



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

Optojump Presentation and Demonstration 11 January 2018



OPTO JUMP next



DISCOVER
YOUR POTENTIAL

WWW.OPTOJUMP.COM

CIT Course Considerations?



First Year

Anatomy &
Physiology

Fundamental
Movement Skills

Gym Instruction

Coaching Children in
Sport

Second Year

Fitness Industry
Trends

Coaching
Adolescents in
Sport

Applied Exercise
Physiology

Athletic
Performance &
Testing

Adapted Physical
Activity

Third Year

Research
Methods in
Sports Science

Coaching in Elite
Sport

Personal Training

High
Performance

Sports
Management

Fourth Year

Sports
Performance
Analysis

High
Performance
Conditioning

Physical Activity
and Children

Physical Activity
and the Older
Adult

Attributes:

- Powerful
- Fast
- Simple
- Versatile
- Accurate

Features:

- Position
- Timing
- Speed
- Gait
- Power
- Reaction
- Audio
- Visual

Uses:

(c.f. CIT agenda)

- S&C
- Clinical
- Education
- Physiology
- Biomechanics
- Neural
- Psychology
- Rehab

Appeal to Authority??? (U.L)

Intro 2009...

1st 1 meter system 2011...

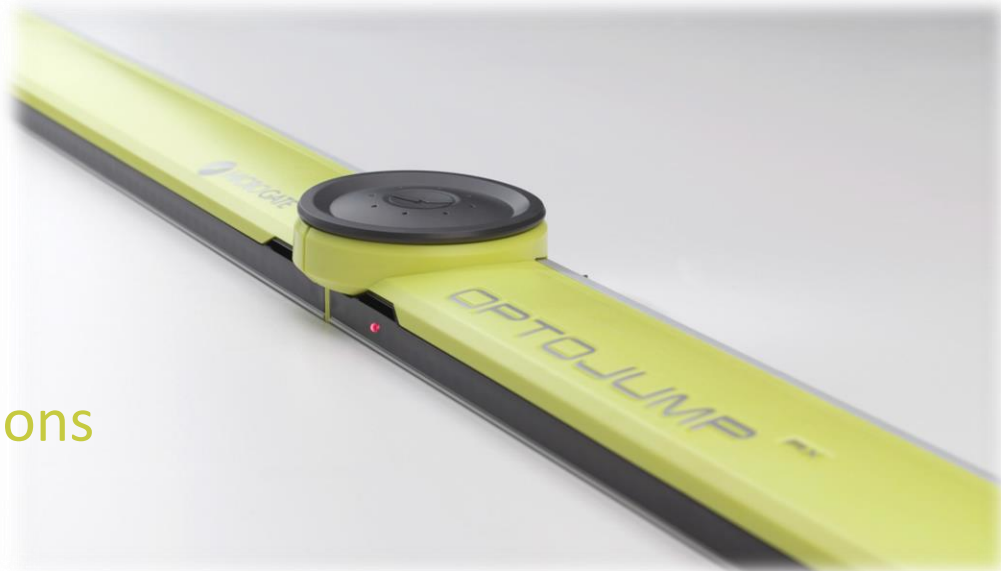
now full lab runs hot...

Dec 2017 quote for 20m...



What is OptoJump NEXT

- PERFORMANCE ANALYSIS system
 - Vertical Jumps
 - Run Analysis (in field and treadmill)
 - Dynamic control (Drift Protocol)
- TRAINING System
 - Biofeedback
 - Real Time Feedback
- System for
 - Dynamic proprioception
 - Coordination
 - Simple & Complex Reactions



Field of Applications

- Sport Performance Analysis
- Training Support
- Biomechanical Analysis
- Return to play
- Sport Orthotics



Introduction (video 0:43 – 6:18)



Questions?

How does it work ?

OptoJump works with 2 bars that emit/receive invisible LED light beams with a grid resolution of 1 cm. Each foot step interrupts the light transmission and is detected at an accuracy of 1 ms.



How does it work ?

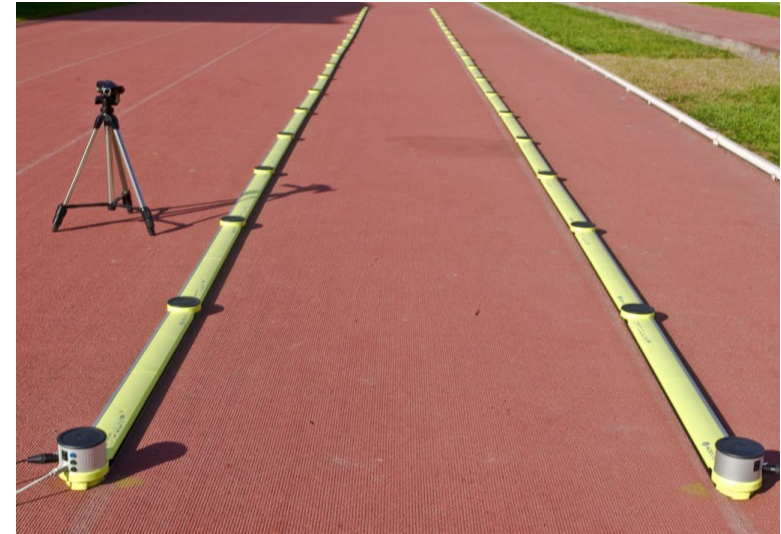
The OptoJump system works contact free, accurate (1000 Hz sampling rate), is immediately ready to go and will not wear out due to mechanical stress.



Four macro-configurations



Single Meter



Modular System



Two-dimensional System



On Treadmill

Checking the hardware or changing settings: (Utility function)

– Video (0:45 – 2:12)



- One CIT staff member demonstrates the **Utility function** using the CIT Optojump

Application Values

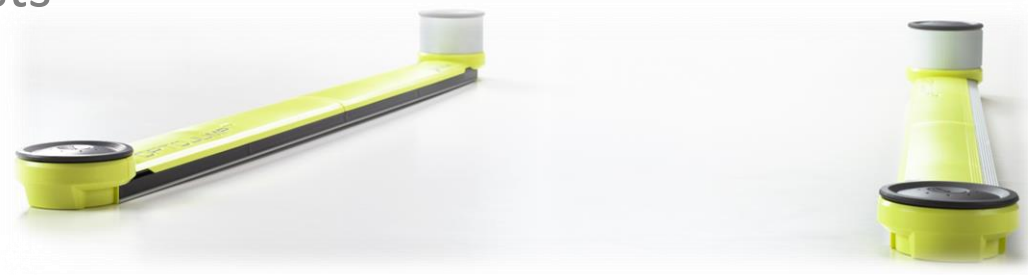
- Super simple setup, fast and easy and to use
- Can be used for natural floor running/sprinting, treadmill running, jumps, march in place, etc.
- OptoJump allows you to instrument your already existing treadmill
- Low space solution for run analysis using a treadmill
- Portable and battery driven for mobile use



- Easiness is the main feature:
 - easy setup (plug n play)
 - easy test execution (it takes a few seconds/minutes)
 - easy results track
 - **Step to Step Data**
 - **Asymmetry** (between right and left leg)
 - **Variability** (CV, Coefficient of Variability)
 - **Coordination** (PCI, phase coordination index)

