

Re-FREAM ECO-processes Hub Roadmap

Short series for fashion purposes nebulized and laser-marked





Envision

A designer has an idea of a garment collection finished with a sustainable process



Laser marking

After deciding a design, laser can be directly marked into the garment



Garment preparation

A first washing is necessary in order to remove impurities from the knitting/ weaving process



Finishing

Garments receive a final finishing that generally gives them functionality



Ozone

Depending on contact time, different color intensities can be achieved using ozone



Customization

Once a customer is interested in the idea, the process starts by:

- Choose fabric
- Choose color
- Choose design
- Fitting



Co-define

Artist and technician contrast their info and decide together how to best perform the idea into reality



Dye prep

The chosen color is weighted and dissolved in a little amount of hot water



Dye nebulization

On dyeing phase, the garments obtain the selected colour through a mist generated by the Ecofinish device



Knife Coating system

Valorised biowastes can be applied for leather-like products





Ozone

Depending on contact time, different color intensities can be achieved using ozone



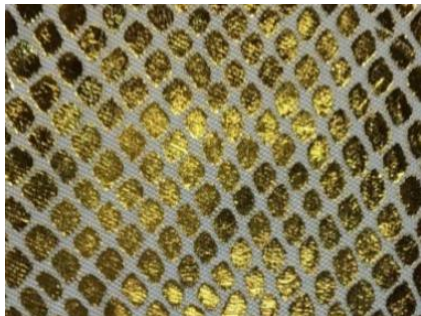
Knife Coating system

Valorised biowastes can be applied for leather-like products



Spraying techniques

Valorised biowastes can be also applied for velvet effects



Complementary technologies

Other technologies are also available



Final garment

The result is a final garment





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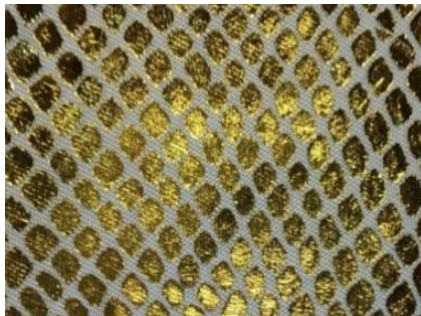
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Envision



First, the designer or artist comes up with an idea that aims to be sustainable, zero waste and uses cutting edge technologies.

Then, they can come to ECO-processes Hub entities: Aitex and Care Applications, to create a garment or a collection based on sustainable and highly technological processes, which are personalized, produced on-demand or short series of a fashion collection.



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Customization



Customization is possible by direct contact consumer-artist or via app, where customer can decide the type of fabric, color or even aroma for example.

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*App owned by Alexander Bello



Co-define



The co-creation dialogue should be a “conversation”, literally a joint dancing (from the Latin cum versare). This “dance” needs a well-designed place (and process), where common languages can be emphatically established, shared goals are emerging throughout the path, hypothesis and solutions are iteratively explored, verified and eventually discarded.

According to that, the playspace should be arranged in a way that supports the immediate action, making ideas become reality. But always taking into account the technical viability.

This co-define phase results in a workplan including foreseen activities and expected outputs to be reached at the end of the co-creation. This is the starting point of the path that will jointly walk artists and scientists to arrive at a final goal.



Laser marking

Laser technology is known for denim applications in industry, as replacement of conventional dry processes like sand blasting, hand sanding, destroying, and grinding etc.

Inside Re-FREAM projects, a variety of new materials have been tested for its suitability regarding laser marking. Therefore, there is a wide database of the parameters to use according to different textile (and non textile) fabrics.

After laser application, a washing is needed to eliminate impurities from the sublimated dyes and/or fabrics.



Garment preparation

For an optimal dyeing result, well-prepared garments are necessary before starting the colouring process. Garments come from previous phases with impurities and product remains that are used in the knitting/weaving and manufacturing process to facilitate the processing of the fabric and garment making up. The objective of the preparation is to make the fabric hydrophilic (with a tendency to be wetted by water) to be ready for the next phase.

In this preparation step, the garment is also prepared with products that provide the correct fibre affinity for the next dyeing phase. With the aim that the dye has a high exhaustion, a correct fixation and that it penetrates evenly throughout the garment.

Another preparation step is the mordant, required for certain dyestuffs that have no affinity or ability to bind to the fibre, such as natural dyestuffs. It has the function of creating a bridge between the fibre and the dye.

The dyeing process with the ECOFinish nebulization system is a continuous process that begins with the preparation of the garments and, without needing to be manipulated, the garments go to the next step, dyeing.



Dye preparation

After having selected the chosen colour shade with the artist, while the garment preparation is processing, the dyestuff preparation is carried out.

In this step, the dyestuff quantity that is necessary for the dyeing phase is calculated, taking into account the amount of garments to be dyed and their weight.

Once the material has been calculated, the necessary amount of dyestuff is weighed, and it is dissolved in hot water to aid with the dissolution.

Garments might be also prepared with plastic-tags with free stitches or buttoned to avoid garment entangling during the processing.

Once the garments are prepared, the solution of dyestuff and water is introduced into the tank, which will later dose the product inside the washing machine.



Dye nebulization

The dyeing phase is in which the garments are coloured to give them the desired appearance and shade.

