

## **EVALUATION OF THE VARIABLES INVOLVED IN THE PROCESS OF APPLICATION OF SOLID PARTICLES OF REDUCED SIZE TO TEXTILE STRUCTURES**

Cellulosic fibres are characterized by good properties among other properties to use generating comfort. However, during use and maintenance, it is also seen capacity shrinkage, wrinkling and little wrinkle recovery. These properties are not desirable and are achieved by applying crosslinkers to the fibre. So far, the most widely used product is the dimetildihidroxi-etilenurea (DMDHEU) whose main drawback is the release of formaldehyde, a product that has created discord to be considered in some quarters as a carcinogen. .

Currently some new products are under study. They are supposed to be environmentally friendly and from the point of view of human health they should be formaldehyde free. The polycarboxylic acids are gaining importance in this field being studied in various research papers. Recent investigations indicate that these products can be used not only as crosslinking agents but as bonding agents for certain substances with no affinity for the cellulosic fibres as well. Binders help to transform a conventional fabric into a smart textile one.

In order to obtain the crosslinking reaction, it is required high temperature which causes a loss of whiteness of cotton fabric. This thesis aims to determine the acids that minimise yellowing and to know what conditions should be applied to reduce that effect. Once the best polycarboxylic acid has been discovered, its application procedure has been designed and results have been compared with the aforementioned DMDHEU.

By developing this thesis, an easy care cotton fabric or non ironing cotton has been obtained. The main advantage is the development of the fabric with environmentally friendly products which can be considered good for health too. Moreover they can introduce new properties to the fabric such as UV or the ability to generate negative ions focused on improve the well being feeling. This incorporation of particles of various materials micro and nanometric scale are studied. The binding agent of said particles to the cotton fibres are the polycarboxylic acids.

Instrumental techniques such as Fourier Transformed Infrared spectra (FTIR) or the method of dyeing with methylene blue allow to know the crosslinking degree of the acid with cellulose. Moreover, these tests offer information about the number of free carboxyl groups which are suitable to react with different materials so that the fabric has been functionalised and given easy care effect as well.

The functionality provided by the particles to the fabric was characterized using specific techniques in order to test the properties to evaluate. Thus, the level of protection against UV has been conducted by measuring the transition at different wavelength. In order to determine the wellbeing sensation a new method has been developed in order to measure the negative ionization of the air by means of an ionometer.

Fabrics treated with different binders (acrylic resin, crosslinking agent) have been tested and results evidence the importance in the selection of the binder. It can block the effect from the active ingredient or increase it. Fabrics have also been studied against its maintenance effects which can decrease the effect.