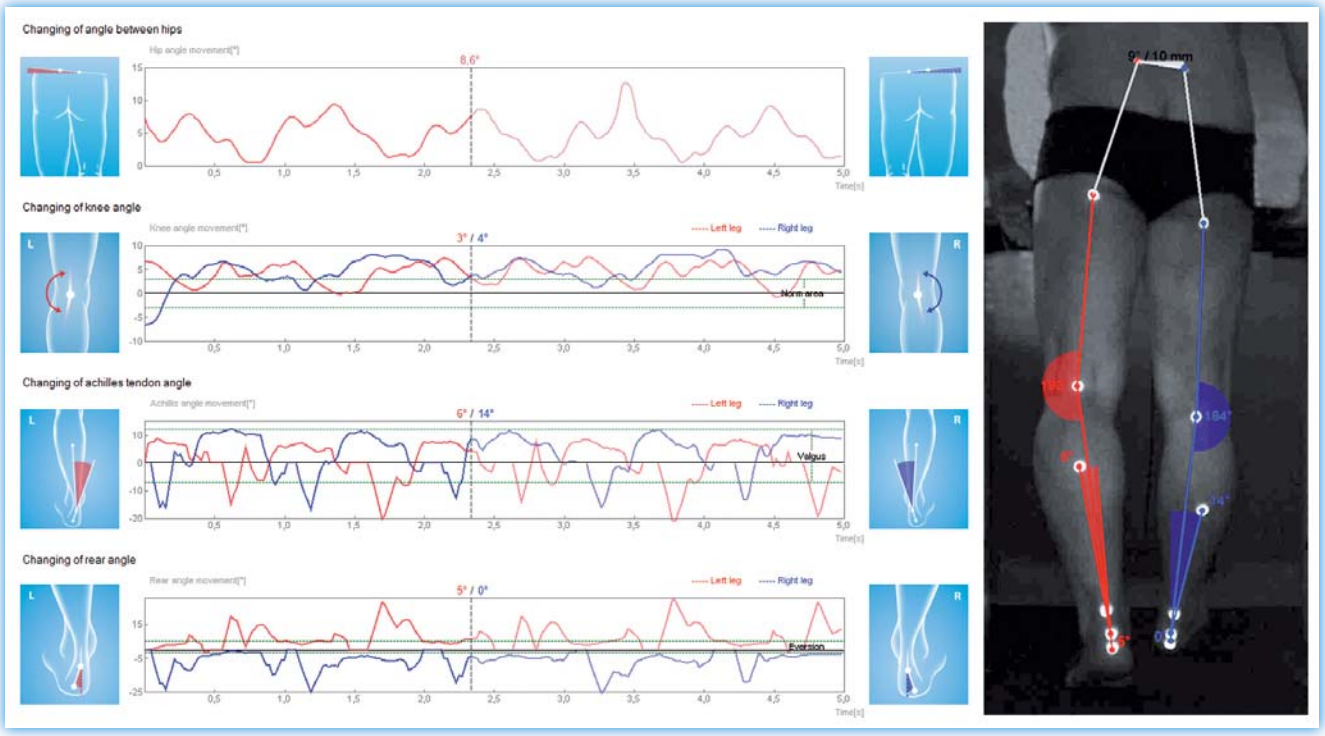
Static Measurement



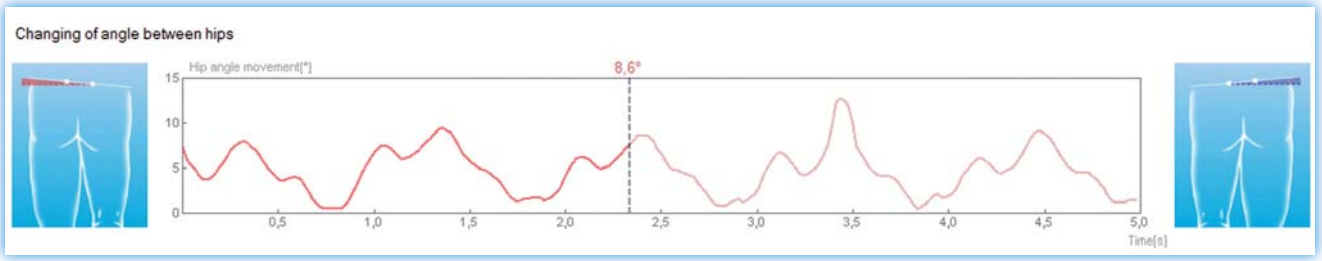
Stance Phase Left



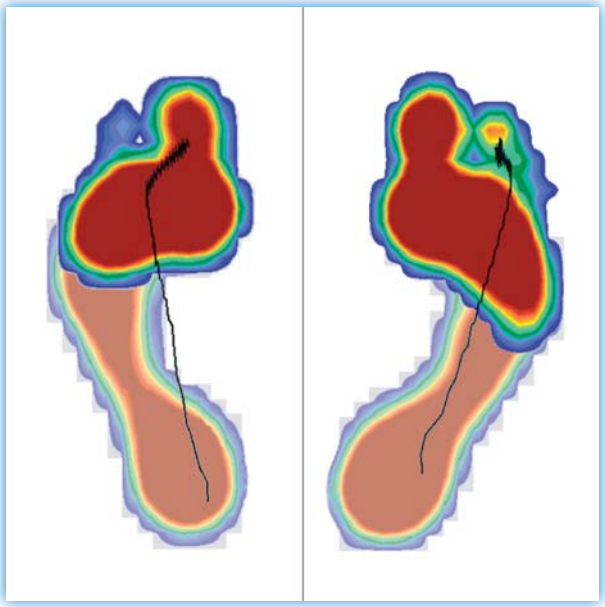
Stance Phase Right



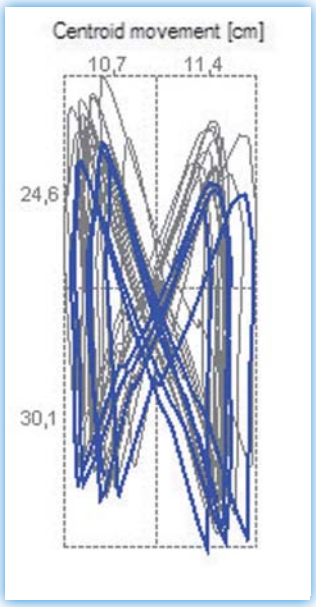
Pelvic obliquity (left) remains in every phase of walking / Suspicion of pelvis forward movement (left)



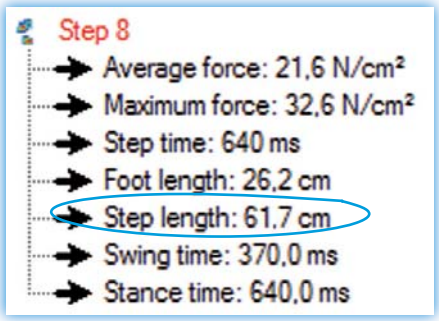
DIERS pedogait (dynamic foot pressure measurement):

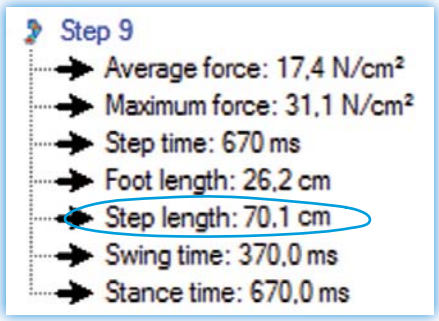


Gait line (left) is shifted to the middle (medial)