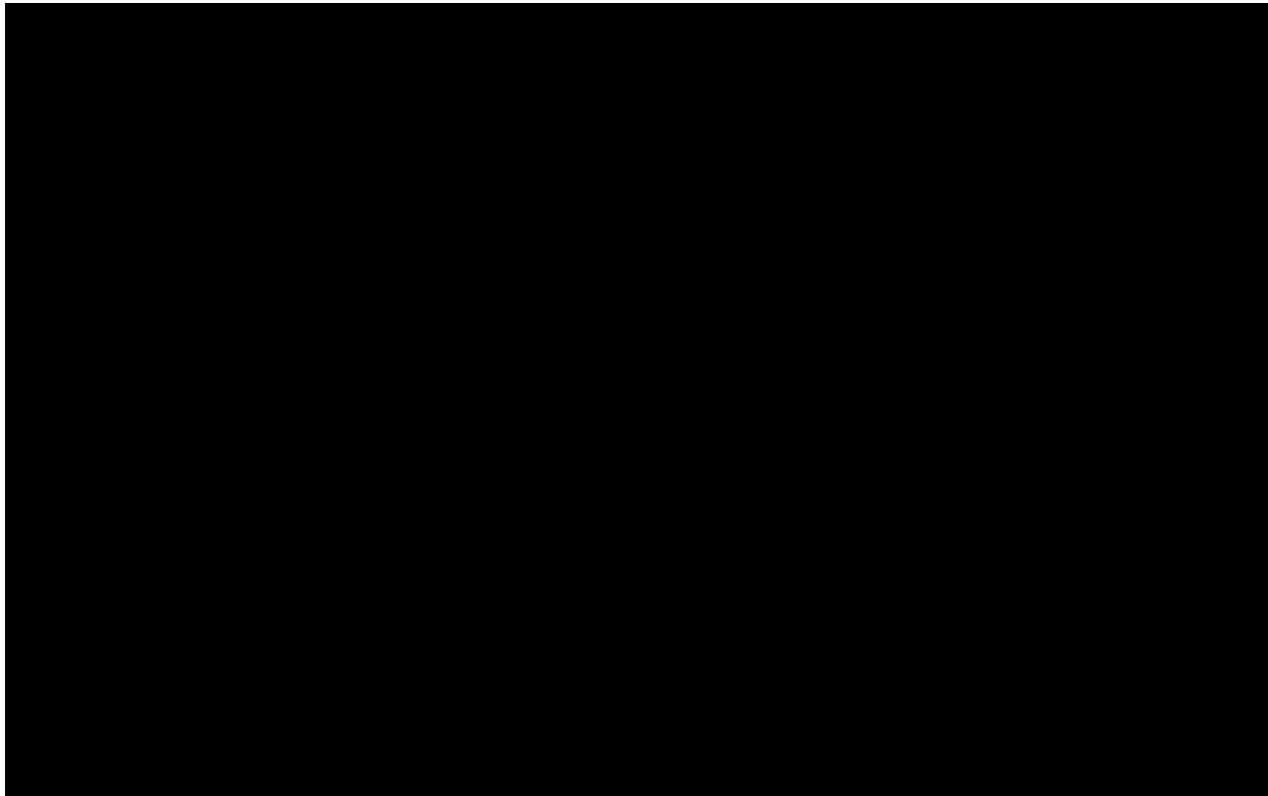
The single meter

- Pull it out from the bag, put it on the floor, power on: ready to go!
- Vertical jumps test, power, reactivity
- SJ, CMJ, Stiffness, dropjump, vertec
 - 5 Dot Drill, Tapping
- Proprioceptive evaluation test, coordination, control
 - March in place (open/closed eyes)
 - Stand on one leg
 - Drift Protocol
- Visual/Acoustic reaction tests



Various tests displayed quickly

- Test case Video (all)



Questions?

The modular system



- It allows Gait/Run analysis on the floor or on the ground (any flat surface)
- The length goes from a minimum of 2 meters to a maximum of more than 100 meters. (battery power supply till 5 meters)
- Maximum width 6 meters
- Practical and innovative assembling system using caps (plug n play)
- It does not require cables to connect the bars



Easy setup



2D System

- It is a modular system. The instrumented area goes from a minimum of 1 x 1 meter up to a maximum of 4 x 1 meters (or 2x2)
- Automatic identification of
 - the starting foot (right and left)
 - the center of gravity of footprints in the two dimensions (march in place, jumps, drift protocol)



The system on treadmill



- It can be positioned on the side bars of any treadmill
- A portable lab for Gait/Run Analysis for small spaces
- Foot Length Input and treadmill speed auto-check



Video Feedback

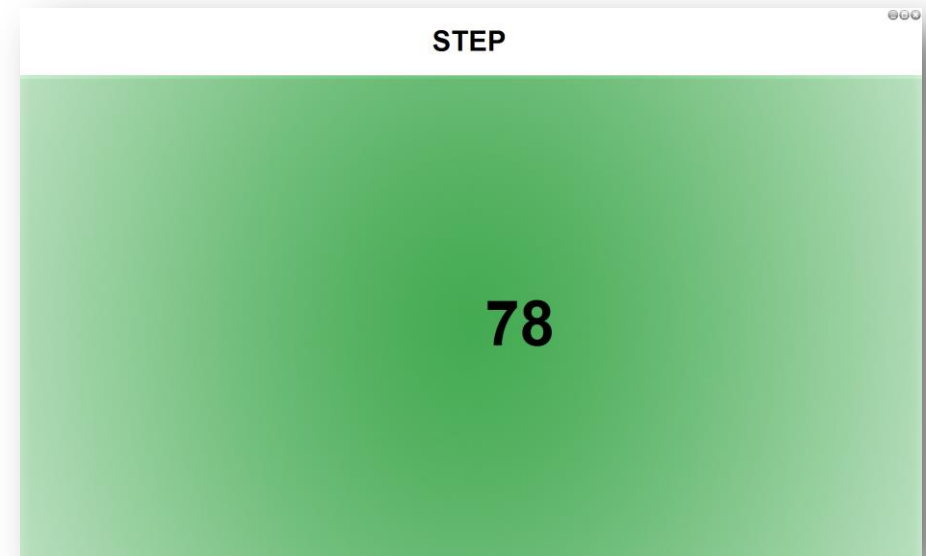
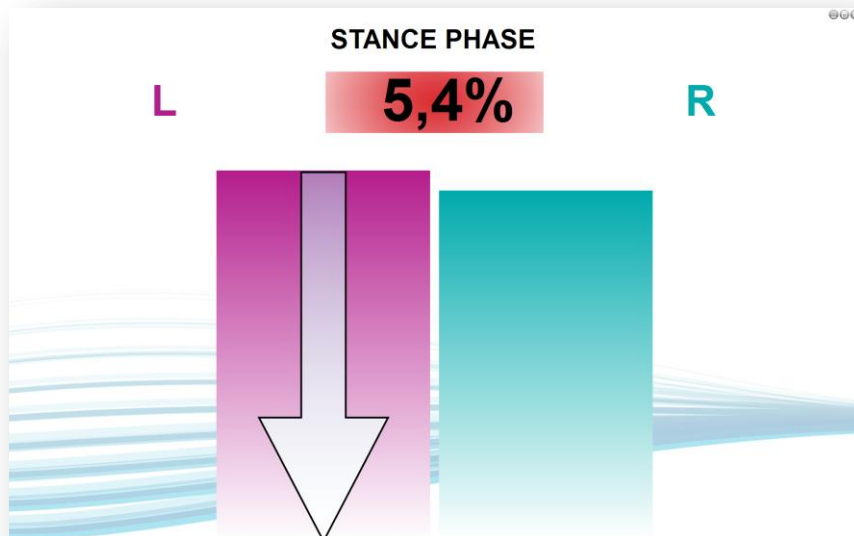
It allows to show the athlete/the therapist some parameters in real time during the test and to correct the performance according to the video feedback



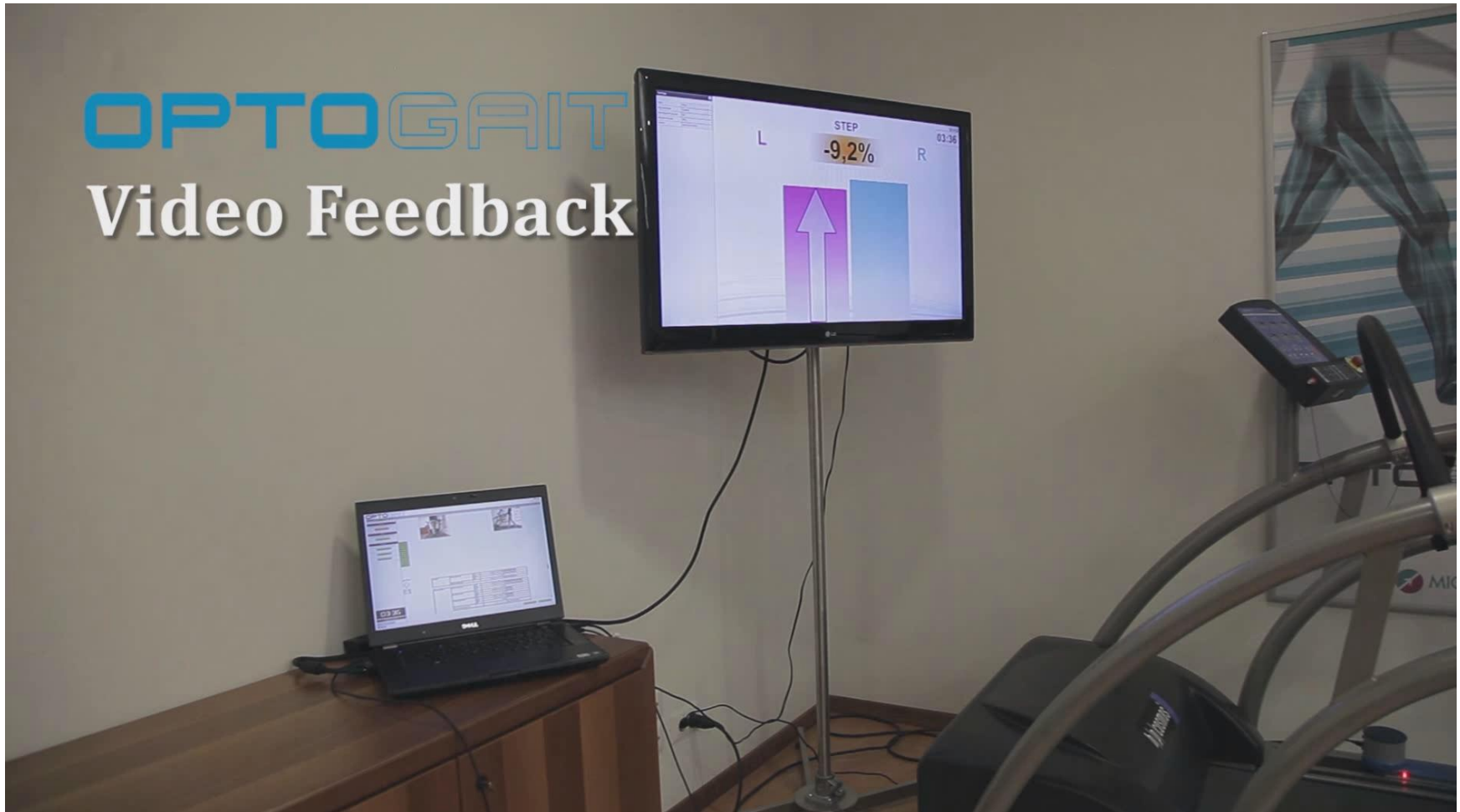
Mode	Asymmetry ▾
Type	Stance phase ▾
Data window	5 DATA ▾
Warning threshold	2% ▾
Bad threshold	5% ▾
Trend	Decrease high ▾
Visualization Second Monitor	Normal ▾

