CTF

Craft
Design
Textile- and Design Management
Textile Technology

The Nordic Textile

journal

Dr Mohamed Mitwally

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The Vision

The Swedish School of Textiles is to be one of Europe's leading seats of learning in the textile field. Through a unique interdisciplinary breadth in education and research from design to final product in combination with a solid equipment park in full-scale environments. With everything from handicraft, machines for traditional production, experimental activities to modern testing equipment we will attract, educate, and inspire the most competent national and international students.

Strategic goals

Through education and research at the Swedish School of Textiles, the students will acquire deep and unique knowledge in textile related subject fields in addition to their programme courses, while at the same time they are inspired to do experimental work in order to break boundaries towards other disciplines and actively search new application areas for the textile material.

The Swedish School of Textiles is to be an obvious partner to the related industry, research institutes, other universities/university colleges, and the community when it comes to education, research, and collaboration where a textile competence is crucial to ensure development, diversity, and permanence.

How do we reach these goals?

Our seat of learning will keep up its tradition of continual development of its educations and conduct research in fields that will secure that our students are attractive on the labor market after they graduate. By continually monitoring both international research in the fields and the market development, the Swedish School of Textiles will be able to predict the way the market demand will look when the students graduate with a great deal of accuracy.

There are few traditional ready-made clothing manufacturers and textile manufacturers left in Sweden and the Nordic countries and a concentration towards niches is taking place.

Facing the increasing competition of the global market of today put demands of greater specialization and higher levels of competence on the future employees of the textile industry. At the same time, the demand for knowledge across professional boundaries will increase.
The Swedish School of Textiles has a unique breadth both in its programmes, the advanced education, and research through its three profile areas: Design, Technology and Managament.

Already, the Swedish School of Textiles maintain good relations with the Swedish textile industry and by expanding these contact surfaces we will secure the help of our students' future employers in guiding the development of the contents of our educational programmes and research efforts.

Through an intensified collaboration between the Swedish School of Textiles and the industrial research institute IFP Research, Mölndal, we close the gap even further between traditional academic research and industrial applications of the research results.
IFP Research has many senior researchers with much experience of research assignments in collaboration with both national and international research partners and partners in the industry. The collaboration between the THS and IFP Research will thus further the professional profile of the Swedish School of Textiles.
The research fields of the two institutions complement each other well and possess both the depth and the breadth required to make them attractive research partners internationally.

"My task will be connecting the applied industrial research of IFP with the fundamental research at a high academic level that is carried out at the Swedish School of Textiles," Ronald Pedersen says, who will become Head of the Swedish School of Textiles at the University College of

Borås by the 1st of Juli 2006 – a position he holds as he is the Managing director at IFP Research.
Ronald Pedersen emphasizes that his task is to bring more of an industrial research perspective to the University College and also to outline the strategy of the Swedish School of Textiles with a view to the needs of the industry. This entails developing courses in a certain way or motivating the students to specialize in fields that will bring more value to the industrial products.
"The education must aim to find areas that will be interesting to the corporations in the future, he continues. That is why the Swedish School of Textiles is to maintain an open dialogue with the industry and make sure there is plenty of feedback", Ronald Pedersen continues.

Another coordination gain is that IFP and the Swedish School of Textiles will be able to share equipment. IFP Research mainly holds advanced testing equipment while the workshops at the University College have both traditional and advanced production equipment such as looms, knitting machines, and preparation equipment.
An additional task of Ronald Pedersen's is to support initiatives that create more student trainee posts in the industry. Combining the global networks of the two institutions will increase the odds of the students having more interesting and challenging work opportunities both prior to and after they graduate.

One important task for the Swedish School of Textiles and IFP is to convey, concentrate, and stimulate the research efforts leading up to the presentation of the Vinnova project Smart Textiles in March 2009.

With great confidence the Swedish School of Textiles and IFP Research together outlines a future that will lead to a win-win situation for all parties.

Ronald Pedersen

Head of the Swedish School of Textiles
Managing director, IFP Research

Contents

The Textile Research Centre, CTF

Aims

The CTF was founded in 1998 and is based at The Swedish School of Textiles at the University College of Borås.
The aims of the Centre are:

To give a research profile to the unique combination of subjects within the School.

To strengthen the research capabilities in the subject areas of the School: crafts, design, textile- and design management and textile technology.

To build up and strengthen research within the School's educational programmes, to attract national and international expertise, thus meeting the requirements of subject-specific professors and postgraduate programmes.

The Objectives of the CTF are:

To bring together all interested parties in crafts, design, textile- and design management and textile technologyin order to create a Nordic centre for textile research.

The Centre collects, assemble and process relevant information, to stimulate research and make it available to all professional groups in the field of textiles. Therefore, part of the Centre's reponsiblility is to arrange lectures, seminars and conferences, and to report ongoing discussions and results of research in publications and other media.

Areas of Interest and Research:

Design

"The development of innovative design with the help of modern technology giving consideration to environmental, estetic, financial and ethical requirements".

Textile- and Design Management

Design management, fashion logistics, humanistik marketing, design direction

Crafts

Historic textiles

Textile Technology

Environmental technology, technical textiles, fibre technology

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IFP RESEARCH

The Research Board at IFP research

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Associate Professor and research manager at IFP. Finished her PhD in 1996, focusing on "Phase Distribution of Mixed Biopolymer Gels in Relation to Process Conditions". Has since then worked intensely with biopolymers and gel formation phenomena, followed by fibre spinning processes, in particular electrospinning of nanofibers. Associate professor in 2003.

Anna Thorvaldsson

Researcher at IFP. Finished her Master of Science in biotechnology in spring 2006. The studies focused on biopolymers (DA-work) and molecular biology. Has thereafter worked with electrospinning of nanofibers for biomedical applications.

Anna Nelvig

Researcher at IFP with focus on electrospinning and meltspinning.
Master of Science in Chemical Engineering, the studies focused on polymer and cellulose technology.

Bengt Hagström

PhD in Mechanical Engineering. Expert on polymer processing, polymer melt rheology and melt spinning of fibres.

Anders Bergner

Senior scientist at IFP. Polymer material engineer in 1987, then studied innovation engineering 1989-1992. Has long industrial experience in the field of polymeric materials, composites and textiles from automotive-, defense- and medical technology as Design Engineer, Project Manager, R&D Manager and Technical Manager.

Annika Fredholm

Analytical chemist and Lab technician at IFP. Finished her Master Thesis, spring 1996 in chemistry. Has since then worked with chemical analysis and electro-spinning of nanofibres.

Ioannis S. Chronakis

PhD in Physical & Colloidal Chemistry of Biomacromolecules. Expert in electro-spinning of functional nanofibers and micro/nanostructures.

Jonas Engström

Senior scientist at IFP. Finished his PhD in 2006 with a thesis titled "Functional Copolymers of Polyvinylpyrrolidone". Has since then worked with electrospinning and crosslinking of polymers. Expert on materials science with a specialization in polymer organic chemistry.

Textile Research Council, CTF

The aim of the membership of the Textile Research Council was to create close links within the field of textiles relevant to the work of the CTF. The first board meeting was held on 31 August 1998.

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smart
textiles

ETT VINNVÄXTINITIATIV

Smart textiles

Erik Bresky
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The textile industry in Sweden has undergone enormous changes since the 1970´s, when a significant part of the traditional clothing industry were outsourced from Sweden. After a complete structural overhaul, the branch is now very much alive. Today the textile industry encompasses much more than cloth and clothing; now textiles are used in everything from blankets and airbags to reinforcements in composite materials in airplanes and sound insulated walls. As a result of a continual development, where quality demands increase constantly, the range of materials grows wider and new areas of use are being developed, we make sure we are conducting relevant research, creating new textiles and generating new uses for them.

With Borås at its centre, there is a nationally working and developed cluster around textiles. From here, more than half of Sweden's textile industries and the largest transportation logistics points may be reaches within 45 minutes. There are also entrepreneural trading companies with a long tradition of daring to invest in new technology.

Smart textiles aims at development, design and highly specialized production of the next generation of textile products; smart textiles and textile integrated wearable technology. "Smart textiles" represents a new generation of high technology multi-functional textile materials and products which will interact with their environment in different ways: change colour in relation to light intensity, adapt sound insulation/reflection in relation to sound levels, stimulate the body's cells to build new tissue through implants etc. "Textile integrated wearable technology" are products with modern high technology functions integrated with the textile construction itself; different types of sensory cloth for clinical medicinal use, cloth with advanced textile interfaces for mobile communication of different types. This necessitates a multidisciplinary approach and uses competence from textile technology and textile chemistry to design and management.

Smart Textiles and Wearable Technology are areas undergoing strong development internationally. With an already solid base in development and production of technical textiles and an offensive multidisciplinary experimental textile and design research, we in Borås and West Sweden have a unique possibility to establish an internationally leading industrial cluster within the area, through a focused effort together with the industries, regional and municipal governments, research institutes and universities.

In our vision, we see Borås and West Sweden as a future internationally leading and bustling centre for development, design and specialised production of the next generation of high technology textile products. A leading centre for research, development and production:

- Of smart textiles and textile integrated wearable technology where advanced textile technology, sensor technology, computer technology and different types of advanced material technology meet and are integrated,
- Which lives and grows through close and dynamic interaction between the community, business community and academia,
- Where different cultures within research, development, production, design and education meet, dissolve boundaries and integrate with each other,
- Which dissolve boundaries between traditionally female dominated areas within textile technology and design and traditionally male dominated areas within technology and management.

The total knowledge in the companies together with regional resources within research and the public sector offers large potential to refine and strengthen the area through development and renewal of working methods for an effective innovation system.

The Smart Textiles initiative means incitement for the business community to start R&D departments which otherwise would be at risk of low prioritization because of lack of resources and a lack of growth would follow.

Most of the leading textile companies which today work with technical textiles have a background in the traditional textile industry and from this position they have developed their ideas within advanced textiles to become profitable R&D intensive industries within their specialized areas. For example, one company has switched its production from curtains to climate textiles for greenhouses and presently has an 80% export share. Another company has gone over to technical textiles after shutting down clothing stichery and exports 95% of its production.

The Smart Textiles is a venture to start processes that will create and establish new markets and renew existing ones. A key word in the running work is "network value" where different participants contribute to a high production and customer value. It is also about identifying and supporting participants who can quickly process ideas and concepts into finished products and services and who, in ideal cases, already have available channels through which they can reach the final customers. This means that we even want to develop new business models which can be created with new integrated technology. We will also look more closely at how today's and future advanced textiles can create new business opportunities in combination with other branches in already existing products and services.

How the initiative means fundamental renewal

Taking the step towards the next generation of high technology textile material and products involves a fundamental renewal within development, design, production and marketing. The initiative also expects a radical shift within education and competence development.

Fundamental changes take place within the development process and the production process when textile techniques, electronics, digital functionality, etc. become integrated; the initiative expects new types of knowledge and breadth of competence in construction and design teams along with production teams. The initiative expects industrial cooperation of a completely new type where for example the textile industry and computer and electronic

industry work in near cooperation around product development and production. Dynamic materials and constructions introduce new manifestations, fundamentally new ways to think textile construction and design. A radical shift in the education of textile engineers and textile designers is taking place to meet the demands for new competence within development and production. Prospective/future developers and designers must also learn to communicate in wide interdisciplinary construction and design teams which requires group based project education across boundaries between e.g. the engineering and designer educations.

The initiative means a fundamental renewal of research and development forms within the framework for an integrated cooperation between companies, academia, institutes and the community in Triple Helix.

The next Nordic Textile Journal to be published in March 2008 will be a spedial edtion on Smart Textiles.

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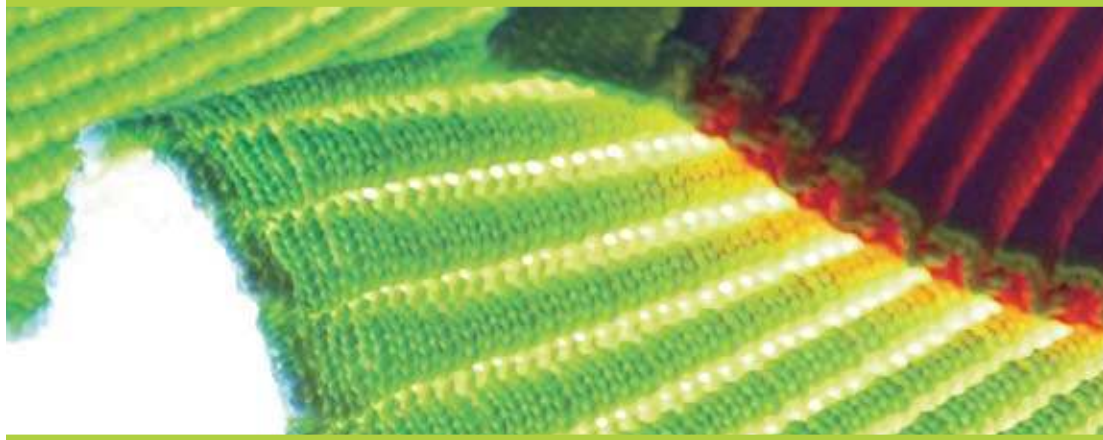
INTERNATIONAL
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June 2-3, 2008

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IFP RESEARCH   THE SWEDISH SCHOOL OF TEXTILE UNIVERSITY COLLEGE OF BORÅS   TAMPERE UNIVERSITY OF TECHNOLOGY Fibre Materials Science

Kajsa G Eriksson is a doctoral degree candidate in design, with a concentration in fashion design. She is enrolled in the doctoral program at HDK, School of Design and Crafts, Gothenburg University and a teacher in fashion design at The Swedish School of Textiles at University of Borås. Her doctoral project, "IN PASSING: Street, Fashion and the Creation of Meaning in Public Space", is dedicated to the fleeting meeting in the street, and fashion as a non-verbal communication in urban public space. It is touching on both sides of the realms of fine art and fashion design, deriving its methods from both areas. The aim is to work with fashion as identity, play and reciprocity between individuals and the environment. In these momentary meetings the magic and the everyday are two sides intertwining in a flash of a moment. It is an artistic R&D project aiming to create, construct, influence and inspire.

She is showing at Tensta Konsthall between the 1/9 – 18/11 in the group show: "ARTIST CLOTHING". On the opening she did the performance "Transformers: Goodbye" together with Fredric Gunve and Pontus H W Gunve.
For further information see:
www.tenstakonsthall.se
www.artistclothing.com
www.dagensdatum.com
www.framtidskonsten.se

The text presented is taken from a draft for a PhD seminar and is an experimental text that will be edited for the final PhD seminar.

06 The final sound

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[lies]
There came a time when I could no longer tell a story about myself and my life. My identity had slipped away from me. I could not get it back until I was able to invent a new story that fit the present situation.

Stories are a strong builder of identity. The loss of one's stories can be connected to the loss of one's idealized images or roles. Clothing and fashion are both used to create these images and roles. In extreme situations, like war, the altering or stripping of clothes are severe and horrific ways of stealing a person's identity.
I am focusing on three characteristics in the shaping of identity: decoration, rules and process. They are used in the creation of the narratives, images, and roles used for the establishing of identity. My interest lies in distinguishing the characteristics in the connection between narrative, identity, fashion and clothing.

In his book Fashion Classics, Michael Carter references the Victorian text Sartor Resartus, by the nineteen century author, Thomas Carlyle. In this text, he writes about clothing and how it can not be only considered as functional, because it would result in "mere externalities". Carlyle sees clothing as ornament, decoration, and as being "the first spiritual want of a barbarous man".
This is one of the first references to clothing as an anthropological matter. [1]

In this case, Clothing refers to the spirituality of man. Later in history, the idea of fashion becomes closely connected to time. Borrowing the idea from Carlyle, of ornament and decoration being a spiritual act, spiritual here being something that is a need outside the utilitarian and of a purpose that is not directly life-sustaining. In the act of ornamentation and decoration a certain contextual meaning can be added through the use of narrative. An example today is the different meaning of the colour and lacing of Dr. Martens boots. The connection between the narrative and the decoration is closed to someone not sharing the knowledge of the narratives. It can be seen as a sharing and hiding game and a group and identity building through the combination of the decoration and narratives.

If fashion is connected to time, it is also related to process. Rules, on the other hand, are the tools which we use to try to control anything that is in process. Rules can be seen as a starting point in experiments, plays, and games.

Another characteristics I have been elaborating with is collage, it has a close relation to image, the possibility of cracking of the image, and the possibility of inventing new stories from the old. I need to investigate more in collage and assemblages techniques as part of the shaping of identity and in the relation to narrative, fashion and clothing.

As I have stated earlier, fashion and clothing are areas of non-verbal communication. Clothing has its greatest power prior to conversations taking place. Story-telling has a great power as an identity marker, and can overshadow any clothing. However, there are certain moments when the individual's stories about themselves, and their lives, are not at play. Clothing gains its strength as non-verbal communication found in groups, and in the flow of people.

It's interesting when the impact of image/role, fashion/clothing, becomes translated into words. This is usually experienced in the passing comment.
Different kinds of these comments exist; the kind that are used to put you down and to question; those that are related to curiosity, and seek understanding; and those that wish convey positive feedback. Positive feedback is something we use in our social interaction with friends, when we give positive response to what our friends and family are wearing. This kind of feedback can also be directed at strangers in certain situations, and is usually understood as being friendly.

The comments I refer to are those that are provoked by what you wear, and are given by strangers in the street. It's fascinating how something worn, can so strongly provoke a feeling that a verbal statement has to be made.

The most common reactions are not even verbal, but are gestures like the opinionated "thumbs up", or "thumbs down". The comments and gestures that I prefer mainly state the obvious.

Once, in Berlin, I was wearing a skirt I had made, a red skirt with two holes cut out at the bottom. A man in the street saw me, pointed with his finger to the holes and then cried out, happily, "Löcher!" Some time later, in Sweden, my three year old niece, acted similarly, pointed at the holes, actually put her finger through one, and exclaimed "Hål!" (hole!).

I enjoy these reactions, not only in that they are non-opinionated, but as an interaction with me wearing something. The passing comment can be seen as confirmation and acknowledgement, like a verbal mirror. I regard these interactions as mutual, and I use my own smile and gaze to confirm that I have received what was said.

I regard the passing comments as witnesses of my existence. Furthermore, they are connected to storytelling, but relate more to the potential of a story to emerge.

As part of my doctoral work in 2006, I have been wearing a mirror brooch.

While wearing the brooch, I have received many passing comments. Here are a few of them:

A 13 or 14 year old girl on the tram, with a purple and black Mohawk, states:

A mirror! (where upon she immediately looks at herself in the mirror.)

Walking along Vasagatan in Göteborg, a man points at my brooch, smiles and says.

The sun!

The mirror broche has provoked many reactions, not only positive ones. Some people react negatively when they see themselves in the mirror. Some make a short, intense analysis of why I am wearing it.

The brooch has also provoked many questions. For Example:

Is it an instrument?

Is it for protection?

A man working in the cashier of a grocery store says to me, while paying for my groceries, "Aha, it will show different people in the brooch, well, then one can not say it is handsome, nice." (meaning, that he could not flatter himself, because at that point he was reflected in the mirror.)

I have noticed that the Mirror is mostly commented on by men, some even think it is a device for me to meet single men. I have also noticed that it is easier to make verbal contact with strangers, when I am wearing the brooch.

One of my favourite comments comes when I meet two men at Gamla Masthugget, and one of them states:

Here comes a mirror girl!

This comment is appealing because it provokes ideas of stories that could be tied to the Mirror girl. The Mirror girl may have a secret identity and unusual strengths like Spiderman, for example.

Clothing and accessories are related to a possible narratives and possible identities.

The process, in relation to time, has the three characteristics of time, the past, future, and present. Storytelling and narrative deal with memory and reshape history to fit our identity within the moment. Fashion is, on the other hand, connected to our aspirations, hopes for the future, and work as an affirmation in the present. In our identity, memory and aspiration meet, and they are both created by our fantasy. We are myth makers and liars, and we need the myths and lies to be acknowledged and witnessed by others.

In the documentary Back, fashion designer Ann-Sofie Back states that she works with "aspirational fashion".[2] The documentary illustrates that fashion-designers work with the idea of the myth making and lies, not only communicating with others, but also points to the possibility of inspiring oneself by the way of dressing.

The importance of the lie and the invented story, in shaping of identity comes alive in the film Big Fish by Tim Burton.

The expression "big fish" has different meanings. It can mean the really big fish, the trophy that every fisher wants to catch, and also to the stories that fishermen tell each other where the truth of the size of the fish is a bit stretched.[3]

In film, the father has been altering the mundane stories of his life, to become fantastic stories about giants and hidden worlds. His son, who has always listened to the stories over and over again is pretty tired of them, and regards his father to be the greatest liar in his life. He thinks of his father as an escapist, and one who can not handle the reality of life. They meet when the father is on his deathbed, and the father asks the son to tell him the end of the story, he needs to know before he dies. So the son continues his father's story by adding the last chapter, wherein he becomes the big fish he always was, and is released in the sea by the son.

Clothing reveals something about who we are, and who we wish to be. In the film, the lies and the stories not only tell something about the father, the stories are the

father. Following this, and from one perspective, clothing can be said to be who we are.

The narratives, or possible narratives, are important aspects of fashion design. It is also connected to the shaping of identity and for this, clothing is used.

In this project, the capture of possible narratives, some perhaps revealed in passing comments, is a goal for the project, and even a guideline for the design of the clothes themselves. In this case, a specific interest in design that provokes interaction between people.