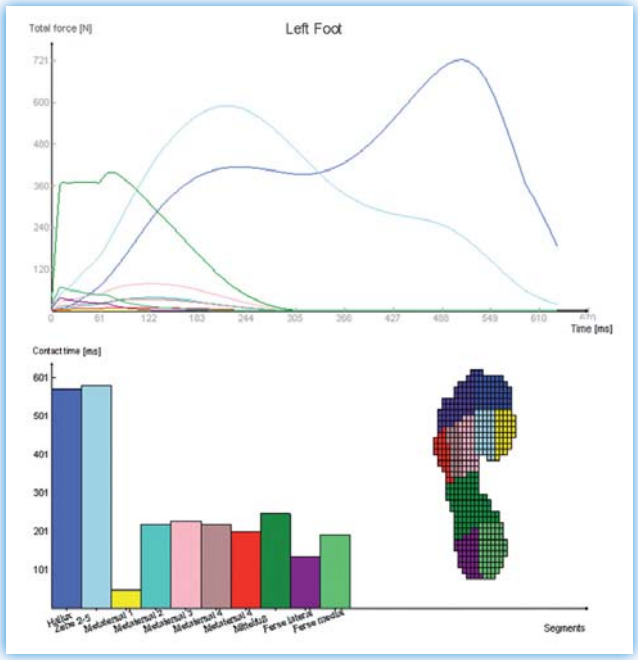


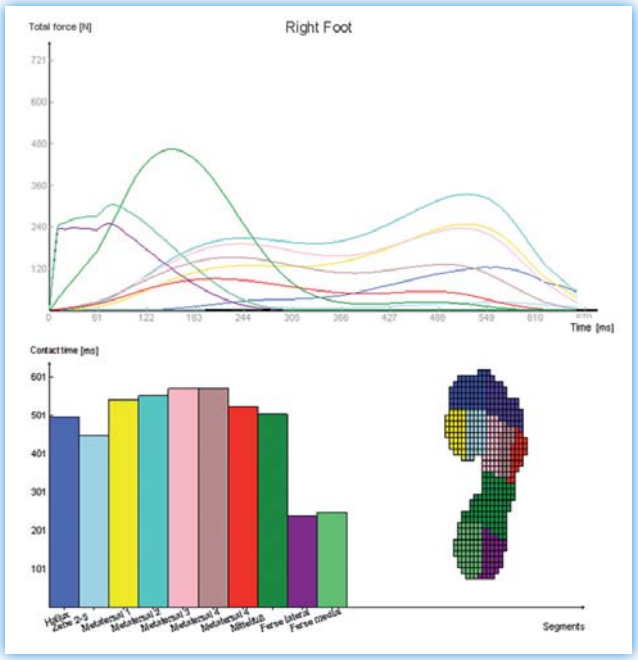
Suspicion of pelvis forward movement (left) confirmed by the Butterfly-Diagram





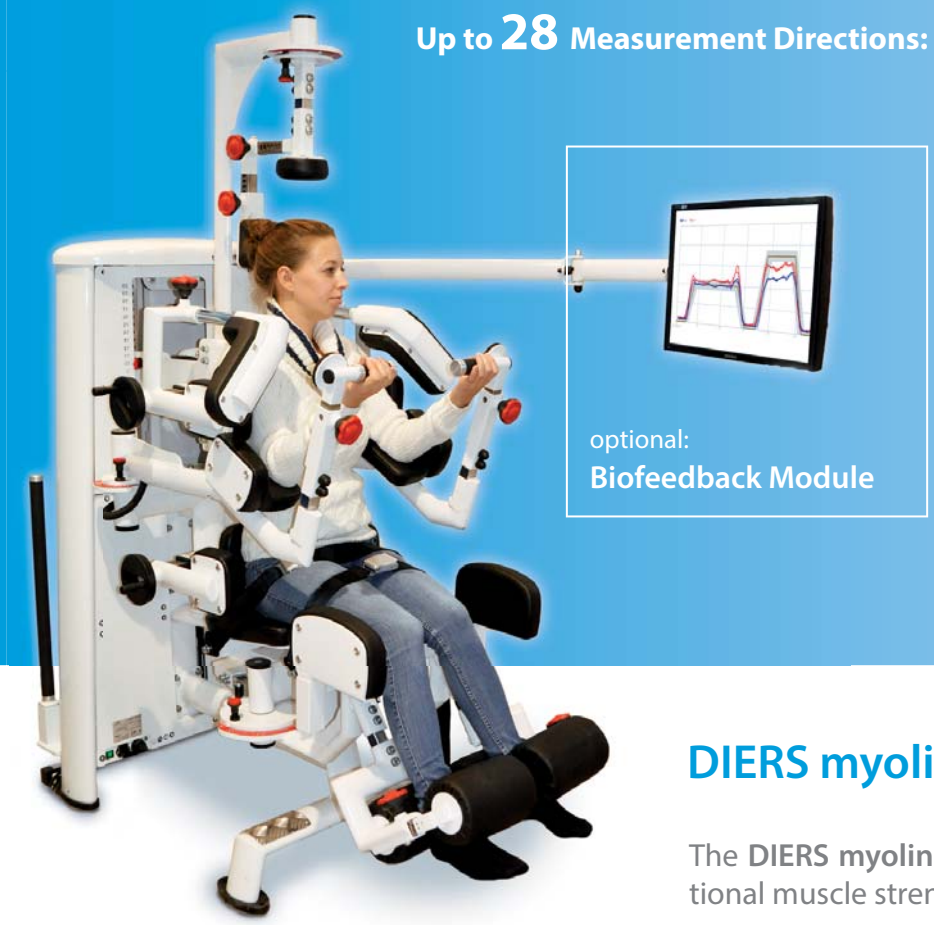
Comparison of the gait parameters (Left | Right)