Video Feedback

- You can visualize in real time
 - **Asymmetry Delta Values** of some measures or phases (stance, swing, step, etc.)
 - **Absolute Values** of some measures (step length, speed, height, contact/flight times) compared to a reference value
- You can set a “warning threshold” (yellow) and a “bad threshold” (red)

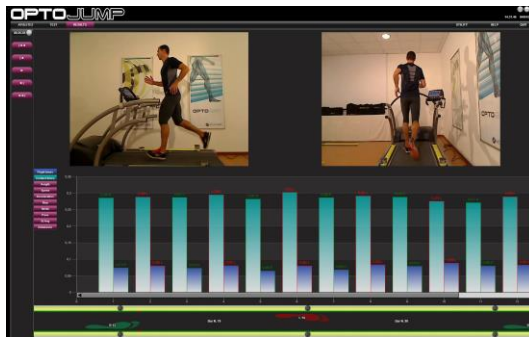


Video Feedback Sample

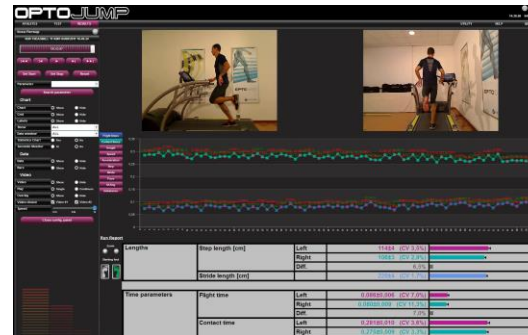


Immediate Use & Quick Result

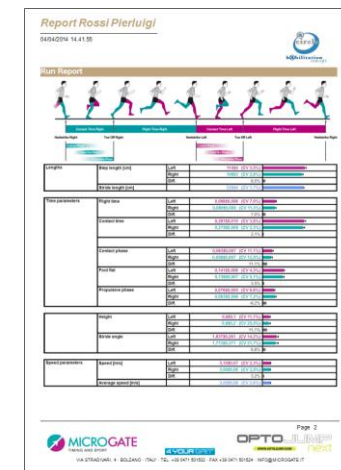
- No preparation or setup time is needed
- No consumables!
- Data acquisition and analysis runs nearly automatic.
- Time from test to analysis < 3 to 5 minutes



1. TEST



2. ANALYSIS



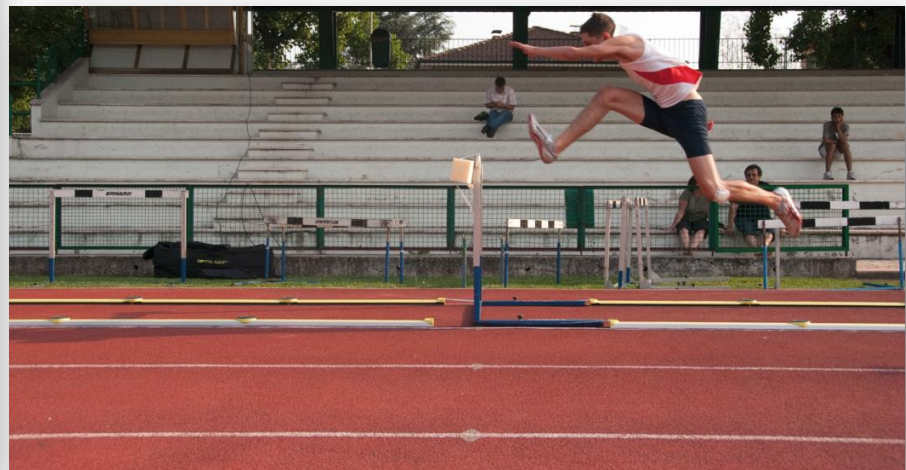
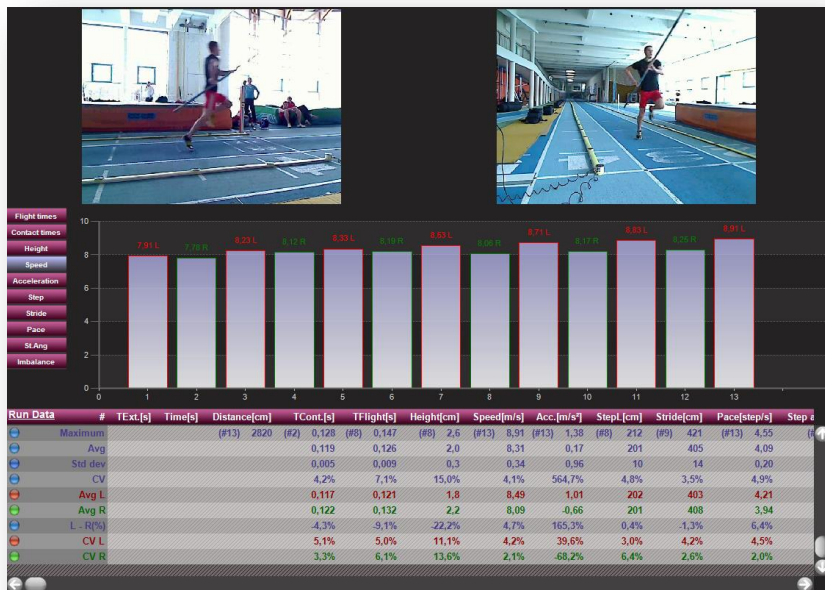
3. PRINT REPORT

Vertical Jumps

- Continuous Jumps (15s, 30s, 60s)
- Squat Jumps (normal/single leg)
- CMJ (Counter Movement Jump; normal/free arms)
- Stiffness (normal/free arms)
- Drop Jump
- Vertec Like Test



- In its modular configuration (from 5 up to 100 mt.), OptoJump Next makes it possible to analyze a sprint/run
- Step/Stride lengths, speed, acceleration/deceleration, pace
- Differentiated left and right foot data (eg. which leg push more?)
- Also suitable for hurdling, long/triple jump, pole vault, etc.



The Run Report

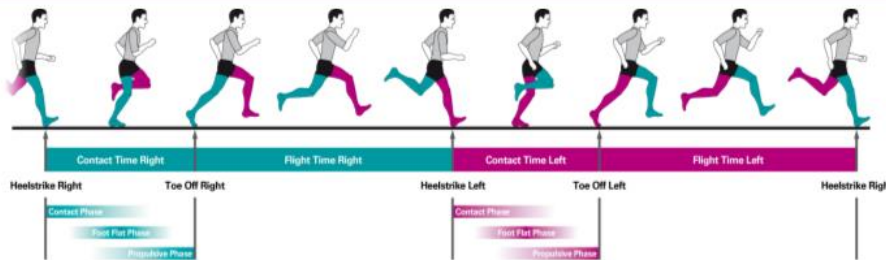
For the run test you'll get a Run Report with the space/time and speed parameters.




