E-Broidery®

Forster Rohner Textile Innovations

www.e-broidery.ch/en

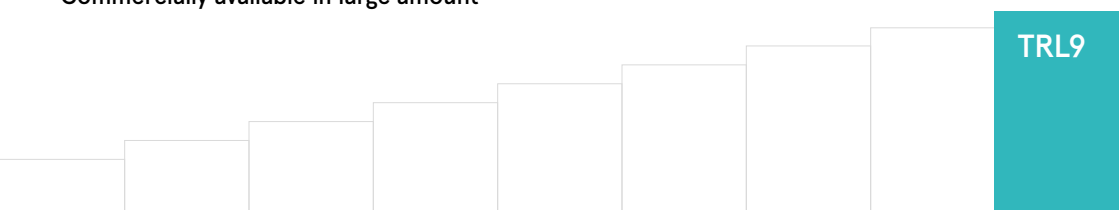
Material System

MATERIAL FEATURES AND COMPOSITION

Flexible, durable and washable textiles integrated with light emitting diodes (LEDs) and conductive embroidery for use as illuminated apparel, accessories, in interiors and for professional lighting products.
Composition: textile, conductive yarns and components, light emitting diodes (LEDs)

AVAILABILITY

TRL 9 – Actual system proven in operational environment
Commercially available in large amount



PHYSICAL QUALITIES

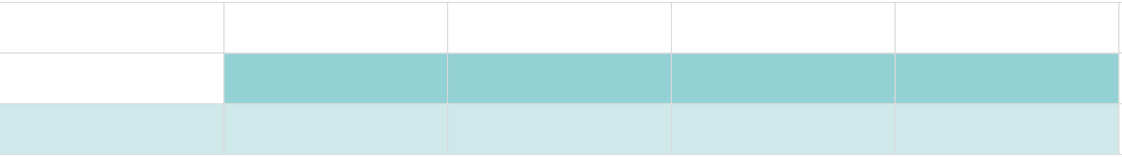
Stiffness	Flexible	Stiff	Surface Reflectancy	Matte	Glossy
Transparency	Opaque	Transparent	Surface Hardness	Rubbery	Hard
Fragance	Neutral	Odorous	Texture	Smooth	Coarse

SUSTAINABILITY PROPERTIES*

Biodegradability | Compostability | Recyclability | Recycled Pre-Consumer Waste | Renewable Content | Recycled Post-Consumer Waste

PERFORMANCE PROPERTIES

Acoustic Conductivity | Chemical Resistance | Fire Resistance | Impact Resistance | Scratch Resistance



Stain Resistance | Thermal Conductivity | UV Resistance | Water Resistance | Wear Resistance

SMART PROPERTIES*

Electrorheological | Magnetorheological | Piezoelectric | Phase Change Material (Pcm) | Photocatalytic

Photochromic | Photoluminiscent | Shape Memory | Thermochromic | Thermoelectric

UNDERSTANDING

*Please see the Glossary at the end of this booklet for more explanation on the terminology.

CERTIFICATES & TESTS

Not available yet.
All information has been provided by the companies and/or material suppliers that delivered the EM&Ts samples.

SUPPLY

Raw Material

Processed Material

System / Product ×

SHAPE

Textile

MANUFACTURING PROCESSES

The textiles are produced using commercial machinery that have large production runs, including numerically controlled sewing and weaving techniques.

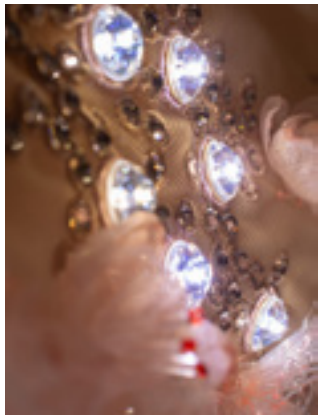
TRANSFORMATION PROCESSES

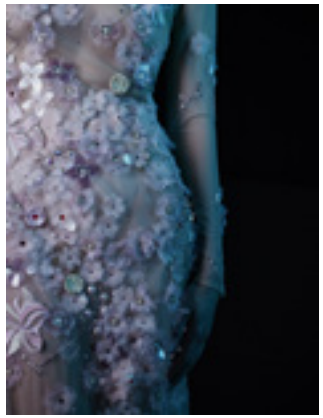
- Additive Manufacturing
- Die Cutting
- Lamination
- Textile Processing
- Blow Molding
- Extrusion
- Metal Working Tools
- Thermoforming Compression Molding
- Casting
- Injection Molding
- Printing
- Welding
- Cold Pressing / Deep Drawing
- Lab Growing
- Rotomolding
- Wood Working Tools

SHAPING

APPLICATION FIELDS

Apparel, fashion, accessories, interior design, professional lighting products.
Potential application: sports, safety, transportation, automotive, yacht design, aircrafts, possibly many others where textiles and lighting can be integrated.