(NOTES)

1 Carter, Michael, Fashion Classics from Carlyle to Barthes, Oford, New York: Berg, 2003. p.8
2 Documentary by Stefania Malmsten/Maria BenSaid/Göran Olsson, www.pipel.se
3 by Esbjörn Guwallius, www.film.nu

Interaction Design Methods in Fashion Design Teaching

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Abstract

The expressiveness of use is of focal interest in fashion design, which makes the perspective of act design important in learning/teaching. The objective of the project presented here was to introduce interaction design methods in fashion design teaching to make act design explicit throughout the different stages of the design process in a systematic manner; to develop a general workshop curriculum in experimental fashion design focusing on the expressiveness of wearing and use. A series of test workshops were implemented to provide a foundation for reflection and critical discussions. The main results, motivated by workshop evaluations, consist of theoretical models for a systematic development of workshop exercises in fashion design aesthetics.

Keywords – Higher Education, Instructional Innovation, Fashion Design, Interaction Design, Experimental Workshop Training, Design Aesthetics

Maria Nordström – winning the prize for the best Swedish contribution at Concours international des Jeunes Créateurs de Mode in Paris. Pierre Cardin, model and Maria Nordström.

1 Introduction

This paper reports on pedagogical development work in fashion design teaching. Focus is on theoretical foundations and development of learning/teaching models and methods. Practical workshop exercises exploring initial hypotheses were done to provide a basis for reflection and for critical discussions. But it is important to note that these exercises were not designed as empirical experiments to evaluate and test suggested teaching models and methods in any strict sense, they were all implemented as course exercises in the regular curriculum. The project reported on here stops with the development of theoretical foundations, models and methods. Empirical evaluation is perhaps next step, but it is another matter that needs more time and a different set-up.

1.1 Rationale for change

When designing cars, clothes, etc., we do not only design things, but implicitly also the meaning of what we do as we use them. It is design of things, but also implicitly of the acts that define them in use. What it means to drive a car of course depends on the cars themselves, what it means to dance in a certain sense depends on the clothes you wear, but also on how you drive the car and how you wear the clothes. Basic elements of fashion design concern the expressiveness of clothes as they dress the body; the silhouette, line, texture etc. But it also concerns the expressiveness of the acts that defines given clothes in use. Actual use defines clothes in some sense just as much as the clothes themselves implicitly define these acts of use; a circle that provides a double perspective on basic issues of fashion design aesthetics, i.e. a double perspective on methods and techniques of fashion expression. It is a duality in perspectives that we have to handle in design practice and the question is how we prepare for this in the design school curriculum: what pedagogical methods do we use for working, throughout the design process, with a broad perspective on fashion aesthetics where the expressiveness of acts of use is systematically linked to the expressiveness of textile materials and clothing form? A "basic course" in fashion design

aesthetics that introduces also this perspective must, in addition to teaching the "laws" of spatial form and visual expressions, introduce the aesthetics of act design in some form, i.e. how we implicitly or explicitly express acts of use in the process of designing a garment. This is still a matter of understanding the intrinsic relationships between abstract form and concrete expression, but from a somewhat different perspective. It is a complementary shift in basic methodology; from design by drawing to design by act-defining.

The main objective of the project reported on here was to introduce interaction design methods in fashion design teaching to make act design explicit throughout the different stages of the design process in a systematic manner; to develop a general workshop curriculum in experimental fashion design focusing on the expressiveness of wearing and use.

The basic working assumption/hypothesis of the project was that learning fashion design aesthetics through workshop exercises in experimental interaction design

- Would give students a broader conceptual perspective on the expressiveness of clothing,
- Would give students concepts and methods to work more systematically with fashion design in a context of wearing and use.

1.2 Review of relevant literature

The world's fashion schools, and departments, of today are fairly equally divided in the sense of either belonging to/and or grown from technological colleges, e.g. the fashion design departments at Fashion Institute of Technology, New York; Hong Kong Polytechnic, Hong Kong; Manchester Metropolitan University, Manchester; Moscow State University of Design and Technology, Moscow, or fine art schools, e.g. Art Academy, Vilnius; Central St. Martins College of Fashion, London; La Cambre, Paris; Parsons, New York. In additions to this twofold background there are also some few examples of fashion departments that stem from home econo-

mics, e.g. Bunka College of Fashion, Tokyo; Buffalo Sate College, Buffalo. Looking at these different backgrounds it is also here we find the difference in training and integrating aesthetics into the education, the general conclusion being that aesthetics is in the first category of schools taught mainly as a subject of its own, often under the title "fashion concept", or "fashion sketching". In the second category of schools, aesthetics is most frequently taught as a fundamental course in a kind of Bauhaus tradition (Wingler, 1969; Naylor, 1985) as well as integrated in the continued supervision of the artistic design projects that dominate the curricula. In the third category of schools aesthetics and artistic training are even less present in teachings as subjects such as fashion sketching is predominantly about representation and the time is devoted to collection composition and design method.

Although there is a lot written about fashion from various perspectives (e.g. Breward, 2003; Carter 2003; Frings, 1999; Johnson, Torntore & Eicher, 2003), the literature on teaching methods in fashion design is not extensive. In basic textbooks such as (Jenkyn Jones, 2002; McKelvey & Munslow, 2003) design aesthetics is also not a basic issue as such, rather its main emphasis is analytic, systematic and concerned with the sequential structure of a thought professional design process. Instead, in a kind of tacit inspired manner (cf. Polanyi, 1967) these still rare contributions to fashion design method make even less of an attempt to articulate and grasp the ambiguous concept of aesthetics, and furthermore, also creativity as an essential element of such a process. In fact, the overall structure of contemporary fashion design methodology is stating the obvious, as e.g. (Tate, 1999) that most designers try to fit their garment into the general fashion climate, where climate is a combination of the economic condition of the country, current technology developments, and current retail trends; timing – the fit in a general fashion trend and aesthetics; the silhouette, are elevated as essential qualities of a designer, however not critically integrated into any methodology.

In industrial design there has been extensive development of design methodology and theories about the design process (cf. Jones, 1992). There are attempts to transfer this type of methodology to the area of fashion design (cf. Lamb & Kallal, 1992; Regan, Kincade & Sheldon, 1998), but very little is done to build a specific methodological foundation for the fashion design process except for explicitly business oriented models (e.g. Carr, 1992; Burns, 1997; Jarnow & Dickerson, 1997). In fact, the overall structure of contemporary fashion-design methodology has taken its bearing in the direction of the early design management discourse (cf. Carr, 1997; Tate, 1999; Potter, 1980; Easey, 1995) without the integration of a creative design methodology in itself; a methodology of which there are just few accounts (e.g. Sinha, 2002; Lacroix, 1996; Mulvagh, 1998), lacking a necessary theoretical level in order to make them generic models.

The interaction design methodology used in project exercises is, in one way or another, related to the "aesthetic turn" in interaction design, i.e. a rather recent more systematic focus on interaction design aesthetics (cf. Dunne & Gaver 1999; Djajadiningrat, Gaver & Fres, 2000; Löwgren & Stolterman 2004; Hallnäs & Redström 2002, 2006; Graves Petersen, Iversen, Krogh & Ludvigsen, 2004). Discussions and results related to theoretical foundations of fashion design aesthetics have also clear connections with the notion of "embodied interaction" (cf. Dourish 2001).

In design education, as well as in art education, different forms of active learning are standard procedure; learning practical work by practical training in combination with theoretical studies. What perhaps is a bit specific here is that learning objectives – to develop a certain perspective on design aesthetics – are somewhat theoretical in nature (cf. Stolterman 1994). The idea of using design methods as tools in practical workshop training to reach given objectives is, in some sense, similar to what we do when in learning mathematics, or music composition, we use generic "design" methods to develop an understanding of, and feeling for, certain mathematical and compositional perspectives (cf. Stohr, 1933). In classical composition

training there is for example a long tradition in using specific methods of counter point (cf. Jeppesen & Haydon, 1939) to develop understanding for a polyphonic perspective on music composition. (Cf. model-based learning, e.g. Clement, 2000). From a constructivist point of view the design methods we use in workshop training could perhaps be seen as forms of construction students uses in learning.

1.3 Questions – critical factors

The basic project hypothesis is founded on somewhat general observations concerning a double perspective on fashion design aesthetics; to express garment and to express wearing. A critical issue was to make this concrete, and precise, enough in terms of more specific learning/teaching methods

- To find appropriate theoretical foundations for workshop design,
- To find relevant general, and workshop specific, learning outcome to guide implementation.

In order for workshop training to be successful students and teachers need to have a clear idea of what it is we/they train and what it is we/they train for. The main critical factor here was to make this distinct enough as a foundation for introducing "new" methods and perspectives in fashion design education through workshop exercises: What is it that we train – to understand the workings of the exercise; What is it we train for – to understand learning outcome.

1.4 Importance of the project

Importance of the project is twofold:

(i) Wearing expression is of focal interest in fashion design. The importance of interaction design methodology in this context lies in the introduction of an explicit design-aesthetic perspective on "wearing" and "use" in fashion design teaching and thereby in broadening the design aesthetic foundation for practice; to introduce expressional methods and techniques that relate to the acts of use.
(ii) The basic issue in learning the fundamentals of design

aesthetics is to see and understand the link between design techniques and design expression; to learn, and understand, the craft of design in combination with training in critical reflection. Design methods serve a double purpose here:

- As tools for training systematic design work,
- By providing a conceptual framework for critical reflection on design work.

Here the importance of the project lies in its contribution to the development of fashion design methodology, with focus on educational training.

2 Methods

2.1 Students

The aim of the project was to develop design aesthetics at Bachelor and Master level fashion design education. Methods developed in the project are also intended for critical seminar reflections at doctoral level education.

Educational programs Bachelor, Master and Doctoral programs in fashion design at The Swedish School of Textiles, University College of Borås. 10 students are enrolled each year at Bachelor level. At Master level a total of 10 students in fashion and textile design are enrolled each year. Main focus of the project was on education at Bachelor and Master level. Education at Doctoral level is carried out in cooperation with Göteborg University and Chalmers University of Technology, where students receive their degrees. Courses included in project exercises range from introductory courses at Bachelor level to advanced Master level courses and seminar courses at Doctoral level. All educational exercises in the project were done in forms of workshops, including related critical seminar discussions.

Students In 2005-2006 there were 100% women at Bachelor and Master level – normally very few men attend fashion design education at our school. At doctoral level, 5 out of 6 doctoral students in design at our school are women. Age of students was 22 – 33, average age 25.

Students have in general about one or two years fashion design training before starting their Bachelor education at our school. Except for exchange students most students at Bachelor level came from Sweden. At the Master level some 30% of the students came from other countries.

2.2 Innovation – project work

Methodologically, the project was based on the idea to work out a proper foundation for a general workshop program on basis of test workshops that would run in two series during two years. Each test workshop was, so to speak, based on an assumption that a certain type of workshop practice would provide relevant learning practice in relation to a given outcome. As such the workshops were meant to explore the assumption and open up for reflection and critical discussion providing material for the development of theoretical foundations and educational methods. The pedagogical program resulting from this is a first suggestion and further evaluation, reformulation, etc. need more time.

2.2.1 Project group and work plan

The project group consisted of five lecturers and four students; three senior lecturers (interaction design, fashion design and textiles design), two lecturers/PhD students (fashion design, textiles/interaction design) and four students (two Master students in fashion design and two Bachelor students in fashion design).
The project group worked as a fully integrated working group and has been intact during the two years of project work. Main project work has been done in four sub-groups:

- Methods and workshops; collecting relevant design methods, defining and organizing the test workshops,
- Evaluation and examination; defining basic design briefs, defining forms of evaluation and examination for test workshops,
- Documentation; sound and video recordings of student interviews and workshops,
- Reflection and development of educational models and methods.

The whole project group met regularly for discussions and overall planning. All project members took, in different constellations, part in the actual test workshops – supervising students, heading critical seminar discussions, documenting workshops, introducing design methods and design briefs.

General work plan:

- Spring 2005; Development of curriculum for experimental workshop;
- Autumn 2005; Test workshops series I with student groups from BA level (year 1 and 2); from BA (year 3), MA (year 1) and PhD level. Study travels. Documentation work (editing interview and video material) and first formulation of pedagogical models,
- Spring 2006; Test workshops series II with student groups from BA level (year 1 and 2); from BA (year 3), MA (year 1) and PhD level. Documentation work (editing interview and video material) and revision and development of initial pedagogical models,
- Autumn 2006; Design of final workshop curriculum, dissemination of results.

Comment on work plan We were able to roughly follow the basic work plan. The test workshops were all integrated as part of the regular curriculum at our school and we had to reschedule the test workshop program a couple of times due to problems with overall planning. Some workshops worked very well, others not so well, but important information came any way out of the workshops that "failed" in various ways. The design of a test workshop implicitly refers to a certain pedagogical context, i.e. a context in which workshop introduction, workshop supervision, workshop examination and evaluation all make sense and provide the intended learning environment. We learned a lot about the meaning of this for specific workshops that failed to work in the context of a given regular course. We initially prepared for two series of regular test workshops with six in each series. This turned out to be a bit

too optimistic. Planning, implementation, documentation, reflection was much more work than we had planned for. In the end we did six regular test workshops plus several reference workshops. The main deviation from the basic work plan concerns the main results, i.e. the design of a final workshop curriculum. Although we have collected a rather large supply of methods easily adaptable for workshops in fashion design and also have a gained good working knowledge about the actual workshop design the main result of project is not a completed workshop curriculum, but rather theoretical foundations and general models for teaching/learning fashion design aesthetics with focus on use and wearing.

2.2.2 Development and design of a test workshop program

Workshop design All workshops aim at exploring models and methods for training interaction design as part of the fashion design process; to define wearing intentions (WI) through wearing expressions (WE), to relate wearing intention and wearing expression to each other by designing a garment and defining intended wearing expressions, i.e. to express a relation WI=WE.

To focus workshop training on different phases of the design process we used the three logical stages in the design process as described by Jones (ref.): divergence (de-structuring the brief), transformation (making the design patterns), convergence (designing the acts). Each workshop will be an exercise in working through one stage in the design process. For each such exercise there will be specific "input" and "output" formats, typically "output" from a divergence workshop will work as "input" for a transformation workshop etc. The basic outline for a workshop is set by applying a specific interaction design method to a given "input" providing training to work with a fashion design problem, in some stage of the design process, from the perspective of act design.

First step in designing the workshop program was to interpret the basic working hypothesis (see above 2.2) in terms of general learning outcome:

General learning outcome Students will be able to explicitly see (analyze) and express (design) fashion in terms of wearing and use in a systematical manner.

Comment on learning outcome What is important here is the duality between analysis and design; wearing and use are not seen from a sociological, ethnological etc. perspective but from the perspective of design aesthetics. It is a matter of learning the practice of fashion design aesthetic with a systematic focus on expressiveness in wearing and use.

Specific learning outcome Each workshop is based on a given interaction design method that focus on the relation WI=WE for a specific phase of the design process. In each case this is interpreted in terms of specific learning outcome that all support specific aspects of the given general learning outcome.

- **I (Workshop I and V)** Students will be able to see (analyze) and express (design) the "user" through (in terms of) wearing intentions/wearing expressions in relation to a given brief,
- **II (Workshop II)** Students will be able to see (analyze) and express (design) the "user" through (in terms of) wearing intentions/wearing expressions in relation to a given activity,
- **III (Workshop IIIa)** Students will be able to see (analyze) and express (design) "use" (wearing) in a given brief,
- **IV (Workshop IIIb)** Students will be able to see (analyze) and express (design) wearing expressions in relation to given wearing intentions,
- **V (Workshop IV)** Students will be able to see (analyze) and express (design) wearing expression style in relation to given wearing intentions.

Test workshops are defined in terms of; Period (when), Class/Groups (students, number of groups), Design brief, Stage (design process phase), Method (interaction design method of the workshop), Workshop input/output (initial information and workshop outcome), Evaluation/

Examination (forms for critical reflection and workshop dissemination).

2.2.3 Workshops and seminars

Test workshops Six different test workshops were held within the project; workshops I, IIIa, V and II during 2005 and IIIb and IV during 2006. We discuss one example below. See appendix 1 for descriptions of all six workshops.

Workshop I (Learning outcome I)
Period: Two weeks, 26 September – 7 October 2005.
Class/Groups: Fashion Design BA Year I (10 students)/ 3 groups.
Design brief: To design a colorful headgear.
Stage: Divergence.
Method: Cultural probes (Gaver, Dunne & Pacenti, 1999). A probe is a thing we use in investigations to gather information. A cultural probe is consequently a thing we use to gather information about cultural phenomena. Here it is something we "send out" to collect information about WI/WE relations in everyday life.
AIM: To paint a picture sketching expressions of garment in use in everyday life. To provide initial inspiration that open up the design brief.

OUTLINE:

- We start with a given design brief,
- Design a cultural probe kit that is appropriate for collecting expressional information about activities strongly connected to the given brief,
- Try to find appropriate locations to place the probes,
- Place the probes,
- Supervise discretely until it is time to collect the probes,
- Collect the probes,
- Sum up and present the material collected by the probes.

Workshop input/output: The design brief/A culture board (presenting the information collected by the probes). Evaluation/Examination: Halfway and at the end of the workshop. Evaluation with focus on intentions and expressions in work methods and presentations is done by two groups of outsiders that have not been briefed about the workshop, nor about the project itself – a sort of blind review.

Implementation: The workshop started with a general introduction where workshop method and design brief were given to students together with a brief description and explanation of project aim and intended learning outcome (See appendix 1). Each group was given a probe-kit consisting of a digital camera, a notebook, post-it notes and a set of fiber-tipped pens. First task for the student groups was to design instructions on how to use the kit. They were then asked to give the kit to someone they thought interesting in relation to the brief together with instructions on how to use it. After return of the kit the task was for each group to analyze and present the information to paint the picture of a "user" of a colorful headgear. The workshop was carried out according to plans with evaluation as a reflective and critical seminar discussion on aims and methods. All groups were given supervision during the workshop by members of the project group.
Outcome: Students demonstrated that given learning outcome was reached, but learning was also clearly only implicit. That students were able to "to see (analyze) and express (design) the 'user' through (in terms of) wearing intentions/wearing expressions in relation to a given brief" using cultural probes as a method of design brief exploration was something we as teachers could observe, but the meaning of this was not something the students could grasp and explain explicitly. Understanding methods and perspective needs a theoretical foundation that was lacking; the level of abstraction was too high on introduction given at the beginning of the workshop.

Reference workshops In order to get a broader background for evaluation we carried out several reference workshops, also involving guest lecturers.

- **Functional clothes** A workshop on functional wear was done with Master students during two days in December 2005. Lecturers and organizers were Sirpa Morsky (International coordinator and clothing design Häme Polytechnic, Finland), Jane McCann (Director smart clothes and wearable technology University of Wales, Newport), Marion Ellwanger (professor in textile design at our school). The aim of the workshop was to train for a clear understanding of all the elements which are to be considered in the design research- and development phase of an aesthetically attractive product which satisfies given use requirements,
- **Interaction design reference workshop** To get a broader perspective on the particular interaction design methods chosen for our test workshops we organized a reference workshop with interaction design students at the IT University in Göteborg in the autumn 2005. The workshop was done in November with 30 Master students divided in 6 groups. Interaction methods were chosen from test workshops II and III. A course in design methods is included in the interaction design curriculum and it was easy for students to understand the workshop exercise and also to explain and motivate the outcome of the exercise. Supervision was done by members of our project group in cooperation with teachers from the IT University,
- **Project course at the Göteborg IT University** As part of our project 6 fashion design students participated in an interaction design project course at the IT University in Göteborg during 2005. They worked together with interaction design students in three groups on projects connecting fashion and interaction design,

- **Workshop at Unga Klara** A workshop at Unga Klara, Stockholm´s City Theater in autumn 2006 on exploring wearing expressions through smart textiles design. The workshop demonstrated how a focus on materials can display the double perspective of fashion design aesthetics.

Seminars, development of models and methods
Work on the development of theoretical models and educational methods was done during the whole project. We organized a series of seminars to present and discuss ideas and results and also two larger workshops with invited guests.

- **Seminars** Suggestion and results from the project were presented and discussed at the regular design seminars at our school continuously during the project,
- **Workshop on interaction design aesthetics** A workshop to discuss issues in interaction design aesthetics was organized in January 2006 at our school with guests from Århus University; Institute of Design, Umeå University; School of Arts and Communication, Malmö University and Chalmers University of Technology,
- **Workshop on fashion design teaching** To sum up our project we organized a workshop on fashion design teaching at our school in November 2006. For this workshop we invited guests from University of Applied Sciences and Arts, Hannover (Professor Martina Glomb); Danmarks Designskole, Copenhagen (Senior lectures Ann Merete Ohrt and Peter Dammand); Beckmans College of Design, Stockholm (Senior lecturers Lena Kvarnström and Marie Louise Nordin); Fashion Institute of Technology, New York (Senior lecturer Sass Brown); Faculty of Textile Technology, University of Zagreb (Professor Tonci Vladislac); London College of Fashion (Senior lecturer Alison James) and HDK Steneby (Senior lecturers Ebba Johansson, Eva Alfredsson). Together with members of our faculty we were 25

participants in the workshop discussing general issues in fashion design teaching. Workshops on fashion design teaching are not that common and we feel that the project gave us an opportunity to open up for a new type of discussion and cooperation between design schools with fashion on their program.

2.2.4 Reflection and documentation

Documentation To be able to evaluate outcome of workshops we interviewed all participating students on how they picture and understand the fashion design process and about their level of, practical and theoretical, knowledge about design methods. All interviews were recorded. All test workshops, including critical evaluation/examination discussions, were documented on video.
Workshop evaluation was then done in closed seminars within the project group. Video material from workshops was used as reference material in these seminars – most project members were participating in workshops, so the video material was not first hand material.