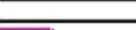
Report Smith John

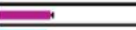





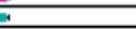
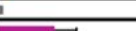
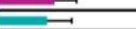
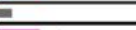

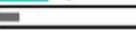


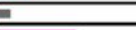
13/02/2013 09:32:32









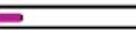



Run Report



Lengths	Step length [cm]	Left	11023 (CV 2,3%)	
		Right	10522 (CV 1,4%)	
		Diff.	4,4%	
	Stride length [cm]		21523 (CV 1,3%)	

Time parameters	Flight time	Left	0,1162±0,005 (CV 4,3%)	
		Right	0,109±0,005 (CV 4,6%)	
		Diff.	6,0%	
	Contact time	Left	0,238±0,004 (CV 1,7%)	
		Right	0,240±0,006 (CV 2,5%)	
		Diff.	-0,8%	
	Contact phase	Left	0,021±0,005 (CV 23,8%)	
		Right	0,020±0,005 (CV 25,0%)	
		Diff.	4,8%	
	Foot flat	Left	0,125±0,048 (CV 38,4%)	
		Right	0,109±0,053 (CV 48,6%)	
		Diff.	12,8%	
	Propulsive phase	Left	0,093±0,043 (CV 46,2%)	
		Right	0,111±0,046 (CV 41,4%)	
		Diff.	-19,4%	

	Height	Left	1,72±0,1 (CV 5,9%)	
		Right	1,52±0,1 (CV 6,7%)	
		Diff.	11,8%	
	Stride angle	Left	3,457±0,293 (CV 8,5%)	
		Right	3,194±0,287 (CV 9,0%)	
		Diff.	7,6%	

Speed parameters	Speed [m/s]	Left	3,10±0,06 (CV 1,9%)	
		Right	3,01±0,05 (CV 1,7%)	
		Diff.	2,9%	
	Average speed [m/s]		3,05±0,07 (CV 2,3%)	

- Step lenght
- Stride lenght
- Flight Time
- Contact Time
- Height
- Speed
- Acceleration
- Foot contact phases (Contact, Foot flat, Propulsive)
- Average, minimum, maximum, std. Deviation, CV

Setting up a Subject(s)

- Video (2:14 – 3:40)



- One CIT staff member demonstrates the **Subject/Athlete setup** function using the CIT Optojump

- Neuromuscular activation patterns with:
 - **March in Place** -> Base movement
 - **Drift Protocol** -> Power
 - **Load & Explode** -> Eccentric/concentric
 - **Gait** (dual task)
- **Open/closed eyes** test (visual feedback removal)

Drift Protocol

The Drift Protocol is a test developed for verifying an athlete's or a patient's **'dynamic stability'** by having him/her carry out 5 + 5 one-leg jumps measuring his/her displacement (drift) on the vertical and horizontal axis.



Report Rossi Pierluigi

12/02/2013 16:44:43



DRIFT PROTOCOL 04/08/2011 15:45:24

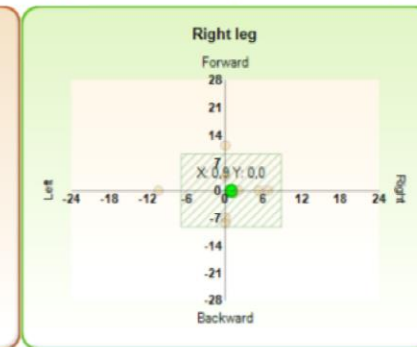
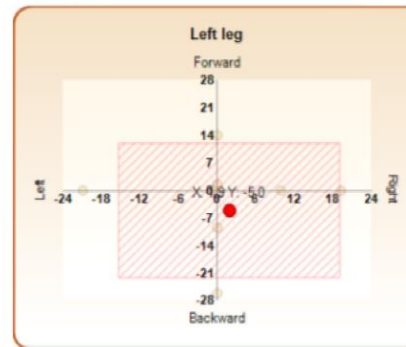
Patient data

Patient

Last name:	Rossi	First name:	Pierluigi
Birth date:	13/11/1977	Gender:	M
Weight [Kg]:	68,0	Height:	178
Foot size:	43		

Drift Protocol

	L	R	Delta%
Average height [cm]	27,1	27,0	0,5%
Average power[W/Kg]	26,91	26,99	-0,3%
Average contact time[s]	0,340	0,345	-1,6%
Average flight time[s]	0,470	0,468	0,3%
Average LEFT/RIGHT drift[cm]	1,9	0,9	53,8%
Average FRONT/BACK drift[cm]	-5,0	0,0	100,0%
Standard deviation LEFT/RIGHT drift[cm]	17,2	7,8	54,9%
Standard deviation FRONT/BACK drift[cm]	17,1	9,3	45,4%
Surface[cm ²]	1176,8	289,6	75,4%



March in Place Protocol (MIP)

- The MIP protocol consists of two tests in which the patient must march on the spot for 30 seconds, the first time with his/her eyes open and the second with his/her eyes closed.
- Using a two-dimensional system, the report will provide information relating to both forward-backward and middle-side movement for the two tests

MIP 12/03/2014 11.31.13

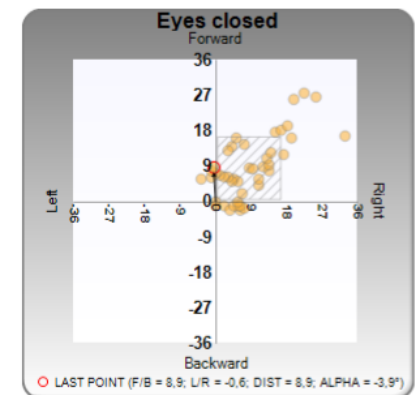
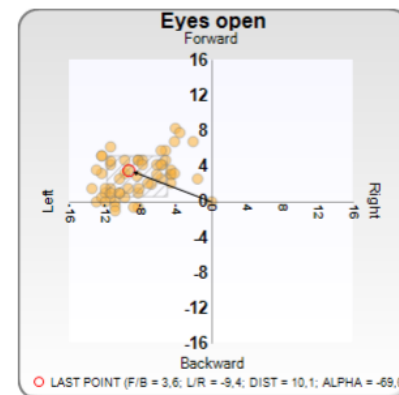
Patient data

Patient

Last name: Doe First name: John
Gender: M

MIP

	Eyes open	Eyes closed	Delta%
Average contact time[s]	0,721	0,895	-24,1%
Average flight time[s]	0,356	0,527	-48,1%
Asymmetry contact time[%]	2,5	-11,0	13,5%
Asymmetry flight time[%]	-6,7	33,5	-40,2%
CV contact time[%]	5,5	92,5	-87,0%
CV flight time[%]	9,3	139,1	-129,8%



Customizable Report System



A report configuration systems allows for individual adjustments, parameter selection, integration of institute logo, export of all data to PDF, Excel, Word, HTML

OPTOJUMP

ATHLETES TEST RESULTS

Data

- ☐ Show
- ☐ Hide

Test data

- ☐ Show
- ☐ Hide

Test data detailed

- ☐ Show
- ☐ Hide

Page

- ☐ Run Data
- ☐ Run Report

Charts

Flight times

- ☐ Show
- ☐ Hide

Contact times

- ☐ Show
- ☐ Hide

Height

- ☐ Show
- ☐ Hide

Speed

- ☐ Show
- ☐ Hide

Acceleration

- ☐ Show
- ☐ Hide

Step

- ☐ Show
- ☐ Hide

Stride

- ☐ Show
- ☐ Hide

Pace

- ☐ Show
- ☐ Hide

StAng

- ☐ Show
- ☐ Hide

Imbalance

- ☐ Show
- ☐ Hide

Apply

Images

Change logo

Change footer

Back

Apply

Print

Export


Search

Zoom

Main Report

Report Rossi Pierluigi

04/04/2014 16.55.28


habilitation concept

RUN TREADMILL 11 KMH 04/08/2011 16.49.34

Data

Athlete

Last name: Rossi

First name: Pierluigi

Birth date: 13/11/1977

Gender: M

Weight [Kg]: 68,0

Height: 178

Foot size: 43

Sport: Athletics

Discipline: Long jump

Test data

Athlete's weight [Kg]: 68,0

Time effective: 00:32.83

Total time: 00:53.66

Specific energy [J/Kg]: 6,946

Total energy [J]: 472,315

Step length calculation: Heel to heel

Minimum gap between feet [cm]: 20

Minimum foot length [cm]: 10

Treadmill speed [Km/h]: 11,000

Filter GaitR. In [Led]: 0

Filter GaitR. Out [Led]: 0

Test Data

#	Test	Time	Distance	Tcount	Flight	Height	Speed	Acc.	Encl.	Stride	Pace
		"	"	"	"	"	"	"	"	"	"
	Minimum	(#61) 0.266	(#61) 0.000	(#61) 0.000	(#61) 0.0	(#61) 0.00	(#61) 0.00	(#61) 0.00	(#61) 0.00	(#61) 0.00	(#61) 0.00
	Maximum	(#61) 0.300	(#61) 0.000	(#61) 0.000	(#61) 0.0	(#61) 0.00	(#61) 0.00	(#61) 0.00	(#61) 0.00	(#61) 0.00	(#61) 0.00
	Avg	0.279	0.000	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
	Std dev	0.010	0.000	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
	CV	3.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Avg L	0.281	0.000	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
	Avg R	0.276	0.000	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00
	L - RMS	2.1%	7.0%	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	CV L	0.8%	7.0%	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	CV R	0.8%	0.0%	11.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

