

UITIC'S 20TH CONGRESS

Let's head for Porto 2018!
16-18 may 2018



The 20th UITIC's Congress is coming!

From the 16th to the 18th May 2018, the 20th International Technical Footwear Congress of UITIC (International Union of Shoe Industry Technicians) will take place in Porto, Portugal.

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



**centro tecnológico
do calçado de portugal**



Pay your membership fees online!

Paying your membership is important to ensure the quality of UITIC activities.

For the first time, the membership fees can be paid online by PayPal, credit or debit card, via a safe and secure system. You can also pay by bank transfer or cheque: more details at www.uitic.org.

Fees:

- Associations: €65 per group of 100 members / €195 maximum
- Individuals & Technical Centres: €25

UITIC News

For further details on information published in this newsletter or when sending articles to be published, please address correspondence to:

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UITIC Membership Rewards

- A privileged access to UITIC's events (Congress) and financial rewards (-20 % on the registration fee - maximum of 2 members/association)
- The UITIC's Newsletter
- Access to UITIC's Group on LinkedIn
- The right to use the logo of the association

TECHNICAL INFORMATION

Sensor-based Rehabilitation Shoe



By participating in the AiF research project «Sensor-based Rehabilitation Shoe» PFI and ISC have taken on the task of developing a measuring system for gait analysis and a special shoe into which the system can be completely integrated.

A shoe with an integrated miniaturised gait laboratory could be used to support rehabilitation of outpatients with injuries or illnesses affecting the human gait. After appropriate instruction, these patients are required to use the newly developed system themselves during their everyday activities between appointments at the rehabilitation centre. The measuring system in the shoe records the specified parameters (gait parameters), and the attending physician or physiotherapist evaluates the recorded data during the treatment appointments. He or she can then draw conclusions about the success of the therapy applied so far and give instructions for further treatment according to the individual progress made by the patient.

TECHNICAL IMPLEMENTATION: MEASURING SYSTEM, SHOE CONCEPT, SHOE PRODUCTION

The measuring system should be completely accommodated in the shoe – a wearable device with high-performance miniaturized compo-

nents such as Inertial Measurement Units (IMUs) and flexible printed circuit boards. It has to acquire and save relevant gait parameters over an appropriate period of time. In a parallel process, evaluation software is to be developed to enable the attending physician to read out and evaluate the recorded data.

At the same time, a special shoe is to be designed and manufactured which can accommodate the measuring system without influencing the gait pattern. Since some components of the measurement system have to be integrated during shoe production, a special production technique also has to be developed. The rehabilitation shoe will have to demonstrate its suitability for everyday use in wear tests.

THERAPEUTIC AID

The rehabilitation shoe could become an important therapeutic aid for patients, physicians, and physiotherapists.

Shoe manufacturers and manufacturers of electronic medical devices could offer a product helping a large and steadily growing target group to possibly recover their health and mobility faster than with conventional treatment thanks to a new approach permitting a greater degree of persistency and more independence.

The project bears AiF Number 19132 N. It began on 1 September 2016 and ends on 28 February 2019. PFI is the project management organisation; ISC is the second research organisation. The project accompanying committee has already been constituted; however, interested companies are invited at any time to participate in the project.

Further information:

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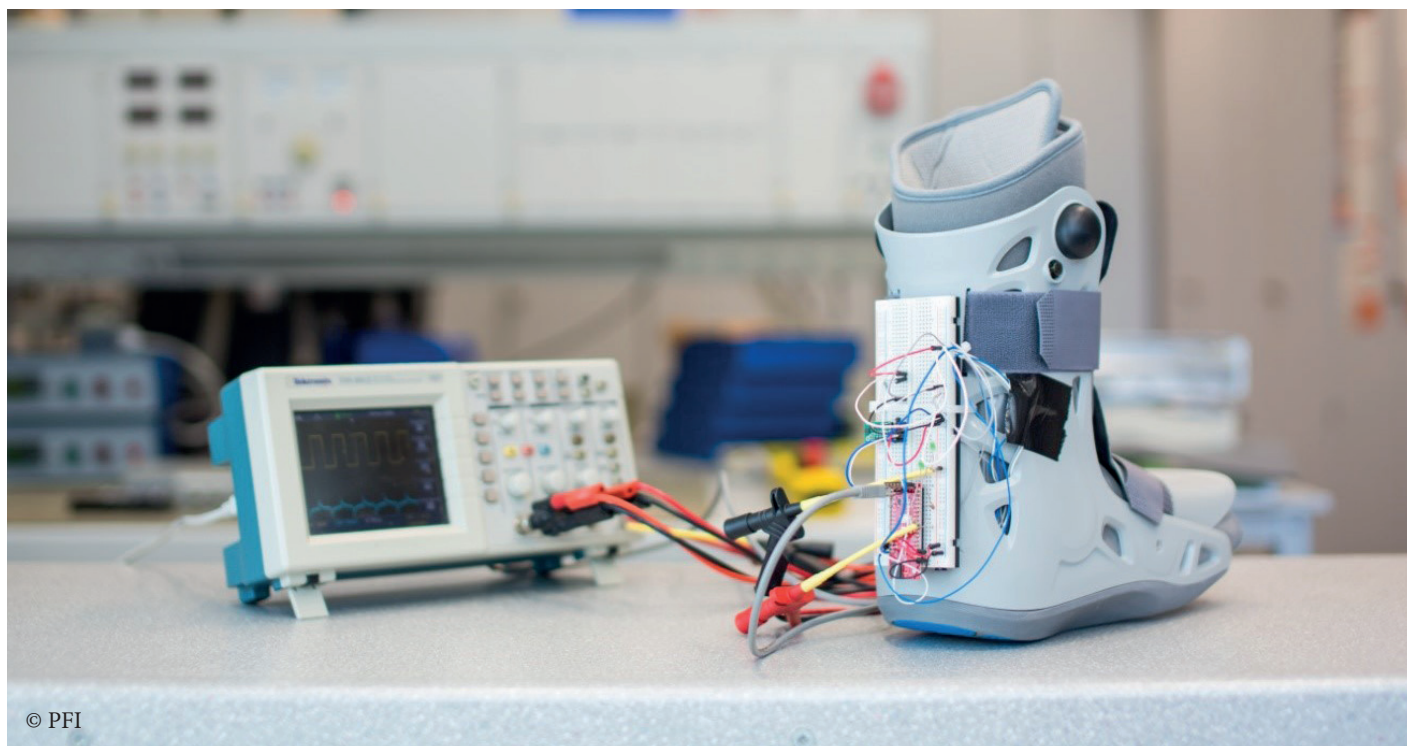
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TECHNICAL INFORMATION

CO2Shoe carbon footprint tool as an environmental indicator for the footwear industry



Currently the carbon footprint is one of the main environmental indicators used to evaluate the environmental behaviour of a product (such as footwear).

The carbon footprint can be defined as a simplified version of the Life Cycle Analysis (LCA) where only one impact category is to be taken into account, the Global Warming Potential (GWP), throughout the quantification of the greenhouse gas (GHG) emissions produced along the whole footwear life cycle. Therefore, one obtains a simple result and this makes the interpretation of results much easier. In addition, as in the LCA, it is possible to analyse the environmental load of each life cycle stage (Figure 1). Thus, the results obtained can be used to detect the stages of footwear manufacture that contribute most to the carbon footprint of the footwear model under assessment. Thanks to the project "Footwear Carbon Footprint (CO2Shoe)", partially supported by the European Union through the LIFE programme, nowadays a carbon footprint tool specific for footwear is available. The project is coordinated by the Centre for Techno-

logy and Innovation (INESCOP) based in Spain and includes the participation of other European technological centres (CTCP in Portugal, IPS in Poland, CGS in Italy), the European Confederation for the Footwear Industry (CEC) and the Spanish Federation of Footwear Industries (FICE).

The calculation tool was developed using the product carbon footprint international standard (ISO/TS 14067:2013) as the reference methodology and was validated by the Spanish Standardisation Association (AENOR) to ensure the correct operation of the tool as well as the fact that it meets the requirements established in said standard.