Study tours In november 2005 the project group went to Berlin for a study visit at Universität der Künste, visiting Professor Barbara Tietze, and also to visit Berlin as a center for experimental art and design in Europe. This included a visit to the Photo museum in Berlin with its large Helmut Newton (Newton, 1993) collection. We also made study visits to the design school in Kolding, Denmark and to the design schools in Eindhoven during the Dutch Design Week 2006.

Fashion shows During the project we systematically documented – photo and video documentation – various student fashion shows. Besides the graduation show at our school we documented the annual KappAhl Design Award show in Stockholm, Mittelmoda in Gorizia, Italy, the annual Designers Nest competition at CPH Vision Fashion Fair in Copenhagen and the Concours international des Jeunes Créateurs de Mode in Paris with fashion students from all over the world. In 2005 160 students from 16 countries participated in the competition and we were very happy to see one of our project group members – Maria Nordström – winning the prize for the best Swedish contribution. In Paris we could document also preparations and testing which gave an unique opportunity to see and reflect on fashion student work from all over the world. Documentation of fashion shows and study tours has been used in the project as reference materials both with respect to discussions about level of student work and with respect to discussions about fashion design presentation in a learning/teaching perspective; the role of the cat-wake, the role of fashion photography with respect to wearing expression as a basic parameter in fashion design aesthetics.

Evaluation Workshop evaluation focused on two main issues

- The way in which the workshop explores the given assumption (learning outcome),
- How the workshop displays possible lack of general training in design methodology and understanding of theoretical/conceptual foundations.

The different forms of evaluation/examination integrated in test workshops served a double purpose

- To involve students in a critical evaluation of the workshop,
- To test different forms of workshop evaluation/ examination.

Note that regular student valuations in relation to given course were not part of this.

3 Results

The main results of the project consist of theoretical models together with reflections on methods for workshop examination and evaluation. It also includes systematic photo and video documentation as well as initial development of models and methods for using photo and video as tools for critical reflection in fashion design education.

3.1 Conceptual framework and theoretical models

The lack of sufficiently precise and elementary concepts to define and explain the interaction design interpretation of "to see (analyze) and express (design) fashion", as foundation for exercises and training, was evident from test workshop evaluations. The "what is it we train and what is it we train for" was simply not clear and elementary enough. To raise the level of reflection in workshop exercises we need a basic conceptual framework in which we can define and explain fashion design practice from the perspective of interaction design in a systematic manner. With respect to theoretical foundations, the main results of the project relate to

- A more in-depth exploration of the notions of wearing intentions and wearing expressions as foundation for a definition of what it is we design in the fashion design process from an interaction design perspective. This is then one way of explaining fashion design from the perspective of wearing and use,
- A system for classifying the form of an initial workshop brief modeling "to see (analyze) and express (design)" as a foundation for the development of workshop exercises.

3.1.1 Wearing intentions and wearing expressions

In what follows a *garment* is a construction of some sort intended for wearing. We consider two basic aspects of this

- Wearing intentions (WI); why we wear the garment, why we intent to use it. More generally what *we* do wearing the garment,

- Wearing expression (WE); how we wear the garment, how it expresses us. More generally what the *garment* does as we wear it.

(Cf. the distinction between real, represented and used garment in Barthes, 1990.)

Both WI and WE refers to some given garment X. We may then view fashion design as a process of defining "that" garment which WI and WE refers to, and thereby relate WI and WE to each other. We, so to speak, express the relation WI=WE in the process of designing. It is not trousers, coats etc. we design. We express relations WALKING=PROTECTING, DANCING=GLOWING etc. *Form*, as a central aesthetical concept, will here refer to the way in which the garment X relates WI and WE to each other.

What we do in the fashion design process from an interaction design perspective is to express wearing intentions by (through) wearing expressions, i.e. we interpret the relation WI=WE by designing the garment as expressional material, something we use to express wearing intentions.

This is to view fashion design as an interaction design problem in order to make the aesthetics of wearing explicit as a design aesthetical problem; we do not only design garments, but also its intended "use" in the fashion design process.

Generic analysis: (A) Given a garment; (B) Explain what it is by defining WI and WE; (C) Describe its interaction form,

Generic design: (A) Given WI and WE; (B) Define an interaction form; (C) Define the garment.
The equation A(BC) = (BC)A then describes the relation between analysis and design.

WI defines in some sense *me* whereas WE defines a *garment*. We can given WI and WE ask

- What the *garment does* with me WE(WI),
- What *we do* with the garment WI(WE).

**WI** and **WE** introduce two basic design variables and the recursion equations

$$WE = WE(WI)$$
$$WI = WI(WE)$$

express the relation WI=WE, i.e. *what* it is we do as we design "the" garment which WE and WI refers to. We define the garment by defining what it does with a wearer. Simultaneously we define a wearer by defining what she/he does with the garment. To design street wear fashion for teenagers, for example, means to define what, in a specific case, street wear fashion do with teenagers as well as what teenagers does with street wear fashion.

3.1.2 Interaction analysis in fashion design teaching

The pedagogical program sketched here is based on the idea to relate exercises, workshops etc. to a certain *fashion design diagram*. Each part of the diagram – it has eight elementary components – introduces a particular perspective on saying that fashion design means expressing wearing intentions through wearing expressions. We learn to *see (analyze) and express (design) fashion in terms of wearing and use in a systematical manner* by training us to see and express a fixed set of elementary perspectives of the relation WI=WE.

WI (WE) can be an abstraction or something concretely given and it is the garment X that relates the abstract and the concrete instance to each other. Given abstractions WI and WE we define in the process of designing the garment X that WI and WE refers to and given a garment X we can by use derive concrete WI' and WE' by wearing X. Viewing basic possibilities in this we can draw a diagram over different ways in which the garment X relates WI and WE to each other.
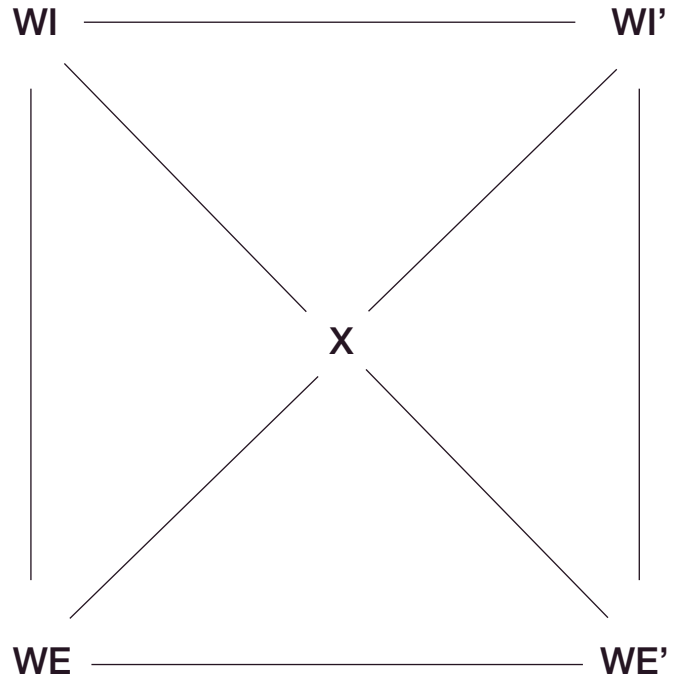
In the diagram we find eight different triangles we can use as a conceptual framework for exercises to train students in working with different basic aspects of the fashion design process from an interaction design perspective with basic focus on design aesthetics.

Examples
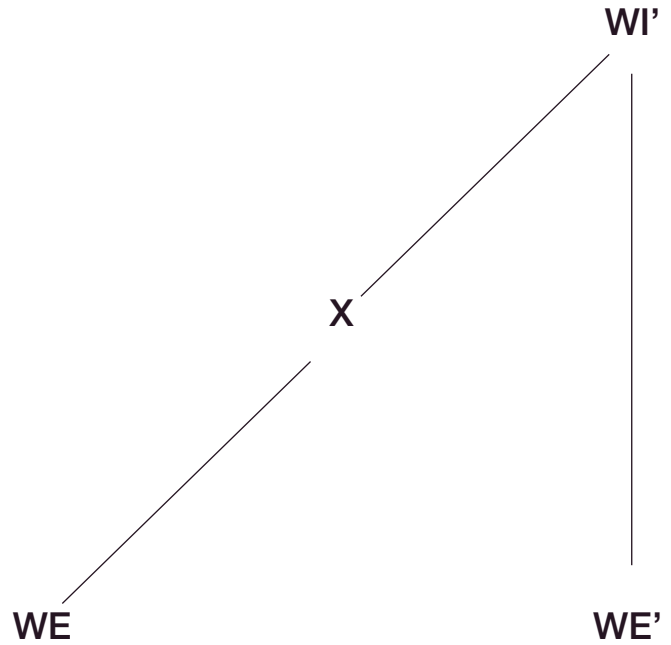
(1) WE = X(WI) (WI = X(WE))
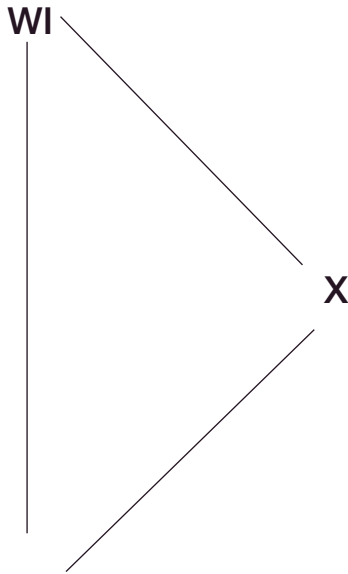
WI

X

WE

To see (analyze) and express (design) fashion in terms of wearing and use means here

- Analysis: Given a garment X to define WI and WE such that WE = X(WI),
- Design: To solve WE = X(WI) by defining X for given WE and WI.

From the perspective of analysis WE = X(WI) is a form of equality the given garment X introduce. Consider some garment X, for instance a suit X, strict in some sense. What is it, we ask, and answer by producing equalities WE = WI, i.e. (WE, WI) such that WE = X(WI). This means we look for wearing expressions WE and wearing intentions WI such that WE is what the suit does to "us" where "us" is what we do wearing some given garment. Say WI = "working at the bank" and WE = "making reliable". Such a series of pairs (WE, WI) is then one way to characterize X in terms of wearing and use.

From the perspective of design WE = X(WI) is the basic design rationale, i.e. that which motivates essential design choices, it is a design brief form we instantiate by defining WE and WI. If we on the other hand start with for example WI = "working at the bank" and WE = "making reliable" the process of designing X will be a process of solving/proving that X makes "us" (working at the bank) reliable.

 (2) WE´ = WE(X)&WE´= X(WI´)

WI'

X

WE   **WE'**

To see (analyze) and express (design) fashion in terms of wearing and use means here

- Analysis: Given a garment X to define WE, WE´ and WI´ such that
  WE´ = WE(X)&WE´= X(WI´),
- Design: To solve WE´ = WE(X)&WE´= X(WI´) by defining X for given WE, WE´ and WI´.

3.2 Workshop models

Each triangle in the diagram is a learning objectives/outcome classifyer, i.e. defining and classifying the "what" of a workshop exercise. The interaction design methods give us methods to solve the equations associated with given triangles, i.e. the "how" of a workshop exercise. The diagram provides in this sense a systematic foundation for learning objectives and learning outcome. The duality in reading an equation in terms of analysis or in terms of design will also provide a model for explaining what it means to turn analysis into design and vice versa. Some workshops are analytical in nature while others are typically design oriented, connecting two workshop exercises can then be used for explicit training in turning one perspective (analysis/design) in to the other.

Example

Consider Workshop I (V). One way to understand this workshop is in terms of the equation $WE = X(WI)$ seen from an analytical perspective; a colorful headgear is given and we use cultural probes to get inspiration/information for defining WI and WE such that $WE = X(WI)$. We can then bracket X and use resulting WE and WI in a design brief $WI = X(WE)$. To solve this we can, in a workshop exercise for example use the method of counterexamples (See Appendix 1, Workshop IIIa) to explore the boundaries of the design space given by $WI = X(WE)$.

3.3 Examination and evaluation

The main outcome of examination/evaluation experiments is a better understanding of how to integrate critical discussions and reflection into workshop exercises. By varying examination/evaluation methods students will train to focus and reflect on different aspects of the design process. A "blind" review demonstrates explicitly that design presentation, design communication, is an integrated and important part of the process. When examination/evaluation is based on students reviewing each others work they will in a natural manner rediscover the divergence phase of the process, i.e. see possibilities, solutions, more questions and different ways of understanding the brief.

3.4 Documentation work

We have a rather large library of photo- and video documentation from the project:

- Video documentation of all workshop exercises, except parts of workshop IV,
- Video- and photo documentation of study trips and student fashion shows.

A side effect of our documentation work has been introduction of photo and video documentation as a natural component in the fashion program to facilitate learning through critical discussions. This has become an integrated, and very concrete, part of the development of theoretical models and a pedagogical program and we view this as a very important project result. Photo and video are powerful and flexible tools for representing WI and WE in seminar discussions.

4 Discussion

4.1 Analysis

Successful workshop training requires

- (A) That training methods support learning objectives (Soundness of principles),
- (B) That learning outcome guides workshop training (Correctness of implementation).

The initial working hypothesis of the project conjectures that (A) holds, with respect to using interaction design methods in workshop training to

- Give students a broader conceptual perspective on the expressiveness of clothing,
- Give students concepts and methods to work more systematically with fashion design in a context of wearing and use.

That design methods with an explicit focus on wearing and use in workshop training contributes to a change in focus that makes the double perspective visible is something that evaluation of test workshops supports.

Correctness of implementation requires, among other things, a clear understanding, and definition, of intended learning outcome and suggested training methods. A key issue is to check ("prove") actual implementation of training methods on basis of given learning outcome. This is the basic rationale for explanations in workshop introductions and in supervising.

Evaluation of test workshops displayed various problems in relation to correctness of implementation, problems that motivates main project results:

- Difficulties in seeing and explaining "use" from an aesthetical perspective – this relates to understanding learning outcome and led to the development of a conceptual framework and theoretical foundations for explaining "what" it is we design in the fashion design process from an interaction design perspective,
- Problems involved in using interaction design methods, and explicit design methods in general, as pedagogical instruments in fashion design teaching – relates to the systematics of design methodology as a pedagogical instrument and led to the development of a framework for modeling and explaining the meaning of "to see (analyze) and express (design)" as a foundation for the development of workshop exercises.

Explaining the learning outcome Even if a perspective on use, wearing expressions etc. in some sense is obvious in fashion design the test workshops made it clear that it is very difficult to make this explicit as an aesthetic perspective in fashion design learning/teaching. To make the learning objectives/outcome of practical workshop training clear enough we need a language, i.e. a conceptual framework for explanations.

The central problem in all design work is how to turn analysis of given problems, requirements, conditions, ideas etc. into constructive suggestions for solutions, i.e. to turn analysis into design.

The design solution can never be a mere "mechanical" derivation from given requirements. This turning point – from analysis to design – is of course fundamental also in design education. In design education this is all about understanding – both discursively and intuitively – what it means to give form (gestalt) to that which in some way is given in analysis. A specific notion of form is consequently a basic building block in design education – this is really the core issue in learning/teaching design aesthetics. Learning outcome in design aesthetics training must have a firm foundation in a distinct notion of form, i.e. design form. A challenge here is then to give an explicit definition of this with focus on the relation $WI = WE$. The need for a theoretical foundation was also evident in the critical seminar discussion where analysis centered on design rationale, i.e. the explanation of, and motivation for, basic design decisions. This foundation is also essential in building and training practical design knowledge, i.e. a foundation for faith in our ability to make the necessary turn from analysis to design.

Design methodology in fashion design teaching

The test workshops gave clear evidence, as we see it, that interaction design methods provide tools for raising the level of learning/teaching in fashion design by giving students and teachers a language to discuss and reflect on design aesthetics with focus on wearing and use in a more systematic and conceptually clear manner. This seems to be true for all the phases of the design process we tested in workshops.

Although we see clear support in favor of our initial hypothesis we feel that we perhaps underestimated the difficulties in introducing design methodology as a conceptual pedagogical tool. To a certain extent it is a matter of "theoretical" tools for "practical " work and we then have to deal with the usual problem of abstraction: the methods are supposed to provide, both conceptually and

linguistically, understanding for the design process, but at the same time it is a conceptual, and linguistic, problem to understand details and components of the method descriptions themselves.

It is one of these typical vicious circles. A specific problem here is also that design methodology with a focus on design aesthetics is not very well developed in fashion design. We simply need basic theoretical models as a foundation for developing fashion design methodology.

Examination and evaluation Examination/evaluation have, in the project, been synonymous with evaluation of given learning outcome. The models of examination/evaluation tested in the project have given valuable information about function and form of critical seminar discussions in the context of a practical workshop – that certain examination/evaluation models failed to work was mostly due to general problems with planning and implementation of some of the workshops. Results were here in general rather positive in the sense that level of workshop reflection and understanding was visible in a very clear and distinct manner in examination/evaluation discussions. The different forms of examination/evaluation tested in the project were easy to understand for workshop participants and did not depend on the introduction of specific concepts and methods. All this means that the critical seminars discussions in the test workshops were an important source for reflection on workshop outcome.

4.2 Implications

The project has clear implications for fashion design, as well as textile design, education at our school. In relation to project results development of education will follow four different tracks:

Theoretical foundations for teaching fashion design aesthetics The project has initiated a more general discussion at our school about methods and theoretical foundations of fashion design teaching. This will, as we see it, raise the level of education and give students a stronger foundation for practical fashion design work.

A basic course in design aesthetics A main outcome of the project is plans for a basic course in design aesthetics that can be given both to fashion design students and textile design students focusing on wearing expressions and expressions in use respectively. This is the course that will provide for the foundations we found necessary for workshop training to work properly.

The educational catwalk In order to introduce the aesthetics of act design more explicit in fashion design learning/teaching at our school we will develop the critical "catwalk seminar" as an integrated part of the curriculum. This is the critical seminar where we discuss fashion as part of the fashion show itself.

Photo and video in fashion design teaching A basic implication of the project is the integration of photo and video as a foundation of critical seminar discussions. This is documentation that focuses on the designer perspective and is a type of fashion documentation very different from communicating fashion to intended customers, the intended target group etc. As a critical and reflective component of the educational design process it is a mixture of documentation and critical design. (Cf. Andersen, 2006; Cotton, 2004.)

4.3 Conclusions

The initial project hypothesis implicitly refers to two basic assumptions:

(A) That good work practice builds on the foundation of explicit concepts, methods and models,

(B) That it is a good idea to introduce foundational concepts, methods and models through practical workshops.

To be able to develop your work practice through reflection and in communicative action it needs a solid conceptual and methodological foundation.

To grasp the working meaning of foundational concepts, methods and models you must use them in practical design work.

A basic pedagogical problem is then to resolve the circle inherent in this; we need some form of general and initial conceptual foundation to be able to start to build this interaction between theory and practice. The question is in each particular case *how* to design such a key that can open up and resolve the circle in an educational context.

We have, in this project, used series of test and reference workshops to explore this issue in relation to the overall aim of broadening the foundations of fashion design aesthetics. The project results combine the suggestion of such a general conceptual foundation with methods and models for introducing it in the fashion design curriculum. Next step is to implement the project results in the regular curriculum and to evaluate the results of this in relation to the initial project hypotheses.

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Interaction design methods in fashion design teaching – Appendix

Workshop introduction and test workshops II – V

1 Introduction (given to students participating in workshops)

Interaction design methods in fashion design teaching – A RHU (Council for the Renewal of Higher Education) project at The Swedish School of Textiles

Introduction

The basic component of interaction design within the fashion design process concerns the definition of wearing intentions (WI) through wearing expressions (WE); to relate use of garments to wearing expressions by garment construction and by defining intended wearing expressions.

WI concerns what we do when we wear garment; walk, sit, belong, hide etc.

WE concerns what garments do as we wear it; warming, cooling, protecting, glowing etc.

WI are the basic design variables in some sense, something we initially develop and explore in order to define what it is we design. WE is an end result in the design process and what gives WI a gestalt.

For the purpose of the workshop we follow Jones (Jones, 1992) and distinguish three major logical stages of the design process; divergence, transformation, convergence.

Divergence: testing for stability/instability in the design problem context. To find the components that will permit change and the fixed points of reference. This is the initial stage where the given design brief is questioned, de-structured, the stage where we open up the design space.

Transformation: to recognize basic patterns of what is being designed, "a pattern that is perceived as appropriate but cannot be proven to be right." (Jones, 1992) In this stage we try to explore the boundaries of the problem and identify basic design variables.

Convergence: the acts of designing where the final decisions are taken. This is the stage where the actual designing takes place, where material is being shaped into things, systems, acts, concepts etc.

A design method is a way to work systematically in the design process. This is a way to design the process itself;

- To provide an explicit structure for the process, making basic decisions traceable,
- To provide a conceptual framework for communication within the design process.

A design method is a tool, not a rule.

2 Workshops II – V

2.1 Workshop III a

Learning outcome: Students will be able to see (analyze) and express (design) "use" (wearing) in a given brief.
Period: One day, September 2005.
Class/Groups: Fashion Design BA Year III (6 students)/ 6 groups.
Design brief: Individual project brief.
Stage: Divergence/Transformation.
Method: Counter examples (Cf. Hallnäs & Redström 2006). A counter example is an example that gives an exception to a rule. As we come cycling on a one-wheel bicycle we provide a counter example to the rule that all bicycles have two wheels. A counter example here is an example where given WI in some sense are satisfied, but where WE is completely up-side-down with respect to ordinary understanding of WE.
AIM: To explore the boundaries of a common understanding of WE in relation to given use, An exercise in critical analysis of given use.
OUTLINE:
- We start with a given design brief,

- Describe the common view of WE,
- Isolate basic WI that define intended use,
- Keep these WI, but introduce WE, through examples, that are up-side-down, i.e. completely different as to form a counter example to the common view,
- Try to isolate what is essential in these new expressions that makes them into counter examples,
- Make sure the counter examples conform to the brief with respect to WI.