#	Step angle	Imp.	Contact phase	%	Foot flat	%	Propulsive phase	%	POI
	"	"	"	"	"	"	"	"	"
	Minimum	(#61) 1.100	(#61) 0.000	(#61) 0.00	(#61) 0.10	(#61) 0.00	(#61) 0.00	(#61) 0.00	(#61) 0.00
	Maximum	(#61) 2.880	(#61) 0.780	(#61) 0.00	(#61) 0.10	(#61) 0.00	(#61) 0.00	(#61) 0.00	(#61) 0.00
	Avg	1.774	2.022	0.00	21.0	0.00	0.00	0.00	0.00
	Std dev	0.220	0.000	0.00	2.0	0.00	0.00	0.00	0.00
	CV	12.4%	0.0%	0.0%	9.5%	0.0%	0.0%	0.0%	0.0%
	Avg L	1.827	2.022	0.00	22.4	0.00	0.00	0.00	0.00
	Avg R	1.740	2.022	0.00	20.0	0.00	0.00	0.00	0.00
	L - RMS	8.2%	0.0%	0.0%	11.1%	0.0%	0.0%	0.0%	0.0%
	CV L	14.3%	0.0%	0.0%	11.1%	0.0%	0.0%	0.0%	0.0%
	CV R	11.7%	0.0%	0.0%	10.0%	0.0%	0.0%	0.0%	0.0%

Page 1

Current Page No.: 1

Total Page No.: 1+

Zoom Factor: 100%

Integrated Two Camera Video Analysis



Each OptoJump System can be equipped with up to 2 USB cameras (max 1920x1080, 30fps), stands, and software for 2D video analysis.



High Speed Cameras

- Beyond Logitech webcams, OptoJump is compliant to those USB 3.0 Hi-Speed Cameras:
 - Ximea Mq013CG (1280 × 1024 pixels, 120 fps)
 - Basler acA640 (658 x 492 pixels, 120 fps)
- Lens Mount
 - C or CS-mount



Run Video Sample



OPTOJUMP

ATHLETES

TEST

RESULTS

Tejeda Anai

HURDLES WOMEN START 24/06/2009 12:36:25

00.21.01

Set Start

Set Stop

Reset

Parameter: Last T.Step

Search parameter

Chart

Chart

Grid

Labels

Show

Data window

Statistics Chart

Secondo Monitor

Data

Bars

Video

Play

Overlay

Video choice

Speed

Close config. panel

Flight times

Contact times

Height

Speed

Acceleration

Step

Stride

Pace

St.Ang

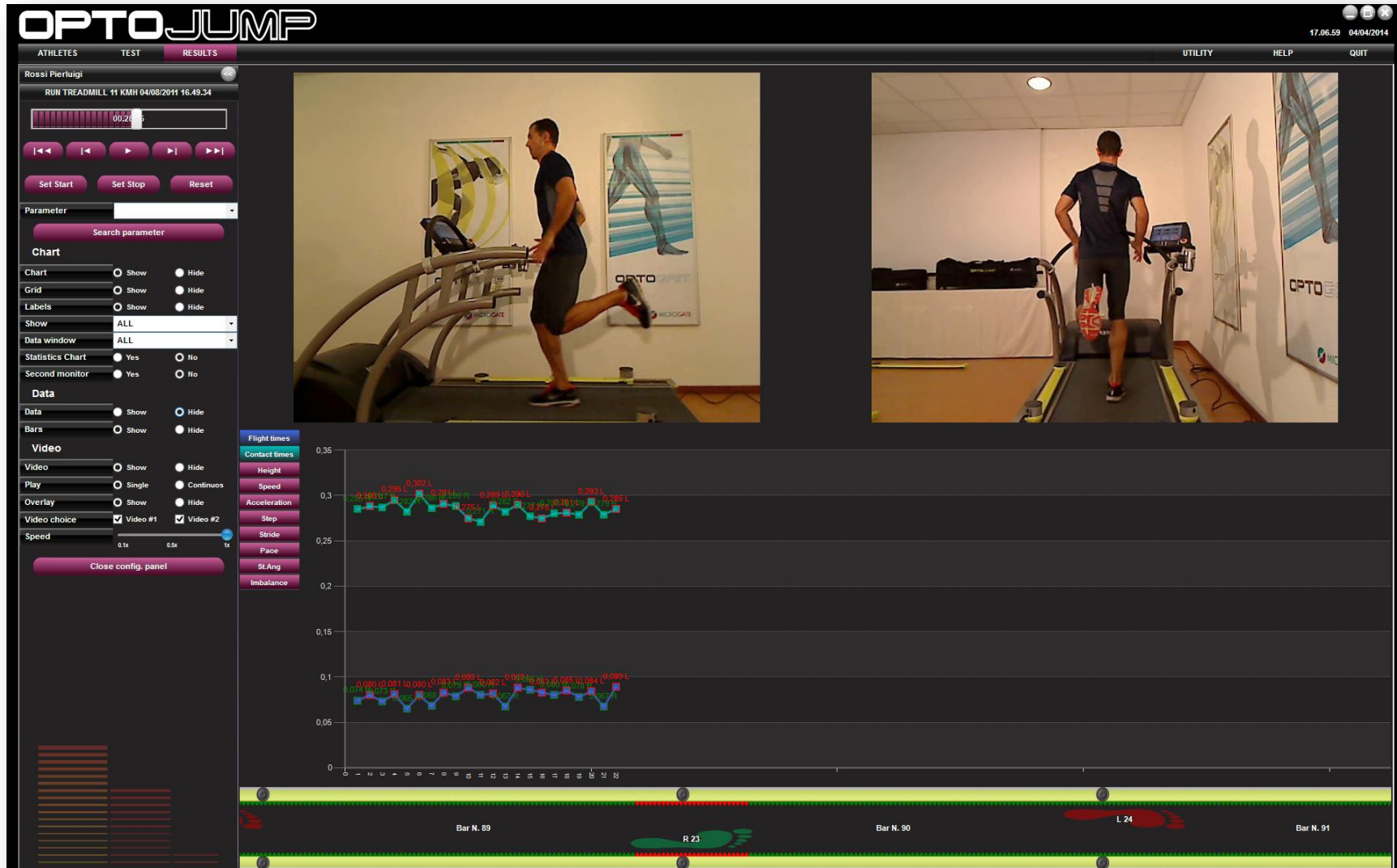
Imbalance

Run Data

#	TExt.[s]	Time[s]	Distance[cm]	TCont.[s]	TFlight[s]	Height[cm]	Speed[m/s]	Acc.[m/s²]	StepL[cm]	Stride[cm]	Pace[step/s]	Step angle[deg]	Imb.[°]	Double sup.[s]	Step times[s]	Contact phase[s]
Minimum																
Maximum																
Avg																
Std dev																
CV																
Avg L																
Avg R																
L - R(%)																
CV L																
CV R																

