ICT-258724

PASTA

Integrating Platform for Advanced Smart Textile Applications

Instrument : Large-scale Integrating Project
Thematic Priority : Information and Communication Technologies (ICT)

Deliverable D7.16

PASTA Newsletter 5

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Contact person : Johan De Baets – imec

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Dissemination Level		
PU	Public	**X**
PP	Restricted to other programme participants (including the Commission Services	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Abbreviations

CFP	Crimp Flat Pack
FR4	Flame Retardancy 4
FTE	Fulltime equivalent
ISO	International Organization for Standardization
LED	Light emitting diode
RFID	Radio-frequency identification

Document history

Date	Revision	Author	Remarks
17.3.2015	0.1	J. De Baets	Table of contents available
7.5.2015	1.0	J. De Baets	Draft version available for internal review
12.5.2015	1.1	J. De Baets	Revised version after internal review, available for approval by the Project Steering Committee
14.5.2015	2.0	PSC	Formal approval by the Project Steering Committee
		J. De Baets	Formal approval by the Project Coordinator for submission to the European Commission

1. Executive summary

The PASTA Newsletter has the aim to support the dialog between the PASTA Consortium and the development communities, which work on similar topics, respectively potential customers.

We want to inform the target group in the fifth and final issue about the many achievements realized in PASTA. The developed, beyond state-of-the-art electronic packages are finalized and this final issue presents the final results of these developments in the form of demonstrators that provide a good idea to what kind of products these different technologies will take us.

2. Introduction – Aim of the PASTA Newsletter

2.1 Target groups

The following reader groups are targeted :

- Project partners
- European Commission, EC Reviewers, Scientific Officer
- Development community
- Interested public

2.2 Means of publishing

So far the dominant way of publishing is by electronic means (pdf-file). The newsletter is available in the download area of the project web page: www.pasta-project.eu

3. Contents headlines

The contents headlines of the third PASTA Newsletter are :

- **Introduction – Contents of this issue**
- **The Project**
  - Aim of the project
- **PASTA technologies**
  - E-Thread : LEDs, RFIDs and sensors in the form of a yarn
  - Stretchable interposer : A clever method to implement a lot of functionality in your smart textile
  - Crimp Flat Pack : Cost-effective solution to integrate electronics into fabrics
- **Industrialization**
  - E-Thread production machine
  - PASTA Robot : Die-bonder for fabrics
  - Large area textile wiring
- **Demonstrators**
  - Emergency signage : Invisibly integrated lighting for your interior
  - C-Prosthesis : Better fitting of prostheses by integrated strain monitoring
  - Smart bedlinen : Urine and sweat detection improving patient's comfort
  - Smart car seat heater : Efficient heating by lightweight, textile based solution
  - RFID monitoring : Improved textile manufacturing quality control by integrated RFID-tag
- **PASTA spin-off**
- **Contact**

4. The fifth PASTA Newsletter

A copy of the fifth PASTA Newsletter is provided in Section 6 (Annex).

5. Conclusion

The fifth and final PASTA newsletter has been created to support the dissemination of the aspects of advanced smart textile applications.

This final issue concentrates on the many achievements realized in PASTA. The developed, beyond state-of-the-art electronic packages are finalized and this final issue presents the final results of these developments in the form of demonstrators that provide a good idea to what kind of products these different technologies will take us.

Annex

6.1 Annex : PASTA Newsletter 5

On the next pages a copy of the fifth and final PASTA Newsletter has been provided.

SEVENTH FRAMEWORK PROGRAMME

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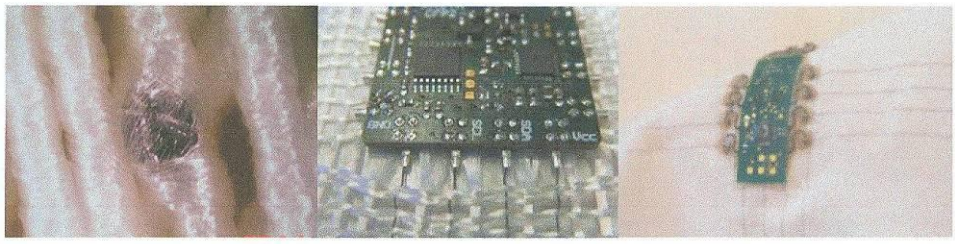
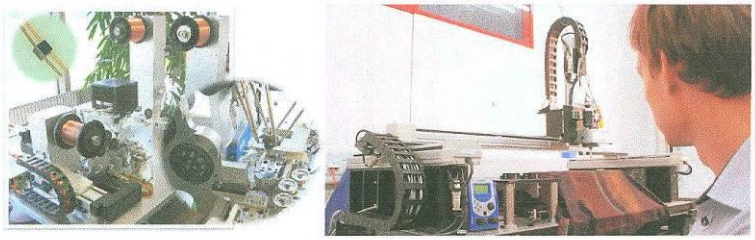
PLATFORM FOR ADVANCED SMART TEXTILE APPLICATIONS



The Technologies



The Equipment

The Smart Textile Applications

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imec cea Fraunhofer IZM stfi csem

PEP CENTRE TECHNIQUE DE LA PLASTURGIE ETTLIN Textiles HOLDING TEXTILE HERMÈS Primo1D The E-Thread Company

asyril Fundeo NIKE TECH 3.0M.