Workshop input/output: The design brief/Counter examples.
Evaluation/Examination: Seminar presentation of, and motivation for, basic choices made in the work process (design rationale).

Implementation: The workshop started with a general introduction where workshop method and design brief were given to students together with a brief description and explanation of project aim and intended learning outcome. The workshop was carried out as part of a course in artistic development. Design brief used in the workshop related to an individually chosen theme of study for the course. First task for the student groups was to understand aim and outline of the given design method and to figure out how to use in relation to the given theme of study. Next step was to step-by-step to follow method "instructions" in developing a series of counter examples. The workshop was carried out according to plans with evaluation as a reflective and critical seminar discussion on aims and methods. Members of the project group gave all students supervision during the workshop.

Outcome: Some students demonstrated that given learning outcome was reached with a high degree of explicit understanding. Going back to interviews we could see that this more or less directly corresponded to previous knowledge of, and training in, how to use design methods as explicit tools in the work process. Some other students had difficulties in understanding methods and tasks of the workshop, which gave clear evidence that workshop introduction was given at too high a level of abstraction, and

that understanding methods and perspective needs basic training and theoretical foundations.

2.2 Workshop V
Learning outcome: see Workshop I.
One week; October 2005.
Class/Groups: Fashion Design MA Year I and II (10 students)/ 3 groups.
Design brief: To design a colorful headgear.
Stage: Divergence.
Method: Cultural probes.
Workshop input/output: The design brief/A culture board.
Evaluation/Examination: Same as workshop I.

Implementation: See workshop I.
Outcome: Students demonstrated that given learning outcome was reached, and also that learning was more explicit than in workshop I. The master students seemed to have reached the level of knowledge and training needed for both understanding introductions and methods.

2.3 Workshop II
Learning outcome: Students will be able to see (analyze) and express (design) the "user" through (in terms of) wearing intentions/wearing expressions in relation to a given activity.
Period: One and a half day, December 2005.
Class/Groups: Fashion Design BA Year I (10 students)/ 5 groups.
Design brief: Working clothes for women.
Stage: Transformation.
Method: Gestalt substitution (Cf. Hallnäs & Redström, 2006; Djajadiningrat, Gaver & Fres, 2000).
A gestalt substitution is a reinterpretation of WI in a given example, that provides a new meaning to WE. Consider for example X that in her new evening dress receive a price and imaging that what she really does is shopping in a grocery store.
AIM: To provide an alternative context for exploring WE.
OUTLINE:
- We start with an example of an activity,
- Give an WI-interpretation of the example at hand,

- Substitute an alternative WI-interpretation for the given one which provides a completely different meaning to WE in the example,
- Try to isolate WE-characteristics typical to this alternative interpretation,
- Give an analysis of WE in the example and look for expressions inconsistent with the alternative WI-interpretation,
- Describe these components in the example by re-designs of given WE.

Workshop input/output: Description of an activity through examples – a substitution that reinterprets the example and given WI in an alternative context.
Evaluation/Examination: Day two questioning and re-design what was done during day one.

Implementation: The workshop was set up as a combination of dancing and sketching training. A film showing a waitress working in a restaurant illustrated the brief "Working clothes for women". A dance instructor was invited to help students substitute an alternative WI-interpretation to provide a different meaning to WE in the example; the waitress "really" is dancing. With a background in actually dancing through the given example, next step was to isolate WE-characteristics typical for the alternative interpretation by sketching. The workshop was carried out according to plans with evaluation as a reflective and critical seminar discussion on aims and methods. Students were given supervision by the invited dancing instructor and also, in part, by members of the project group.

Outcome: The workshop can be divided in two parts: the dancing phase (to substitute an alternative WI-interpretation) and the sketching phase (to isolate WE-characteristics typical for the alternative interpretation). In the first phase learning outcome were clearly reached, but going from analysis by dancing to design by drawing turned out to be very difficult. Much more work, and initial training, is needed to prepare for such a workshop. The necessary understanding of methods and perspective needs a theoretical foundation that was lacking. It is simply very difficult

to introduce explicit methods of training in turning from analysis to design – the core of design training that often enough is referred to in terms of the "magic" of "creativity".

2.4 Workshop III b
Learning outcome: Students will be able to see (analyze) and express (design) wearing expressions in relation to given wearing intentions.
Period: One day, March 2006.
Class/Groups: Fashion Design BA Year III (6 students)/ 6 groups.
Design brief: Individual project brief.
Stage: Transformation-Convergence.
Method: From intention to expression (the art of use/wearing) (Cf. Hallnäs & Redström 2002).
To better understand the aesthetics of use we can look for the art, or the game, of use, i.e. a maximal focus on WE. Walking in a new pair of shoes we can pretend that they are a sort of sports equipment; just tools for putting our feet at exact places and then jump on to other marked out places, all in an intricate given pattern. In terms of gestalt substitution we may say that what we do is not to transport ourselves to work, but playing hopscotch.
AIM: To explore and expose hidden and forgotten aesthetical choices in common WE interpretations of given WI.
OUTLINE:
- We start with WI that describes intended use of a given garment,
- Try to describe an art (game) of wearing,
- Give several examples of garment and WE that defines this artful (athletic) wearing,
- Describe basic WE-characteristics of the art (game) of wearing,
- Use these characteristics as a basis for a characterization of central aesthetical choices in expressing intended use.

Workshop input/output: The design brief/A design for the art of use.
Evaluation/Examination: Half-way in the workshop show, results and then continue to build further on these for the rest of the workshop.

Implementation:

The aim of the workshop was to examine different expressions in wearing while self being in motion, to move from situation and context to the process where wearing comes to expression, e.g. if Batman is a somewhat theatrical example of someone that have made his being in the metropolis into an artful expression through his clothing and equipment, a pair of three inch stilettos and a short tight skirt answers for the same thing, though, in a perhaps more sublime way.

In order for the second year students in fashion design to work with this theme the task that was given them was based upon dwelling in a metropolis area. It included the following tasks but was not restricted to only these:

Theme: Alienation of man/urbanism
- Meditate on the city as it falls a sleep and as it wakes up,
- Take a tram or a bus that you have never taken before and ride with it for one or two laps from beginning to end, or a full circle,
- Sit down somewhere outside your favorite café for 1-2h and observe the people in it without going in,
- Sit down as near as possible to a bigger street/highway entrance to the city (e.g. bridge) for an hour,
- Lay down to rest where you normally would feel embarrassed to do so and stay there until your feeling of shame has left you,
- Move in a grater speed than everyone else (e.g. run through the pedestrian quarters),
- Move extremely slowly relative the tempo than dominates the environment,
- Find a place to sleep as well as having dinner and breakfast on the street.

Rules: You are not aloud to be inside at any time,
- You are only allowed clothing,
- Use public toilets or sneak into café or McDonalds,
- Taken frequent pictures: portraits, situations and still life,
- Use camera or take note only in-between exercises.,
- Finding a place to crash. (Allowance: a flat roof, call a friend),
- No cell phones allowed.

Outcome: The result of the class was mostly varied. It ranged from people who took it very seriously to those that regarded the exercise as meaningless. However, amongst those, who undertook the exercises properly a lot of interesting ideas come out, e.g. a collection of garment for an alternative pattern of moving and resting in the urban environment or an collection for homeless. These results showed to be more or less affected by the actual "living with the environment" as they showed a much more nuanced and almost poetic understanding of the subject. Therefore, in conclusion, as an approach to understand the expression of wearing it seemed like a very conductible approach. However, the bridge from design methods already well known to the students was arguable a bit to stretched, as it was believed that it was this gap between different approaches to research that was the reason for some students not being able to conduct the research in a proper way.

2.5 Workshop IV

Learning outcome: Students will be able to see (analyze) and express (design) wearing expression style in relation to given wearing intentions.
Period: One week, March 2006.
Class/Groups: Fashion Design BA Year II (10 students)/ 5 groups.
Design brief: Function clothes.
Stage: Convergence.
Method: Interaction style (Cf. Öritsland & Buur, 2000)
Interaction style can be understood as a rule that relates WI characteristics with WE characteristics; basic properties of what we do wearing a garment relates by a rule to certain properties of what garments do when we wear them. An interaction style is thus a certain way of expressing WI. One example could be to expression movement by movement; if I walk, then movement should also characterize WE.

AIM: To explicitly relate a design to a style of wearing.
OUTLINE:
- We start with a series of WI that describe intended use of a given garment,
- Given for each WI a series of different WE interpretations,
- Rule out the interpretations that are inconsistent with intended final design,
- Isolate basic WI characteristics,
- Isolate corresponding WE characteristics in given interpretations,
- Formulate a rule that describes how WI characteristics relate to WE characteristics,
- If no pattern is visible, go back and give a new series of WE interpretations,
- Give a name to the style and look for historical references.

Workshop input/output: WI describing intended use – a wearing style describing intended design.
Evaluation/Examination: Each participant analyses all other participants' results. All analyses are then compiled into a final evaluation.

Implementation: The workshop was planned to be carried out as part of a course in march 2005. This did not work well for various reasons. Together with the Gestalt Substitution method (see Workshop II) the Interaction Style method was the most difficult one to explain and properly implement and we underestimated this, resulting in a workshop that was not properly prepared with the respect to resources in time for introduction and for basic explanations and supervision.

Outcome: The problems with implementing this workshop as planned gave perhaps the most explicit illustration of the need for developing theoretical foundations of, and elementary training in, fashion design aesthetics.

General conclusions:

- Theoretical foundations that provide an explicit language and concepts are necessary to make the aesthetical perspectives visible to students,
- Students have to work through the whole design process – even if different phases are done in different workshops – to grasp aesthetical perspectives in relation to the different phases of the design process,
- The design brief is very important; the workshop must be well prepared in this respect.

It is in some sense a matter of revisting the Bauhaus "Vorkurse" with its "Abstrakte Formenlehre" (Wingler, 1969) and look for the specific elementary notions needed to introduce fashion design aesthetics in basic fashion design training

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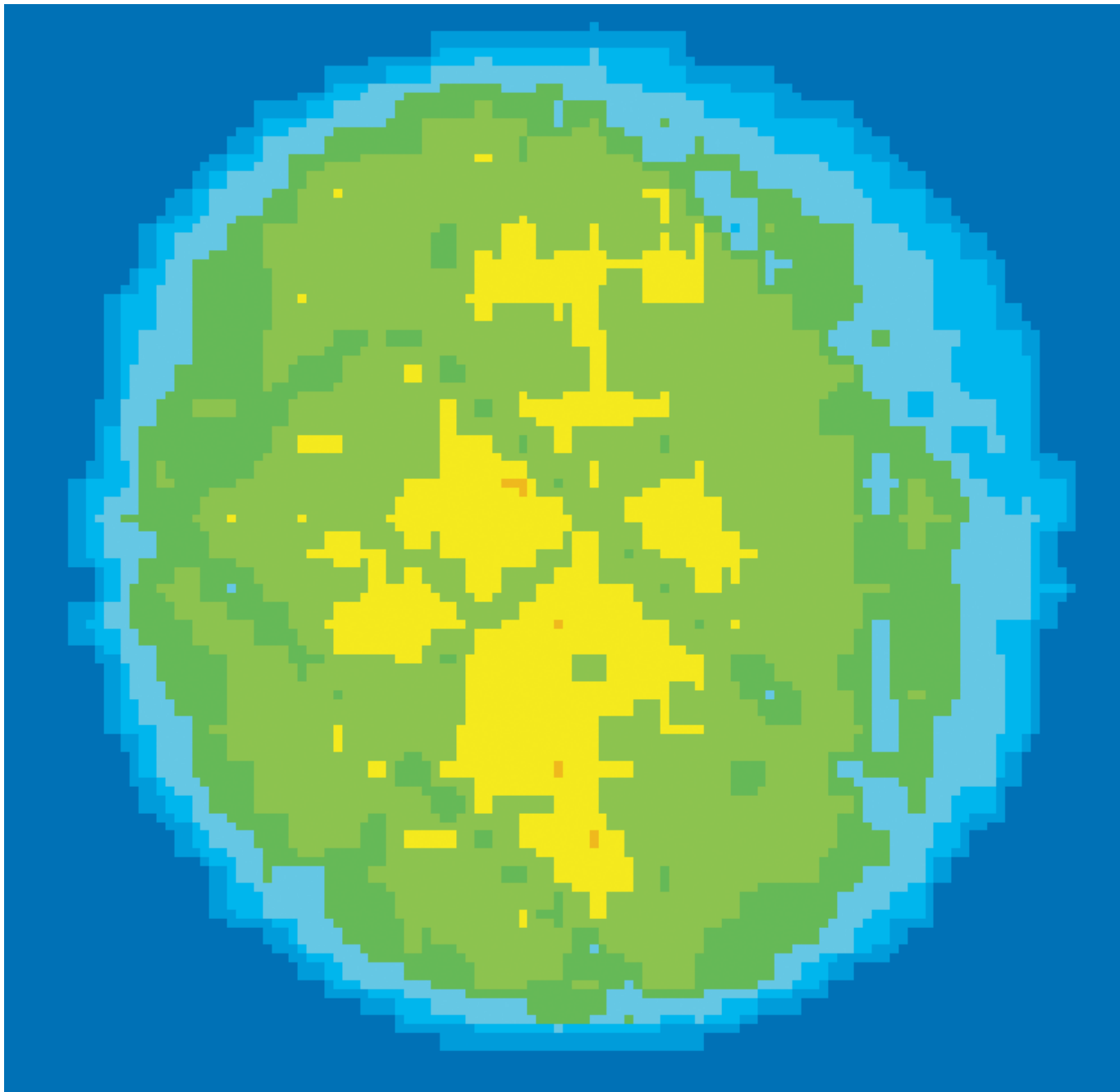
Pressure distribution on mattress, example

Testing of comfort-related characteristics at IFP Research

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Alf Börjesson har arbetat inom olika oråden på IFP Research sedan 1971.
Bland de viktigaste kan nämnas textila mattor med tonvikt på statisk elektricitet och mekanisk påverkan och småskalig brandprovning av olika typer av textilier och angränsande material. Han har också erfarenhet som kvalitsansvarig för ackrediterad uppdragsverksamhet.
Med tonvikt på bäddar och möbler har han arbetat inom komfortområdet sedan 2003.

Mechanical recumbent comfort

Beds are often referred to as 'comfortable to sleep in' – that they give good comfort. In this statement is implied that the bed is soft, i.e. it is able to distribute the weight of the body and thus lessen the pressure on individual parts of it. However, frequently used terms such as hard, soft, very soft, comfortable, or less comfortable are seldom connected to any scientific tests.

Tests with pressure sensor pads

Pressure mapping systems have been available for some time now, tools that enable high resolution measurements of the pressure between a human body and the surface it lies or sits on. Such measuring systems provide a good picture of the distribution of pressure underneath a certain individual on a certain surface at certain time.

The problem is, however, that there are big differences between individuals and that it may be hard to achieve identical results even when retesting with the same individual.

Simulation with indentors

To leave behind the problems of differences between individuals, IFP Research has developed indentors, which simulate the shape of certain parts of the human body.

By loading the indentor with weights, representing the weight of an average human body, one may use the pressure mapping system to assess mattresses and beds in an objective way.

To submit the support surface to as realistic an effect as possible, the indentor is kept at 35 °C, which is the skin temperature of a human body.

The measurement technique is described in a proposal for a new Swedish standard.

Large and small indentor for the measurement of pressure distribution.
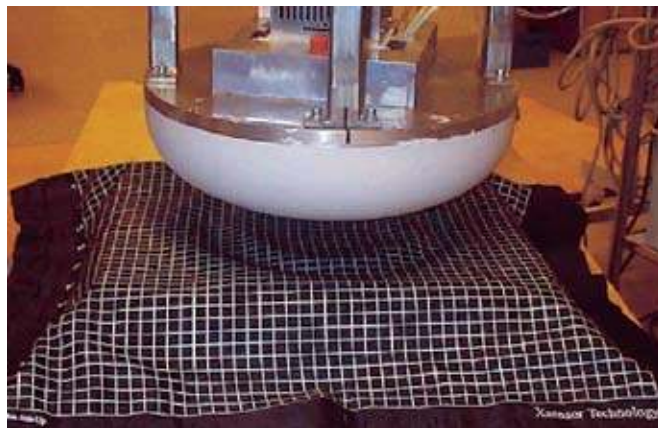
Large indentor and an Xsensor pad.

Measurement of heat transfer

The heat balance of the body

The core temperature of a human body is kept at around 37 °C. Due to that our bodies are normally warmer than our surroundings, which means that heat is given off by the body. When developing and constructing clothes, sleeping bags, duvets, mattresses, etc. it may be essential to know the amount of heat that may travel through one or several layers of the material. A number of testing procedures have been developed to this end.
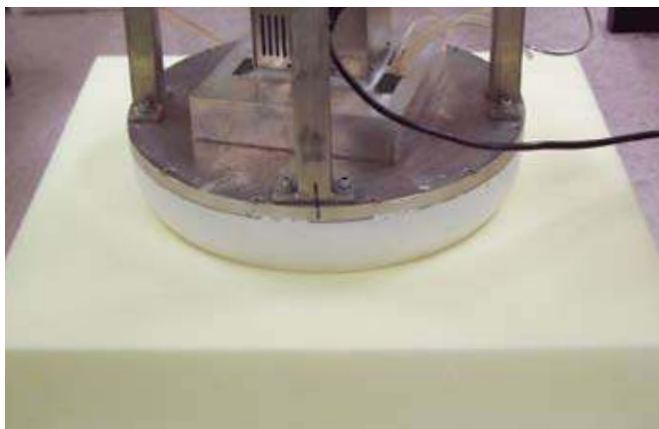
Heated indentor, measurement of polyurethane foam for mattress

Testing heat transfer in seating and recumbent furniture

When measuring the flow of heat through seating and recumbent furniture the compression of the measured material layers plays an important part. Thus, IFP Research has constructed an indentor that is shaped to simulate the back/seat of a human body. The indentor is heated up to 35 °C and on its underside a sensor has been placed that measures the heat transfer in the unit W/m^2. By depressing the indentor against a support surface with a stipulated force, the heat flow at simulated use may be measured.

Testing other products

Despite the indentor being built to measure the heat flow in seating and recumbent furniture, it has proved to work excellently for other products such as duvets, blankets, and different kinds of fabrics. To perform such measurements the specimen has to be secured in a special kind of specimen holder. In order to attain the stipulated pressure between the indentor and the specimen, the specimen holder is placed on a scale.
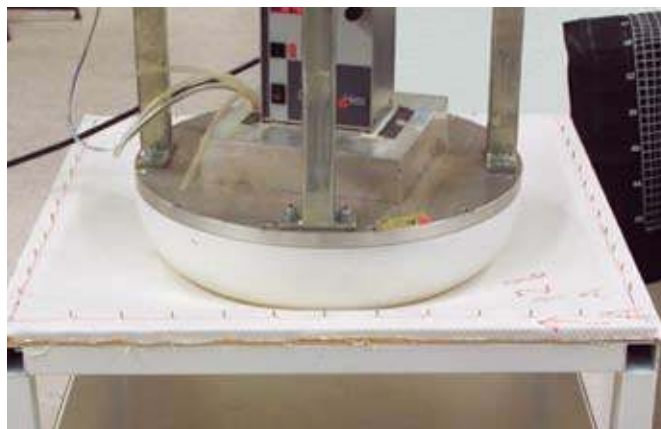
Specimen holder for measurements of heat flow through blankets, duvets, and fabrics

Maximum value and stationary value

When measuring, there is at first a short period of time during which the surface layer of the specimen is heated up. This is the equivalent of the feeling one gets when putting on a piece of clothing or slipping in between sheets. Gradually equilibrium is reached, which will give a measure of the amount of heat that may travel through the different layers of the specimen.
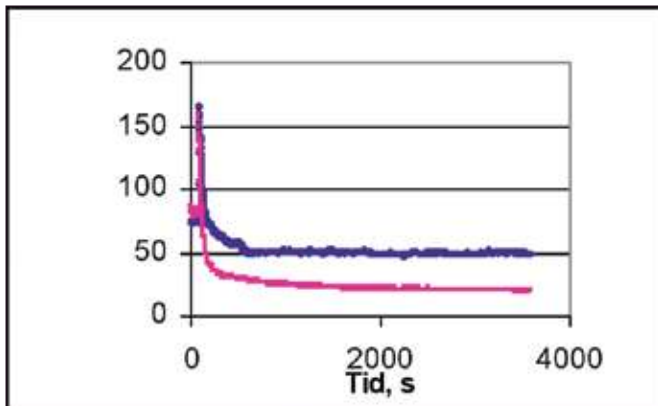
Heat flow through two different materials

Emission of water vapour from the skin

Our skin constantly emits moisture and this intensifies when we perspire. During the active part of the day when we move or sit down, the water vapour is given off by the skin directly to the air or through our clothes, which often possess good moisture transportation capabilities. However, when in bed the emitted water vapour is closed in. In particular the water vapour emitted from the skin that press against the support surface, i.e. the mattress/bed. If the mattress does not allow transportation of water vapour it may soon become moist and warm.

Simulation with a sweating indentor

In order to measure the amount of moisture that may be transported through the different layers of a mattress/bed, IFP Research has constructed a sweating indentor. The underside of the indentor has holes inside which there is a membrane that does not allow liquid water through, only water vapour. The indentor is filled with water at a temperature of 35 °C. When the indentor is surrounded by air it gives off about as much water vapour as the palm of a slightly damp hand.