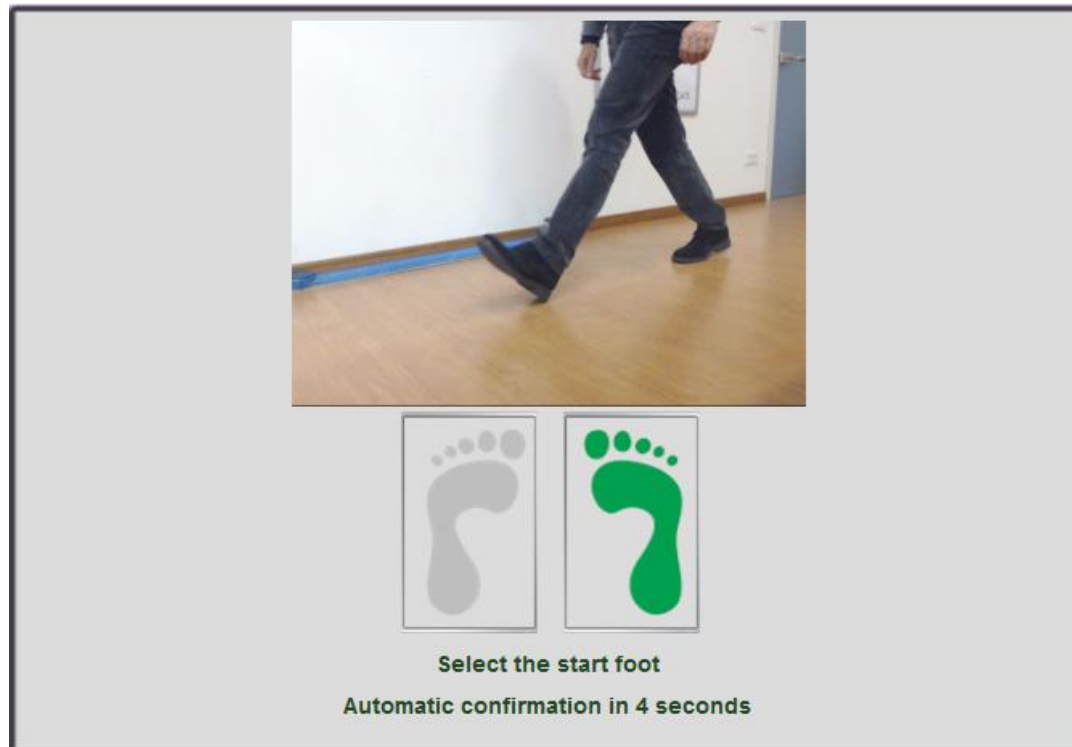
Synchro Data & Video

The videos are time synchronized to data and recorded within each measurement.
Video and data can be replayed for visual inspection at any time



Video popup: First Step Preview

The video helps the user to choose some parameters (for example: starting foot)



Setting up a Test(s)

- Video (3:40 – 6:20)

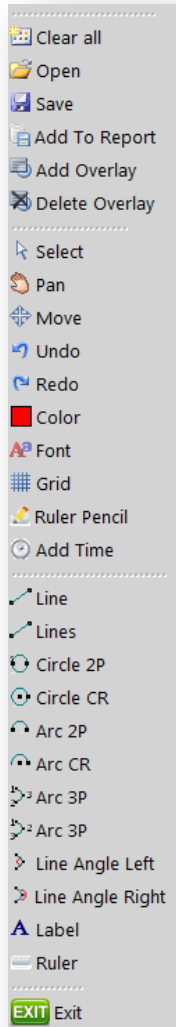


- One CIT staff member demonstrates the **Tests** Function using the CIT Optojump

- Have a look at the large number of tests already to go.
- Run through some of the test menu and collect data.

Video Drawing Tools

At any video position 2D angles can be drawn, text comments can be entered, individual pictures can be marked for report



Still Frame Images

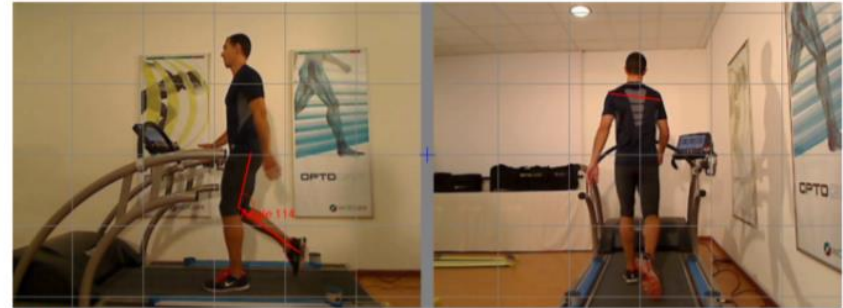
- Images can be saved in standard formats or can be integrated in the Print Report
- You can get:
 - Left-right side comparison
 - Test/Re-test comparison
 - Comparison of different gait/run phases

Report Smith John

13/02/2013 10:20:30



Immagine



Caption
Some notes...

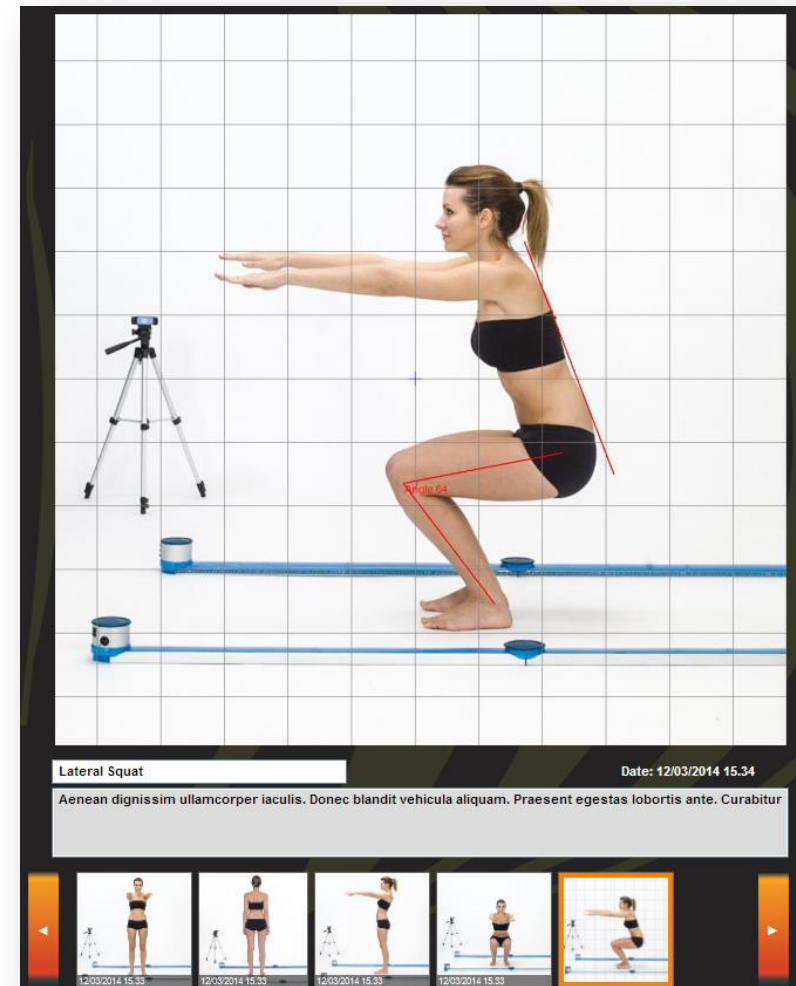
Note e commenti



Titolo immagine

Media Gallery

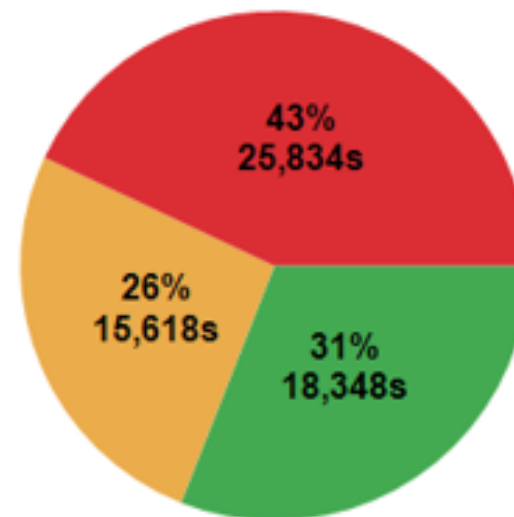
- Archive images and videos of postural situations without needing to carry out a test with the bars.
- Take photographs, record videos and capture stills, making the patient assume various poses which are useful for evaluating his/her anthropometric measurements, posture or pathologies.
- The photos or still images can be processed with editing tools



- Pie chart depicting *the division of time elapsed between specific thresholds* defined previously.
- With side panel we set which value is to be taken into consideration (Stance, Swing, Step Length, Jump Height, etc.) and which “*warning threshold*” (yellow) and “*bad threshold*” (red) values are to be set.
- Like Video Feedback, we can work with **Asymmetry** or with **Absolute Values**

Mode	Asymmetry	▼
Type	Step	▼
Data window	5 DATA	▼
Warning threshold	5%	▼
Bad threshold	10%	▼