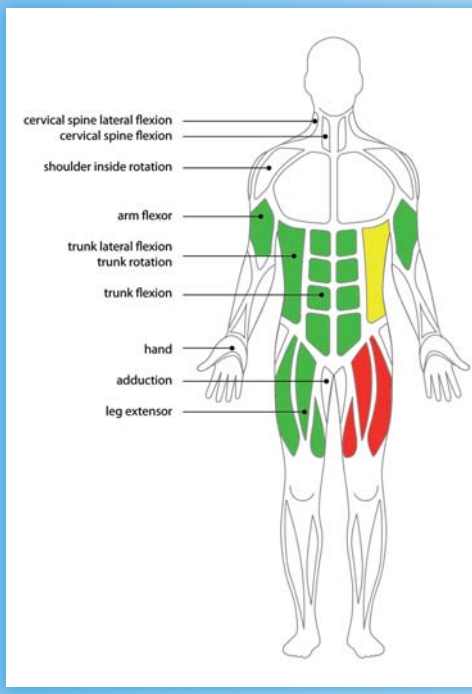
Left foot: Shortened contact time of the back- and the middle foot as well as in the area of the ball of the toe (*metatarsale*)

Isometric Muscle Strength Measurement



Up to 28 Measurement Directions:

optional:
Biofeedback Module



DIERS myoline professional

The **DIERS myoline professional** is a multifunctional muscle strength measurement device.

With up to 28 test directions the **DIERS myoline** is a compact solution for recording and documentation of all posture-relevant muscle strength parameters.

As a whole body measurement system, the **DIERS myoline** unifies several conventional devices and offers the user considerable savings of time, because all measurements can be done while the patient is sitting - a new positioning is not necessary.

The device was developed and tested in a university environment. Its solid construction guarantees reliable measurement results and high operating safety.

Aside from recording diagnostic measurement parameters the system is also ready to be used for biofeedback training therapy.

Possible Measurement Directions:

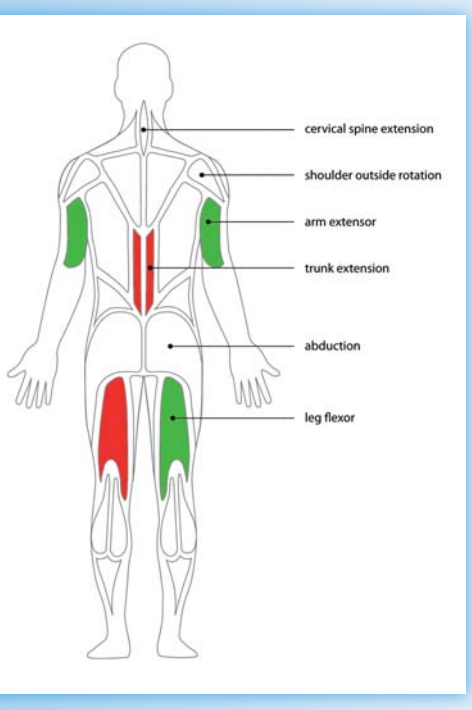
Trunk:
Flexion / Extension
Lateral flexion (left / right)
Rotation (left / right)

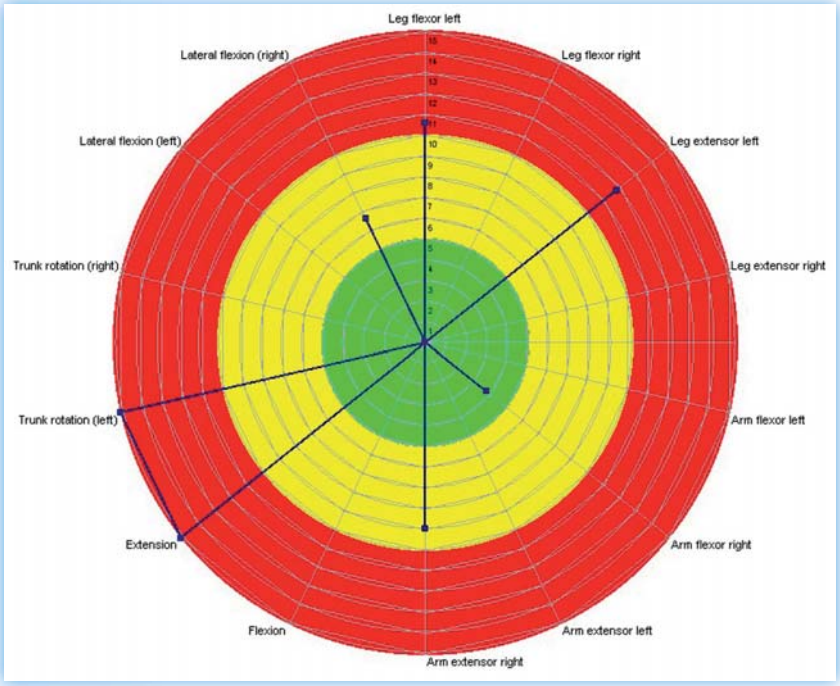
Legs: (left & right)
Leg Flexion / Leg Extension
Leg Abduction / Leg Adduction

