

SMART TEXTILES FOR KNITTED PRODUCTS – PROTOTYPE FACTORY

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ABSTRACT

This paper describes a concept of collaboration between industry, university and research institutes in the area of Smart Textiles in Sweden. The concept idea of a laboratory and Prototype Factory at The Swedish School of Textiles for development of Smart Textiles in knitting is presented. The result presented shows a concept where Smart Textiles can be developed and knitted in a prototype factory and a development laboratory. Companies, researchers and others with product ideas in the area of Smart Textiles can here get a first prototype and help to continue to make a ready made product for the market.

Key Words: smart textiles, technical textiles, knitting technology

1. INTRODUCTION

Smart textiles are a relative new business area which is now opening up new possibilities for the European textile industry. It focuses on textile integrated wearable technology but also other types of products. With this, textiles are endowed with a “smart function” and can sense and react to environmental conditions or stimuli. Smart Textiles is a prioritized research area in the region of Borås in Sweden. Smart textiles gathers researchers and technicians within textile and fashion design, nanofibre technology, interaction design, knitting and weaving technique and dying and manufacturing technique. Researchers from The Swedish School of Textiles, The School of Engineering at the University of Borås cooperate with researchers at Chalmers, Swerea IVF, Interactive Institute and SP within the framework for the Nordic network NEST – the Nordic Centre of Excellence for Smart textiles and Wearable Technologies – and in a number of national and international networks. Research exchange occurs even with other national and international research institutes.

This paper presents **Prototype Factory**, a part of the larger Smart Textiles on going project, with supporting funding by Vinnova, a government initiative. Smart Textiles is a project in collaboration between companies, research institutes and The Swedish School of Textiles at the University of Borås. The aim with Prototype Factory is to give companies the opportunity and help with the development of new ideas in the area of smart textiles. Full equipped laboratories and textile machinery at The Swedish School of Textiles and research institutes together with skilled staff can help companies, designers and researchers to develop there project and product ideas [1].

The result shows the concept of **Prototype Factory** for knitted products where smart textiles can be developed and knitted in a full scale environment.

2. WITHOUT HISTORY NO FUTURE

The textile industry in Sweden has gone through fundamental changes since the 1970's, when the major part of the traditional textile and ready-made clothing industry moved out of Sweden. After a radical structural transformation the industry is now focusing on technical textiles, smart textiles and wearable technology. With a solid foundation of development and

production of technical textiles and an aggressive interdisciplinary experimental textile and design research already present in the region of Borås, there is a unique opportunity to establish an internationally leading industrial cluster in the area through one focused venture where the industry, the region, the municipalities, the research institutes, and the University of Borås. More than half of Sweden's entire textile industry and the largest logistic nodes of the branch are reachable within 45 minutes. In the region, there are strong trading houses with long traditions, who dare try new technology. The University of Borås, the Technical Research Institute of Sweden (SP), Swerea-IVF, and Chalmers University of Technology all do research in Smart Textiles [1].

3. WHAT IS SMART TEXTILES?

Smart textiles are a new type of products in the textile portfolio that transforms the whole business of the textile industry. The definition of a smart textile according to Xiaoming Tao are materials and structures that sense and react to environmental conditions or stimuli, such as those from mechanical, thermal, chemical, electrical, magnetic or other sources [2]. Examples of smart textiles are fabrics that measure pulse and blood pressure in the human body, sense how much sound to absorb or gloves with headsets and reinforcements of concrete. Product possibilities are not limited only to the textile industry; these textiles can be found in almost any line of business. An example of a transboundary project is Delia Dumitrescus' master's project of a flat knitted structure containing electroluminescent wire shown in figure 1 [3]. She is an architect and uses an interactive facade covering which reacts to light and sound. When a sound is heard it begins to light up. This is an example of smart textiles which can be both useful and give interesting visual effects.

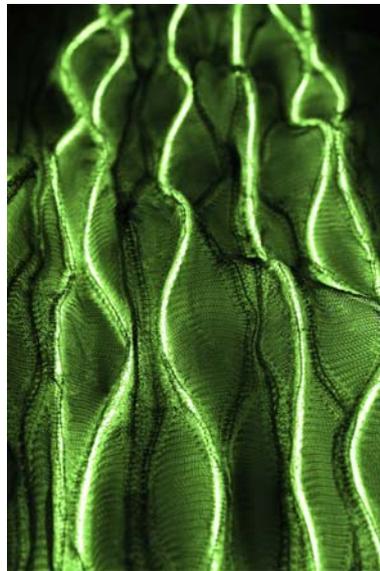


Figure 1. A flat knitted textile structure consisting of electroluminescent wire [Photo:Jan Berg]

