


EASYWASH - Plasma technology

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INFORMATION ON THE ECO-INNOVATIVE SOLUTION PROVIDER

This eco-innovative solution is the outcome of the project titled “BISCOL” co-funded by the European Commission in the framework of the call CIP-EIP-Eco-Innovation-2009. This solution has been developed by Next Technology Tecnotessile and was finalized in 2013.

SHORT DESCRIPTION OF THE ECO-INNOVATIVE SOLUTION

Atmospheric plasma surface treatment is used to modify the functional properties of fibers and possesses advantages in comparison with traditional techniques. Plasma requires less water and energy consumption, with negligible fiber damage, which makes the plasma process very attractive. It can be used to enhance the quality of textile products in fabric preparation and in dyeing and finishing methods.

Industrial sector – Market segment and actual applications in industry

Different types of plasma technologies have been developed for different industrial sectors. Despite the obvious advantage of low-pressure plasma in numerous applications, vacuum plasma must operate off-line in batch mode. Atmospheric pressure plasmas have a major output advantage in textile processes that operate in open perimeter mode, allowing continuous, on-line processing and can be easily integrated into conventional textile finishing lines. Successful examples of atmospheric-pressure plasma technologies applied to textile processes are available. A pilot-scale DBD apparatus built by the German company Softal in collaboration with the textile engineering department of the University of Minho (Portugal) was tested by a textile industry in order to replace the sizing, scouring and bleaching pre-treatments of cotton. All the costs of the conventional methods resulted higher than the DBD technique.

INDUSTRIAL CLASSIFICATION - NACE CODE;

Other research and experimental development on natural sciences and engineering (7219)

1. DESCRIPTION OF ECO-INNOVATIVE SOLUTION

Technical aspects of the eco-innovative solution

In general, the traditional fabric preparation for natural fibers may be accomplished in a variety of ways using a range of different chemicals. The choice is often based on the scale of the operation with fully continuous processes, the most efficient on the large scale, and pad-batch or batch processes (the latter often in dyeing machines), preferred on the small scale. The use of alkali, acid or hypochlorite is an essential part of the traditional process, and waste streams are overwhelmingly alkaline or acid, thus requiring neutralization. The usage of atmospheric plasma treatment permits to evade the application of acids or alkalis for the removal of the epicuticle layer by replacing them with non-pollutant gases (helium and nitrogen), thus decreasing the relative impact on ecotoxicity and acidification impact categories.

Within the BISCOL project, the effectiveness of gas as pre-treatment for both wool and cellulosic fibres has been demonstrated: the removal of the outer layer, its morphological modifications enabling to increase superficial and friction area, modification of fibre chemical composition by adding reactive species is improving reaction dyeing yield.

Economic and environmental benefits of the eco-innovative solution

The usage of atmospheric plasma treatment avoids the application of acids or alkalis for the removal of the epicuticle layer by replacing them with non-pollutant gases (helium and nitrogen), thus decreasing the relative impact on ecotoxicity and acidification environmental impact categories.

The treatment speed of the equipment is 1-20 m/min and investment cost coverage will be achieved with a minimum quantity 1000 tons.

The investment costs contribute for about 20% on the final price of dyed fabric. An economic saving of about 48% could be achieved if plasma technology is used instead of conventional chemical process.

The substantial reduction of water and energy consumptions determine an economic saving of about 80% if plasma technology is employed for the pre-treatment.

For the water depletion category, a reduction of about 57% has been calculated and this is mainly due to the replacement of a wet pre-treatment with the irradiative technology. Moreover, the pre-treatment phase is in general responsible for a significant amount of the consumed energy for the dyeing process. The irradiative technology allows to save about 70% of direct energy for 1 kg of fabric.

2. AVAILABILITY OF THE ECO-INNOVATIVE SOLUTION AND BUSINESS PARTNERSHIP

Market readiness, Trade mark, existing market coverage commercialization strategy

Market ready for the textile industry, applied already for woollen fabric treatment

Requirements to adapt the solution to the local market and potential applications/market size

No requirements to adapt

On site after-sales services support and the technical assistance requirements

After sales services will be provided from Italy.

Targeted local business partners

Textile industry

Type of local business partnership sought

Equipment selling by coupling the plasma pre-treatment technology with dyeing process for natural fabrics.