Introduction

CONTENTS OF THIS ISSUE

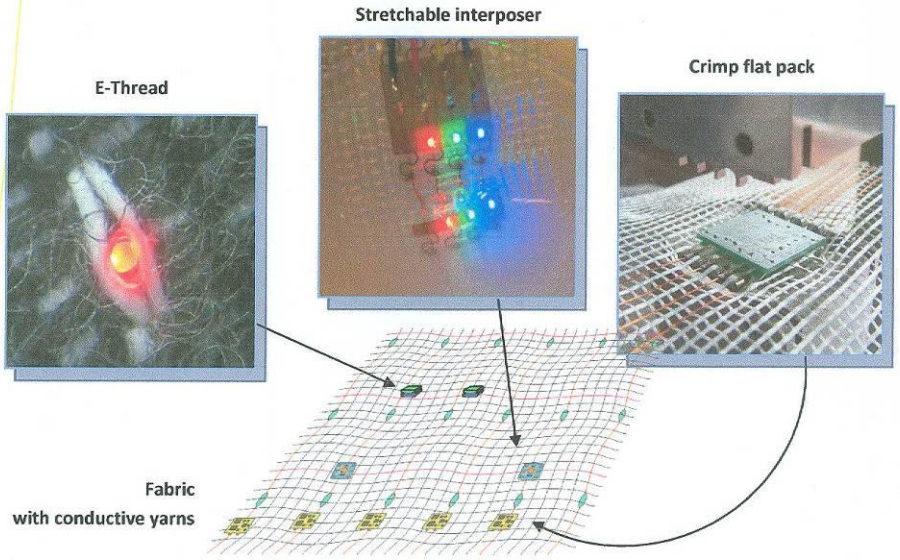
This is the final newsletter of our PASTA project. Four and a half years is a long time in project-land, so it is time now to finish and to make a round-up of our achievements. The idea to develop new concepts for electronic packaging, so that they would fit much better to the flexibility, stretchability and comfort of textile has been challenging but very rewarding. The development of technologies for integrating small electronic components in a yarn, miniaturized crimp interconnections and stretchable polymer based electronic interposers has lead to the integration of electronic functions in fabric in an unprecedented way. This newsletter shows the final results of these developments in the form of demonstrators that provide a good idea to what kind of products this technology will take us to.
We believe that the PASTA project has brought the two very different worlds of textile and electronics a bit closer together by offering new technical solutions for integration. Applications will go much beyond the current demonstrators : wearables, healthcare, fashion, decoration will obviously benefit from this technology, but also technical textiles – in a more hidden way – will be able to use integration of electronics for e.g. cars, structural elements, buildings...
I would like to thank all the project partners for the fruitful meetings and discussions, their valuable contributions in reports, and the successful results of our cooperation. Of course I would also like to thank the Commission, represented by Mr. Andreas Lymberis, for the financial support but above all for the interesting discussions and continuous push to drive the consortium to relevant developments.

Enjoy the reading,
Johan De Baets, Project Co-ordinator, imec

The project

AIM OF THE PROJECT

The PASTA project combines **research on electronic packaging and interconnection technology** with **textile research** to realize innovative **smart textiles** with **unlimited possibilities**.
Methods have been developed to **integrate electronics in a robust way into textiles**,
The ambition of the project was to realize a number of functional demonstrators showing the feasibility of the Pasta technology and proving the **added value** created to the **textile**.

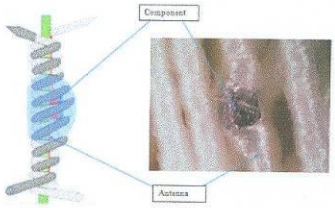


E-THREAD | LEDs, RFIDs and sensors in the form of a yarn

The E-thread process aims at a direct connection from a chip assembly to external wires without using the traditional bonding / packaging stage. In addition of that a minimalistic die scale packaging has been implemented in order to be almost undetectable when inserted in textile while an efficient protection is guaranteed. Through a very limited set of wafer scale operations, one or several chip dies can be assembled and connected to conductive wires directly from the chip surface. The result of a fully processed E-Thread assembly is a spool of chips connected to a flexible wire (string) that can be used for incorporation into materials through taping, weaving, knitting or extrusion.

In the frame of PASTA project, two approaches were implemented.

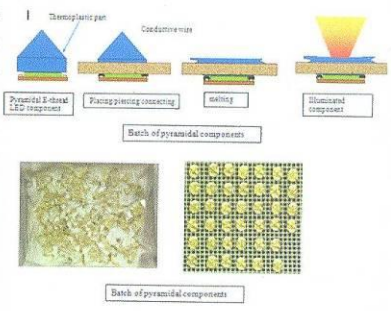
-The first solution, called **pre-mounting**, consists of inserting and connecting a conductive thin wire on micro-machined grooves, localised on both sides of the chip. Different kind of conductive wires can be attached to the devices by this way like copper monofilaments, silver plated on polyamide monofilaments, filaments covered with a metallic tape.



In addition to the mechanical wire/die attachment, studies carried out in the frame of PASTA made it possible to realize a connection with insulated conductive wires. Indeed, a patented solution allowed simultaneously organic layer removing and electrical connection in one shot process. The string of components is then twisted in textile thread by spinning in order to be fully compatible with wired textile technology (weaving, knitting...). The technology is currently exploited by Primo1D for RFID application.

- The pre-mounting approach is not suited for the insertion of LEDs in textile (orientation, placement accuracy). Consequently, a new method called **post-mounting** was developed in the project: a specific package for LEDs is designed and allows the accurate placement of the LED component into a "pre-weaved" textile equipped with conductive wires. The package is made of a thermoplastic micro -pyramidal sharp tip manufactured by PEP using injection moulding. LED components are then collectively glued to the micro-pyramids, before final dicing.