Indirect measurement with scales

To be able to measure the amount of water vapour that is emitted from the indentor, the water tank in the indentor has been connected to a vessel, which is placed on a scale. The turn of the scale is registered continuously and the flow is calculated by computer.

Measurement of temperature and relative humidity

While measuring the flow of water vapour from the indentor, one may also measure how temperature and relative humidity change at different places in the mattress/bed. If the moisture transportation ability of the surface is small the relative humidity will be high. When the test is performed the specimen is raised to come in contact with the indentor by a trolley that may be raised and lowered. By placing a scale between the specimen and the trolley one ensures that the specimen is exposed to the stipulated force.

IFP's sweating indentor, underside

Indirect measurement of water usage

Testing of other products

Using a special kind of specimen holder, other products such as blankets, duvets, and fabrics may be tested.

Testing thermal resistance

When developing, constructing, and buying clothes, sleeping bags, duvets, mattresses, etc. it may be essential to know the thermal resistance provided by one or several layers of the material. A number of testing procedures have been developed to this end. One of them is named the tog meter and it is described in SS-ISO 5085-1:2004.

Measurement of three temperatures

When measuring with the tog meter it is important to have a temperature regulation system. This is because the point of the test is to maintain three temperatures at constant levels. Since even small deviances may result in serious errors it is of vital importance that the temperature emitters are meticulously calibrated. During the test, the specimen is placed on a reference plate and a measurement plate is placed on top of it (see the adjoining picture).

By heating a plate that is placed underneath the reference plate to a certain temperature, the regulation system sets the so-called T2 temperature to 34 °C. The other two temperatures follow suit and after about three hours equilibrium is reached.

The calculation model of the togmeter works on the presumption that all heat from the heating plate, via the reference plate and the specimen, to the measurement plate moves vertically. However, some heat moves sideways and thus gives an error margin that increases with the thickness of the specimen.

To provide more accurate results for thicker materials IFP has constructed a correction factor.
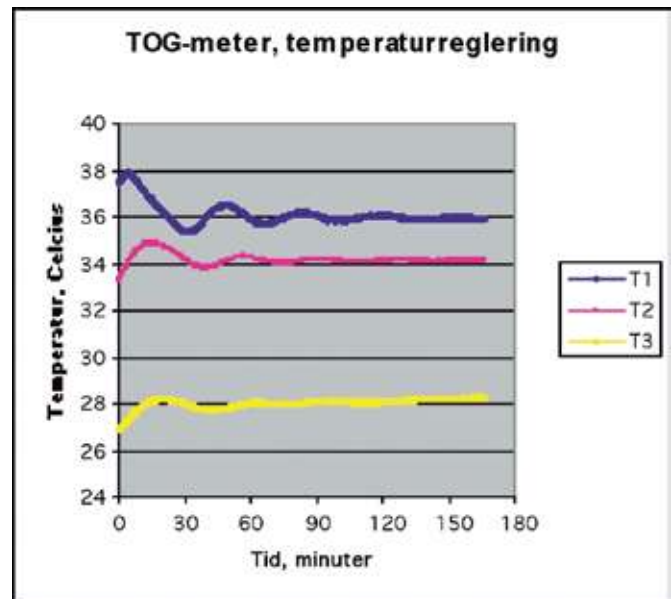
Togmeter, example of temperature regulation

Testing with thermal dummy

With the togmeter described above one may measure the thermal resistance of one or several layers of materials. Testing composite products correctly calls for more sophisticated methods. One method which is developed especially for clothes uses a heated dummy.

Constant skin temperature

IFP's dummy is called Tore. His body, a size 50-52, is segmented into 17 different parts, representing different parts of the body. Each segment is equipped with an electrical heating coil and a temperature sensor. Through a computer guided control system the skin temperature in each body segment is kept within a narrow span (34±0,1 °C). Keeping this temperature constant requires the use of a certain amount of electrical power. The actual amount of power depends on the clothes Tore is wearing, the area of the actual segment, the temperature of the lab, and air velocity past the dummy.

When temperature equilibrium has been reached after a few hours, the power to each skin segment is measured and thermal resistance in the unit $m^2 \cdot K/W$ is calculated. Also, using the description in an international standard designated En ISO 15831:2004 the thermal resistance of the entire dummy may be calculated.

The IFP togmeter. Uppermost in the picture is the measurement plate on the underside of which the temperature sensor T3 is located. The yellow specimen is resting on the reference plate (not visible in the picture) on which the T2 sensor is mounted. Underneath that is the heating plate with sensor T1.
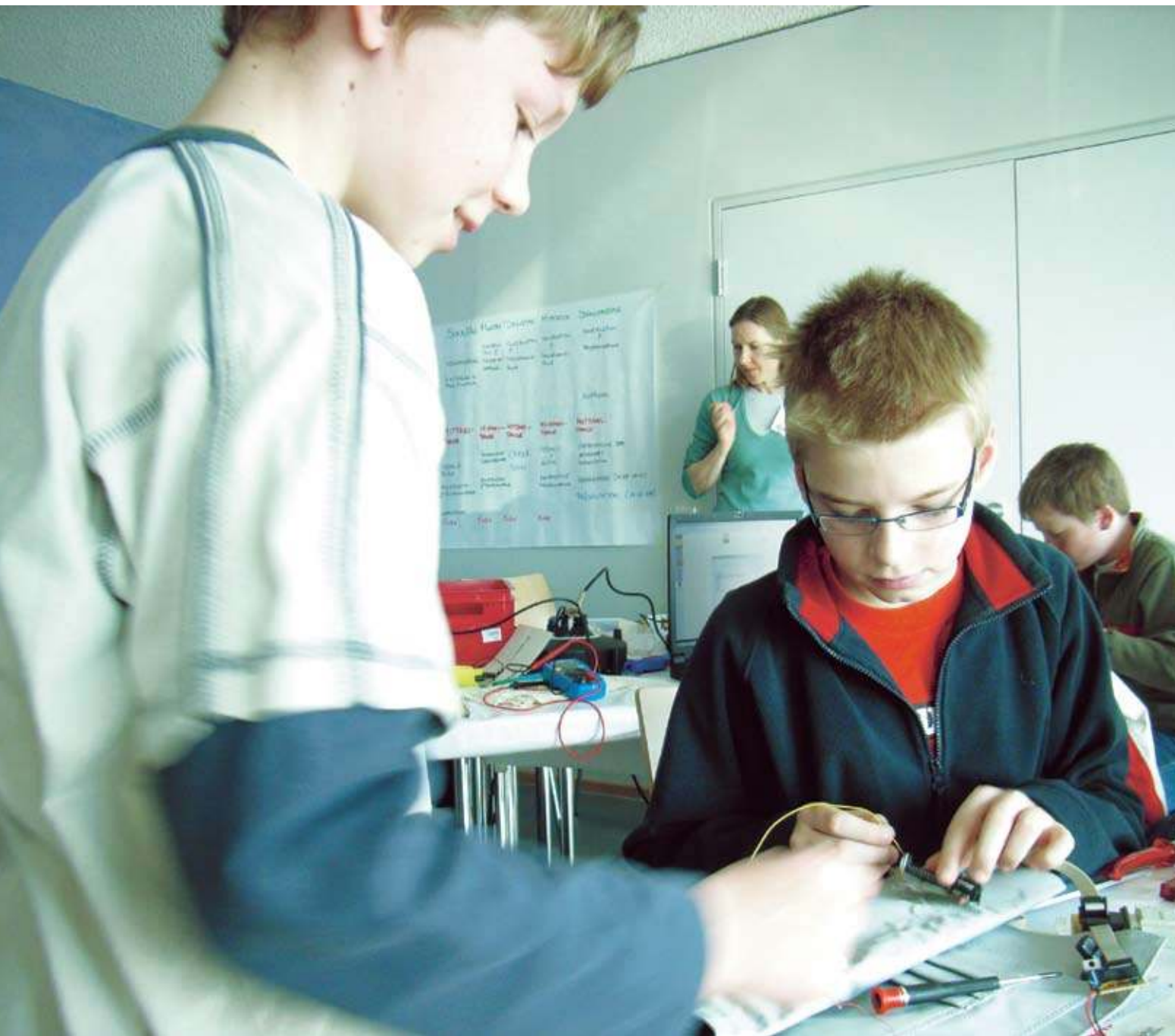
Clothes for low temperatures

In the EN 342 standard there is a description of how to test thermal isolation for clothes that are to be used in low temperatures.

Standing dummy. Testing of winter clothing.

Recumbent dummy. Testing of duvet.

E D U W E A R
Children designing tangible and wearable computing for playful educational purposes

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Marion Ellwanger is a Professor for smart textiles design in The Swedish School of Textiles, THS, since 2004. She received various european grants to develop new design concepts and innovative applications for smart textiles and wearable technology, considering different types of target groups, eg. children and elderly people. The new use and interactive properties of innovative textiles changes and challenges the whole textile/fashion design and manufacturing process.

Besides the development of coordinated international education modules in smart textile design and wearable technology,eg. in performance design, she is an active member in NEST[1] and in EURATEX[2]. Marion aims to bring together The Swedish School of Textiles, THS, with other institutions and Companies to build an international public spirited platform for the future of textiles in Borås.

[1] NEST is a network of participants from universities and Research Institutes in the Nordic countries with the goal of transfer know-how and generate projects together with the industry within the sector of Smart & Intelligent Textiles.

[2] Euratex The European Technology Platform for the Future of Textiles and Clothing

Understanding ICT - Information and Communications Technology - and being able to use them competently and confidently, and possibly to actively shape their development are competences that are crucial for societal participation in the information society.

Structural barriers and mechanisms of marginalisation as well as high cost of educational ICT materials inhibit the development of such competencies.

The E D U W E A R - Project aims at contributing to the reduction of inhibiting factors by employing an approach rooted both in education and in ICT development. An educational low-cost construction kit for wearable and tangible interfaces – particularly smart textiles - will be developed.

These new interfaces open up opportunities for haptic, tactile and aesthetic experiences, thus a wider range of learner types can be included. Thematic concepts for courses, workshops (both as part of school offers and as freetime activities - formal and informal learning settings) will be developed, implemented and evaluated, also focussing on issues of marginalisation. A web-based virtual laboratory will be established and used as a platform for the collaborative development of the construction kit and for cross-national and project-wide communication, exchange and dissemination. One of the main objectives of the project is to foster the experience that one's environment can be shaped and influenced – and how.

In addition to family, school and peer-group, digital techno-
logies play a major role in children's socialisation. The rapid
pace of developments in information and communication
technologies changes habits as well as structures of per-
ception and communication, and it has a fundamental
impact on the way we think and act: Technology catalyses
changes – changes regarding what we do, and regarding
the way we think. It changes people's perception of them-
selves, of others and of the way they relate to the world
(Turkle 1984). These processes of change will be intensi-
fied even further by the development of those innovative
technologies that can be summarised under the term of
„ubiquitous computing", such as tangibles, wearables and
smart textiles.

Digital technologies are and will be crucial factors in life.
Merely using them does not necessarily contribute to
understanding how they work and their role in Knowledge
Society. Hence, in order to reach an understanding,
digital technologies themselves have to be experienced
as something that can be shaped and modified, not as
something static that users have to adapt to.
Even though educational concepts dealing with those
technologies mentioned above do exist, there is a lack of
simple concepts that can be implemented in school and
leisure-time contexts (Robotics being an exception here).
Besides, though the technical equipment necessary for
such educational offers usually comprises rather simple
constructions, the acquisition and purchase is usually very
time-consuming and tedious as there are no ready-made
construction kits available.
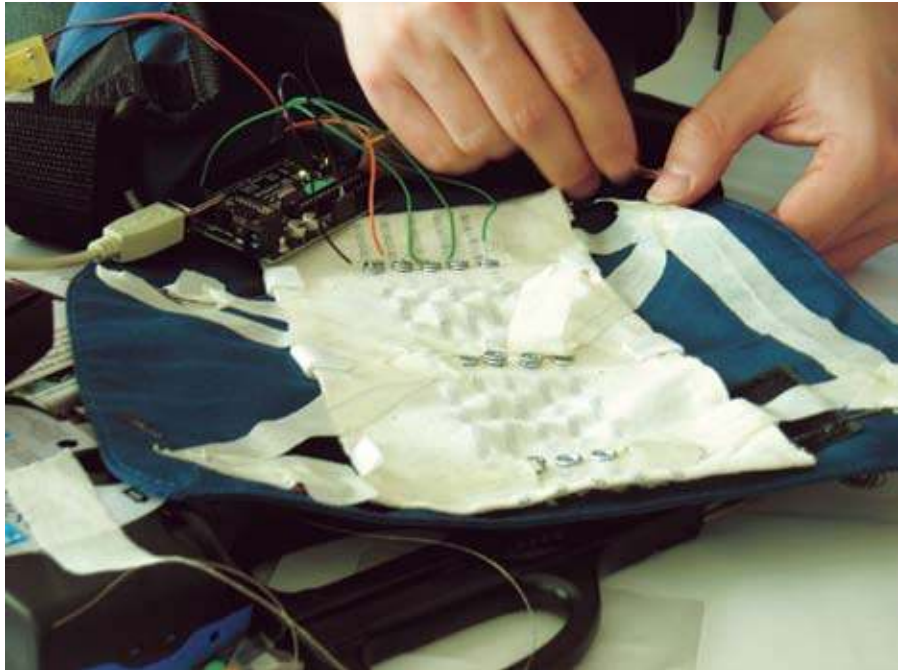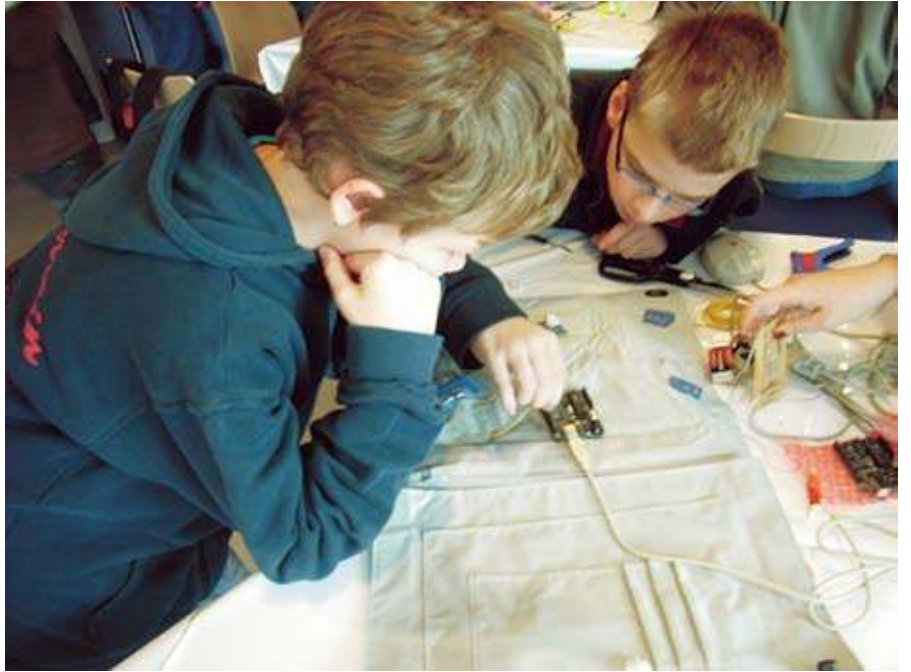
The EduWear project aims at closing these gaps, both in the area of educational concepts and in the area of the technology required.

The interplay of technological developments on the one hand and factors inhibiting an experimental and self-confident approach to them on the other hand is the starting point of our project idea.

Specific consideration is given to access to new digital technologies as a step towards a more profound societal participation of marginalized young people. We aim at interweaving issues of marginalisation - and migration and gender in particular-, with a hands-on, joyful approach to digital technologies that combines tactile, concrete experiences with a deeper understanding of abstract concepts. For educational purposes new and innovative technologies should be in use in order to win young people's interest and to engage them in learning activities that matter for their living and acting in future society.

When using digital technologies, communication takes place via interfaces. Mouse or keyboard are not the interfaces of tomorrow. Rather, there is an increase in the development of tangible user interfaces which connect virtual worlds and the actual physical environment. Amongst those technologies, wearable interfaces that are woven into articles of clothing can be found, as well as specific robots that react to the physical environment (such as Lego Mindstorms), RFID Technologies that can accumulate information in the physical environment, tactile user interfaces, etc.

Yet by offering "Tangibles", tactile user interfaces as pathways into digital technologies, we do not just wish to introduce technologies of the future. Rather, we are aiming at
– winning or re-gaining young people from different backgrounds for learning experiences
– facilitating a playful, experimental and concrete access to abstract concepts
– bringing across both the boundaries and the connection between "real" and "virtual" worlds by exploring abstract concept e.g. algorithms or data transfer through tangible artefacts and the other way round
– fostering processes of a hands-on, tangible access to the world and one's environment,
– and fostering the experience that one's environment can be shaped and influenced – and how.

Tangibles and wearables (especially smart textiles) open up opportunities for haptic, tactile and aesthetic experiences, thus a wider range of learner types can be included. Due to the rich history of textiles, their combination with digital technology will foster a new perspective, from which textiles and their traditional symbolic and emotional meaning can be viewed. As an advanced technical material it will attract the interest of girls and boys alike.

Within the project we aim at developing hard- and software needed to reach the overall objectives as well as on developing concepts detailing how these technologies can be used in an educational setting. The concepts have to be applicable within current curricula and situations at school and in non-school related context. Within the project we want to include groups of marginalised people and focus on Gender Mainstreaming.

The combination of high-tech components from current developments in ubiquitous computing, adapted to children as a target-group, resulting in a low cost development kit is innovative. In particular, the design of Smart Textiles is a young and rarely explored area. To create simple and cheap soft technological devices for children is a unique approach in Europe.

Other innovative aspects are:
- the participation of children in the development process of the kit (children as designers)
- a hands-on approach of addressing the changes in every-day life and experiences brought about by digital technology
- enhancing the understanding of innovative technology and boosting children's interest in/attraction to learning processes
- actively addressing marginalised groups
- specifically addressing girls with offers that attract them
- supporting processes of actively shaping, designing and modifying technology.
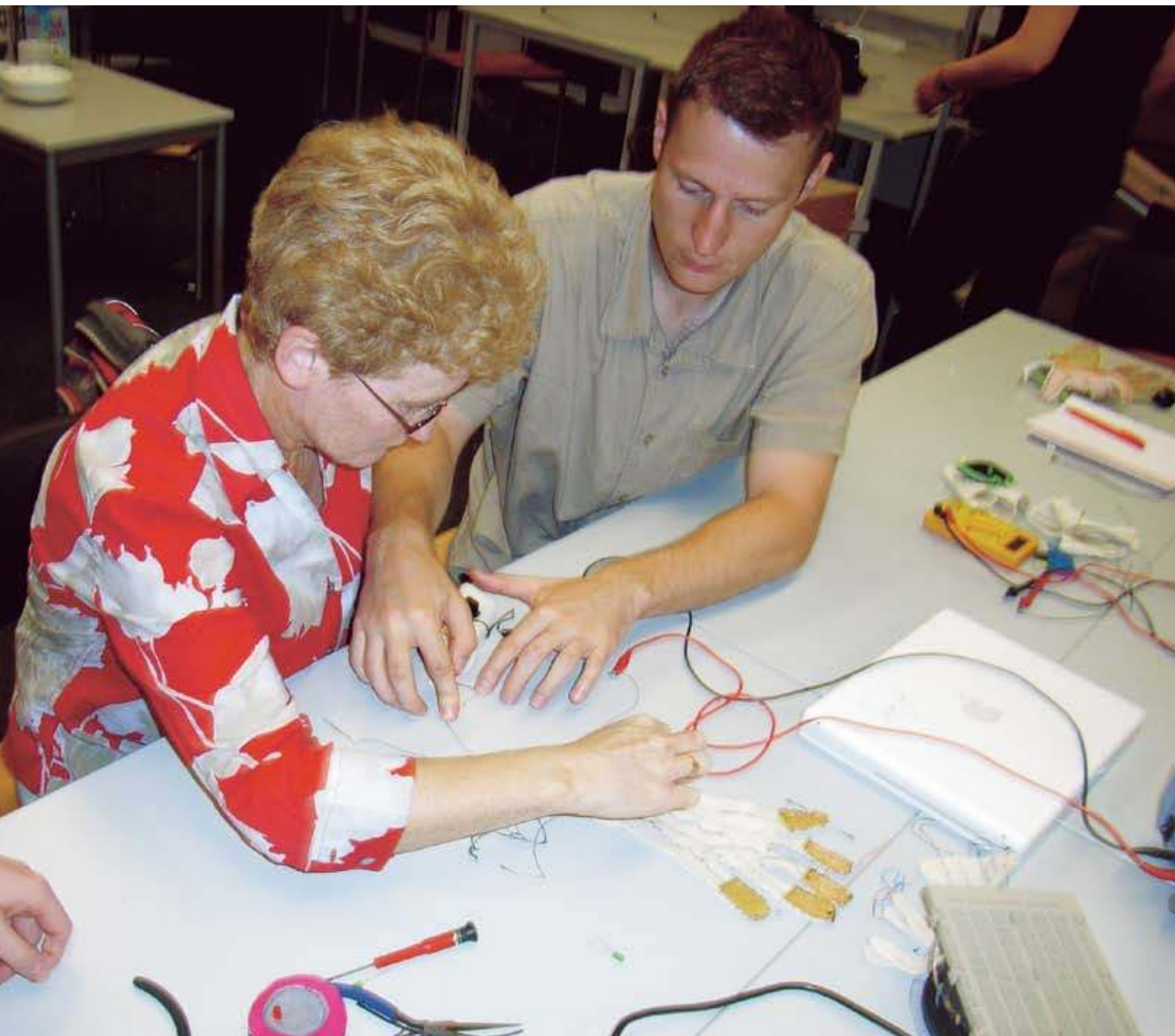
Eduwear

The E D U W E A R project is part of the Partners

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©Accademia di Carrara's students for the Liberamentelibro exhibition

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The Design of Prosperity research project

By Professor Simonetta Carbonaro
The Swedish School of Textiles
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It has been nearly a year since The Design of Prosperity Summit took place. And my conviction about the strength of this project is still very firm. I believe that designing a new idea of prosperity represents the greatest challenge for our civil society, our academic community, and for all those directly involved in designing for and shaping the marketplace. This is a task that will require openness to change and a great willingness to see things in a different light. Certain things can be changed immediately; others will have to be thought through, but without wasting any more time.

