Learning about the CTC Biomechanics “Living Lab” - p.4
CTC expertise in leather, footwear, leather goods and gloves has been supported by a one-of-a-kind research centre, the CTC European Campus, located in Lyon (France). We wanted to give you a glimpse of this Campus through an article about our ultra modern platform of biomechanics located in Lyon.

Thanks to this “living lab” and our experts, we bring a relevant and innovative answer to our clients needs for design, manufacturing, training or for quality control of their equipments: shoes, gloves, bags, clothes, saddlery, etc. If you need more information, do not hesitate to contact us!

This issue of CTC International is also the occasion to mention our solution for social audit. Do not hesitate to contact our teams if you need any support. Enjoy reading!

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Come & see us at international fairs
- APLF
  Hong Kong / 29–31 March 2017
- CIOSH
  Shanghai (China) / 4–6 April 2017
- Center (SECC)
  Ho Chi Minh City (Vietnam) / 12–14 July 2017
- ACLE
  Shanghai (China) / 30 August –1 September 2017
- PremiereVision Leather
  Villepinte (France) / 13–15 September 2017
- A+A
  Dusseldorf (Germany) / 17–20 October 2017
Sustainability

"Moving Toward Sustainability"
An APLF Green Initiative with Higg Index and supported by CTC

"Moving Toward Sustainability" is a program launched by APLF and supported by CTC, designed to help exhibitors at APLF Materials+ and Fashion Access become compliant with the environmental measurement standards and requirements set by the Sustainable Apparel Coalition (SAC).

The core of this sustainability initiative is the Higg Index, a suite of self-assessment tools to measure the environmental, social and labor impacts of a company’s operations and identify areas for improvement; with modules for facility, brand and product. FEM (Facility Environment Module) is the module of Higg Index which is used for factories to measure their environmental sustainability in a simplified way. All SAC members, including brands and their suppliers, commit to using the Higg Index and to collectively revising and improving it.

APLF LEATHER & MATERIALS+ | 29–31 March 2017, Hong Kong
www.leatherfair.aplf.com/en-us/

Association

The 20th uitic’s Congress is coming!

After successful events in China (2013) and India (2016), the 20th Congress of the International Union of Shoe Industry Technicians will take place from the 16th to the 18th May 2018, in Porto, Portugal.

Organized by CTCP and APICAPS with the support of the UITIC, the event will bring together a representative sampling of the footwear industry with professionals and experts coming from all over the world.

The President of the UITIC is Yves Morin, CEO of CTC.

www.uitic.org

Seminar

Safety Gloves at CIOSH

CTC is pleased to invite you to the following seminar on Safety Gloves.
Free entrance.

CTC will propose a Safety Gloves Seminar during CIOSH, on the 6 of April. It will be about the EN 388-2016 new standard, Test procedure & Certificate Update, PPE New regulation 2016/425.
Time: 1000–1130 - Venue: Hall W5, please contact CTC Staff at the exhibition for details – Speaker: Kevin Lee/Chris Chen - Language: Chinese.

For more information please contact Liya Ji, CTC China Marketing Executive: lji@ctcgroupe.com (+86) 136 1194 9193

Communications

CTC, closer to you!

In order to keep in touch with its clients and to provide the best and latest information about its services, CTC Groupe invites them to connect on different media:

ctcgroupe.com wechat linkedin

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Learning about the CTC Biomechanics “Living Lab” based in Lyon, France.

CTC is putting its expertise in biomechanics at the disposal of its customers through the creation of a new platform devoted to product analysis (shoes, leather goods, gloves, tanned goods, saddlery items), the objective being to measure or compare products under conditions of use. Thanks to various tools, ergonomic analyses can also be carried out. Stresses at the workstation can be quantified, as can the benefits provided by ergonomic solutions that are implemented. This article aims to introduce our innovative platform and to highlight the main measurable features in the areas of shoes, leather goods, gloves and tanned goods.

CONVEYOR FITTED WITH FORCE PLATFORM
The first piece of equipment is a conveyor belt that measures the forces produced by the foot against the ground, thanks to two force platforms.