Any footwear company interested in calculating the carbon footprint of their models has just to fill in a simple questionnaire, which is the life cycle inventory. Thus, data corresponding to all inputs (weight and type of raw materials, water and energy used, chemicals used, suppliers, etc.) and outputs (waste, wastewater, clients, etc.) are to be provided.

Subsequently, INESCOP enters these data in the footwear carbon footprint tool and, finally, the

footwear manufacturer receives the carbon footprint results associated to the footwear model assessed.

In a first pilot stage, the footwear carbon footprint tool was used to evaluate the carbon footprint of 36 footwear models manufactured in different EU countries (Spain, Portugal, Italy and Poland). Global results obtained showed values between 1.3 and 25.3 kg CO₂e, with an average value of 10.6 kg CO₂e per pair of shoes. These carbon footprint results vary according to the complexity of footwear models, in that the nature and weight of the materials making up the model under study are significant aspects to be taken into account (take for instance a trekking boot and a flip-flop, which are quite different). For this reason, the carbon footprint results should not be used to compare different footwear models, but the results of a given model with improvements implemented over time.

Figure 2 shows the percentage environmental of some footwear lifecycle stages on the carbon footprint. The components manufacturing stage is one of those that contribute most to the total carbon

footprint of footwear. Therefore, the measures to improve the environmental performance should focus on this stage.

ECODESIGN

One of the main features of the footwear industry is its dynamism, that is, it is characterised by the fact that a great number of models launched on the market, are constantly renewed following the latest fashion trends. Another advantage that the footwear carbon footprint tool proves is that it can be used as an ecodesign tool during the product design stage. Thanks to its inventory, the tool can be used to analyse in advance how certain changes in the shoes to be produced may affect the Environment in a different way, as for instance changes in the nature and/or the amount of the materials used, changes in suppliers, optimisation of transport routes, etc.

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Figure 1 – Footwear life cycle stages

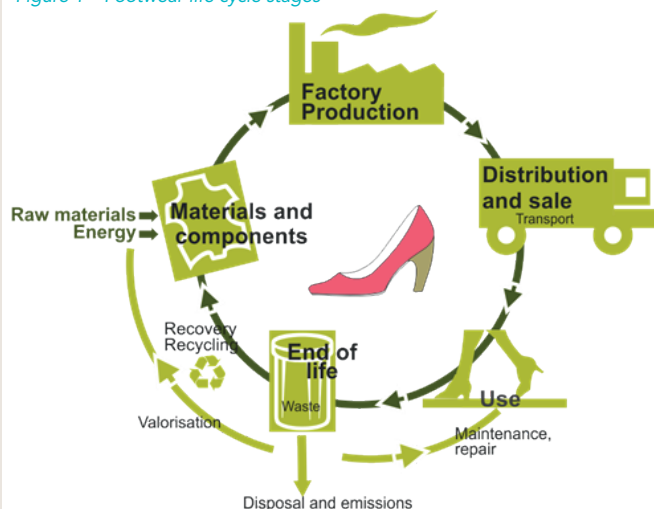
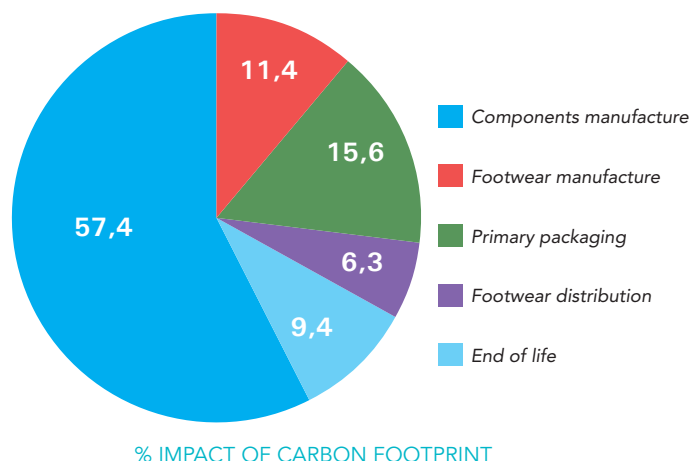


Figure 2 – Carbon footprint results per stage



TECHNICAL INFORMATION

News from the CLIA

ACLE WILL OPEN ON AUG 30TH IN SHANGHAI

All China Leather Exhibition, which is known as the premier event for companies seeking opportunities in China's huge markets, will be held from Aug 30th to Sep 1st. in Shanghai.

