The future of fibres and fabrics

Smart textiles’ are best described as fabrics that work with their ‘own control and response mechanism’.

In simple terms, smart textiles can sense electrical, thermal, chemical, magnetic, or other physical responses from the environment, and adapt or respond to them.

This help sheet will help you to identify the different types of ‘smart textiles’ that are available, and think of the potential that these new technological advancements present in product design.

Interactive fabrics range from integrating devices such as MP3 players or mobile phones, to clothing known as ‘wearable computers’, to ‘intelligent’ fabrics and clothes that can conduct electricity.

The uses for interactive textiles are endless and include clothes for special events (like weddings), security, emergency services, interiors, furnishings and cushions.

Micro-encapsulation

Micro-encapsulation is where tiny bubbles of liquid or solid substances are encapsulated and integrated into fabrics. The friction caused in the general use of a fabric breaks down the membrane of these gas or liquid bubbles over a time of repeated friction. As it breaks down, the contents, such as moisturisers, therapeutic oils, and insecticides, are released slowly.

PureTemp technology is a micro-encapsulation product that helps to absorb, store and release body heat, keeping the wearer at a moderate temperature. This technology is ideal for ski jackets, military uniforms, gloves and footwear.

Microtek Laboratories, Inc. advertises on their website that they can ‘develop and produce various forms of micro-encapsulated products which can be applied to textiles’.

The products included in their list for encapsulation are:

- Phase-change materials for temperature regulation
- Deodorants
- Lotions (aloe Vera, vitamin E, lanolin, etc.)
- Dyes
- Fabric softeners
- Flame retardants.
Thermochromic colour

In textiles, thermochromic dyes are used to change the colour of a garment or textile as it changes temperature. The two methods of using thermochromic effects in textiles are liquid crystals and micro-encapsulate thermochromic.

Liquid crystals
The crystals reflect light. As the liquid crystals heat up, the direction of the crystals changes, which causes the crystals to reflect a different wave length of light (what we see at this point is a change of colour). When the crystals cool down, they return to their original position (and we see the original colour).

Micro-encapsulate thermochromic
The thermochromic dye contains millions of tiny capsules that look a little like bubbles. Each capsule has three chemicals within it. Once they are heated up (normally through friction) these chemicals react and the dye develops. When the dye cools down, the chemicals separate, and the colour returns to its original state.

Smart textile finishes
Smart textile finishes offer new and exciting performance characteristics to textiles. One example is Outlast®, a new technology that interacts with the climate of the human body and the environment to ensure that the wearer remains at a moderate temperature. Because sweat or moisture is reduced significantly, the wearer is kept dry and comfortable.
The use of Outlast® is becoming wider. Here are just a few products that currently make good use of this finish.