Several challenges had to be overcome within the development of the polymer micro-pyramids. First, the suitable polymer material for LED capping was selected, with regards to the requirements of transparency and textile cleaning processes. Then, the injection moulding process for high aspect ratio µ-structures was developed and optimized, involving additional processes like heat & cool and vacuum technologies. Finally, the compatibility with micro-electronic post-processes was validated (pick & place, dicing).



The component is first aligned and pressed through the textile by the back side until piercing. The conductive wires are connected to the LED bumps and the top part of the pyramids are then melted in order to obtain a flat and smooth shape. A customised machine has been made for this critical last stage.

UNOBTROUSIVE

You can integrate a very small chip on top of a yarn, integrated in the textile. Ideal for RFID tags or illumination!

MOISTURE PROTECTION

Integration method is compatible with enamelled conductive wires which gives you a protection for humid environments.

ALSO FOR WEAVING

This one dimension concept allows you to integrate electronic components into textiles by weaving.

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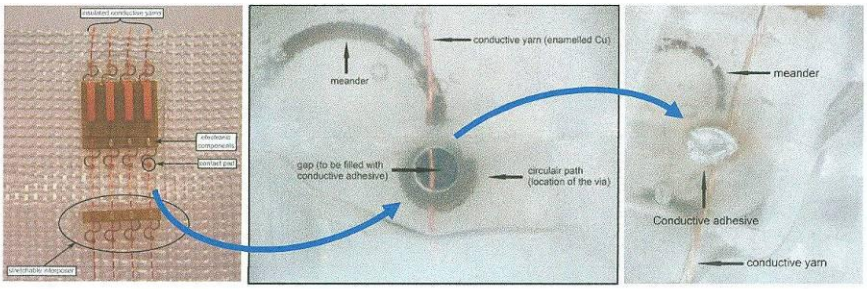
STRETCHABLE INTERPOSER

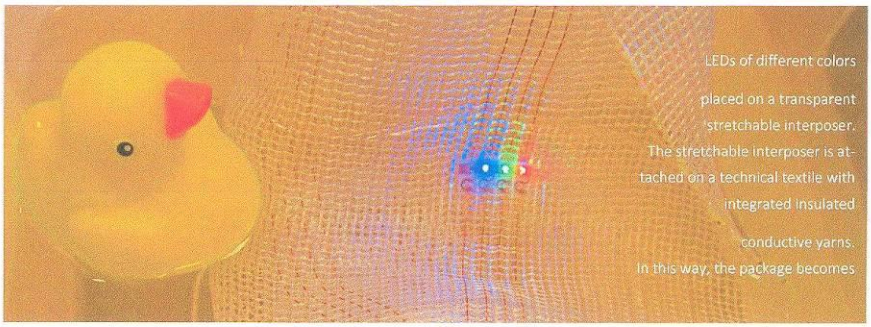
A clever method to implement a lot of functionality in your smart textile

Everybody knows the problem. You have a great idea about an **intelligent application** which you want to produce with **textiles** but you don't know how to do it without changing the textile properties of the fabric. This solution will bring your idea into practice!

You start with a conductive wiring system on or in the fabric. The conductive yarns can be woven into the fabric or embroidered on the fabric. This integration technique can handle **both methods**. The most important part of this technology exists of stretchable interposers. This is a stretchable electronic circuit which is encapsulated in an elastic material.



The elastic material serves as **mechanical protection** and as **barrier against moisture.** The stretchable interposer is attached on textile by using a flexible adhesive. After attaching the stretchable interposer on the textile fabric an electrical connection between the stretchable interposer and the conductive yarns has to be made. The connection is insulated to make the whole concept resistant against moisture. Now you turn on the power supply and the intelligent fabrics come to life!



Not every application needs the same properties.
To fulfill certain properties some additional products and process steps are needed.
This influences the cost significantly.
The most important options that can be chosen are listed below:

- Total insulation (e.g. the application come constantly in contact with moisture)
- Washable (e.g. clothing applications)
- Maximum transparency (e.g. lightning applications
- Connection with insulated yarns (e.g. applications in humid environments)

imec

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RELIABLE

By using the numerous stretchable technology patents, maximum reliability of the electronic circuit is guaranteed.

ADJUSTABLE ELECTRONICS

You can use whatever electronic components you want to integrate with this technology. From advanced circuits like processors till simple resistors, everything is possible.

LARGE FABRIC COMPATIBILITY

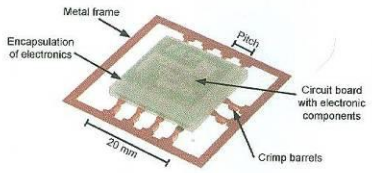
This integration method uses low pressures, low temperatures and no aggressive chemicals.

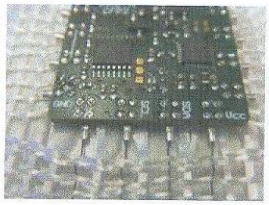
CRIMP FLAT PACK | Cost-Effective solution to integrate electronics into fabrics

Nowadays Europe's textile business is under increasing pressure from Asia. Only special sectors like technical textiles and luxury brands have a chance on the world market. New products that are equipped with new functionalities based on integrated electronics can offer an extra advantage for the textile industry and can achieve higher prices. However, due to the high market pressure prices for those extras need to stay in a reasonable range.

The goal of the crimp technology is a cost effective and easy to use technology that offers a reliable method for integrating complex electronics into textiles – e.g. for sensor applications in composites. The technology should be used with a minimum of special equipment at room temperature and should be directly processible in textile manufacturing facilities.