The exhibition provides the largest variety of leather, components & accessories, manufacturing equipment and tools, machinery and technology and business services. Since its inception back in 1998 ACLE has impressed exhibitors with the number and quality of buyers attracted to the event, while buyers have found an extraordinary variety of exhibitors, particularly from overseas. Over the years additional attractions, such as fashion shows, seminars and special events designed to keep all participants conversant with fashion and technology developments.

NATURAL FUR LABEL APPLIED BY CLIA HAS BEEN APPROVED

The Natural Fur Label has been approved by the state trademark office on October 14, 2016. The label was initiated by China Leather Industry Association, with the aim to certificate that the product with this label is made of high quality natural fur.

The logo is the combination of N and F, which stands for natural and fur. Fur products are always of high price, and sometimes consumers can't tell whether it's natural or artificial fur. It's believed consumers will benefit from the label.

THE THIRD WORLD LEATHER CONGRESS IS READY FOR REGISTRATION

The third World Leather Congress will be held in Shanghai on 29 August 2017, at Pullman hotel. The theme of the congress will be "The leather revolution, recognizing the profound changes that will be taking place throughout the leather marketing chain over the next 20 years, and focusing on how the industry should be responding. This event is organized by ICT, and co-hosted by China Leather Industry (CLIA) and the Taiwanese International Leather Association (TILA).

For further information, please visit:
www.worldleathercongress2017.com.



To the discovery of our new members: focus on LETSB

LETSB is the Leather Engineers and Technologists Society, Bangladesh. It was created in 1989 and counts in 2016 more than 1225 members whose criteria of eligibility are : Minimum B.Sc Engineering/Technology in Leather/Footwear/Leather Products. The Executive Committee is composed of a 23-Members Cabinet elected by direct voting of all general and life-time members.

Its main objectives are :

1. WELFARE: to keep reserve the interest and welfare of the members.
2. COMPETENT: to enhance professional competency of the members by exchanging technology, ideas and views in relevant fields globally.
3. TREND: To get members introduced, informed and trained on new and trendy fashion and technology on Leather/Footwear/Leather Products i.e. Leather Sector as a whole by attending national and international events.
4. ENTREPRENEURSHIP: Establishing a Technical Facility Center (TFC) having Technical/Mechanical/Job-Work facilities. Where members can learn technical know-how pragmatically as well as make small quantity of goods commercially using the TFC. Thus a member can turn into Entrepreneur.
5. CONNECTIVITY: Working together with relevant Organizations, Associations and Societies in home and abroad for the betterment

of Leather Sector.

6. EVENT: To organize technical seminar, symposium, discussion with technically sound Persons/Organizations/Institutions.
7. COMPLIANCE: To make awareness about compliance on Chemical/Environmental/Social aspects in Leather Industry.
8. ASSISTANCE: To assist Government Bodies, Non-Government Organizations (NGOs) providing authentic technical support and information.
9. PROJECT: Arranging various projects for the sake of Leather Sector, for example, project on Proper Flaying and Curing during Eid-Ul-Adha.
10. TRAINING: To arrange training programs for workers focusing proper Chemical Application, Mechanical Operation and its Safety, Protection and Remedy in Leather Sector.
11. PUBLICATION: Publishing souvenir, bulletin, magazine regarding Bangladesh and World Leather

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TECHNICAL INFORMATION

The digital transformation of footwear manufacturing



What the recent examples of Adidas Speedfactory, Reebok Liquid Factory and Nike are teaching us in terms of advanced robots and hybridisation between traditional and additive manufacturing technologies.