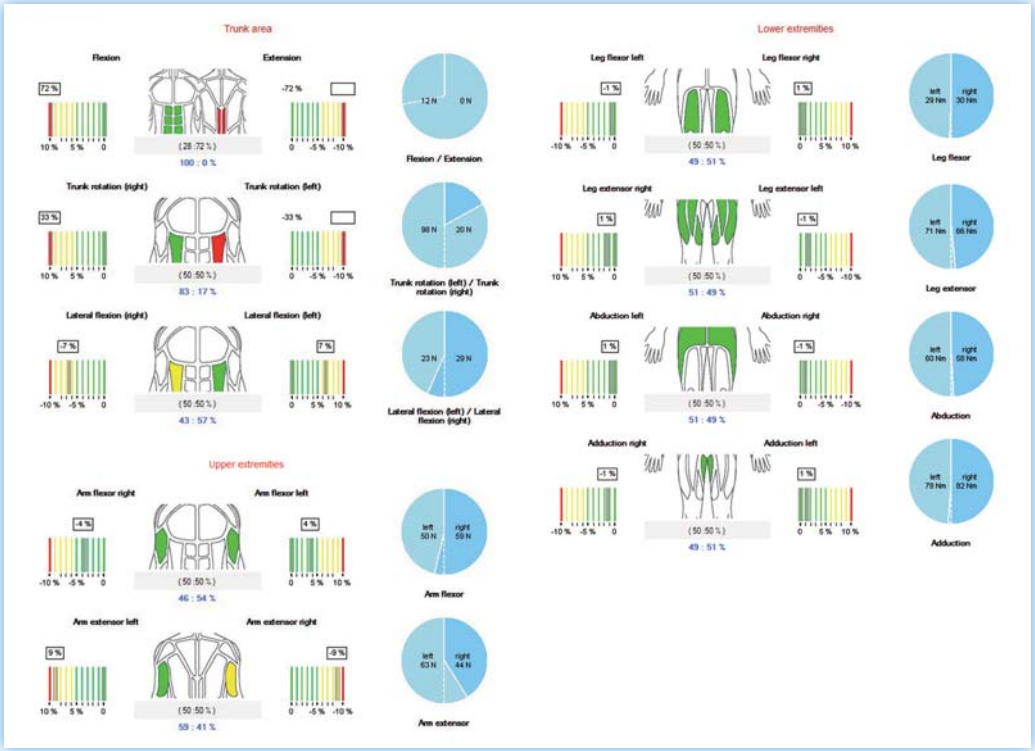
Shoulder: (left & right)
Shoulder outside / inside rotation

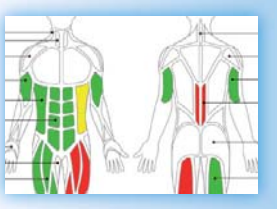
Arms: (left & right)
Arm Flexion (biceps)
Arm Extension (triceps)

Cervical Spine
Flexion / Extension
Lateral flexion (left / right)









DIERS body balance
Medical Training Therapy

Based on the measurement data of the DIERS myoline and the DIERS formetric 4D

▸ p.30

The Bridge to Therapy...

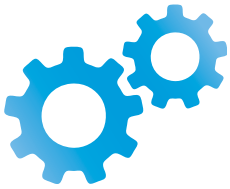
DICAM

DIERS COMMUNICATION & APPLICATION MANAGEMENT

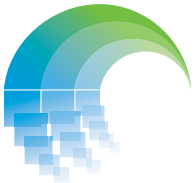
There are various measurement methods and tools used for biomedical analysis. It creates many problems for clinicians when more then one method is used to control and store all of the collected data, due to different software structures. DICAM solves these problems:

DICAM unites the different measurement devices in just one single software structure.

The integrated remote maintenance allows a fast software update and immediate online assistance in case of a problem.