The basis for the CFP is a metal frame that is equipped with a circuit board. The circuit board is a conventional FR4 and contains all "intelligence" of the module and is exchangeable as needed by the application. The metal frame acts as an interposer to make connection to a larger substrate. In the case of the PASTA project the substrate is made out of textile fibers and integrated conductors and sensor yarns. The connection from the metal frame to the substrate is made by crimping – meaning a mechanical deformation of the metal parts to achieve a mechanical and electrical connection. Of course, it is possible to protect the CFP if necessary. It can either be encapsulated before crimping or after crimping using available standard processes, like hot-melt molding or transfer molding. If the module is integrated in a composite afterwards no additional encapsulation is required.





The left figure shows an encapsulated CFP before its release from the metal frame. The design of the specific module is always dependent on the application. In particular the size, number, and material of the textile wires define the CFP. The right figure shows a functional module without encapsulation crimped on the sensor textile for the C-leg. The new package is simple and robust enough to be used in a textile company. The integration can either be done by a special automated piece of equipment or with simple manual presses for medium volume production. The manufacturing flow was chosen to be extremely close to current circuit board processing flows.

One reason to develop a crimping process for the integration in textiles was the expected high reliability. The reliability test program performed within PASTA showed that the CFP is indeed very reliable under the conditions relevant for the integration in composite materials: thermal cycling, humidity and bending. Especially the bending tests have been essential for the qualification of the package as this is the dominating stress in the mission profile of the C-leg. Over 100 000 bending cycles have been shown without electrical failure.

The results of PASTA show that the crimp technology is a promising integration technology for complex electronic modules in technical textiles with high reliability requirements. It is based on conventional processes which are widely available. This allows fast implementation.

FEATURES

- Mechanically robust
- Easy to use interconnection process
- Free module design
- Partly or full encapsulation
- Compatible with open weaves textile carriers
- Compatible with metallic and metallic/textile hybrid yarns

Fraunhofer IZM

HIGH RELIABILITY

Crimped modules offer you excellent results for heat and humidity.

LOW COST

By use of standard equipment and due to the simple crimp processes this technology offers a low-cost entry into the world of smart textile interconnections.

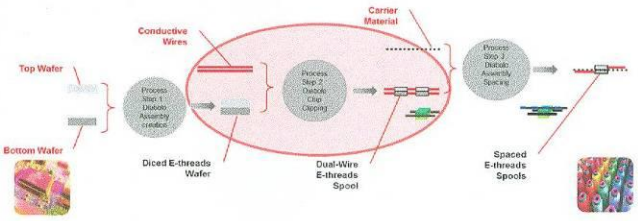
FAST PROCESS

Mechanical deformation in less than a second is all you need.

INDUSTRIALIZATION

E-Thread production machine

During the Pasta project, the equipment for the production of E-Threads (formerly Diabolo technology) was developed first in the form of a demonstrator to validate the process and then as an automated equipment prototype.



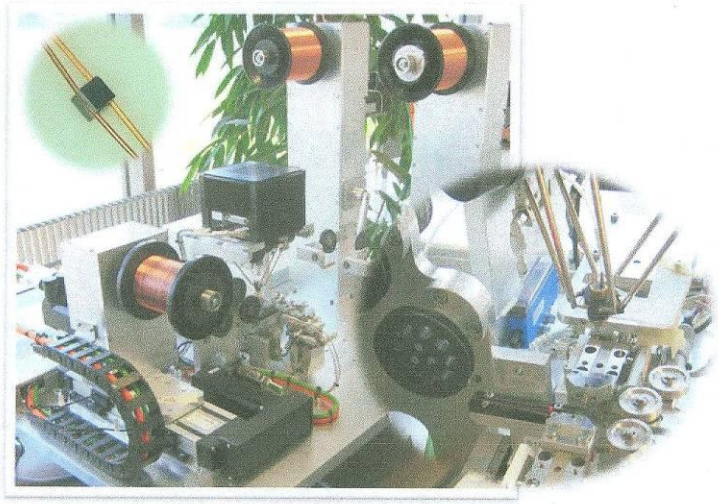
The figure above resumes the manufacturing flow from wafer to complete spools containing the final RFID E-Threads. The Pasta equipment is dedicated to the crimping of the electronic device on the conductive yarns. At the end of the project, e-threads can be automatically assembled on the conductive yarns in a roll to roll process.

AUTOMATED

E-Threads are automatically produced by the developed equipment.

RELIABLE

Precise assembly o f small dies on flexible yarns.



E-Thread Pasta production equipment to crimp electronic devices on conductive yarns

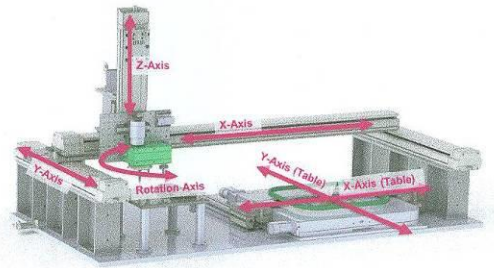
The challenges of this development was to guaranty a reliable and precise assembly of small dies (<1mm) on flexible yarns (Ø 0.13mm). As the equipment development, the optimization of the fabrication process and of the device, as well as their validation occur simultaneously, the equipment had to include adjustment possibilities as well as flexibility in the controller to overcome potential subsequent needs. After a completely manual demonstrator, robotics was then a key advantage in the automated equipment. A Pocket Delta robot was used to align the dies onto the yarns. The small packages are then directly crimped on the two yarns before they are rolled in spool. The equipment is now ready for the technology transfer into a complete industrial process of fabrication.

asyril

INDUSTRIA LIZATION

PASTA-Robot Die-bonder for fabrics

With the PASTA-Robot a new production method is now available at the cutting edge of technology to overcome the technological roadblocks like not rugged, geometry-stable substrates as fabrics, insulated conductive wires, temperature sensitive textile fibres and new LED devices like the Diabolo LED with integrated contact pads for low temperature eutectic bonding with SnBi solder paste and the pyramid cap that is thermally reshapeable to penetrate into the fabrics and to maintain the device attached to the textile.



