TECHNOLOGICAL INNOVATIONS IN THE TEXTILE INDUSTRY

In the last decades there have been significant technological innovations not only in the field of raw materials, but also in the manufacturing processes and on the finished products. The results are surprising , like, for example, the production of UV resistant or antibacterial textiles. However these innovations are not always welcome, because many manufacturers and consumers still prefer traditional textiles and traditional manufacturing techniques.

RAW MATERIALS

Among the new raw materials introduced in the European textile industry there are some which have already been used in the textile sector in other parts of the world or in other types of industry. Most of the innovative fibers are the man made ones (both artificial and synthetic), but there are also new natural fibers. Due to growing concern about environmental issues, companies tend to use environment friendly raw materials.

MANUFACTURING PROCESSES

With the widespread use of computers and high technology in manufacturing, labour has been partly replaced by highly performing machinery, particularly at some stages of the production, like pattern making and cutting, where the use of special software is very common. However, hand and craft processing are still widespread, especially in some phases of clothing production. Nowadays more and more companies tend to reduce energy and water consumption and get lower noise levels thanks to the use of the latest machinery, which can reduce even processing times. And last but not least, safety at work is a very important issue as well.

FINISHED PRODUCTS

As far as finished products are concerned, innovations are mostly suggested by the market demand, in particular by consumers looking for specific cutting edge products for special uses. For example, at the moment there is a high demand for stretchy clothing highlighting anatomical forms, obtained by inserting elastic fibers like elastane into products such as jeans, velvet or T-shirts.

NATURAL ANIMAL FIBRES

In the field of natural animal fibers innovations originate from hybridization, that is the crossing of two animals of different species to obtain another one called hybrid, which has the best features of the originary species. Among the hybrids used in textiles the most important is certainly the “cashgora” goat, a cross between the female Kashmir goat and the male angora goat. Two other interesting hybrids which might be used in textiles in the next future are the “tigone” and the “liger”, which are both crosses between a lion and a tiger.

NATURAL PLANT FIBRES

Owing to the increasing demand for environment friendly products on the market, protecting human health and the environment, some plants are being used for making fibers for textiles, retrieving habits and traditions of far away countries, where they have been used for a long time. The most successful are the bamboo and the pineapple. The use of the nettle, on the other hand, is quite recent.

THE BAMBOO

The bamboo grows mainly in tropical and subtropical Asia, Africa and South America. Its fiber is soft and shiny and is commonly woven in China. There are attempts to grow bamboo in Italy as well, but here it is mainly used as foodstuff. The fiber is obtained from the inner part of the bamboo stalk by means of two different processes, one mechanical and the other one chemical. The former is similar to the one used to make linen or hemp fibers. The result is a completely natural fiber. The latter turns the natural vegetable fiber into an artificial one. It is as shiny and soft as silk and it does not require any softeners. It is cheaper and more durable than the natural bamboo fiber, but it may be unhealthy both for the worker and for the wearer. The bamboo fiber has microcavities which allow transpiration and maintain the body heat. It also has good elastic properties allowing a comfortable fit and natural antibacterial features which, together with its odour-free and antiallergic qualities make it particularly suitable for making underwear. Besides, it may be easily dyed. As regards maintenance, textiles made from bamboo fibers can be machine washed at no excessive temperatures and ironed at a lower temperature than cotton.

THE PINEAPPLE

The pineapple fiber, which is about 60 centimetres long, can be of excellent quality if it is processed by hand. It is mainly a summer fibre, white or cream coloured, with good absorbency and breathability. It is flexible and resistant, but extremely delicate in the weaving process. It is very shiny, machine washable and suitable for dyeing. It can be blended with other vegetal fibres, with silk and man made fibres. In past centuries in the Philippines people used it for textiles. They got it from the leaves, but it was quite delicate and the cloth was very precious and expensive and therefore only for rich customers. After reaching its peak popularity in the 19th century, the pineapple fiber disappeared from the markets, replaced by cotton, which was cheaper and easier to process. However, in the last decades there has been a revival. The government in the Philippines, where pineapple growing is very widespread, has made the first move, starting a project of mechanical processing of the fiber. Since 2007, even in Bangladesh they have been extracting and processing the pineapple fiber, which is now being used for making clothes and accessories, in particular showpieces.

THE NETTLE

Unlike the bamboo and pineapple, the nettle was used in the past as a textile raw material. This plant has a lot of hair causing itch in contact with the human body. It does not require any pesticides or fertilizers , but it needs a good water supply. The nettle is mainly considered a summer fiber, but it guarantees insulating properties, protecting the wearer against both cold and hot temperatures. It is also breathable and 100% biodegradable. The fiber is obtained through enzymatic maceration and the use of machinery and methods which are similar to flax and hemp processing. Unfortunately the fiber has limited length. For this reason it is not particularly requested on the market. In the past it was used to make uniforms for soldiers in case of cotton shortages. For example Napoleon’s armies and German and Austro-Hungarian soldiers towards the end of the First World War wore uniforms made from nettle fiber. Nowadays it is used as an alternative to hemp or linen or blended with cotton to make furnishing fabrics. The plant is used to make cosmetics and foodstuff as well.