Prosperity is a powerful word

Words can help. Words can speak. Words can speak to those who—following the hermeneutics of doubt—free them from the sediment of the commonplace.

The true significance, the true nature of the word prosperity is hidden by its handsome signifier, which in most of the central and northern European languages is commonly associated with the wealth of our affluent societies *(i.e.Välgång, Wohlstand)* and the "safety net" of our welfare states *(i.e. Välfärd, Wohlfahrt)*. We therefore tend to associate this ancient Indo-European word with that sense of well-being experienced by the "democratic" consumer, with that neither praiseworthy nor ignominious "good feeling" of that "typical" consumer, who, while awaiting eternal rest, lives on his average wealth and consumes in the limbo (or the purgatory) of the majority, the majority according to demographic percentages and market share.

Prosperity is instead a strong word like freedom, brotherhood or equality that has deeper meanings than that simple sentiment of well-being which fills the wealthy conformist, the man who, in his golden dusk of "teatime" tranquillity, believes that he has stopped time just by stopping his clock.

Prosperity is not just an entry in a modern dictionary, a simple word among thousands. Prosperity is a *mythos*, meaning a concept word that suggests barns full of wheat, fertile fields, industrious factories, happy workers, learning expeditions, and free time that fosters culture (not just entertainment), while trains run on time and planes fly like gulls (not like rapacious eagles), sails unfurl on boats laden with oriental spices (none of these seafaring wrecks overflowing

with refugees and migrants), and people march towards one another to meet (not to fight), and, and, and…

Prosperity is a strong word, a word that makes us happy because there is a treasure in its mouth which is not just about wealth, but also about heading in the right direction. Like "Design", which literally means "Project", Prosperity has in its prefix "PRO" a kind of knight of the future who stands guard before us. And we should not forget that Prosperity harbours the ancient word "SPARA", which means "Saving". Designing prosperity entails not only imagining and creating the design conditions for progress, but also thinking about a kind of design economy in terms of saving resources.

Progress without Prosperity

The pseudo logic of progress that imposes constant growth rates pays little heed to the fact that the advancing growth must relate to existing stockpiles and resources. If, while advancing, I scorch the earth I conquer, I may progress, but I certainly don't prosper. If progress is accompanied by the spectre of famine, hunger and destruction, people will live with the terror of losing what they already have.

Terrorised by mindless advancement with no restraint, the Eastern West (Europe), the Western West (North America) and perhaps even the West of America (China) have over the last decades begun to question the nature of progress with prosperity. But a terrorized society cannot embrace prosperity because it is blinded by the fear of losing rather than being overjoyed by its capacity to share. It is terrorized because the mythical GNP is a colossus with feet of clay. It is terrorised because pensions may be here today, but tomorrow who knows. It is terrorised because life expectancy increases, but the immortality of the soul is more and more evanescent. It is terrorised because some use religion today in the same way that the Christian West used it in the past.

Prosperity on the other hand doesn't worry about terror because it believes in life cycles and in their alternating ups and downs. Good years are followed by bad ones, rainy seasons by dry ones, the years of plenty by years of shortage. That's why prosperity is always accompanied by foresight, which has nothing to do with the social foresight that has proven to be particularly short-sighted, but instead embraces the original Latin idea of providence, the prudent (provident) and at the same time visionary outlook of the future, that asks "why" and "how" rather than brooding over "what" and "how much".

Perhaps it is not just by chance that Tao philosophy holds prosperity in great esteem. It is a dualist doctrine revolving around concepts such as full and empty, up and down, abundance and scarcity.

I do not wish for the argument to take on apocalyptic overtones; there's nothing here to reveal. Everything is right under our noses, but to start to climb out of the hole, one has to introduce a few simple learning tools.

Learning from Humanities

Prosperity assigns for instance a special task to humanistic education, and particularly to aesthetic education, which conveys the understanding of antiquity, the knowledge that culture and the arts exist because throughout time, people had visions of the world (*Weltanschaung*).

Antiquity does not come from a past designed to fetter the future. Antiquity is our primary source and renewable resource for looking at the world today. It harbours the experience of its creatures, like a century-old beech tree that has hosted generations of chaffinches. Antiquity has an aesthetic and educational purpose because the values with which it is imbued manifest themselves to us even today. It is a treasury of values that we can understand, reinterpret, and share but not possess.

The degree to which Europe can be farsighted depends upon its ability to cultivate its knowledge of the past, and thereby avoid repeating mistakes of that past. By deeply internalizing its history, Europe could fully inhabit

From an ancient tale of the land of rising sun

Kojiki , the oldest surviving book in Japan, describes Amaterasu as the powerful Japanese Sun Goddess who created the cultivation of rice and wheat, the use of silkworms, and loom weaving.

One day Amaterasu orders her grandson Ninigi to reign over the Earth.
She gives him three treasures:
the ring of royalty; the mirror of knowledge; the sword of power.
On the Earth, Ninigi meets the princess Flower (Sakuya),
daughter of the master of the mountains, and falls in love.
He asks the father for his daughter's hand; happily,
the father offers both his daughters, Rock (Iwanaga) and Flower (Sakuya).
But Ninigi marries only Flower, and refuses Rock.
"Rock has the gift of immortality, while Flower is endowed with prosperity"
the disappointed master tells him.
"By refusing Rock, your life from now on will be prosperous but mortal".
So Ninigi had three children and his life was prosperous,
but he lost the gift of eternity.

its challenging role as "laboratory of humanity" heading towards a humanistic "wisdom society", instead of towards a technology-driven "knowledge society".

(Re)searching for Prosperity

The Design of Prosperity project is ongoing research that aims to induce a discussion of progress in terms of overall prosperity. It is a project that aims to review the criteria by which consumption grows in a European context that needs self-awareness to go forward free of obsession about balance of payments and GNP. The balance implicit in prosperity is in this sense revolutionary because it establishes boundaries and precepts for development. This is where one can open up new economic, ethical, and artistic scenarios.

The settings for prosperity are many, because in every field prosperity is primarily a balanced world vision, yet by no means conventional or conformist. The balance of prosperity is dynamic, creative, and farsighted. In no way does it resemble the static daily repetition that would like to reduce eternity to a long Sunday afternoon.

Prosperity requires courage and initiative while the time is ripe. To waste the value of the years of prosperity in the dark waters of mass terror is tragic, truly tragic.

Obviously one can not expect that out of a project of this importance one may cull recipes for prosperity which may ipso facto be applied in various fields: from biotechnologies to mass media, from ICT to furniture and fashion design.

What can be done is to initiate a trickle-down process that might subsequently lead to the flow of open hypotheses (instead of the construction of rigid models), which must then be subjected to the scrutiny of social criticism. Too many models applied by technocrats have left nothing but scorched earth in their wake.

The simplistic linear logic of early globalisation has failed because diversity is one of the pillars of prosperity. The mono-logical ideology of globalisation has strangled diversity in the noose of the global marketplace. It is now clear that the market is "one, none, and a hundred thousand". One has begun to question the limitations of an unbalanced model of development, which created wealth but not prosperity.

No models are wanted therefore, just sketches, trials, and rough outlines of possible scenarios in which prosperity may have a place and a time. Prosperity is not everywhere and forever. It is in a specific place, for a certain time.

Designing Prosperity

Experts in globalisation and environmental matters tell us that our western model of development is not a vision, but just an illusion. If all the new consumers of the fast growing markets wished to enjoy—as they are fully entitled to do—the same standard of living as ourselves, it would require four more planets like this watery one of ours to allow everyone to eat and drink, consume energy and produce waste at the same rate as we do today here in the West. So let's be honest. We don't just live well. We waste and squander. And even what we view as poverty in our European countries corresponds to a standard of living that populations in the southern hemisphere envy, this being the primary cause of the mass exodus of desperate people from third world countries.

The central question of The Design of Prosperity project is therefore not about the design of the next product, what can be consumed, but instead, what can be conceived, what can be thought. It is about what kind of consumption we should be designing. What life models and "styles of thought" should we design that might have a hope of breaking that vicious circle of shopping bulimia (or anorexia) on one side of our world and penury and starvation on the other?

What pension scheme should I come up with if I don't want the pensioner to retire, even as a consumer? What kind of sober happiness should we be devising in order to prevent our consumer society from plummeting into depression and recession?

What products should I offer in order to promote an awareness focused on real energy preservation? How do I reach the one who believes he is not wasting energy because he is romantically spending two or three hours by candlelight, while his heating system is blasting, burning the equivalent of a truckload of candles a minute?

Should we really focus on the form and the sensorial interface of the objects that bring us such "non material" products as images and sounds? Or should we better start to ask ourselves which are the sounds, images and stories that speak to us of prosperity? The impoverished nature of our cultural products—which constitute our ultimate intangible product—is a primary cause of the impoverishment of our times. Today the world is certainly poor, particularly in food for the soul.

Marketing Prosperity

In terms of its effect on marketing practice, the first implication of a project of prosperity is a radical change of attitude towards the consumer. We have to find a way out of the mindset of considering consumers as targets. This is a mindset that blinds us to people's real needs, makes reciprocal relationships impossible, prevents us from expressing our own views of the world through our products, and last but not least, turns the consumer into an enemy to be shot down. Too bad, because when a target is hit, it is also dead, and therefore does little consuming…

We must find ways to ensure the materialisation of content. In other words, we have to relearn how to provide a sense of direction, how to provide a meaning with what we offer and free ourselves from the schizophrenia and neurosis of grammarless communication, devoid even of any syntax, which simply chases after the "me-too" of the latest trendy trend. This means cleaning the communication archetypes of all marketing encrustations, so that we may go back to calling a loaf a loaf.

We have to entrust aesthetics with the task of designing a

range of different and alternative way of lives and modes of thought instead of constantly falling back on standard lifestyle marketing. We must retrieve the knowledge and pleasure gained from creating poetical experiences.

And last but not least, goods can no longer be proposed as fetishes. We have to relearn to consider them and prize their intrinsic values, not glorify standard products sugar coated with added values. We have to design real products with real values, real quality and real prices.

Design will then finally become the most dynamic, creative, farsighted tool for opening up new scenarios of a balanced world vision—a good, beautiful, clean, and fair world in which prosperity may find a place and a time.

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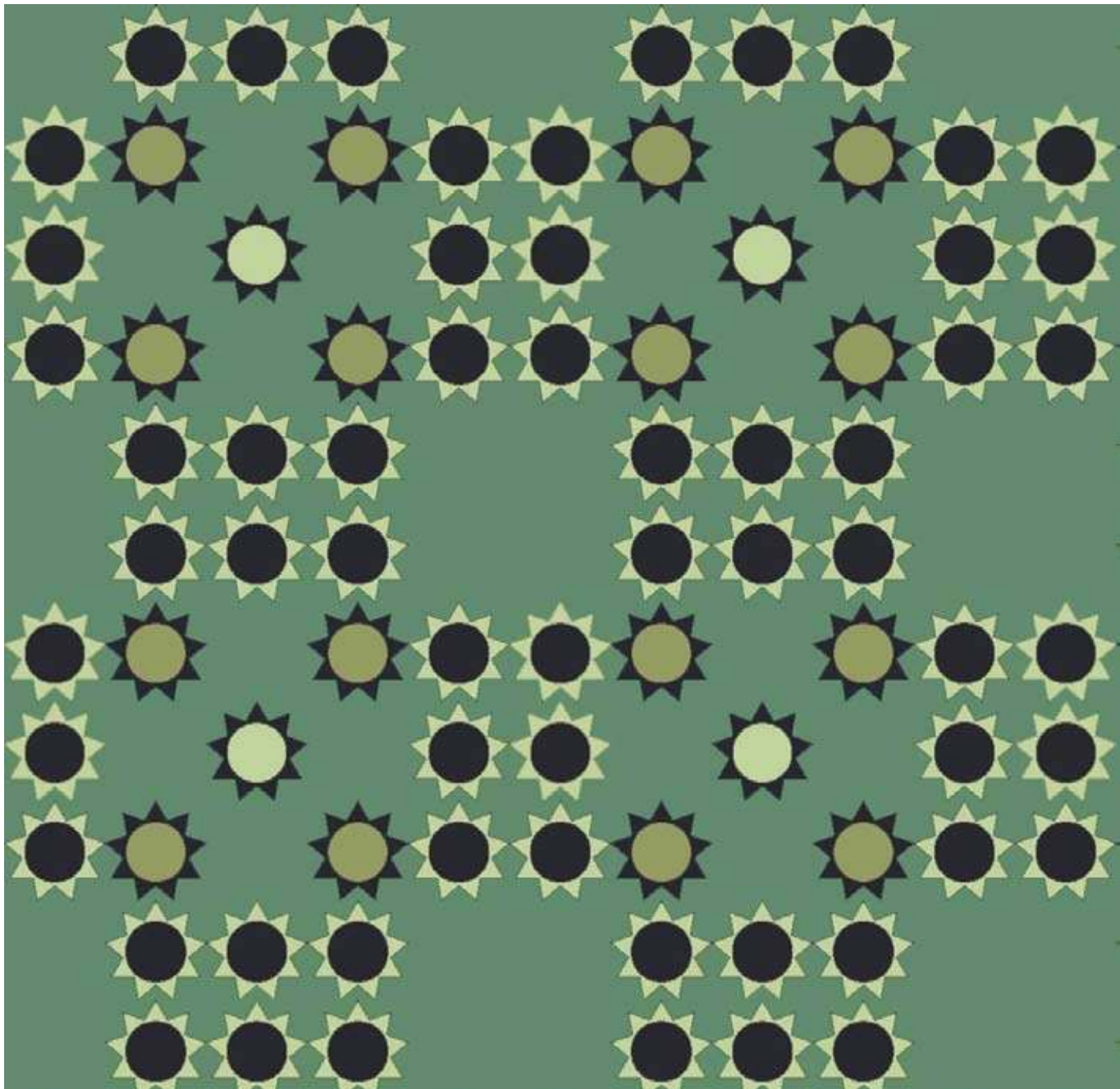
Upholstery design

Contemporary view for upholstery and curtain jacquard fabrics matching with woven hanging design

Submitted by:
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Abstract

Fabric designing process in general and upholstery and curtain jacquard fabrics designing in particular is the complete plan for structuring a whole weaved product which can compete in international and local market alike though there is no obvious difference between both markets in the light of free market and lift of importing restrictions. In such conditions, there is no protection for the local product which has to compete with the imported product regarding quality, price and fashion.

Therefore, fabric designer in general and jacquard fabric designer and woven hanging in particular has to develop his creative abilities to add new and special aspects to his product regarding form and function in which he has to use all the available recent technological methods in the designing operation. It is also important to use different sciences such as mathematics, physics and chemistry as well as humanities, history and social sciences which allows designer to possess creative abilities to design a weaved product that we might call creative product.

The design of the form is one of the most important elements of the primary design process for the upholstery and curtain jacquard fabrics and woven hanging matching with it which the designer has to know as the design of the decorated form of the jacquard fabric and woven hanging to do a close matching together is the complete plan to constitute decorative units and its distribution in the form according to the basics of the design and depending on its different elements. The design plan depends on the designer's ability to innovate as the good design that is built on scientific basis is the base of any successful piece of art.

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Plastic Basics for Designing Repeat in Designing upholstery and curtain Jacquard Fabrics:

Forming a repetition of the upholstery and curtain jacquard fabrics design inside geometrical shape either square or triangle as ornament unit is distributed inside this geometrical shape specified before on the aforementioned basis of distributing the ornament unit in the upholstery and curtain jacquard fabrics.

In such form, the ornament unit and colours is connected and related to other surrounding units and spaces in a correct connection. It also considers connection between design repeating units to each other in a continuous and correct connection without causing any break of these units in the design. To secure such condition, one can divide the space of the design to a number of vertical, horizontal and inclined lines as well as some circular and arc lines which can work as a guide of balance during the repetition of the ornament units and colours inside the whole spare of the design

Plastic basics for designing woven hanging:

Forming of the woven hanging design need a good experience to insert a close relation inside geometrical shape (outside frame of design).
It is important to know how the design elements, motifs and colours are distributed inside this geometrical shape specified before on the aforementioned basis of distributing the ornament unit and colours and shadows in the woven hanging.

In such form, the ornament unit, colours, textures and shadows is connected and related to other surrounding units and spaces in a correct connection. It also considers connection between design elements to each other in a continuous and correct connection without causing any unbalance of these elements in the design. To secure such condition, one can divide the space of the design to a number of vertical, horizontal and inclined lines as well as some circular and lines which can work as a guide of

balance during the insertion of the ornament units, colours, textures and shadows inside the whole spare of the design.

Comparison between units and repetition in the design of upholstery and curtain jacquard fabrics:

Ornament unit repetition in the upholstery and curtain jacquard fabrics is the complete unit that is based on scientific methods while designing it which would consider all the design factors without breaching any of its scientific bases. Beside these scientific methods, the designer of upholstery and curtain jacquard fabrics has to consider the technical operation of the weaving loom on which such design would be carried out according to will of the designer concerning the power of the jacquard M/C., the applied method and the chosen specifications for the design. On the other hand, the ornament unit is the artistic form chosen by the designer to be repeated in the specified space of the design. It represents the width & height of the repetition in centimetre and is specified according to the aforementioned known design aesthetic factors and executive abilities.

There are many known methods of distribution which the designer uses during the creating process of designing the upholstery and curtain jacquard fabrics. This study attempts at creating a mathematical method which might help the designer in the creative process of designing upholstery and curtain jacquard fabrics.

Matching between the upholstery and curtain jacquard fabrics and woven hanging:

It is important to do matching between the upholstery and curtain jacquard fabrics and woven hanging speciality which has been at the same place that is added a new aesthetical value to the fabrics design that is looked much better because that add anew unique for the fabrics . The matching has done during the cooperation of motifs, colours, shadows and the methods of designing processes. Addition that the area for the woven hanging it is closed with the surrounding space area.
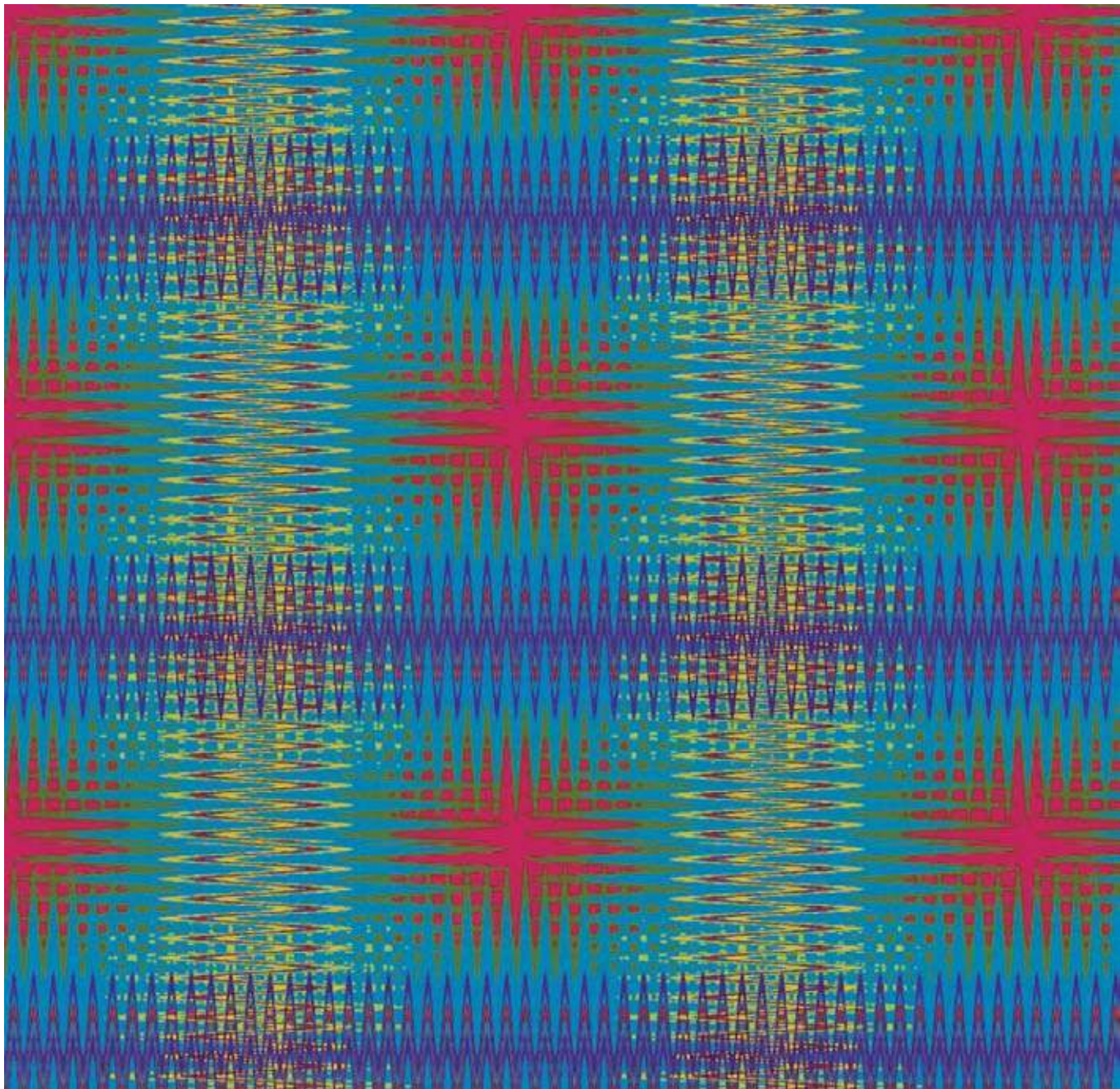
Upholstery design

Upholstery design

Inspiration the design motifs and colours:

The designer have his inspired from Egypt heritage and culture and have formatted it on the modern form to create a contemporary design so he is used some pharaohs. Coptic and Islamic motifs you can see it obviously if you vivit the Egyptian museum, Coptic art museum and Islamic art in Cairo.