The big brands of the sport industry have started a phase of profound rethinking of the whole concept of shoe manufacturing. Adidas run for the past few year an intensive research program that involved a high number of technology suppliers (not all of them from the footwear sector) and research centres under the umbrella of the Speedfactory project; recent announcements from the German brand indicate that for the new experimental plant located in Asnbach (Germany) production is due to begin in mid-2017, slowly at first and the ramping up to 500,000 pairs of trainers a year. Adidas is constructing a second Speedfactory near Atlanta for the American market. If all goes well, they will spring up elsewhere, too. Nike is following a similar path after the announcement in 2015 of their strategic alliance with FLEX

(formerly FLEXTRONIC). With approximately 200,000 professionals across 30 countries, Flex provides innovative design, engineering, manufacturing, real-time supply chain insight and logistics services to companies of all sizes in various industries and end-markets, with one point to be kept in mind: they are no expert in the shoe manufacturing process. According to Nike, this alliance is aimed at revolutionising the whole concept of shoe manufacturing in the near future and the two companies are already putting the paradigm at work in a brand new, ultra modern manufacturing facility that is being built in Mexico in the area of Leon. Last but not least Reebok has made a series of announcement of something that goes under the name of "Liquid Factory" more a new product concept than a manufacturing technology but that brings along a high number of innovations also in the way the shoes are produced.

So what do all these experiments have in common? There are a few recognizable elements that can give us an insight on where the digital manufacturing revolution

led by these major brands can lead us to. First they all start from the product, meaning that in order to simplify manufacturing, you need to rethink the way the product is designed, changing its structure, the materials it is made of and the way parts are assembled; a true "design for manufacturing" approach in which processes are made simple because shoes are thought simple. The second common element is 3D printing; all the above examples include extensive portions of the shoe (typically the outsoles but in the case of Reebok also other aesthetic elements) made with additive manufacturing techniques. It is clear the amount of design freedom and manufacturing flexibility that this brings in (remember that 3D printing is the approach that makes impossible things to become possible) realizing that "hybridization" between traditional and additive manufacturing that we will more and more see in the shoe factories of the future.

And eventually robots: the cross combination of product design enhancement and simplification and 3D printing creates a perfect

environment for an ideal redistribution of tasks between human workers who, despite all the dystopian views of the future of manufacturing, are still there in key, highly skilled, high added values roles. Simple, innovative (shoe) products for a seamless, streamlined manufacturing approach, 3D printing to complement and hybridize production and robots to serve and assist the shoe workers: these are the ingredients that will more and more shape the DNA of footwear manufacturing in the years to come; the recent examples of Adidas, Reebok and Nike give us the chance of glimpsing into the brave new future world.

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3D Printing – an opportunity for our industries?



The term '3D printing' or 'additive manufacturing' refer to a whole range of technologies and materials. With machines costing anything from a few hundred euros for kits available online to manufacturing machines worth over €500,000, it can be difficult to get an objective idea of what is still the stuff of dreams and what is of interest, economically and technically speaking, to our industries. Faced with this extremely diverse range, we will limit our focus to the materials and technologies that we believe most closely address the areas of interest and purposes of those working in the leather industry.

THE MAIN PRINTING TECHNIQUES AND THE MATERIALS

Whatever technology is used, they all work using a process of adding material, hence the alternative name of additive manufacturing.

With additive manufacturing, parts are created using successive layers of material after the previous layer solidifies. This type of manufacturing means that extremely complicated parts (even nested parts) can be produced in a single pass. The most commonly used materials are plastics and metals, as well as ceramics and organic materials. They can be solid, liquid or in powder form. The three main printing technologies are: FDM technology, 3D printing by photopolymerisation, and powder binding (see 1 - on the following page).

Fused deposition modelling (FDM)

This method is the simplest to implement: a mobile extrusion nozzle melts the filament at a temperature of 180°C and deposits the material on a table which lowers (by around 0.04 mm) as layers build up.

This is the process that has been successful for printers for the general public. A number of materials, such as ABS, PC and PLA, are available, and there is a wide range of colours on offer. These materials have good physical and mechanical properties, allowing them to be used for a number of functional parts (claws in robotics, positioning tables for parts, etc.).

The level of precision of the parts produced depends significantly on the machine and the nozzle diameter; however, it is difficult to achieve precision of less than around 0.1mm.

Photopolymerisation

Two main processes use liquid polymers.