This belt allows for the measurement of the vertical, horizontal and mediolateral forces produced when the foot is in contact with the ground.

Use of the two force platforms located on each one of the two conveyor belts allows a differential analysis of right and left feet during walking. During running, there is no moment of double contact, thus only one platform need be used.

This system allows two different features to be quantified with regard to shoes:
• analysis of general parameters such as length, frequency or breadth of step, etc.;
• differentiation of impacts at the level of the lower limb (shock absorption of shoes);
• analysis of the fluidity of the walking action;
• analysis of the stability of locomotion.

All types of footwear can thus be analysed and/or compared (sports shoes, shoes with heels, safety footwear, etc.).

Analysis of the impact of load bearing (backpack or handbag) on locomotion is also possible using this device. For instance, the changes in running pattern while carrying a backpack of varying weights can be quantified.

A number of studies have already been carried out measuring, for instance, new shock absorbing concepts, the stability produced by various shoes or even how older people walk in shoes with heels.

This belt is embedded in the ground and thus allows non-linear movements to be tested (lateral movements, for instance) and also permits the study of people for whom use of a conveyor can be risky (children walking or seniors running, for example).

MOTION ANALYSIS SYSTEM
A motion analysis system comprising six cameras allows cinematic analysis to be carried out. Thanks to this system, reconstructions of movement, or of the product, can be done in three dimensions.

With regard to motion analysis, by means of markers attached to the testers, we can measure various joint angles, and quantify the accelerations or speeds of certain segments, etc.

In terms of product analysis, motion analysis allows us to show in precise detail how the product (or a part of it) moves under conditions of use. These data are crucial for understanding the effects of products on the human body, so that we can then make the appropriate modifications. Integrating these measurement tools on test machines or beds could also prove interesting. Finally, changes in the way different groups move (seniors, children, people with diseases, etc.) can also be measured.

This measurement system has already allowed us to quantify the stability of runners while they wore various types of running shoes, through observation of the tibia-calcaneal angle.

The precise trajectories describe how handbags while being carried by various individuals were also identified.

These two systems are “heavy” biomechanical tools, which cannot be removed from the CTC laboratory in Lyon.

MINILAB
A motion analysis system coupled with a force platform is also available. This system combines the two aforementioned types of measurement (force measurement and motion analysis system). However, the MiniLab only allows measurements to be taken at the level of the foot and the leg, as far as the calf. The upper limb is not taken into consideration with this tool.

This piece of equipment is portable, so it can be used to carry out measurements in the field.

PRESSURE ANALYSIS SYSTEM: TEKSCAN
This device allows the measurement of weight distribution, maximum pressure levels, contact surfaces, etc. It is made up of different pressure pads allowing these analyses to be done.

The pressure pads can be placed directly into the shoe, in contact with the lining, the objective in post cases being to obtain a reading of how different linings affect the way pressure is distributed. The notion of (underfoot) “comfort”, which is overwhelming, can be approached using these measurements of plantar pressure.
Studies have been done in order to quantify maximum differences of pressure (zones of potential discomfort) and surface contact. Lining materials have also been tested. This system also provides for the use of pressure sensors of differing sizes. For example, we have a pad capable of measuring pressure on the hands of testers. This pad is mainly used in the area of workstation ergonomics in order to measure exertion during gripping. It is completely suitable for characterising what happens when people are gripping things such as rackets, handles, etc.

Finally, other pads allow the measurement of how pressure varies across large surfaces, like the backs of horses, seats of chairs, and bicycle or motorbike saddles.

In the area of leather goods, pressure analysis can also be very instructive when it comes to product design. For example, the varying pressures put on the shoulder while carrying handbags fitted with different straps can be studied.

The way pressure is distributed across the back and shoulders while carrying different backpacks can be measured.

This system is portable and manageable. It can function using Wi-Fi (200m range) and thus facilitates various types of analysis in the field.

**ME 6000**

The ME 6000 is a device allowing three types of measurement to be made:

- electromyographic analysis;
- goniometric analysis;
- accelerometric analysis.