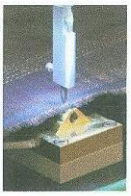
AUTOMATED

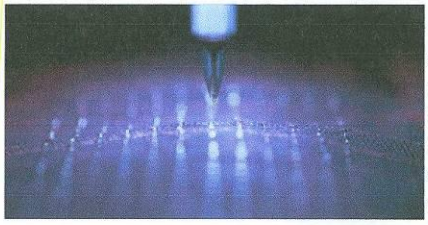
Automatic assembly of electronics on flexible textiles

MODULAR

The equipment design and software is modular and can be adapted to production needs

Two new features enable the automatic assembly of electronics on flexible textiles. The first new technology is the intelligent vision system based on a machine learning algorithm for automatic localisation of the best fitting contact points on the textile to guarantee electrical interconnection. Using a neuronal computer algorithm, the machine is able to self-learn the criteria for the best interconnecting points and navigate on the textile structure.





The second technology is the heating tool for the eutectic bonding of LED pads to the insulated conductive yarn in the fabrics. The very tight temperature ranges between melting the SnBi solder paste (160°C), the wetting of insulated yarn (170°C) and damaging the fabrics (180 °C) is controlled by heated vacuum nozzle, which is holding the Diabolo LED component, and the heated ambos under the fabrics, which is supporting the fabrics and preheating the contact points.

The equipment design and software is modular and can be adapted to production needs. CSEM offers customer designed equipment and bonding services for assembly of Diabolo LED Components to fabrics.

Features

- XY-Table workspace for bonding 190x190mm.
- Spring loaded vacuum gripper with controlled heating.
- Vacuum gripper interface is compatible to the die-bonder industry standard.
- Intelligent look-down-camera system for automated alignment.
- Intelligent look-up-camera system for automated die localization in the gripper.Resolution 10um.
- Dispensing system (Pressure controller and dispensing cartouche mounted on the robot head) for applying solder on the textile
- Punching needle mounted on a pneumatic cylinder for pre-perforating the textile on the bonding position
- Laser distance sensor for measuring the distance between the bonding head and the substrate

csem

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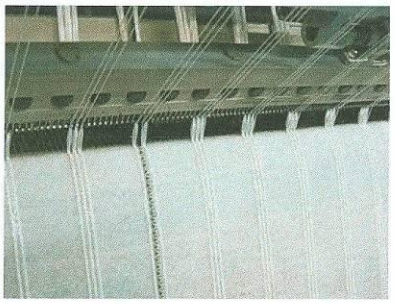
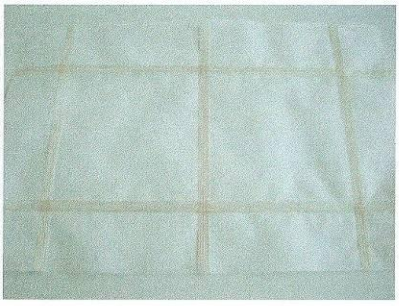
INDUSTRIA LIZATION

Large area textile wiring

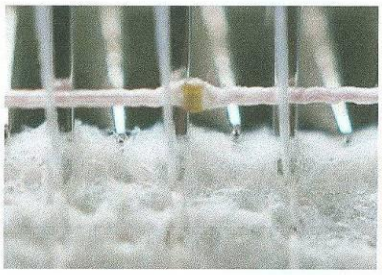
Large area textile wiring via Raschelmaschine with direct web feeding (RS MSUS-V, Karl Mayer Malimo Chemnitz) provides a brilliant tool for a fast wiring of textiles – large area nonwovens or woven fabrics. With a medium speed of ½ m per minute, more than 4 m of textile in width can be functionalized. Functions like heating, monitoring of moisture or bending, lighting and others could be integrated, on washable or technical textiles as well as nonwovens for one way use/disposal.

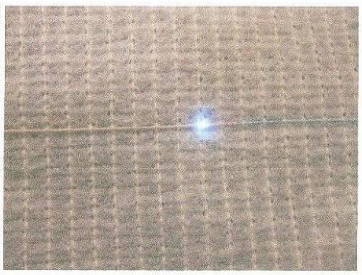




Unidirectional or orthogonal wiring – different material in each weft could be used.

Also functionalized yarns, i.e. eThreads, are processible without damage; so the pre- as well as post mounting technique for the E-Thread technology could be used for the electronic insertion.





E-Thread on Raschelloom and afterwards

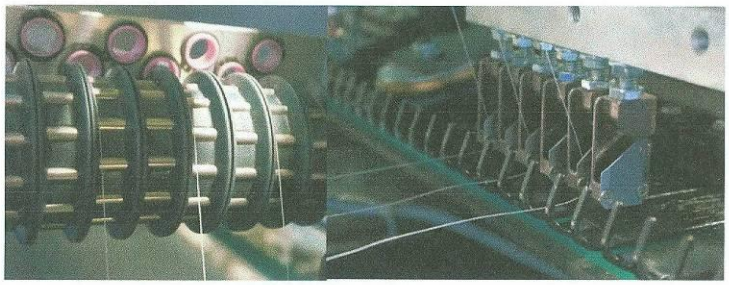
FAST

With a medium speed of ½ m per minute, more than 4 m of textile in width can be functionalized.