> Stereolithography: solidifying a liquid using laser light

Extremely precise and with very high-quality detail, this process can be used to make very large parts (up to 2 metres), but it is expensive and the parts are relatively fragile. There is also a very limited choice of material and it is impossible to print parts in colour.

TECHNICAL INFORMATION

1/ ANALYSIS OF 3D PRINTING MATERIALS: CASE STUDY FOR SHOE SOLE MANUFACTURING (FLEXIBLE MATERIALS IN GREY) BINDER GUIDES

TYPE OF MACHINE	MATERIAL	ABRASION RESISTANCE	SHORE HARDNESS A	TENSILE STRENGTH		FLEX RESISTANCE
		Loss of volume - mm ³	After 15s	daN/cm ²	%	No. of cycles
Powder sintering	PA 12 Polyamide	64	98	469.3	22	
	PA-GF Glass filled polyamide	147	99	449.9	5	
	Alumide	133	97	308.9	3	
	TPU 92A1 Thermoplastic Polyurethane	38	91	174.7	317	100,000
FDM Filament deposition	ABS Acrylonitrile butadiene styrene	406	98	218.7	7	
	ABS M30	324	99	370.1	9	
	PC Polycarbonate	139	98	496.3	5	
	PC + ABS	364	99	363.3	7	
SL Stereolithography	TuskXC2700T (Epoxy)	585	99	608.8		
	Xtreme	478	98	566.9		
	Poly 1500	484	99	434.4		
Multi-density Poly Jet	Tango Black rubber-like resin +	3661	21	7.1	152	20,000
	Digital Material rubber-like resin	1348	52	36	68	400
	Vero White resin	508	99	729.2	5	
	Sports shoes	<120		min 100	450	100,000
	Smart shoes	<150		min 100	400	100,000

> The Polyjet Matrix process: solidifying a jet of material using ultra-violet light rays

This is the only process that can combine flexible materials (from 95 to 27 Shore) and a rigid material, but the results are not very effective, mainly due to the materials' very low abrasion resistance.

Powder binding

> Powder binder jetting using inkjets (3D Polychromes)

This is the only process that can simultaneously print hundreds of thousands of colours. A range of materials can be used (ceramic, polymer, composite). This technology is much less expensive than stereolithography (it is six times cheaper) but the printing quality is lower, with grainy surfaces.

> Laser powder-bed particle binding

This uses the same principle of depositing successive layers of powder, but in this case it is a laser beam that binds the powder particles together. An extremely wide variety of materials can be used, such as polyamides (PA), thermoplastic polyurethanes (TPU), flexible materials, and even metals (stainless steel, cobalt-chrome, titanium, etc.). This technology is also very expensive. Precision levels are a long way from traditional mechanical techniques, but this approach can be sufficient for equipment such as binder guides or sewing machine feet.

PHYSICAL AND MECHANICAL PROPERTIES

We are particularly interested in flexible materials that are similar to our finished shoe products (materials in grey in the table), and we tested them in our physical laboratory for their abrasion resistance, tensile strength and flex resistance (see 2).

2/ COST OF BINDER GUIDES USING DIFFERENT TECHNOLOGIES

TECHNOLOGY	MATERIAL	COST
FDM	ABS	From €10 to €50
Polyjet	Resin	From €20 to €50
Lost wax mould	Brass (Mirror polish)	From €160 to €180
Metal fusion	Stainless steel (microblasted and unpolished)	€260
Traditional manufacturing	Stainless steel	From €70 (standard) to €400 (custom-made)

CONCLUSION

The benefits of 3D printing at the design and development stages is adamantly clear, and some design firms have already used them for a number of years. However, our technical and economic review shows that for now, 3D printing is reserved for the manufacture of high-end products. This technology will completely alter the way that shoe soles and uppers are designed as a result of the limitations and (above all) the benefits it provides (product customisation, complex shapes, multiple materials, responsiveness, etc.). There is no doubt that the cost of machines and materials will continue to fall and that manufacturing times will also become even shorter, meaning that 3D printing has a bright future in the shoe industry.

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Find all the information
 about the association
 on www.uitic.org