4. PROTOTYPE FACTORY - DEVELOPMENT IN KNITTING

A central idea behind the initiative is that development is propelled by corporation-based development projects with the initiative as a coordinating party. All development projects have access to the open experimental workshop, i.e. the industrial full-scale environment, supervising resources, and expertise in The School of Textiles, the institute, and industry. In

the smart textiles **Prototype Factory** ideas are tested and future products is created, table 1. In addition to this, technology and knowledge transfer of the future textiles and textile processes are stimulated. The goal is to operate a dynamic innovation system, to promote growth and create new employment opportunities in the region. This way, the open experimental workshops become meeting places where information and solutions to common problems may be discussed and developed in seminars and workshops. The projects are initiated in collaboration between companies, the University of Borås and the institutes but are owned by the companies. A project starts somewhere in the step-model of the initiative but may also be initiated directly by the industry for example. The corporations have also voiced wishes to raise the research level in product development and the need for seminars where the corporations meet and when possible, discuss thoughts and ideas on research projects. The Prototype Factory concept model is shown in figure 3.

Table 1. Examples of joint development in the following areas

Increased functionality of textile materials, e.g. filtering and waterproofing.
Measurement of environmental performance
Developed application of nanotechnology
Solar cells integrated into textile materials
Application of composite materials

4.1 Equipment in Prototype factory – knitting

Prototype factory can use the well equipped knitting department at The Swedish School of Textiles where most of the common flat- and circular knitting machines are available to use in product development projects. A Knit & Wear complete garment flat knitting machine from Stoll is one of the machines [1]. Available is also a flat knitting machine, STOLL CMS 330 TC, and a circular single Jersey machine from Mayer & Cie for knitting stiff metallic (or other stiff) yarns.



Figure 2. The flat knitting machine STOLL CMS 330 TC specially equipped for knitting stiff metallic yarns

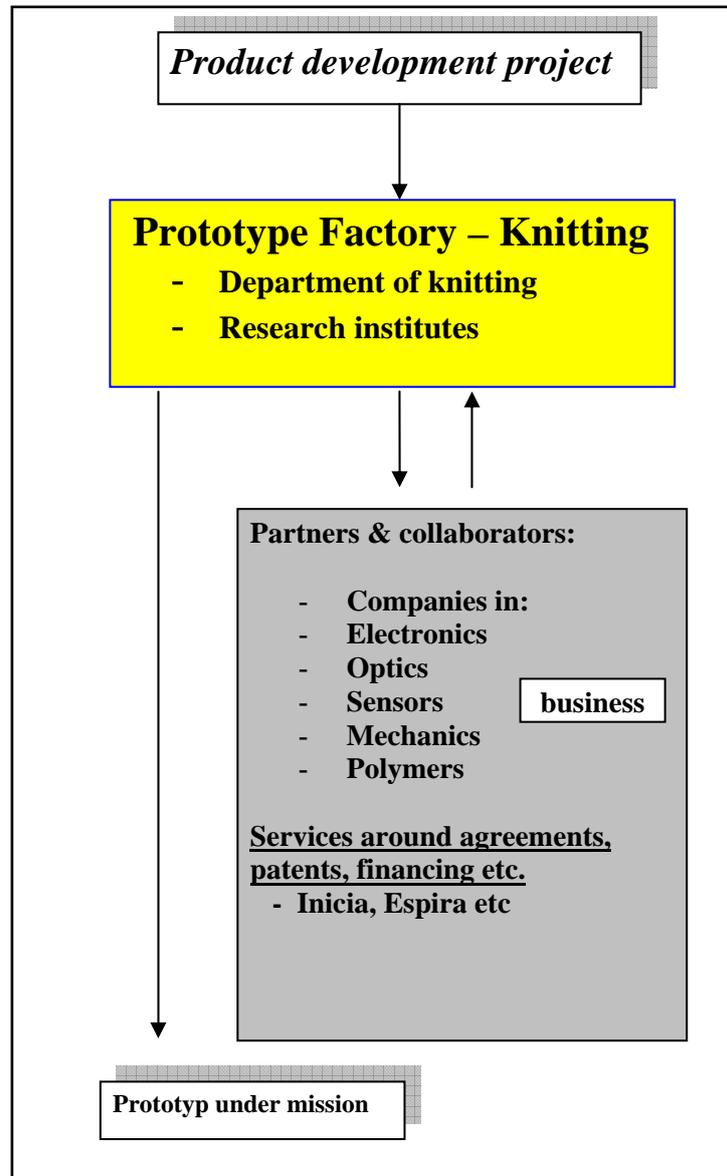


Figure 3. Prototype Factory concept model

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