SMOOTH INSERTION

Specific yarn feeding devices were developed to realize a smooth insertion of sensitive or also uneven yarns.

Some specific yarn feeding devices were developed to realize a smooth insertion of sensitive or also uneven yarns.



Active yarn/wire feeding for sensitive or conductive materials

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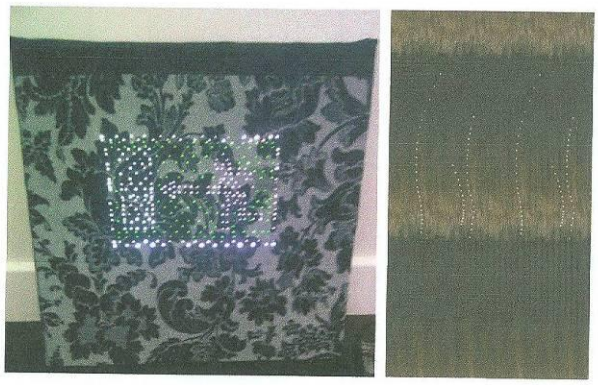
EMERGENCY SIGNAGE

Invisibly integrated lighting for your interior

Emergency signage that will not ruin your art deco Louis XV interior will soon be real after this project of intensive and successful development. Interior design is a huge and growing market for both private and public housing. People want more and more customized and "personalized" products for their living spaces. With this mindset, a luminous textile for emergency exit has been realized.

This realization offers the following advantages:

- LEDs are ***invisible*** when lighted off due to their tiny size (less than $1mm^2$)
- ***Free*** and automated LEDs ***positioning***
- No modification of the textile properties (touch and appearance)
- Complementary to the textile design (printed or jacquard), LEDs placement allow to reinforce patterns by the use of light dots.



An emergency exit signage has been produced and all the LEDS (389) are inserted in the fabric using the CSEM PASTA-robot. Cross connections and interposer soldering are manually done. Luminous inhomogeneity of the first demonstrator has been lowered thanks to a preparation of the fabric and a finer screening of the LEDs.

Decorative textiles have also been produced (handcrafted) and show the potential of the PASTA technology in design for interiors.

Tests and status:

Functional (luminous properties) and use tests (mechanical stress, dry, vapor and vacuum cleaning, hydrolysis and flame retardency) have been performed and show that the luminous fabrics fulfill the norms for interior textiles (except for FR properties) and light output have to be enhanced for emer-

Invisible

The integrated light elements are invisibly integrated in the high quality textile, not ruining your interior design.

Improved safety

Exit signs appearing on the walls during an emergency will help people evacuating in a faster way outside public places, hotels, etc.

Versatile

This technology can be used for various applications where lights integrated in textile are an added value.

HOLDING TEXTILE HERMÈS

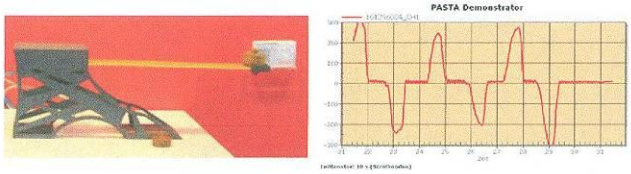
For more information, contact:
Delphine Christophe, Holding Textile Hermès
dchristophe@hth.hermes.com

C – PROSTHESIS

Better fitting of prostheses by integrated strain monitoring

ETTLIN started with the scope to develop a sensor textile for structural health monitoring of composite components. Monitoring the inside of composite materials is still not possible. For example in the field of wind energy the rotor blades have to be checked. Nowadays it is still done visually and with monitoring systems on the surface. The concept of the sensor textile is to have a carrier structure with integrated stress sensors for global and local stress measurement. This sensor textile will be embedded as an additional layer in an exciting composite structure.

The sensor textile has to fullfill two measuring tasks: global stress measurement and local stress measurement. The global stress measurement recognized in accordance with the location of the filamentous sensors the entire load on the composite component.



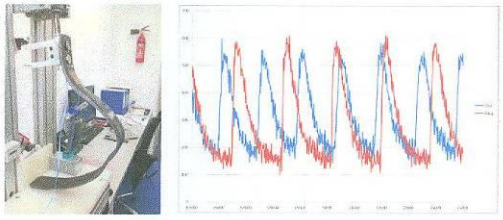
Measuring the weight on a load beam with integrated sensor textile

The dimension of the sensor textile as well as the placement of the integrated sensors depends on the application. Within the project the functionality of the sensor textile has been proven. It was shown that an up and down scaling of the sensor textile is possible.

Integration of the sensor textile in c leg of a sports prosthesis

As a first application for the use of the developed sensor textile the C-leg of a sport prosthesis was selected. The prosthesis is customized and it is always an individual production. Thus, the processability and the functionality of the sensor textile have been proven.

After mechanical start-up of the prosthesis the signal of the sensor textile could be verified. On a test bench the load profile of walking/running person was applied. The measured signal correspond to the different cycling load profiles.



Measured stress in the prosthises caused by different load profiles

Avoiding injuries

Integrated sensor textile capable of measuring stress and strains continuously, avoiding incorrect fitting.

Fully integrated

The sensors are fully integrated in the composite structures.

Versatile

Not only applicable for prostheses, but in any situation where stresses need to be monitored in composites.