The garments are inside the washing machine from the previous preparation phase. The dyeing process starts introducing the dyestuff solution previously prepared into the tank and then nebulizing the product. This dyeing process is carried out through micronebulization technology with the ECOFinish system.

ECOFinish is a sustainable device that micronizes the water droplets and the product until it achieves a misty effect, thereby allowing its controlled diffusion on the material. It is only applied what the garments are able to absorb. This process generates a large amount of savings up to 90% of water, 90% of chemical products, 85% of energy and 90% of water treatments depending on which kind of dye process is done. It equals and even improves the quality results obtained by traditional systems that consume a huge amount of resources.

<https://www.youtube.com/watch?v=k7ut-QzXvNk>



Finishing

The finishing phase provides the garments with a series of properties that can be aesthetic but above all functional, such as softening to give a good touch, application of different resins to obtain an easy care, anti-stain or anti-UV or microcapsules with essences to obtain a pleasant smell.

The finishing process is carried out in the same way as the preparation or dyeing process. The product solution is prepared, then it is introduced into the ECOFinish tank and subsequently the water and product solution is nebulized.

Little by little the garments absorb the solution and finally, the garments are removed from the washing machine and after a spin, they are dried in the tumble dryer.

If a resin has been applied, after centrifugation, a next curing step is required in an oven. After the last step, the garments are finished.



Ozone

Ozone provides fashion effects on fabrics and garments dyed with direct, reactive or indigo dyes. Ozone degrades colour and depending on contact time different colour intensities can be achieved. Ozone technology considerably reduces water and energy consumption. It also eliminates the need for toxic processes, such as bleaching with hydrogen peroxide and the use of permanganate.

Cleaning and bleaching effects can be obtained when applying ozone to wet garments. Results obtained are similar to the traditional process with hydrogen peroxide, but achieving better resistance in the fabrics, as chemicals are not used. Is possible to use it in denim and knits. Worki in dry, the process improves whiteness and eliminates the back staining the back of the pockets of the jeans and other possible organic spots.

With this young technology, AITEX have finished denim textile with go result, but we are happy to widening our range.

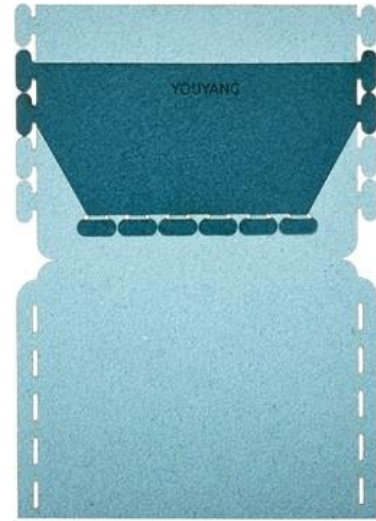


Knife Coating system

Knife coating system for the application of functional coatings on textiles, based on water-based dispersed polymers: bio-based or synthetic.

Coating pastes are formulated and can include functional additives (minerals, powders, colour-changing pigments, nanoparticles, etc.). Coating thickness is controlled. Drying and curing of the coating to reach the final performance.

Valorised biowastes have been also tested for leather-like applications.



Spraying techniques

Velvet effects can be obtained by the combination of small particles (that may come from valorised wastes) and bio-resins.

Here, formulation is the key, then the technology is as simple as compressed-air spraying.



Complementary technologies

Hot-melt bonding, lamination and calendaring

- Dual flatbed lamination system for sandwich (multiple-layer flat materials, up to 4 layers) and rigid materials. Dry system.
- Materials up to 150 mm thick.
- Thermosensitive films and powders are used for bonding.
- Calendering system for transfer printing on polyester, bonding with thermosensitive films and coating with special effect films (e.g. metallization, snake-skin, crush effect, black out, etc.). Dry system.
- Use of hot-melt adhesives for bonding several flexible materials (woven or knitted fabrics, nonwovens, films, membranes, foams, etc.).
- Not water-based or solvent-based. 100% solids, any effluent isn't generated.
- Dot coating application system. It doesn't interfere in the breathability of the materials to be bonded.



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Final garment

The last step is carried out: the creation of technical sheets, pattern making* and sewing process.

Final garment is delivered to the customer or ready for distribution.



**If the dyeing and finishing processes have been developed in fabrics and not garments*

Credits

All images come from Hub Valencia Re-FREAM projects:

2020 Artists

Marinero by Jef Montes

<https://studioadaptiveskins.com>

<https://www.instagram.com/jefmontes>

Fragments garments by Elisabeth Jayot

<https://www.instagram.com/elisabeth.jayot>

Leather for vegetarian by Fabio Molinas

[Lebiu Design – Genuine cork skin](#)

<https://www.instagram.com/lebiu.design>

Cooking new materials by Youyang Song

<https://youyangsong.com>

https://www.instagram.com/youyang_song



2021 Artists

Sustainable Evolution by Loreto Binvignat

www.loretobinvignat.com

<https://www.instagram.com/animabyloreto/>

Neobotanical Tailoring by Alexander Bello

https://www.instagram.com/alexbello1_work/

New Blue by Tim van der Loo and Sandra Nielsen

<https://anewkindofblue.com>

<https://www.instagram.com/sandranicoline/>

https://www.instagram.com/tim_van_der_loo/



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