CASE STUDY

In 2017 ElektroCouture together with fashion designer Anja Dragan created "The Last Dress of Marlene Dietrich" in tribute to this internationally acclaimed actress. The custom-made crystals provided by Swarovski perfectly suited the material and the e-broidery® technique by Forster Rohner Textile Innovations, which uses Osram LEDs. The dress was made by combining new technology with traditional craftsmanship. It required 151 LEDs, 313 flowers and 2371 specifically-developed Swarovski crystals. The dress's embellishments can be switched to different light patterns, matching the moods in Dietrich's songs.

COMPARISON & INNOVATION

In comparison with other light integration systems in textiles, e-broidery is able to cohesively combine active lighting into fabrics without compromising their drape and strength. These smart fabrics are sewn or woven with intricately embroidered conductive yarns and miniaturised LEDs, so the textiles can sustain regular wear and tear and can undergo multiple wash cycles.

The Last Dress of Marlene Dietrich

APPLYING

SUSTAINABILITY PROPERTIES

Biodegradability

Ability to be broken down into carbon dioxide, water, and biomass by the natural action of microorganisms (aerobic and/ or anaerobic). It is misleading to merely claim biodegradability without any standard specification. If a material or product is advertised to be biodegradable, further information about the timeframe, the level of biodegradation, and the required surrounding conditions should be provided, too.

Composting

Ability to go through the process by which materials biodegrade through the action of naturally occurring microorganisms and do so to a large extent within a specified timeframe. The associated biological processes will yield CO2, water, inorganic compounds, and biomass which leaves no visible contaminants or toxic residues. The products can be classified in "Home compostable ' or "Industrial compostable", having each of them specific temperatures, conditions and timeframes defined by international regulations.

Recyclability

The capacity of a product to be reduced all the way back to its basic materials, reprocessing those materials, and using them to make new products, components or materials. Recycling refers to materials that are processed in practice (as opposed to materials for which recycling is technically feasible), this varies from one region to the other invoking the regulations and technologies of each country.

Recycled pre-consumer waste

Pre-consumer waste refers to waste produced by manufacturers or industries before released for consumer use. Pre-consumer waste refers also to the reintroduction of manufacturing discards back into the manufacturing process, in this case it is often not considered "recycling" in the traditional sense. Pre-consumer waste is produced in large quantities, while this is easier to collect and sort, high amounts of pre-consumer waste are non-recovered.

Renewable content

Materials that are replenished at a rate equal to or greater than the rate of depletion and must be produced using regenerative practices or, in a transition phase, using sustainable practices.

Recycled post-consumer waste

Post-consumer waste is the waste produced at the end of a consumer-product lifecycle. Post-consumer waste has served its intended purpose, passed through the hands of a final consumer, and has been discarded for disposal or recovery. It usually refers to the household waste we generate every day, and does not include manufacturing or converting wastes. Depending on the type of waste, governmental legislation and the action taken by the consumer, post-consumer waste is recycled, sent to landfill or incinerated.

SMART PROPERTIES

Electrorheological

Change in the rheological properties (viscosity and viscoelasticity) of a material caused by an electrical stimulus.

Magnetorheological

Change in rheological properties (viscosity and viscoelasticity) of a material caused by a magnetic field.

Piezoelectric

Phenomenon exhibited by certain materials, which when applying mechanical stress, generate electrical energy. The effect can also be inverse, that is, they can present small deformations when an electrical current is applied.

Phase Change Material (PCM)

Materials considered latent heat storage units: They are capable of absorbing or releasing a large amount of thermal energy when they undergo a phase change (from solid to liquid, from liquid to gas, or vice versa).

GLOSSARY

Photocatalytic

A substance that increases the speed of a chemical reaction by the effect of light or other forms of radiant energy.

Photochromic

Reversible color change induced by the indication of sunlight or UV. The color disappears when the fountain ceases.

Photoluminiscent

Is the emission of cold light caused by the absorption of electromagnetic radiation (visible light, UV, X and cathode rays). There are two types of luminescence: fluorescence (emits light only during absorption of radiation) and phosphorescence (stores absorbed radiation, so that it continues to emit light for a time after the stimulus subsides).

Shape Memory

The material with this property recovers its initial shape after being permanently deformed (plastically) when heated above a characteristic transition temperature of the material. In addition, while regaining its form, in some cases it is able to perform work. The characteristics of these materials, depending on the temperature, contemplate superelasticity (which grants large elastic deformations in a specific range of temperatures), simple shape memory effect (in which the material remembers a single shape, when heated) and which can be educated to achieve a double shape memory effect (in which the material memorises two shapes in a hot and cold state).

Thermochromic

Reversible or irreversible color change induced by temperature changes.

Thermoelectric

Property that supposes a change of voltage in response to a variation of temperature and vice versa.

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GLOSSARY

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ICS: WEARABLES EM&TS

WEARABLE TECH: Smart electronic devices with micro-controllers embeddable into clothing or worn on the body as implants or accessories. ICS EMTs: Interactive, Connected, Smart solutions able to establish a two-way exchange of information, to respond contextually and reversibly to external stimuli, linked to another entity or to an external source, and programmable not only through software.

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