MAN MADE FIBERS

There are a lot of innovations among manmade fibers too. In fact new raw materials are being introduced on the market and very high technology is used in production processes. As for the product, the most interesting innovations mainly concern artificial fibers, that is the ones obtained from natural products, such as cellulose, proteins or production waste. As far as synthetic fibers are concerned, manufacturing companies have tried to improve or modify existing fibers rather than make or research completely new ones. Among the most recent artificial fibers there are cellulose fibers deriving from fir or eucalyptus wood, protein fibers from soy, corn and milk, biosteel and fibers obtained from waste material like shells of crabs and other shellfish or orange peel.

LENPUR AND OTHER TYPES OF WOOD

Lenpur is a man made ecological cellulose fiber deriving from the pulp of silver fir and other selected woods. Lenpur has great hygroscopic properties and vapour permeability so that body moisture can be absorbed and drawn away. It is also anti-odour and breathable. Finally lenpur fabrics have antistress qualities and are so soft that they are also referred to as vegetal cashmere. As for maintenance, they are washing and shrinkage resistant. They are mainly used to make underwear, shirts and blouses, legwear, sportswear and household textiles.

THE EUCALYPTUS FIBER

The eucalyptus fiber absorbs moisture well, it is breathable and antibacterial. Because of its softness it is particularly suitable for knitwear.

SOYBEAN PROTEIN FIBER

It is a high-quality fiber obtained from processing the proteins contained in soybeans. It has been launched on the market quite recently. Actually the idea of making fiber from soybeans is not new. It dates back to the early 20th century, but the processing required toxic substances, so Henry Ford’s experiment was not successful. Nowadays the main manufacturers are Chinese. It is a light yellow fiber which takes dyes easily and thanks to its softness it is commonly named vegetal cashmere. As for maintenance, it is machine washable at low temperatures , it does not require softeners and allows easy steamless ironing. Some Italian companies are using it to make both underwear and outwear, including elegant eveningwear.

THE CORN FIBER

The corn fiber is soft, highly hygroscopic and hypoallergenic. It is more fire resistant than the most widely used vegetal fibers and it is self-estinguishing. Regarding maintenance, only low temperature machine washing is allowed. This fiber is mainly used to make bedding and cushions, quilt and sofa padding, but recently also for sportswear and workwear.

BIOSTEEL

The glands of the “nephila clavipes” spider produce a special type of “silk” characterized by very high tensile strength, lightness, elasticity and silk-like look and feel, which could be widely used in the textile industry. Since it is as resistant as steel, the new textile fiber has been called biosteel. It is mainly used in the medical sector, to repair diseased human tissues, but it could become a valid alternative to the carbon fiber and be used to make light, comfortable, unalterable, anallergical, bulletproof clothing for pilots and soldiers, even better than the one made from Kevlar. It could also be employed to produce sportswear, especially for extreme sports. However the production of this fiber is quite limited at present, as it is too expensive. The attempts made to breed the spiders in large numbers in order to increase the production have not been successful due to their cannibalism. Therefore, thanks to genetic engineering,, the genes of the spider which are responsible for silk making have been implanted in a goat which can produce the fiber protein through its milk. This genetic experimentation, started by a Canadian company, is now carried on by Randy Lewis Lab with promising results.

CRABYON

Crabyon is a totally new manmade fiber obtained by blending viscose with chitosan, a natural polysaccharide derived from chitin, a compound of natural origin obtained from the shell of crabs and shellfish. This fiber is ideal for use in the textile market, as it has antibacterial, antimicrobic, anallergical, anti-smell and hygroscopic properties which make it particularly safe and comfortable also for people with weak or sensitive skin like children, old and hospitalized people. Besides, it is easy to weave and dye, and, being a mixture of chitosan and viscose structurally connected to one another, it keeps its peculiar characteristics over time. Finally, it is easily mixable with other textile fibers like cotton, linen, wool, rayon etc. It looks and feels like very soft fresh cotton. In Japan it has been used for years for making underwear, childrenwear, sportswear, pyjamas, socks and any garment or accessory to be put in direct contact with the skin. In Italy the imported fiber is processed by the company “Pozzi Electa” in Milan.

THE ORANGE FIBER

Two young women from Sicily have invented a new ecofriendly vitaminic textile fiber (the orange fiber) obtained from the cellulose of citrus byproducts. From about 20 oranges you can make the amount of fiber for a T-shirt.

MANUFACTURING PROCESSES

Manmade fibers have undergone significant changes in the production methods and technology, which have made them more and more successful on the market.

**FIBERS**

 *PLANT FIBERS*: a) from stem LINEN, HEMP

 b) from seed COTTON

 c) from leaves SISAL

 d) from fruit COCONUT OUTER SHELL

**NATURAL FIBERS --------------------------** *ANIMAL FIBERS:*  a) from animal fleece WOOL

 b) from secretion SILK

 *MINERAL FIBERS:* not involved in clothes manufacturing,except

 for ASBESTOS, used in small percentage to make

 firefighter clothing

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 *ARTIFICIAL FIBERS* : a) from cellulose

 b) from proteins

**MAN-MADE FIBERS**

*SYNTHETIC FIBERS*  from oil, coal, plastic, natural gases