The designer have been could mixing between a lot of art at the same design for upholstery and curtain jacquard fabrics either for woven hanging and have succeeded to obtain a creativity pattern and have done wonderful matching between it.

The specification for upholstery and curtain jacquard fabric designs

1- The repeat specification :
   A-   width of all designs 18.18 cm
   B-   height of all design is different as the design form but the maximum height is 18.18 cm
   C-   the colours as the design form

2- warp specification for the raw fabrics :
   A-   Count 150/1 polyester
   B-   66 yarn/cm on the loom
   C-   Reed 11 dent / cm
   D-   Sleying 6 yarn / dent
   E-   number of colours depends on the design colours and executive methods which is selected for the design form and the end using
   F-   the woven structure between normal structure (plain , twill ,stain ...ext) and is mixed between normal and combine woven structure for success the upholstery and curtain jacquard fabric designs building

3- weft specification for the raw fabrics :
   A-   Count 30/2 cotton
   B-   28 : 32 picks / cm on the loom suit with executive methods which is selected for the design form and the end using

C-   number of colours depends on the design colours and executive methods which is selected for the design form and the end using

loom:

Electronic jacquard loom have 2668 hooks and weft selector for 8:12 colours

The specification for woven hanging designs

The designs form has matched with previous upholstery and curtain jacquard fabric designs

The techniques which is used for build the woven hanging design that is hand woven by tapestry technique (goblin techniques).the materials is cotton for the warp, and natural wool but with high counts and colours, shadows and textures as the design form.

Results and discussion

1. The designer discovered created anew methods and techniques rule which would help the designer to have a better chance to get innovated designs.

2. The designer discovered created anew innovation patterns for upholstery and curtain jacquard fabrics.

3. The designer discovered created anew innovation designs woven hanging matching with the previous upholstery and curtain jacquard fabrics pattern.

4. The designer study of use the Egyptian heritage (pharaoh art. Coptic art. Islamic art) discovered created anew innovation patterns for upholstery and curtain jacquard fabrics matching with anew innovation woven hanging designs according to contemporary vision.

5. Adding new method to the familiar known methods used by the designer in distributing his ornament units during the innovation process of a repeating design for jacquard fabrics .

6. The design of fabric that is based on mathematical law makes the design more balanced.

7. By applying the aim of designer through out the former patterns, the research resulted in getting a big number of designs by using the same ornament units which is proved on the success of the research.

8. The importance of specifying and unifying the direction of distributing ornament units in the repeating design to avoid repeating the same pattern which might confuse the designer which is clear in the first experiment of the research.

Hanging woven design

Hanging woven design

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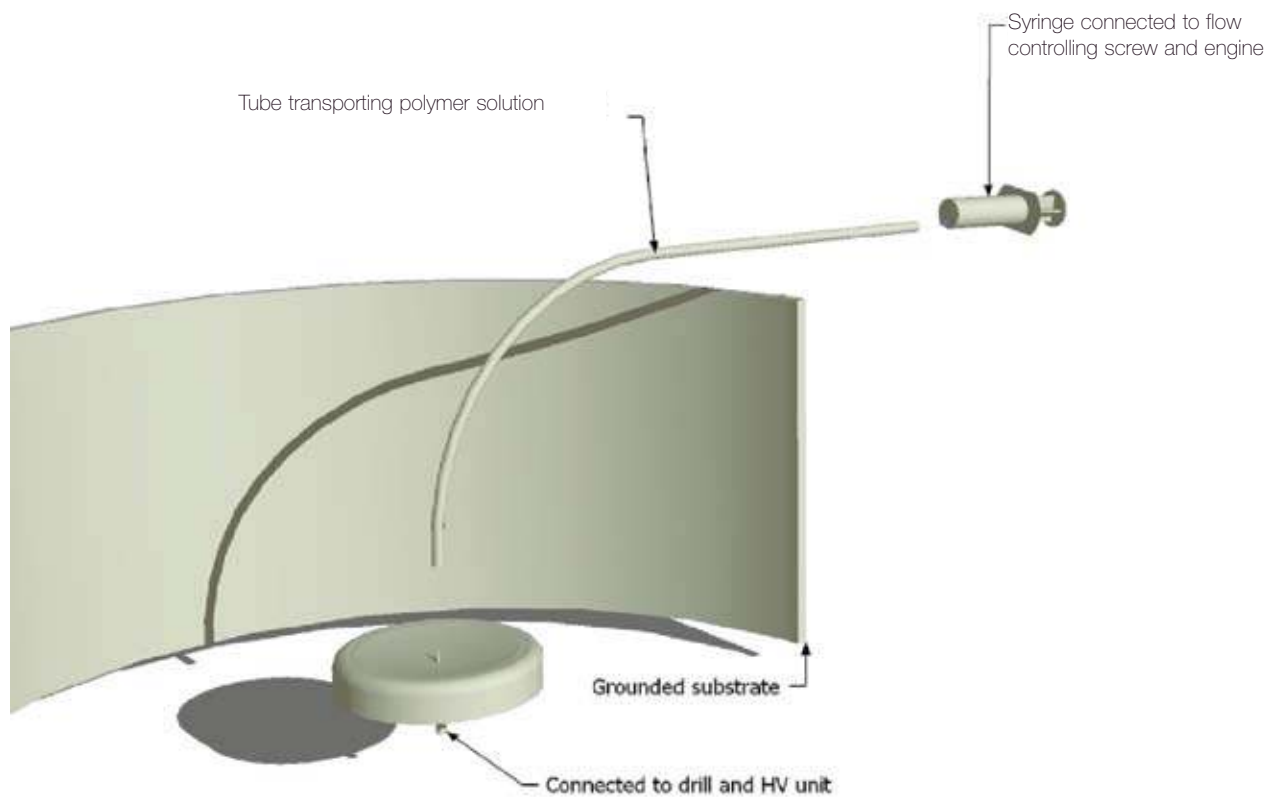18- William Watson; F.T.I "Textiles Design and Colour" London , 1975.

Syringe connected to flow controlling screw and engine

Tube transporting polymer solution

Grounded substrate

Connected to drill and HV unit

Figure 1. Principle sketch of the large-scale electrospinning device developed at IFP RESEARCH AB [2].

Nanofibers in technical textiles

Anna Nelvig, Jonas Engström, Bengt Hagström, Pernilla Walkenström, IFP Research AB

Electrospinning of nanofibers at IFP Research AB

Electrospinning is a straightforward method of producing polymeric fibers with diameters in the range of a few hundred nanometers. The surface to weight ratio as well as the porosity of a nanofibrous web is large compared to other non-woven materials, and can be utilized for technical surplus in a range of applications such as technical textiles.[1]

At IFP Research AB, we are presently focusing on the use of nanofibers in technical textiles. As a consequence we need to be able to produce large amounts of nanofibers for testing and prototype manufacturing. Until a few years ago we focused on small-scale electrospinning, however we have now developed an up-scaled principle of electrospinning nanofibers.[2] The principle is based on centrifugal forces working on a polymer solution simultaneously with electrostatic forces and can be seen in Figure 1. A pump applies the polymer solution on a rotating disc that hurls the solution into the applied electric field.

The polymer solution is applied on to a rotating disc through a tube. High voltage is applied to the polymer solution and a grounded metallic cage surrounds the device. Centrifugal and electrostatic forces initiates fiber formation, the fibers are collected on the walls of the grounded cage.

The authors have worked within the field of electrospinning of nanofibers for several years, at IFP Research AB. Their various background creates a multidisciplinary team representing competences within polymer chemistry, chemical engineering and mechanical engineering. Within technical textiles, the targeted applications have mainly been filters and sound absorption materials.
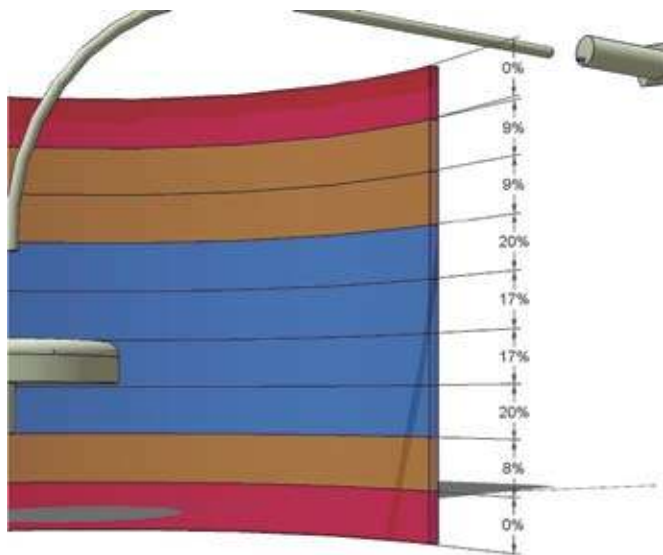
Figure 2. The spread of nanofibers spun in the large-scale electrospinning device developed at IFP Research AB

During a recent diploma work (Karl Ivanovic) at IFP Research AB the parameters of the new device were investigated. Figure 2 shows the percentage spread of the nanofibers on the grounded collector. One problem is obviously to obtain an evenly distributed web of nanofibers over a large area. By creating a cage that passes the rotating disc several times the layer is to be more even.

Environmentally friendly approaches

When it comes to large-scale production of nanofibers in the production line of technical textiles, environmental aspects must be taken into consideration. We are therefore working mainly with water-based systems, which is also economically and technically preferable over organic solvents. Examples of water–soluble polymers are cellulose acetate (CA), polyvinylalcohol (PVA) and polyvinylpyrrolidone (PVP). The latter are shown in Figure 3.

However, nanofibers spun from water-based systems dissolve in contact with water, and even humid air. The use of nanofibers for applications in technical textiles, e.g. in air filters demands for waterproof materials. We have tried a few different possibilities to obtain water resistant fibers from water-based systems:

Figure 3. SEM picture of electrospun nanofibers of PVP with diameters between 200-400 nm.
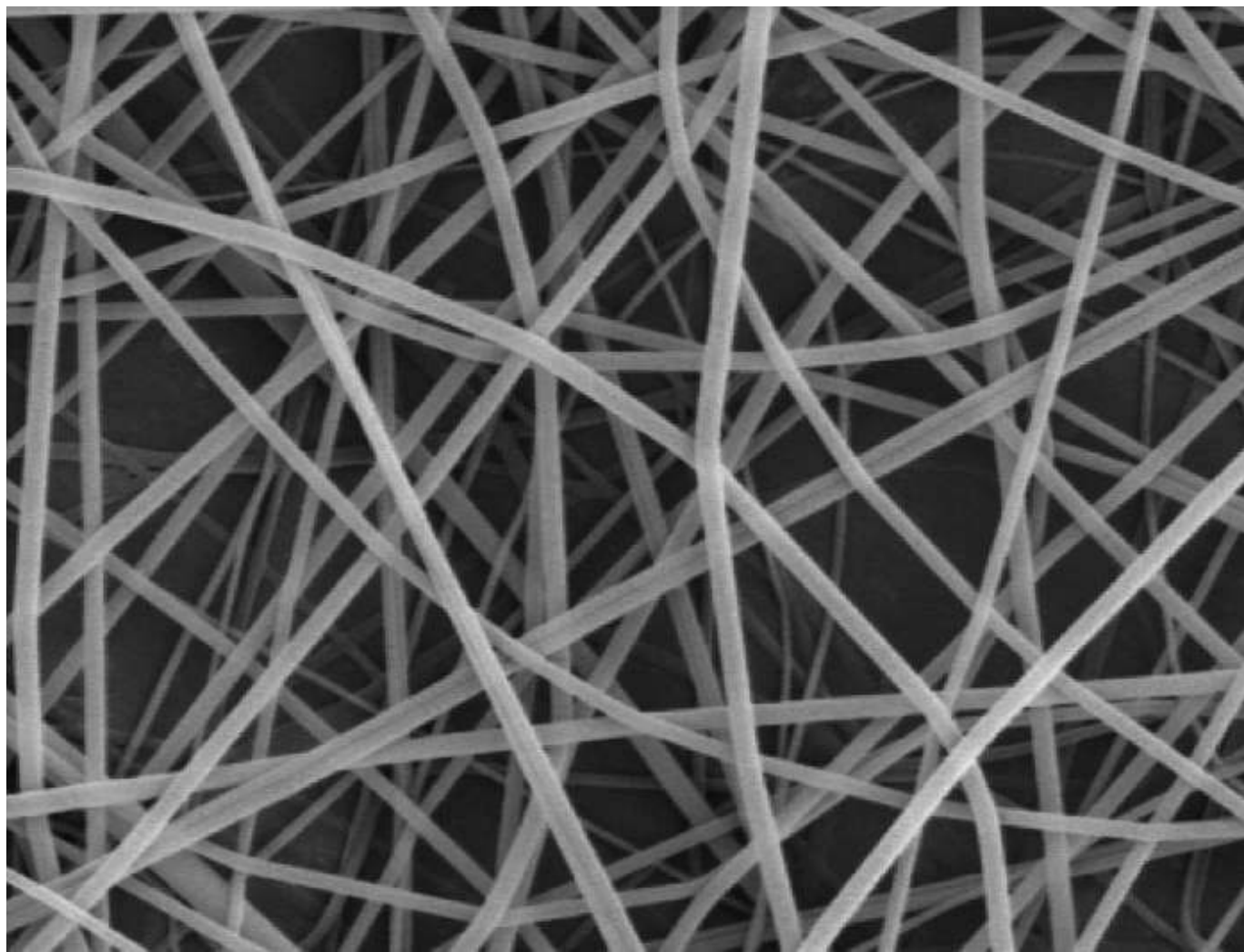
By cross-linking the polymer chains within the fibers dissolution of the web could be prevented. However, although the cross-linked PVA-web withstands water, swelling temporarily turns the fibers into a film. By soaking the film in organic solvents the fiber structure can be restored. This procedure is shown in Figure 4 a, b and c. Work is in progress to increase the degree of cross-linking in order to prevent film formation.

Another possibility is to treat the water-soluble fibers with hydrophobic plasma it is possible to create a water resistant membrane on their surface. A group of students (from the course *Surface Technology* given by the Department of Polymer Technology, Chalmers University of Technology) performed experiments with plasma treatment on PVA nanofibers in a project work at IFP Research AB. Their work showed that trifluoromethane was the most efficient gas for plasma treatment of PVA. The hydrophobic layer from the plasma treatment stays active for at least a couple of weeks. The results may be improved by using another kind of plasma equipment or by storing the samples in a different way. Nonetheless, using this method for fibers in a filter means short filter life length.
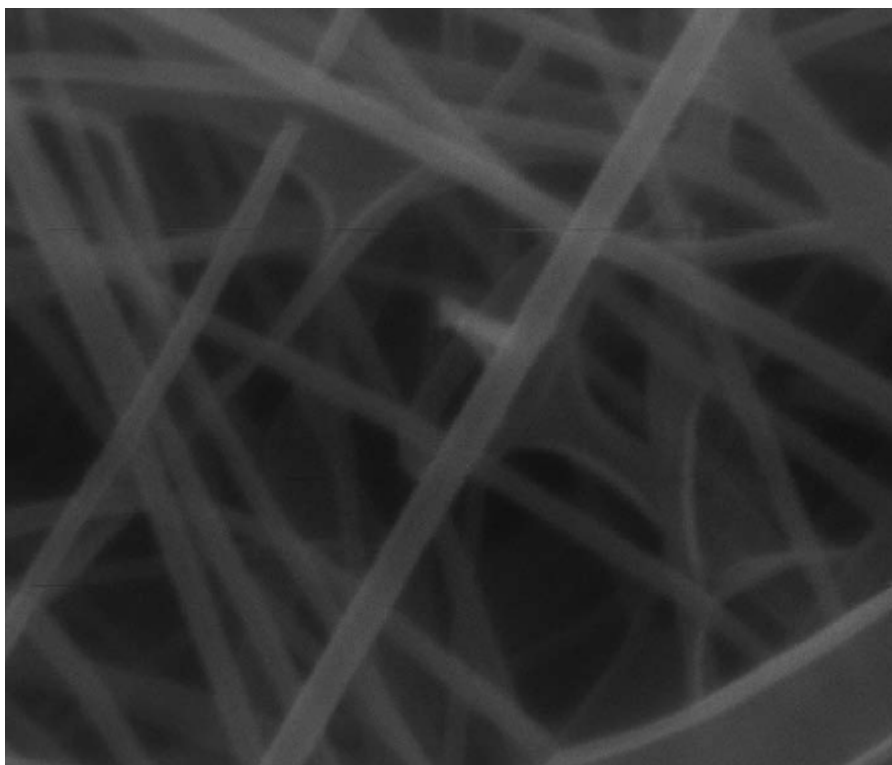

Figure 4 a. SEM picture of PVA nanofibers electrospun with a cross-linking agent. The fiber diameters are between 200-400 nm.

Figure 4 b. The cross-linked PVA nanofibers forms a film the moment they are soaked in water. The length of the figure represents about 150 µm.
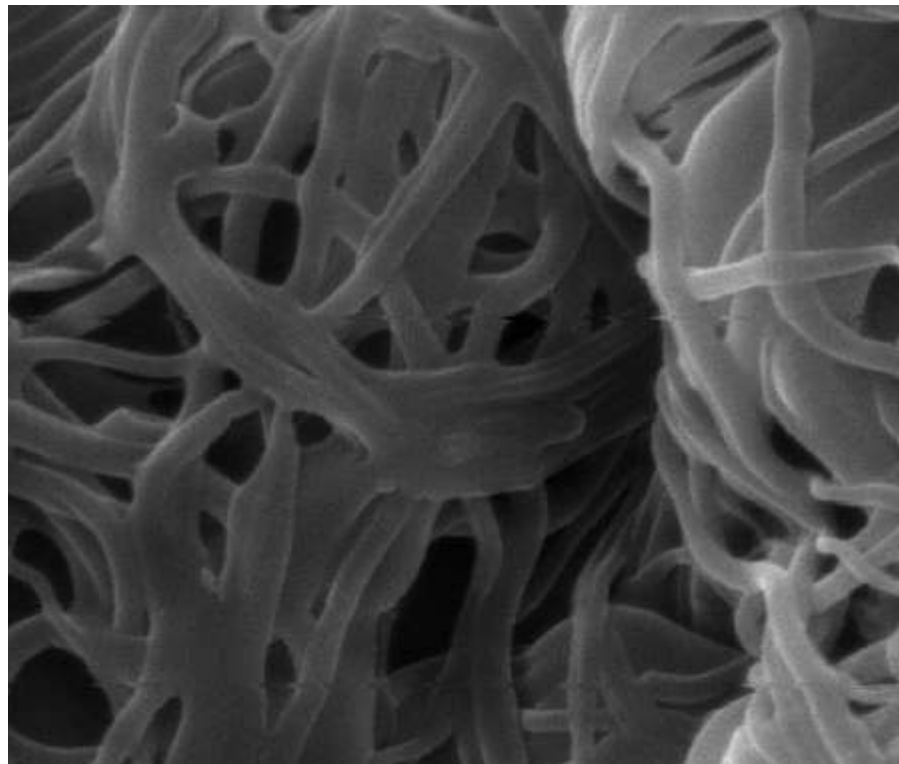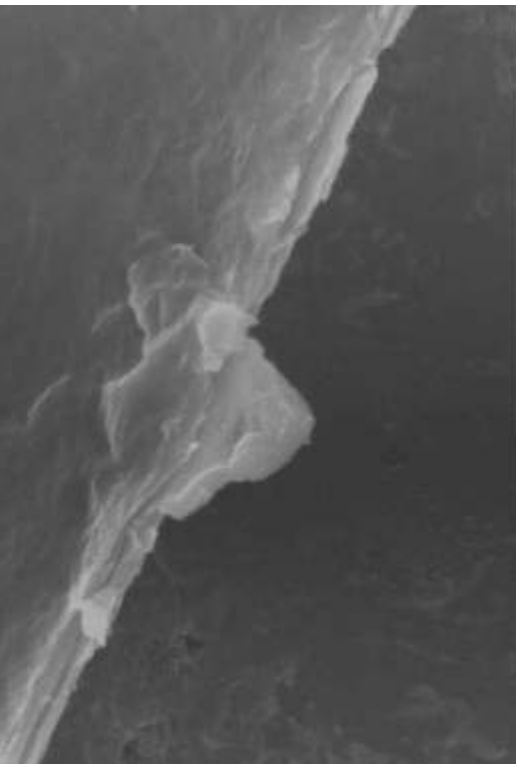
Figure 4 c. Treating the film of cross-linked PVA nanofibers with organic solvents partially restores the fiber structure. The length of the figure represents about 60 μm.

Technical Textiles

IFP focuses on implementing nanofibers in filter- and sound absorbing applications, there providing technical surplus value like increased filter efficiency and sound absorbing properties.

