



## Analyzing gait with Qualisys

The Qualisys Gait Module is optimized for day-to-day use where data needs to be analyzed efficiently and consistently. It takes advantage of the Project Automation Framework (PAF), which provides data management, data collection, analysis and reporting – all from one interface within Qualisys Track Manager (QTM).

Enter and manage subject data directly in QTM, collect data swiftly following a pre-defined protocol, add gait events (automatically or manually), and run the analysis to get an immediate report, ready for you to add your interpretation and comments in Word.

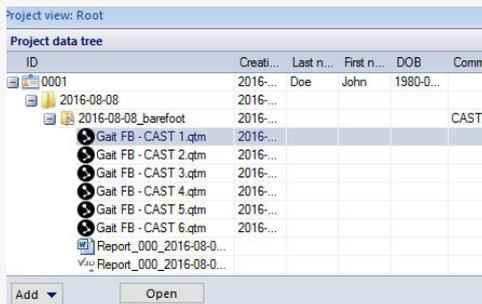
Pre-defined marker sets and models are included so that you can get started right away, but you can adjust marker sets, segment definitions and data processing as needed, building on the powerful features of the Visual3D software by C-motion.

### FEATURES

- Streamlined work flow
- Meta data management
- Automated report generation
- Word and HTML5 Report output
- Full QTM integration
- Not limited to a single marker set

### AVAILABLE MARKER SETS

- IOR
- CAST/6DOF
- Conventional Gait Model
- Option to add Oxford Foot Model to any of the above marker sets



The project view provides quick access to all files of a patient or subject.

Details for item 'Gait FB 1.qtm':	
Property	Value
Treadmill speed	0.00 m/s
ID	0001
First name	John
Last name	Doe
Height	1.87 m
Weight	79.0 kg
Comments	
Creation date	21/05/2013
Creation time	15:31
Walking direction	Auto detection

Easily edit and review meta data of patients. Fields can be inherited, copied or linked for maximized productivity.



Color coded buttons make it easy to track the progress of a session. When the required trials are captured, analysis is as simple as clicking the Analyze button.

## RESEARCH OR CLINICAL – WHICH GAIT MODULE SHOULD I USE?

If you are a research user, the module presented in this document is most suitable. If you are measuring on patients for the purpose of diagnosis, treatment assessments, or general monitoring, the best choice is the Qualisys Clinical System (Art. No. 150401). The Qualisys Clinical System (QCS) is a medical device with Class 1m CE marking. More information can be found in the separate QCS brochure.

## DATA MANAGEMENT

Personal data such as height, body mass and birth date, can be entered and changed directly in QTM. This data is stored in the motion capture files, so there is no need to keep and maintain external databases. All files are stored in a simple, transparent file hierarchy, making it easy and hassle-free to move the data across disks and computers.

Personal patient data is transferred directly into the Word report, avoiding mistakes and speeding up the report generation.

## DATA COLLECTION

During data collection, we want you to be able to focus on the subject instead of repetitive tasks such as file naming. That is why PAF offers you a list of pre-defined measurement names once you create a session, using an intuitive system of red and green buttons. Alternatively, press the Go button, step away from the computer and use a trigger push-button to start and stop data collection populating missing trials.

Measurements are labeled using pre-defined our Automatic Identification of Markers (AIM) method. The AIM includes all marker names and colors set and ready for your first data collection. If needed, automatic marker identification can be improved by applying your own files to the model.

## DATA ANALYSIS

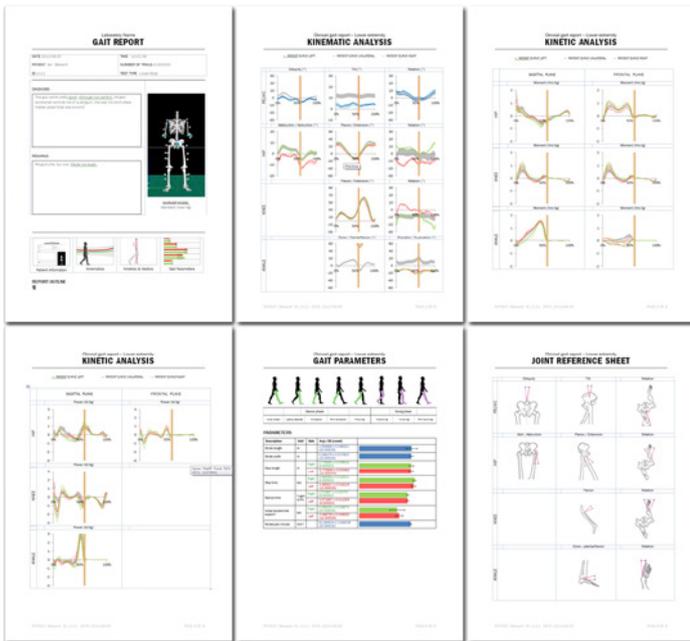
Simply click on the “Analyze” button and QTM exports the files, runs a script in Visual3D to process the data them, and imports results into a report template. There are several modes for automatic event detection including multiple force plates, single force plate and instrumented treadmill. You can also identify events manually or adjust the automatic events in Visual3D if needed.

## MARKER SETS

We understand that there is not a single marker set that fits the specific needs and preferences of all gait labs. That is why the Gait Module supports three different marker sets, all of which have a proven record of being used in well-established gait labs.