DICAM can be plugged directly to existing software systems or networks which are connected to any biomedical device. A repeated input of patient's data can therefore be avoided.



DICAM combines the outcome of different measurement devices with expert's knowledge of research and clinical case studies, which have been collected over the past 10 years.
The result is the DIERS theraline software, which offers customized treatment proposals for individual patient care.

DIAGNOSIS

DYNAMIC SPINE ANALYSIS

MOTION ANALYSIS

SPINE & POSTURE ANALYSIS

MUSCLE STRENGTH & EMG

FOOT & GAIT ANALYSIS

EXPERT'S KNOW-HOW

EXPERT'S KNOW-HOW

DICAM

THERAPY

INDIVIDUAL INSOLES

MEDICAL TRAINING

BIOFEEDBACK TRAINING

DIERS body balance

Medical based training therapy

The **DIERS body balance** software utilizes the high quality and reliable clinical measurement data of the **DIERS formetric** system and the **DIERS myoline** system. The University of Hamburg (Institute for Sports and Locomotor Medicine) brought in the corresponding expert's knowledge within the context of a research project.

The software **DIERS body balance** uses the measurement data to generate an individual training plan for the patient. The user can modify this recommendation. The training plans can be exercised on all common training equipment.

Clinical Applications:

- Muscular imbalances
- Strength deficits
- Performance improvements
- Prevention & rehabilitation

DIERS posture balance

Posture correcting insoles

The **DIERS posture balance** program is based on the principles of posture correction in accordance with Dr. Bourdiol. It uses the measurement data of the **DIERS formetric** system. The expert knowledge was verified in a research project with the University of Tübingen (Institute of Sports Medicine), Germany.

The **DIERS posture balance** program is useful for generating recommendations for posture correcting insoles (also known as sensomotoric or proprioceptive insoles) – in consideration of the patient's medical anamnesis.

Clinical Applications:

- Postural deficits
- Back pain
- In combination with TMJ treatment
- In combination with treatment of foot and leg malpositions

DIERS foot balance
Foot correction insoles

The **DIERS foot balance** software can be used to generate recommendations for the production of high quality insoles to correct feet and gait.
This is based on the high frequency measurement data of the **DIERS pedoscan** device.
The University of Tuebingen (Institute of Sports Medicine) accompanied the development of this software as part of a research project.
The new software converts the dynamic foot pressure distribution into numerous strength and acceleration vectors.
The additional measurement data improves the efficacy of insoles.

Clinical Applications:

- Plantar foot problems
- Foot malpositions
- Diabetic foot disorders
- Gait deficits and gait asymmetries
- Leg length discrepancies

DIERS feetback
Biofeedback training

The biofeedback training software for the foot pressure plate **DIERS pedoscan** offers various modalities for specific training treatments.
The optical feedback of the patient's activity effects higher motivation and influences the therapy progress positively.

- Training configuration based on an existing foot pressure measurement and/or individual configuration
- 8 different training procedures
- Length of training individually adjustable

Scientifically Based & Clinically Proven:

In the following list you will find a selection of international clinical studies, journals and publications regarding DIERS products:

3D/4D Spine & Posture Analysis (DIERS formetric 4D):

09. Frobin, W.; Hierholzer, E. (1981). Rasterstereography: A photographic method for measurement of body surfaces. Photogrammetric Engineering & Remote Sensing 47, 1717-1724 >> *https://eserv.asprs.org/PERS/1981journal/dec/1981_dec_1717-1724.pdf*

20. Drerup, B.; Hierholzer, E. (1985). Objective Determination of anatomical landmarks on the body surface: Measurement of the vertebra prominens from surface curvature. Journal of applied Biomechanics 18, 467-474 >> *http://www.sciencedirect.com/science/article/pii/0021929085902829*

28. Drerup, B.; Hierholzer, E. (1987). Automatic localization of anatomical landmarks on the back surface and construction of a body-fixed coordinate system. Journal of applied Biomechanics 20, 961-970 >> *http://www.sciencedirect.com/science/article/pii/0021929087903253*

44. Drerup, B.; Hierholzer, E. (1996). Assessment of scoliotic deformity from back shape asymmetry using an improved mathematical model. Clin. Biomech. 11, 367-383 >> *http://www.ncbi.nlm.nih.gov/pubmed/11415649*

51. Schülein S.; Mendoza S.; Malzkorn R.; Harms J.; Skwara A. (2012). Rasterstereographic Evaluation of Inter- and Intraobserver-Reliability in Postsurgical Adolescent Idiopathic Scoliosis Patients. J. Spinal Disord Tech. ePub
>> *http://www.ncbi.nlm.nih.gov/pubmed/23249884*