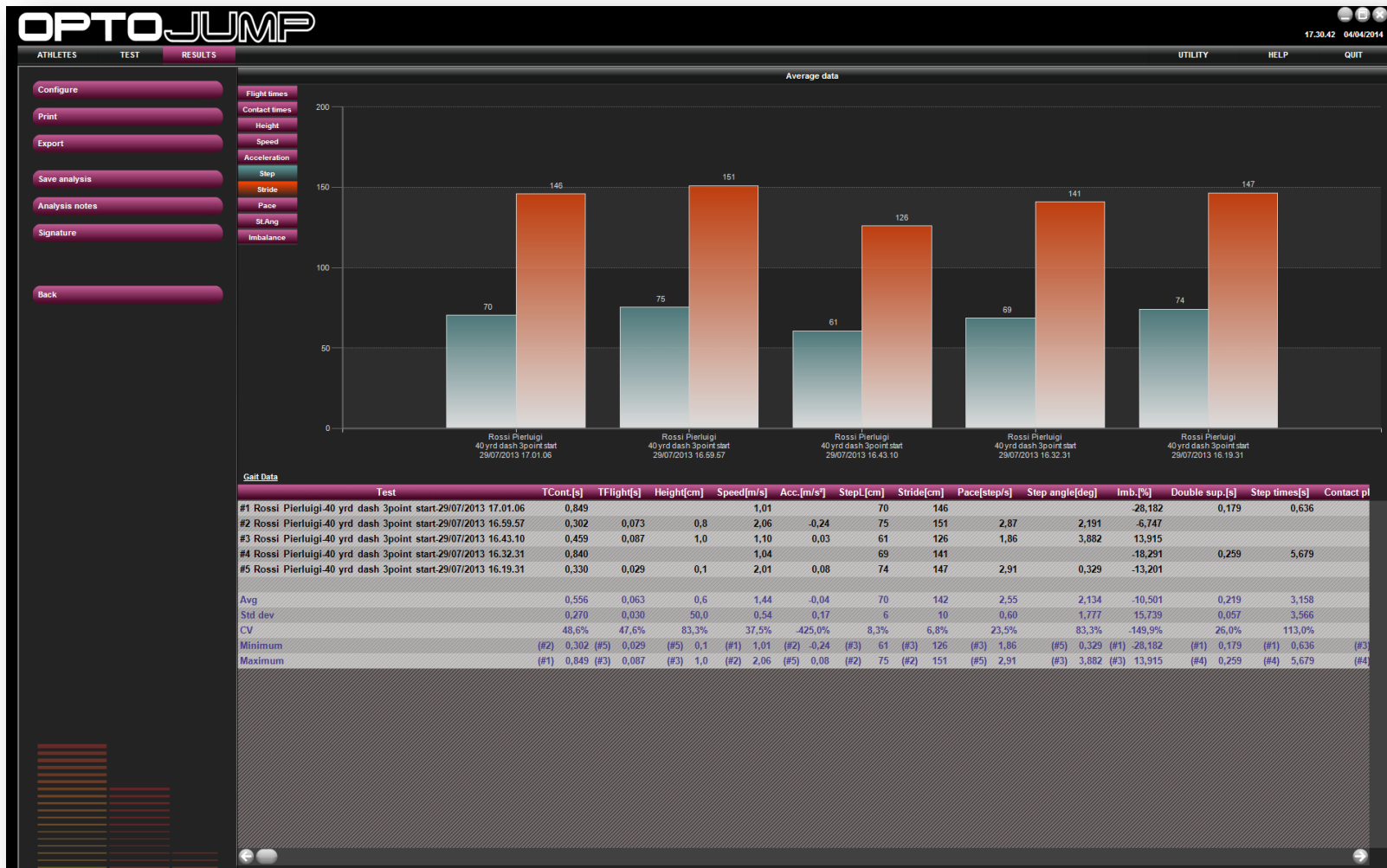
Mode	Absolute Value	▼
Type	Height	▼
Data window	5 DATA	▼
Reference value	30	▼
Warning threshold	10%	▼
Bad threshold	20%	▼



Trend/History Analysis of Data



The powerful database systems allows selection and analysis of test series over time to analyze the progress of certain performance relevant parameters.



Managing results (in brief)

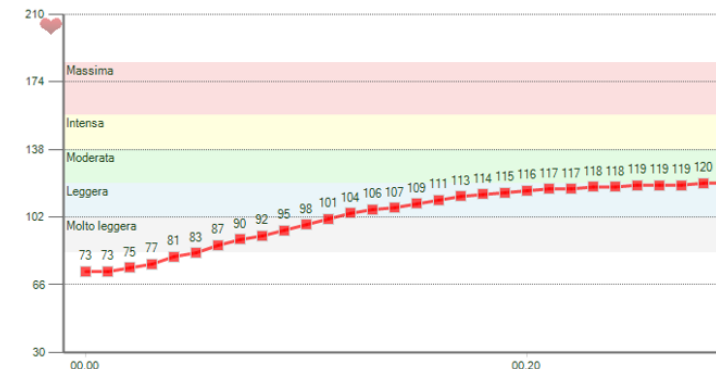
- Video (6:20 – end)



- One CIT staff member demonstrates the **Results** function using the CIT Optojump

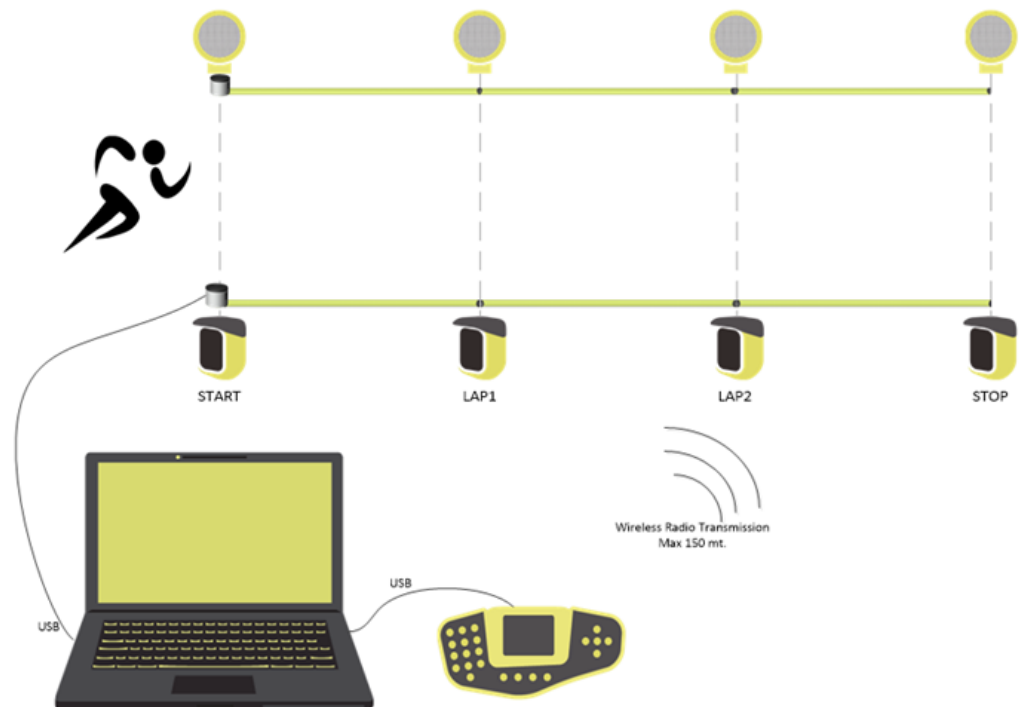
Heart Rate Monitor

- OptoJump is compliant with **Polar WindLink** and **ANT+** cardio wraps (Garmin, Suunto, etc.)
- If the athlete wears the cardio wrap during the test, his/her heart rate will be recorded and temporarily associated with the events of the test itself (e.g. with a jump, a step, etc.).



OptoJump Next and Witty

- OptoJump Next may be used in combination with the **Witty** (Wireless Training Timer) system.
- The photocells have the purpose of giving the external start impulse and to stop the test, as well as recording intermediate times during the sprint/run test with modular systems, if needed.



OptoJump Next and Witty

- *Example: Timing a 30-m sprint with start and finish photocells, as well as intermediate times at 10 and 20 m.*
- Just set up the photocells at the required positions and **connect the Witty timer to the PC with the OptoJump Next software.**
- The photocells will transmit the impulse, which will then interact with the software