Regardless of which marker set you choose, we include a specific marker guide with references to a palpation manual<sup>[1]</sup> and pre-defined label lists for quick marker identification.

Note that the module is not limited to a fixed implementation of these models – segment definitions can be adapted using Visual3D if required. Simply save a new model template and use it for your analysis.



Example of a Word report, populated with kinematic & kinetic results

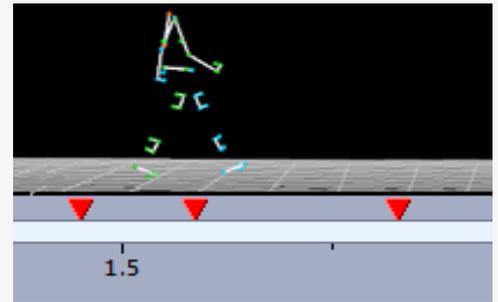
## REPORTS

The Gait Module comes with a template ready for creating reports in Microsoft Word. The template is like any other Word document except that it has special fields that get populated with plots and data when run through PAF.

By utilizing Word, changes and finishing touches become as simple as editing any other Word document. You can either make changes to the template itself or the resulting document. Since the template is just another Word document, you can change the template directly in Word.

Alternatively, generate an interactive HTML5 report that includes curves, metrics, 3D animation and video, all in a single report.

All reports are prepared to show your own normative data as shaded areas in the background.

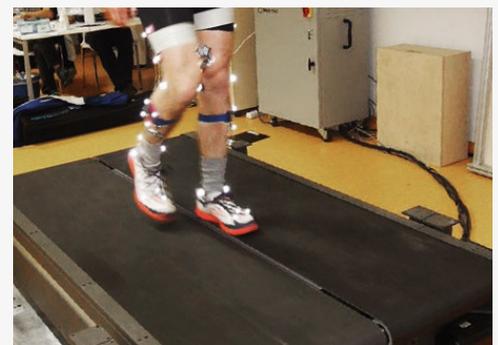


The Gait Module supports adding events through different event modes including manual, one force plate and multiple force plates.

The automatic events are created in the analysis step using Visual3D's event creation algorithm.



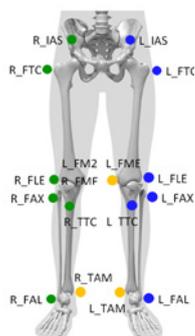
Qualisys Track Manager and the Gait Modules are fully integrated with Noraxon DTS and Delsys Trigno, EMG, making it easy to synchronize motion capture data with EMG data.



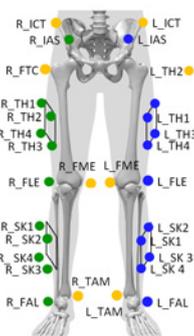
Instrumented treadmills are seamlessly integrated into the Gait Module.

## INTEGRATIONS

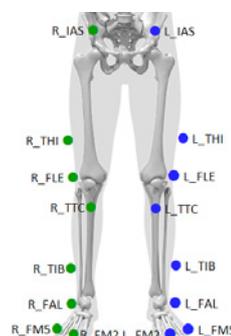
Data from all major force plate and EMG systems can be collected easily with our QTM software. You can even set up the Noraxon DTS and Delsys Trigno EMG system directly from QTM. The EMG data is automatically processed with customizable filters, time-normalized using gait events and included in the PAF reports.



IOR<sup>1</sup>



CAST<sup>1</sup>



Conventional Gait Model<sup>1</sup>

<sup>1</sup>Not all markers are shown in the pictures

## AVAILABLE MODELS

Name	Lower body markers	Upper body markers	Comments	Report	Ref
Leardini	Static only: 6 Dynamic: 20	20	Similar to CAST but no clusters. Hip joint centers are used to track thighs with less markers. Same foot definition as in CAST.	Word, HTML	[2], [3]
CAST (6DOF)	Static only: 8 Dynamic: 28 (including 4 clusters)	16	Uses clusters for tracking of thighs & shanks.	Word, HTML	[4]
Conventional Gait Model	Static & Dynamic: 20 (all on skin)	23	Also known as modified Helen Hayes model	Word, HTML	[5]

## REFERENCES

- [1] Sint Jan, S. Van (2007). *Color Atlas of Skeletal Landmark Definitions. Guidelines for Reproducible Manual and Virtual Palpations.* Edinburgh: Churchill Livingstone.
- [2] Leardini, A., Sawacha, Z., Paolini, G., Ingrosso, S., Nativo, R., & Benedetti, M.G. (2007). A new anatomically based protocol for gait analysis in children. *Gait & Posture*, 26, 560-571. doi: 10.1016/j.gaitpost.2006.12.018
- [3] Leardini, A., Biagi, F., Merlo, A., Belvedere, C., & Benedetti, M.G. (2011). Multi-segment trunk kinematics during locomotion and elementary exercises. *Clinical Biomechanics*, 26, 562-571. doi: 10.1016/j.clinbiomech.2011.01.015
- [4] Cappozzo, A., Catani, F., Della Croce, U., Leardini, A. (1995). Position and orientation in space of bones during movement: anatomical frame definition and determination. *Clinical Biomechanics*, 10, 171-178
- [5] Original version: Kadaba, M.P., Ramakrishnan, H.K. & Wooten, M.E. (1990). Lower extremity kinematics during level walking. *Journal of Orthopaedic Research*, 8, 849-860.