**Electromyographic analysis (EMG)**

The ME 6000 allows the analysis of muscular effort by means of electromyographic measurements. This works by placing electrodes on the chosen muscle in order to quantify its activity during a given task.

The device allows up to 16 muscles to be measured at once. This type of analysis is used in ergonomics in order to quantify the effort made during various work cycles.

EMG also enables the impact of products on the human body to be measured (distinguishing between types of shoes or the weight of various load being carried). EMG analysis can be carried out on muscles of the lower limb in order to compare different shoes with regard to how tiring or stable they are.

**Goniometric analysis**

Goniometric measurement enable joint angles to be quantified by means of a goniometer.

This measurement allows quantification of parameters, such as locomotion, while wearing different shoes (angle of the hip, knee or ankle). Thus, impact of different joint amplitudes in the knee and ankle while walking in high heels has been measured among senior citizens.

The effect on joint amplitudes at shoulder level carrying handbags in different ways (with a shoulder strap, in the hand, on the elbow) has also been studied.

**Accelerometric analysis**

Using an accelerometer allows us to quantify accelerations and also to determine the speed and the position of a part of the body or a product. These sensors are small in size and can easily be placed in various places: on the human body (hand, arm, head, leg, etc.) on a product (shoe, bag, etc.).

The use of this type of sensor also permits the measurement of impact produced while running depending on the shoes being tested. The shock wave (vertical acceleration) transmitted to the lower limb as the foot hits the ground can be measured by means of these accelerometers. The greater the acceleration, the greater the impact.

The ME 6000 thus allows these three types of measurements to be synchronised. It also has Wi-Fi functionality and is fitted with a data acquisition card. Subjects can thus take measurements in the field. Data is saved, then downloaded when the device is next connected. In addition, this system is unobtrusive for users. A simple belt allows the information to be stored; the sensors are attached by means of cables, which are easily disguised.
FLIR INFRARED CAMERA
The CTC Biomechanics Laboratory also comes with an infrared camera allowing heat exchanges to be measured. This camera allowed us, for instance, to measure the increase in temperature of a shoe sole during physical activity, with shifts in weight. This camera can also identify differences in temperature related to wearing different textiles (breathable T-shirts, etc.). Finally, thanks to the infrared camera we can locate target areas (heat loss, heat absorption, etc.), by analysing differences in temperature.

HIGH FREQUENCY CAMERA
High frequency cameras enable slow-motion filming, the goal being to be able to analyse movements that are too fast for the naked eye to see. The sampling frequency of this type of camera is greater than 1000Hz. We are able, for instance, to measure the compression levels of the outer soles of different running shoes. Sudden movements can also be analysed (falls on testing equipment).

ANALYSIS OF GAS EXCHANGES (O2 /CO2) MÉTAMAX 3B
In order to quantify the overall energy consumption of the body, CTC is equipped with a system for analysing exchanges of O2 and CO2 gases. The MetaMax 3B is also used in ergonomics at the level of the workstation in order to quantify energy expended in the carrying out of given tasks. This system has been used in a tannery environment on workstations that are rather physically demanding. For example, the advantages of wearing an exoskeleton on this type of task is going to be measured thanks to the MetaMax 3B.

The system is made up of a mask that allows the air that has been inhaled and exhaled to be gathered, and is fitted with an analysis and processing module directly attached to the testers. It enables a performance in an endurance sport to be measured and, specifically, allows the VO2 max of sportspersons to be determined with precision.

CONCLUSION
In conclusion, CTC puts at your disposal a large number of biomechanical tools. Product differentiation, proofs of new designs, innovation, ergonomic analysis, as well as assessment of the advantages of workstation solutions can all be measured thanks to these various tools.

Various research projects have also been conducted thanks to this biomechanical platform. A benchmarking of running shoes has been carried out, advances in physical test beds have also emerged, and analyses involving particular groups, such as senior citizens, have been made. Finally, biomechanical measurements are carried out directly on a panel of testers carefully selected depending on the product being tested or the study been conducted. A minimum of 10 people is required to be able to precisely identify potential differences. Thus, this type of measurement demands a significant investment, but is however eligible for research tax credit. Please do not hesitate to contact our innovation department (Département Innovation Technologique) should you require any further information.