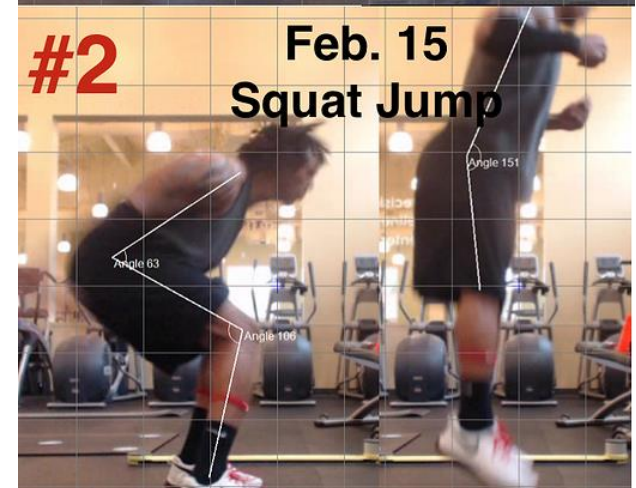
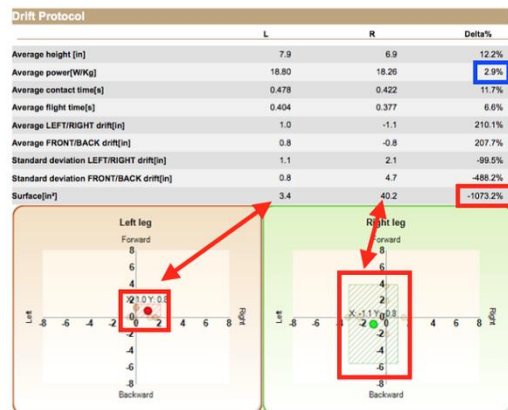
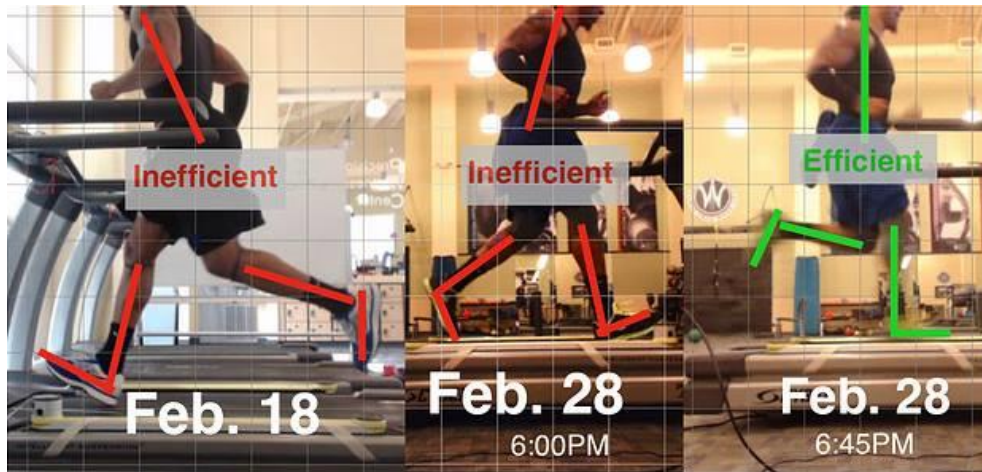


Why use OptoJump



OptoJump introduces **objectivity** in the world of sport performance and training.

*If you're not **assessing**, you're **guessing**...*



Why use OptoJump



- Objectively evaluate the condition of your athletes
- Measure while training your athlete
- Rapidly identify deficits, postural problems, asymmetries through observation of both data and video
- On the basis of the objective data, develop and apply personalized training programs, return to play programs, interventions, orthopedic solutions and constantly verify the out coming results with a view to full recover
- Avoid worsening of an injury/problem caused by an incorrect evaluation
- Create a database of test (video included)
- Periodically compare multiple tests of a athlete to further and easier verify the improvements after a therapy or an applied solution (like the insertion of an orthopedic insole for example)
- Compare multiple tests of different athletes
- Compare the condition of a athlete with his pre-injury/illness situation (“foot print concept”)
- Give objective results to interested third parties
- Motivate subject by providing tangible evidence of improvements
- Quickly print/export comprehensive and easy to understand reports
- Exploit the angle/distance drawing tools for kinematic analysis of still video-frames and include them in the reports

Benefits

- Cost-effective
- Incredibly simple and quick to install
- Extremely portable
- Rechargeable battery operated (up to 5 meters)
- Easy to use / user friendly software interface
- Not invasive (no contact) / freedom of movement for the patient/athlete (maximum distance between the bars: 6 m)
- Usable on every type of floor (from 1 to 100 meters) and treadmill
- Can be put and operated on the majority of existing treadmills
- Treadmill use allows complete and in depth gait/run analysis on a limited surface
- 1,042 cm spatial resolution (96 leds on 100 cm)
- 1000 Hz time resolution (1 ms)
- USB 2.0 interface
- No mechanic moving parts, maximum repeatability is guaranteed
- USB cameras do not need external triggers or manual synchronization



Available Data



	Gait/Run Test	Gait Test on Treadmill	Run Test on Treadmill	Jump Test	Tapping Test	Reaction Test
Stance Time	X	X				
Swing Time	X	X				
Step Time	X	X	X			
Gait Cycle	X	X				
Single Support	X	X				
Double Support	X	X	X			
Loading Response	X	X				
Pre-Swing	X	X				
Step Length	X	X	X			
Stride Length	X	X	X			
3 Foot Phases (Contact, Flat, Propulsive)	X	X	X			
Cadence/Rhythm/Pace	X	X	X	X	X	
Speed	X					
Acceleration	X					
Flight Time	X		X	X	X	X
Contact Time	X		X	X	X	
Height	X		X	X		X
Stride Angle	X		X			
Imbalance	X		X			
Specific Power				X		
Jumping Point				X		
Jumping Point Gap				X		
Used Area				X	X	
Cycle Time (Flight + Contact)					X	
Reaction Time						X

Internal power supply (range of measurement from 1 to 5 m)	Rechargeable Li-ion battery 7.4V 1800mAh
External power supply (range of measurement from 1 to 10 m)	24VDC $\pm 5\%$
Infrared wave length	890 nm
Number of optical sensors	96 per meter
Space resolution	1.041mm
Sensor height (from the optical center of the sensor to the lower edge)	3mm
Time accuracy	1 millisecond
Operational temperature	0°C ~ +35°C
Storage temperature	-25°C ~ +70°C
Max. distance between transmitter (Tx) and receiver (Rx)	6m
Dimensions of TX - RX with integrated interface	1100mm x 100mm x 100mm (W x D x H)
Dimensions of Tx - Rx	1000mm x 100mm x 45mm (W x D x H)
Dimensions of Tx - Rx with integrated interface	2kg
Weight of additional Tx and Rx bars	1.5kg

Medical Certifications



- Microgate is **ISO9001:2008** certified
- The OptoJump RX and TX bars are homologated and passed all the EMC (*Electromagnetic Compatibility*) tests
 - 2004/108 EC Directive
 - FCC Rules & Regulations, Title 47 - Part 15
 - EN 61326-1:2006



DNV BUSINESS ASSURANCE

MANAGEMENT SYSTEM CERTIFICATE

Certificato No. / Certificate No. 67544-2009-AQ-ITA-SINCERT

Si attesta che / This is to certify that

MICROGATE S.r.l.

Via Stradivari, 4 - 39100 Bolzano (BZ) - Italy

*è conforme ai requisiti della norma per i sistemi di gestione:
has been found to conform to the management system standard:*

UNI EN ISO 9001:2008 (ISO 9001:2008)

Questa Certificazione è valida per il seguente campo applicativo:
This Certificate is valid for the following product or service ranges:

Progettazione, sviluppo, produzione e commercializzazione di sistemi di cronometraggio professionali e di attrezzature elettroniche per lo sport. Progettazione, sviluppo e produzione di sistemi di controllo real-time industriali e applicazioni in ambito astronomico. Progettazione, sviluppo e produzione di dispositivi medici per l'analisi biomeccanica, la riabilitazione funzionale e la prevenzione degli infortuni
(Settore E.A.: 19 - 29a)

Design, development, manufacturing and trade of professional timing systems for sport applications and performance analysis. Design, development and manufacturing of real-time control systems for industrial and astronomical applications. Design, development and manufacturing of medical devices for biomedical analysis, functional rehabilitation and injury prevention
(Sector E.A : 19 - 29a)

Data Prima Emissione/Initial Certification Date

2009-12-15

Il Certificato è valido fino al:
This Certificate is valid until:

2015-12-15

L'audit è stato eseguito sotto la supervisione di
The audit has been performed under the
supervision of

Claudio Cuba
Lead Auditor

Lugogo e Data/Place and Date:

Agrate Brianza (MB), 2012-12-19

Per l'Organismo di Certificazione:

For the Accredited Unit:

Zusatz:

Zeno Beltrami
Management Representative

La validità del presente Certificato è subordinata al rispetto delle condizioni contenute nel Contratto di Certificazione.
Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.

DET NORSKE VERITAS ITALIA SRL - CENTRO DIREZIONALE COLLIERE - PALAZZO SMO - V.le COLLIERE 9 - 20064 AGRATE BRIANZA (MI) - ITALY - TEL. 039 58 99 905 - WWW.DNV.COM/IT

Celebrity Boxing?

Specifications:

1. **Punch Force (instrumented bag)**
2. **Lateral Jumps over object (Optojump)**
3. **Vertical Jump (Optojump)**
4. **Reaction time to visual cue (Optojump)**
5. **Boxing task in ring (Optojump)**

- **Single leg hop**
- **Vertical jump**
- **Ball Shuttle**
- **Run to penalty and score task**

- **Start with Witty**
- **Opto just before hurdle and after**
- **Witty just before and after**
- **Witty at the end**

Run through website

www.Optojump.com

(selected instruction manual items)

Thank you for the attention !