73. Mohokum, M. (2009). Reproducibility of rasterstereography for kyphotic and lordotic angles and for trunk length and trunk inclination - A reliability study. Spine 35 (14), 1713-1714 >> *http://www.ncbi.nlm.nih.gov/pubmed/20505568*

80. Mardjetko, S.; Knott, P.; Rollet, M.; Baute, S.; Riemenschneider, M.; Muncie, L. (2010). Evaluating the reproducibility of the formetric 4D measurements for scoliosis. Eur Spine J 21, 241-242 >> *http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2938639/*

85. Betsch, M.; Wild, M.; Jungbluth, P.; Hakimi, M. (2011). Reliability and validity of 4D rasterstereography under dynamic condition. Computers in Biological and Medicine. 2011 06; 41 (6), 308-312 >> *http://www.ncbi.nlm.nih.gov/pubmed/21489425*

89. Knott, P. (2012). A comparison of automatic vs. manual detection of anatomical landmarks during surface topography evaluation using the formetric 4D system. Scoliosis 2012 >> *http://www.scoliosisjournal.com/content/7/S1/O19*

203. Knott, P.; Frerich, J.; Hertzler, K.; Mardjetko, S. (2011). Comparison of Radiographic and Surface topography measurements in adolescents with idiopathic scoliosis. IMAST July 2011 Proceedings >> *http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3414720/*

Dynamic Spine & Posture Analysis (DIERS 4D motion®):

273. Betsch, M.; Wild, M.; Rapp, W. et al. (2013). Evaluation of a Novel Spine and Surface topography System for Dynamic Spinal Curvature Analysis during Gait. PLOS ONE, Jluy 2013, Vol.8, (7), 1-8
>> *http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0070581*

Gipsman, A.; Rauschert , L.; Daneshvar, M.; Knott, P. (2013, for submission). Evaluating the Reproducibility of Motion Analysis Scanning of the Spine During Walking

Foot & Gait Analysis (DIERS pedoscan /pedogait):

239. Hallemanns, A.; D´Août, K.; De Clercq, D.; Aerts, P. (2003). Pressure Distribution Patterns under the feet of new walkers: The first two month of independent walking. Foot and Ankle International/Vol.24, No. 5/May 2003, 444-445

262. De Cock, A.; De Clercq, D.; Willems, T.; Witvrouw, E. (2004). Temporal characteristics of foot roll-over during barefoot jogging: reference data for young adults. Gait and Posture. Elsevier, 1-8

263. Schröder, J.; Mattes, K. (2008). Posture analysis by means of pedobarography and videorasterstereography: bivariate and multiple correlation analysis. 13th Annual Congress of the European College of Sport Science (ECSS). Estorial, July 9-12, 192

270. Schröder, J. (2009). Posture Analysis: variations and reliability of biomechanical parameters in bipedal standing by means of formetric-system. Sport sciences: Nature, Nurture and Culture. 14th Annual Congress of the European College of Sport Science. Oslo/ Norway, June 24-27.

322. Willems, T. (2004). Intrinsic risk factors for sports injuries to the lower leg and ankle. University Gent, Department of rehabilitation science and physiotherapy

323. Segers, V. (2006). A biomechanical analysis of the realization of actual human gait transition. University Gent, Faculty of medicine and health science, Department of movement and sports science

324. Vereecke, E. (2006). The functional morphology and bipedal locomotion of hylobates lar. University Antwerpen, Faculty of biology

384. Willems, T. et al. (2004). A prospective study of gait related risk factors for exerciserelated lower leg pain. Gait and Posture. Elsevier

385. Willems, T. et al. (2005). Relationship between gait biomechanics and inversion sprains: a prospective study of risk factors. Gait and Posture. Elsevier

Muscle Strength Measurement (DIERS myoline):

264. Schröder, J.; Reer, R.; Braumann, K.; Mattes, K. (2008). Evaluation of evidence based training therapy in patients with non-specific back pain – variability of spine shape parameters and difficulties in short-term comparisons. J. Cabri, F. Alves, D. Araujo, J. Barreiros, J. Diniz, A. Veloso (Eds.). 13th Congress ECSS 09.-12. July 2008. Estoril, 440

Treatment Proposals (DIERS theraline):

271. Schröder, J.; Mattes, K. (2010). Spine shape changes following individualized exercise programs in back pain patients over 60 years of age. Congress abstract. ECSS, Antalya 2010

Clinical Cooperations:

Here is a selection of hospitals and universities, with whom we collaborate and maintain a scientific network to continuously develop our measuring systems and find new product solutions to accommodate your needs.

CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN

Universitätsklinikum Hamburg-Eppendorf

JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

FACHKLINIK BAD WIESSEE
Fachklinik für Orthopädie · Traumatologie Sportmedizin · Innere Medizin

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

HEINRICH HEINE UNIVERSITÄT DÜSSELDORF

Universität Hamburg

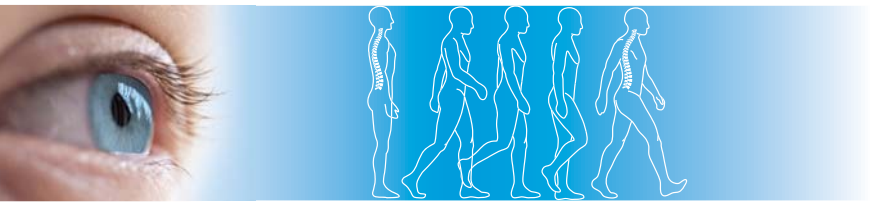
UKD Universitätsklinikum Düsseldorf

ASKLEPIOS
Katharina-Schroth-Klinik
Bad Sobernheim

Technische Universität München

Philipps Universität Marburg

DIERS supports the German Football Association (DFB - Deutscher Fußball-Bund) as well as some teams of the German Professional Football League (DFL - Deutsche Fußball Liga) and the European Football Leagues.



PRODUCT PORTFOLIO

Biomechanical solutions for the functional analysis of the musculoskeletal system in the static and the dynamic ...

3D/4D Spine & Posture Analysis:

DIERS statico 3D
Static Measurement

DIERS formetric 4D
Functional Measurement

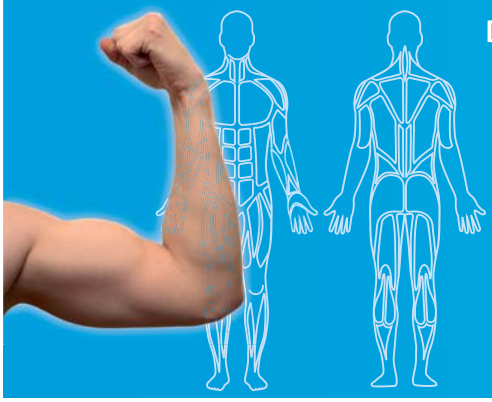
DIERS 4D motion®
Dynamic Measurement

Additional Components:

cervical spine

3D simulation platform

Muscle Strength Measurement:



DIERS myoline professional

Therapy Proposals

DIERS body balance

DIERS posture balance

DIERS foot balance

DIERS feetback

DIERS®
BIOMEDICAL SOLUTIONS

Foot & Gait Analysis

DIERS leg axis
(posterior)

DIERS leg axis
(lateral)

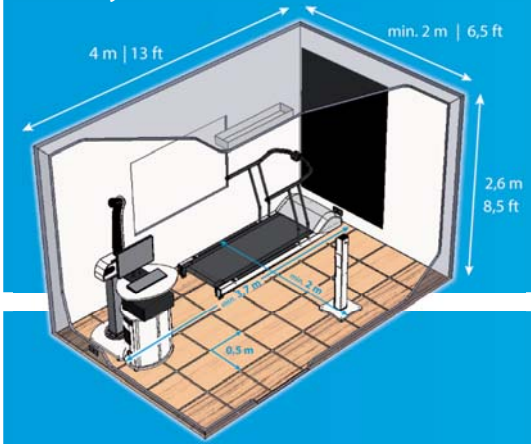
DIERS digiscan

DIERS pedoscan

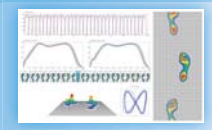
DIERS pedogait

Compact Motion Analysis:

Only 8 m²



DIERS *4D motion® Lab*



Components:

SERVICE

is a priority for us.

- ✓ Service & support by competent professionals (Engineers, sports-, computer scientists, i.a.)
- ✓ Technical planning assistance
- ✓ Professional installation with flexible scheduling
- ✓ Intensive product instruction by specialists
- ✓ Advanced training courses for medical assistants
- ✓ Annual user meetings to promote an intensive exchange of experience
- ✓ Immediate assistance via remote maintenance
- ✓ Regular maintenance of the systems according to the Medical Device Directive (MDD)

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