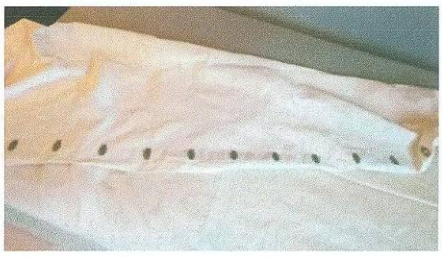
ETTLIN Textiles

For more information, contact:

Frauke Haensch, Ettlin Textiles

SMART BEDLINEN | Urine and sweat detection improving patient's comfort

Imec developed a smart bedlinen which is able to measure moisture e.g. urine and sweat.



This intelligent textile will improve the care work in hospitals, elderly homes and home care. Geriatric nurses and hospital nurses will be informed when bedwetting occurred. Furthermore, bed linen hygiene can be automatically monitored, improving the patient's comfort.

Automatic urine detection

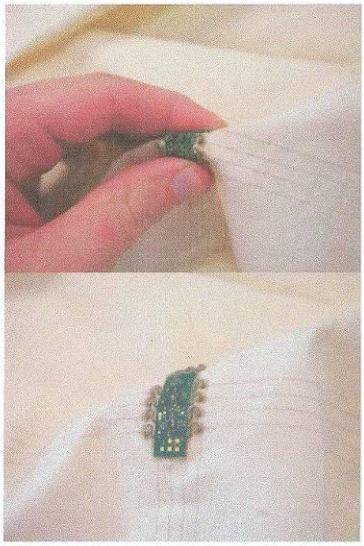
The integrated yarns and sensors allow detection of urine, facilitating the work of the nurse and improving the patient's comfort

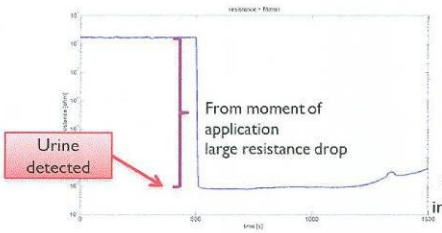
Hygiene check

The system is able to measure the accumulated amount of sweat, giving an objective indication on the hygiene of the bedlinnen

To be able for this detection, sensor yarns are woven into a high quality cotton fabric. The sensor yarns are used for moisture detection. The placement of the integrated sensor yarns is shown in the pictures.
Stretchable interposers are fixed on the crossing points between the sensor yarns (weft) and signal communication yarns (warp).
A central communication unit is connected with the hospital environment. The target is to connect the bedlinen with the normal used equipment in hospitals and elderly homes.

The backside of the fabric is coated to avoid that moisture is running into the mattress. To have the coating on the backside, the textile character will not be disturbed on the topside where the patient lies. The bedlinen will have the same lifecycle compared to normal bedsheets in hospitals. The bedlinnen has been evaluated on home laundry washing and is able to withstand at least 25 washing cycles at temperatures upto 90 degrees.





Signal captured by the system indicating patient's loss of urine.

imec

For more information, contact:

Johan De Baets
johan.debaets@imec.be

SMART CARSEAT HEATER

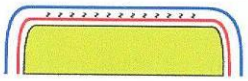
Efficient heating by lightweight, textile based solution

Developing a product for the automotive industry is always a challenge. **Cost** and **reliability** are important design parameters. To further reduce the ecological impact of cars, **reduced power consumption** for hybrid and electrical cars is a must. Another aspect is the weight reduction leading to reduced fuel consumption.

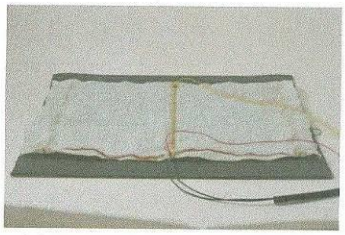
Within the Pasta project, the development of this product had two primary objectives:

- **Reduced power consumption** compared to state-of-the-art solutions
- **More clever manufacturing technologies** to reduce cost and weight

For the demonstrator developed in Pasta, the fabric's selected materials are polyamide yarns in combination with conductive and feeding yarns, which are based on silver plated copper. The silver plating is used to prevent patina. The heating fabric is integrated in the carseat in-between the leather covering and the foam.



foam
leather covering
heating fabric with integrated NTC

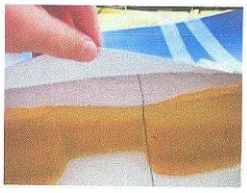


The supreme properties of the seat heater are achieved through optimization of the interface between the conductive fabric, integrated sensing components for temperature and pressure, and a power regulating, electronic system. The different components are connected through **stretchable interposers**, which also are providing the connection between the heating device and the car environment. Encapsulation of electronics ensures guaranteed functionality in humid environments.

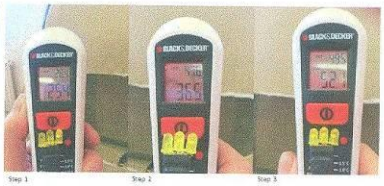
The temperature can be set by the user in a range from OFF up to 50°C, and the power supply is working only under the condition that the pressure sensors are indicating use of the seat. The wide temperature range has been chosen to satisfy the heat needed to be comfortable also in very cold working environments, such as vehicles in deep-freeze warehouses. Power supply within the project has been set to 12V, but the product is adaptable towards up to 48V.