Cédric Vigier, Innovation Department Manager
cvigier@ctcgroupe.com

Discover the living lab in video
www.ctcgroupe.com
The social audit and the CTC solution

Worldwide, the social audit has become a key tool in “assessing social risks” (protection and respect for workers’ rights, codes of conduct, and the management of health and safety risks). CTC offers its customers services based on the SA8000* standard.

The social audit has been developed at the behest of major customers and under pressure from consumer associations and NGOs. The audit applies to companies, particularly the way in which they manage human resources, but it also increasingly incorporates corporate social responsibility. Globalisation and company strategies have broadened the range of issues this tool addresses, which now includes concerns relating to regulation, organisation, ethics, company performance and governance procedures.

For several years, the CTC Group has been involved in conducting social audits on the sourcing of leather, footwear and leather goods, building on partnerships or internal and external expertise, depending on the needs of its customers and the programmes for which we were approached.

Numerous customers have contacted us to find out which social audit programmes are most appropriate or under development. Defining a universal programme (or organisation/initiative) to which each market player or factory could refer seems an impossible task.

SOCIAL AUDIT STANDARDS

Two “open” standards dominate the market:
- SA8000, created in 1997;
- WRAP (Worldwide Responsible Accredited Production), launched in 1998, for the textile sector.

These standards have inspired a multitude of “social audit” programmes, each of which has its own specific features. Without providing an exhaustive list, one of the common elements shared by all these initiatives is that they propose to their members a “code of conduct” and “audit procedures” for their specific suppliers; these initiatives include (historically) the US Fair Labor Association (created in 1998), the UK’s Ethical Trading Initiative (created in 1998), France’s Initiative Clause Sociale (created in 1998) and the European Business Social Compliance Initiative (created in 2003).

Note that numerous fashion and retail operators have chosen to use their own standards (mainly based on the SA8000). In addition, among other significant developments, the Initiative Clause Sociale (ICS, closely followed by French retail chains and distributors) announced an alignment pending a merger with the BSCI (Business Social Compliance Initiative) programme. CTC also closely monitors international initiatives such as FFC (Fair Factory Clearinghouse), Sedex and Sustainable Apparel Coalition** (an initiative historically focused on the textile and footwear industries).

THE SOCIAL AUDITS OFFERED BY CTC

CTC’s social audit offering is currently structured around the SA8000 standard. We provide you with support on simple request, with the possibility of taking action on all of your production sites in Asia in less than 72 hours.

CTC’s social audit reports include:
- a review based around the nine areas checked by the SA8000;
- a corrective action plan (incorporating implementation and investment priorities and/or alerts);
- a photo file relating to the observations of our auditors;
- the updating of your factory profile.

Most social audits are conducted in one or two days; CTC undertakes to provide a complete audit with the elements listed above in under five days. This tool, dedicated to our leather, footwear, leather goods and textile markets, is an effective instrument in determining the reliability of a supplier network as part of a cross-functional audit policy.

In today’s world, despite the multitude of initiatives relating to the assessment of companies’ corporate social responsibility policies, we believe it is important to conduct social audits to at least gain an understanding of the working conditions at your suppliers. The objective of this approach is not to decide unilaterally if a factory strictly speaking complies with SA8000 objectives, but rather at least to collect and analyse information on your production sites. This enables you to diagnose the risks and to take well-informed decisions with your factories relating to change management or more simply improvement.

To get more information, contact:
Pierre Beaupoil, pbeaupoil@ctcgroupe.com


** Co-developed SAC benchmark, whose social audit framework is still under development.
YOU WANT TO SECURE YOUR PPE AND ENSURE THEY ARE COMPLIANT?

CTC experts provide EC type-examination certificates and laboratory tests to ensure your safety footwear and gloves are really compliant to European Directive and to assure your customers of the reliability and the quality of your products.

Work with the Leader for Personal Protective Equipment evaluations and certifications, work with CTC!

For further information on CE certification contact cemarking@ctcgroupe.com