The seat heater with electronic steering system is adaptable to most customer requirements on a wide range of applications such as automotive, working vehicles, furniture and hospital equipments. Temperature regulation in different climate zones is possible. It is easily installed and it compliers towards the requirements within ISO 16750-2

Car seat heater prototype: electrical characterization



Pressure sensing yarn integrated in car seat heater



Temperature measurements on car seat heater

Textile based

Heating by means of conductive textiles in combination with integrated textiles

Highly efficient

Energy consumption reduction compared to existing solutions

Lightweight

Textile in combination with stretchable electronics

NIKE TECH

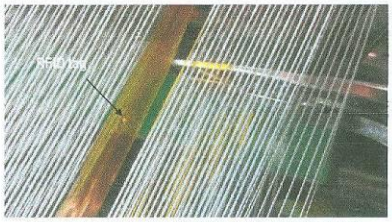
For more information, contact:
Arne Ericsson , NikeTech
arne@niketech.se

RFID MONITORING

Improved textile manufacturing quality control by integrated RFID-tag

The growing competition in the textile industry leads to innovative ways to further improve the quality control of produced fabrics. Furthermore, the logistical challenges in the supply chain of textiles need clever solutions to reduce these costs.

In Pasta, we have tackled these challenges by integrating RFID tags in the yarns of textiles, in order to monitor in a better way the production of fabrics and tag in a unique, invisible way the origin of the fabrics. This is possible by introducing the RFID tag before the start of the weaving process.

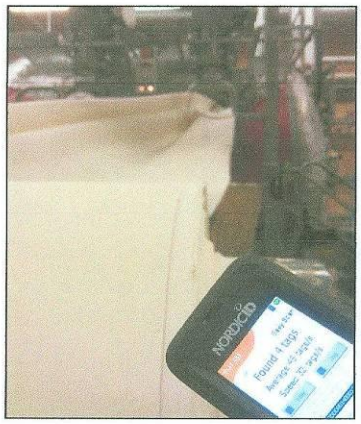


Insertion of Diabolo RFID tags during weaving

RFID is a system where passive or active tags can be written to or read from. It is used in a broad area of applications e.g. for identification of persons. In Pasta, **E-Threads** have been fabricated with this feature. The E-Thread contains the RFID chip, the conductive yarns are serving as antenna.

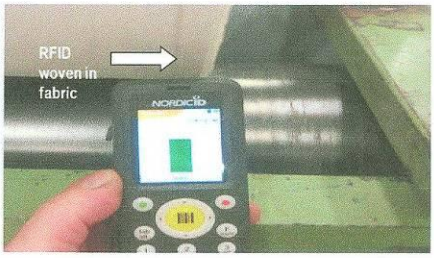
Such a small RFID tag is attached between two layers of sustainable special tape. The tag is programable with a commercial standard writer (e.g. NordicID). This tape will be woven into the edge of the fabric. The fabric flow throughout the plant decides where readers are needed. The possibility to write to the tag is also given. Logging process conditions are possible. Information has to be implemented into different process monitoring systems. Furthermore, the possiblity of automatic store management is guaranteed.

In the PASTA project we are working with the E-Thread RFID tag. The special tape design guarantees a protective cover of the tag. The tag withstand conditions found in the textile process industry. Eg. Rolling, Scouring, Dyeing or Heatsetting.



Detection of RFID tags in woven fabric

Within the PASTA project, we have investigated the possibilities to use allready existing process programs. (E.g. Loomdata or Barco)



RFID before dyeing. Scoured and pre heatsetted.

We are now producing with the latest state of the art manufactured RFID yarn. First results are showing a very good outcome!

For more information, contact:
Cyril Meyer, FOV Fabrics
Cyril.meyer@fov.se

BETTER QUALITY CONTROL

Integrated RFID tag allows reading and writing process information allowing trace-ability and process control.

AUTOMATIC STORE MANAGEMENT

The RFID tag can store fabric information making logistics easier.

PASTA SPINOFF

Primo1D - The E-Thread Company

Primo1D

The E-Thread® Company

Primo1D was created in July 2013 as a spin-off of CEA by 4 individual founders (Emmanuel Arene, Dominique Vicard, Alain Papanti and Jean Brun) and a participation of CEA. In August 2014, Primo1D successfully secured 3M€ of funding with a pool of VC investors and more than 40 Business Angels. Production is scheduled for Q4 2015, and the company has 7 FTE. Primo1D joined the PASTA consortium in 2014.

Primo1D is exploiting the results of the PASTA project as a basis for the final tuning of the E-Thread® process (the "Diabolo" Technology commercial name) and is currently working on product industrialization: for that, another result of the PASTA project, a prototype assembly line designed and manufactured by ASYRIL (CH) is currently used by Primo1D, and is the starting point for the manufacturing of Primo1D's production equipment.

The results of the PASTA project for Primo1D constitute a significant bootstrap that allows targeting a commercialization of innovative breakthrough products less than 2 years after the project completion. In fact, those results triggered the creation of Primo1D, a *Genuine European Start-up Company*.

The main innovation of the E-Thread® RFID product is its conditioning under the form of a yarn; this conditioning makes the product invisible and inseparable from the textile or material it is inserted into.

Primo1D aims at commercializing yarns embedding electronics. The first product will be a yarn designed for the industrial laundry market, and will feature a UHF EPC Gen 2 RFID as electronic function. Primo1D is focusing its research efforts at the integration of more and more sophisticated electronic functions in a yarn, such as sensors and sensing units. Primo1D is actively applying for participation in European projects supporting its R&D Roadmap. The E-Thread® Technology won the Avantex Innovation Award in 2013 in Frankfurt.

Check out the Pasta website for more information:

www.pasta-project.eu

Contact us today!

pasta

PLATFORM FOR ADVANCED SMART TEXTILE APPLICATIONS

Project co-ordinator

Johan De Baets

Johan.DeBaets@imec.be

Imec - Gent
Technologiepark 914
9052 Zwijnaarde
Belgium