Air filtration

There are several different classes of filters depending on area of use; some different samples are shown in Figure 5. Roughly speaking there are coarse filtering and fine filtering. Coarse filtering is used in ventilation systems in offices, public buildings, schools, etc. Fine filtering is used in more sensitive environments such as hospitals or laboratories where viruses and bacteria are handled. Fine filtering is also used where small, harmful particles exist in large amounts, for example in the operator's cabin in mining vehicles, in industrial vacuum cleaners, and in high performance breathing masks used for asbestos handling or similar.

Using nanofibrous webs instead of the common dense HEPA media (High Efficiency Particulate Air-filter) allows the production of filters with very high particle retention while the pressure drop over the filter remains low. This is a consequence of increased surface energy and porosity within the structure when using nanofibers.

Figure 5. In the foreground; HEPA filters for vacuum cleaners from Dinair Filter AB.
In the background; different classes of coarse filters from Dinair Filter AB and CE Produkter AB.

Initial experiments with nanofibers spun on a coarse substrate, see Figure 6, shows that the pressure drop over a thin web of nanofibers is small. A lower pressure drop means a lower cost for the user by the means of air pumping systems. The same experiments also indicate that the nanofibers have the ability to trap a large amount of very small particles. This is due to the higher surface energy provided by the nanofibrous structure, which increases the degree of the filtering mechanisms controlled by diffusion, interception and impaction. The decrease in pressure drop is a consequence of the high porosity.

Sound absorption

Noise, or unwanted sound, is a growing environmental problem in today's society. Long exposure to noise can lead to work related stress, impaired hearing, and sleeping disorder. Thus, noise can be considered a threat to public health. In a survey from 2001, 9 % of the responders said they were disturbed by noise from traffic, and 9 % that they were disturbed by noisy neighbours.[3] As many as 22 % of the responders claimed to be disturbed by noise of some form. Increasingly higher demands are therefore set on noise reduction in new products, e.g. low noise levels from the road are becoming a very important sales argument for new cars.
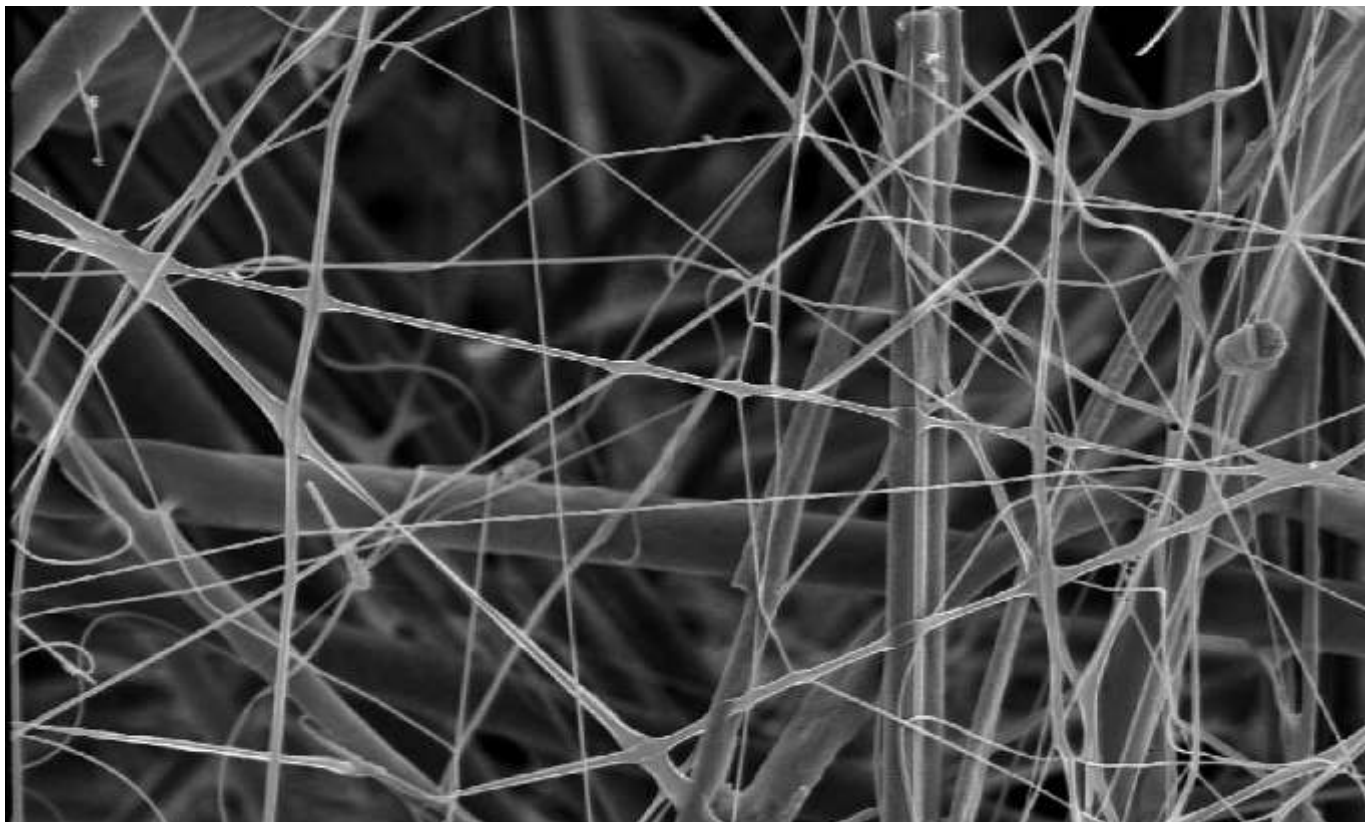

Figure 6. PVA electrospun on a non-woven substrate of celloluse. The fibers of the substrate have diameters in the range of 2-10 μm, while the PVA fibers have diameters in the range of 200-700 nm.

Research has shown that nanofibers, i.e. fibres with diameters in the range from a few nanometres up to several micrometers, have very attractive properties for sound absorption. For some frequencies, absorbents based on nanofibers can have much higher absorption factors compared to traditional absorbents. Today, the Czech company Elmarco has two patents for a product called NanoSpider Acoustic Web, which is a compound material consisting of several layers of carded webs and layers of nanofibers in between.[4-6] Elmarco suggests several applications for this product, but in order to be efficient as a sound absorbent it has to be approximately 40 mm thick.

In October 2007, IFP Research AB in cooperation with a number of Swedish SME:s will start a project where nanofibers for sound absorption will be studied. The general idea is to manufacture nanofiber based materials with a controlled porosity in order to achieve better sound absorption properties. In this technique a sound wave hitting the surface of the absorbent will experience a progressively denser material as it penetrates the material. In this way most of the sound will be absorbed within the material instead of reflected at the surface. The expectation is that this type of materials can be made thinner and lighter than today's sound absorbents.

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BODY & SPACE
An exhibition in progress

BODY & SPACE- man and environment - has been exhibited during 2006-2007 at Stockholm International Furniture Fair, Fiera di Mobile in Milan, MateriO in Paris, Design week in Prague, Textile fair in Brussels, Designers Week in Eindhoven, Futurotextiles in Lille and Avantex in Frankfurt.

Ulla Bodin
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In daily life, the textile material has always been connected with our bodies, a necessity for our survival. Textiles protect us from strong sunshine and against a cold and wet climate. Since the ancient time in which weaving was invented, textiles have been used for our bodies and spaces.

Today we develop textiles for new applications in Smart textiles, wearable built in technology to create innovations for public spaces, the automobile industry, health care and sports.

In November 2005, the Swedish School of Textiles, the THS, decided to find a new way to exhibit and promote the profile of the education at the international Stockholm Furniture Fair in February 2006.

The intention of the THS was to show its knowledge in materials and the prototype production capabilities of the unique textile machine park available at the THS. Further, we wanted to put focus on our strength in working across borders with design/technology for the future in a global world.

For some years now, PhD students have been conducting research in the field of technical and Smart textiles and master students are now following in their tracks. Research in interaction design, environmental and sustainable textiles has increased.

At the THS the creativity of art is combined with the ingenuity of technology. The textile field is interdisciplinary. The School conducts research in Fashion and Textile Design, Interaction Design, Technology, and Design Management.

Ulla Eson Bodin, Professor in Textile Design at HDK, University of Gothenburg, Artistic Supervisor and Professor in Textile- and Fashion Design at The Swedish School of Textiles, University College of Borås 1996-2002. From 2002 Consulting Professor at The Swedish School of Textiles.
Her research and artistic development work are based on knitting techniques for Smart textiles and she works as curator for exhibitions abroad.

BODY
&
SPACE

International Furni

Stockholm

February 2006

Placid place
I started out sitting and thinking in an empty
space. I thought about all the million´s of things
that are flooding my everyday life. At that time I
realized I needed to create a placid place.
Jenny Stefansdotter Stentoft,
Bachelor, Final work,
The Swedish School of Textiles,
University College of Borås.

The exhibition BODY & SPACE, man
and environment, shows the breadth
and depth of the education and
research at the THS. The experimen-
tal materials, fashion, and products
currently found at THS are in some
cases at the research stage, while
others are on the brink of production.
Entering the exhibition in Stockholm
demanded everything to be minutely
organised. First of all, items had to
be chosen and thus criteria had to
be set up for the selection among
the items available. Every material,
idea, prototype, and product had to
be new in its field or displaying new
possibilities and new applications.
 It presented an aesthetic problem
to create an exhibition in a specified
area with fixed walls and a floor we
could not change. Anna Persson,
artist, was engaged in the planning
and she started out by making a
model. The participating students
brought their items to our meetings
and through discussion we were
successful.

A special information folder had to be created for this exhibition, telling the background story of the project and giving descriptions of every displayed textile. Because of the exhibition content, e.g. changeable textiles and afterglow effects, one challenge was to put in some kind of special effects in the folder. We consulted Kari Palmqvist, graphic designer, to discuss the layout with us and decided to print the folder with neon yellow afterglow effect on the front page. For many years, Swedish design has been in focus and has become well-known. We saw a gleam of hope to realize this project and present the THS at the Milan Furniture Fair. In case the exhibition would continue to tour Europe, the folders had to be printed in an English version.

3

A pioneering spirit and radical experiments in new textile materials

"My beginning was far from what I had hoped for: fate put into my hands limp threads! Threads to build a future? But distrust turned into belief and I was on my way."

Anni Albers

In the entire current global development of new materials, including textiles, the optimal combination of sometimes contradictory material properties presents a special challenge for our times and generates a pioneering spirit worldwide comparable with the Bauhaus movement of the 1920s.

Today, seemingly unusual blends of existing materials can lead to surprisingly innovative textile products by means of beneficial properties, built-in intelligence and new manufacturing processes.

Today's textiles are customized materials with totally new properties and design features that can be shaped, combined and utilized in totally new ways. Built-in electronics and sensors measure our movements, positions and biological data and evaluate them.

Fabrics are able to sense our emotions and react to them by changing their state and triggering entirely new functions. They store energy, are luminous, interact with people and give directions. The new textiles increase our safety and create new forms of mobile communication. Their surfaces are antibacterial, conductive, sound-absorbent and dirt-repellent.

Areas in which the new textiles can be used are highly specific and include health care, intelligent protective clothing, sportswear and leisurewear, art and games, smart military wear and clothing, and smart automotive and industrial textiles. In this context textiles gain a totally new significance as innovative materials that question the role of textiles in the context of contemporary society.

As designers we will, in the future, face totally new tasks and must radically rethink textiles in terms of their form, use and significance. The design process requires an experimental, scientific and interdisciplinary approach. Knowledge of textile traditions, new skills, curiosity and unconventional thinking are equally important prerequisites.

The experimental materials, fashion and products that are currently taking shape at the Textilhögskolan i Borås are in some cases still at the research stage while others are on the brink of production.

A number of the clothing and bag prototypes designed in Borås have already been tested for design and function and have gained recognition all over the world.

Marion Ellwanger, Professor in Textile Design

Notes:
1 Sigrid Wortmann Weltge, Interview with Anni Albers, Orange, Con., Feb. 21, 1987; transcript in The Josef and Anni Albers Foundation archives.

1. SILENCE

In recent years, fabrics have seldom been used in pu-
blic premises such as offices, schools and restaurants.
The poor acoustic conditions resulting from this affect
people in a negative way.

This is a knitted sound-absorbing fabric made
of 100% wool. The fabric is developed together with
Acqwool AB and the Swedish National Testing and
Research Institute. It is an attempt to make a sound-
absorbent fabric with pleasant look.
Margareta Zetterblom. PhD student,
The Swedish School of Textiles,
University College of Borås.

2. SMART TEXTILES

Smart Textiles is a generic term for textile materials and
products that interact with the environment and users.
Smart Textiles combined with wearable technology
introduce a shift in textile and fashion, from a passive
to a dynamic behaviour, from textiles and clothing with
one single function to products with double function.
This undershirt is integrated with textile-based sensors
that monitor vital signs such as heart rate. Textile-based
sensors are soft, convenient, washable and therefore
reusable.
Lena Berglin, PhD student, The Swedish School of
Textiles, University College of Borås.

3. ROOM EXPERIENCE

An experimental work with textiles in rooms.
This room should be a place for rest and for taking a
break from everyday doings.

In this project I wanted to make use of the textile's
capacity. And, experimentally, see how it can change
the expression of a room. My room models lack win-
dows but with combinations of textile and artificial light
an illusion of daylight is brought about, which makes
the room feel more open and deeper.
The purpose has also been to break the square that
many rooms are built upon.
Cecilia Andersson, Master student,
The Swedish School of Textiles,
University College of Borås.

1

2

The idea behind BODY & SPACE has to be clarified. All the technical tools, the modern textile industrial computerized machines at the THS, give the students unimagined possibilities to develop new materials, yarns with completely new properties to weave and knit for new specific purposes. Also, there is a laboratory for dying, measuring, and testing and a new excellent industrial department for making coated fabrics. The new textiles have properties such as conducting light, absorbing sound, changing colours, and performing an ECG.

The space at our disposal at the Stockholm Furniture Fair was big enough, but the location was a little out of the way. This position was a challenge. By covering the floor with silver coated paper and painting the walls with metal enamel, our space took on a very futuristic appearance together with all the equipment made of oxidised sheet-metal. The textile presentation looked very good against this background arrangement. After the Stockholm fair we evaluated the event. All students felt positive about having been involved and claimed to have learned a lot. Contacts with different companies were also fruitful and a discussion on going further with BODY & SPACE began.

Electric beauty

According to Einstein, energy can only be transformed, never destroyed. Electricity transforms into light and light into warmth. The distance between the body and cloth is the space were skin meets another material. My design transports energy that the body generates, embodied by the element of water. Eternity flows in a net of water and sparkle, with vibrant light. The form is abstract and sculptural. The net of frill is shaped into different characters of the water elements.

Therese Södervall, Master student,
The Swedish School of Textiles,
University College of Borås.

Acquiring a place to exhibit BODY & SPACE in Milan during the Fiera di Mobile at the end of February 2006 would be impossible, people told us. Every inch of exhibition space had been occupied for years. By a lucky chance we found a place in the prominent district Tortona, reputed to host the best design exhibitions. We were glad to meet with the understanding of the Board of the THS when they granted us the means for this project to take a leap into the unknown.

The exhibition stand at the Tortona district was presented via mail. There was no chance of hanging anything from the ceiling or fasten any items on the walls. New solutions had to be found to fit the exhibition into the room. This was a new challenge. New metal constructions had to be made. The PhD and master students went to Milan to put together the exhibition lead by Anna Persson. The textiles did indeed look very nice with the old architecture with white walls and a dark wooden floor. The exhibition plan worked perfectly.

Glow

Glow is a flat-knitted textile that can be used in lighting products or combined with daylight or other light-sources as interior installations. The appearance of the textile changes from white to a chosen colour when light passes through it. The energy from the light charges the phosphorescent yarn which, when it gets dark, emits lights, creating a third and distinctly different appearance.
Linnéa Nilsson, Master student, The Swedish School of Textiles, University College of Borås.
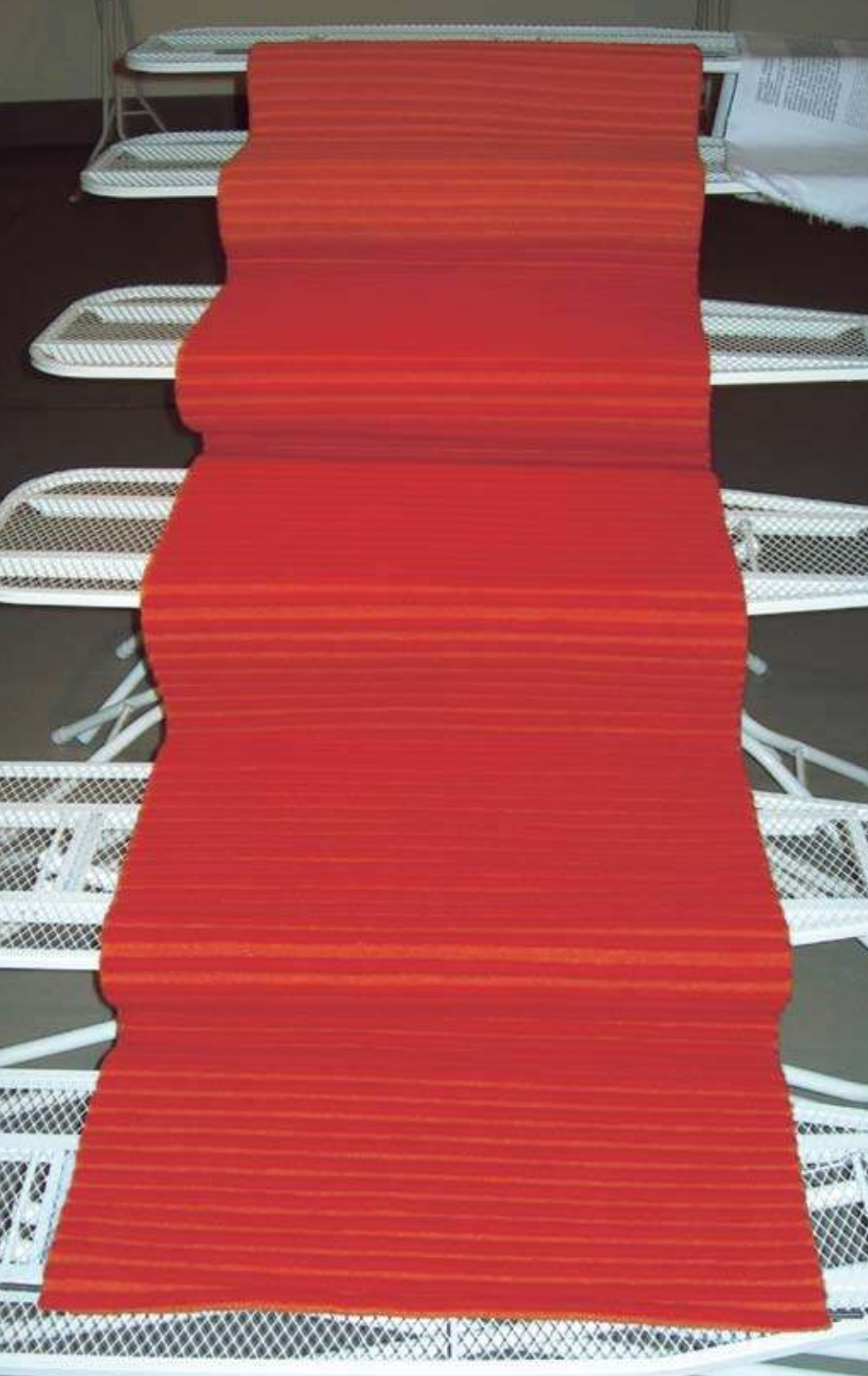
Silence
In recent years, fabrics have seldom been used in public premises such as offices, schools and restaurants. The poor acoustic conditions resulting from this affect people in a negative way. This is a knitted sound-absorbing fabric made of 100% wool. The fabric is developed together with Acqwool AB and the Swedish National Testing and Research Institute. It is an attempt to make a sound-absorbent fabric with pleasant look. Margareta Zetterblom. PhD student, The Swedish School of Textiles, University College of Borås.

This event gave the THS a fantastic opportunity to meet Europe. By exhibiting in the most important design district in Milan we suddenly discovered that we attracted attention. Elodie Ternaux, director of MateriO, an important material bank company in Paris, visited our exhibition and invited us to exhibit together with Grado Zero Espace, one of the most successful sportswear companies in Europe that also collaborates with both Nasa and Esa.

Ulla Eson Bodin and Lena Berglin visited MateriO in Paris to make sure all textiles were in order. In July, during the exhibition period, it was interesting to come back for a video documentary and an interview with Elodie Ternaux, who is both an engineer and an industrial designer. She had invited two talented set designers to create the exhibition. The items were shown very smartly and sensitively on simple white iron-ing-boards together with texts on transparent fabric. Elodie Ternaux was deeply impressed, positive, and surprised with all the attention and interest in technical and Smart Textiles. Technical textiles are most interesting materials for the moment, she mentioned.

Knitted lamp
The lamp consists of two layers of textiles, knitted on a flat-bed machine in white and glossy trans-parent yarns. Both layers have the same pattern, one in positive and the other in negative picture.The frame is transparent plastic folio and it is about one meter high.
Hanna Bolin, Master student, The Swedish School of Textiles, University College of Borås.

A journalist from the famous design paper Frame made a big scoop on new textiles and 90 % of the images came from BODY & SPACE. Through this publication all of the participants in the article received lots of mails with inquiries about their materials. Elodie Ternaux brought part of the exhibition to Decotec, a textile fair in Brussels, to show Textiles for the future on the 9th – 12th of September.

During the exhibition period in June and July in Paris, visitors from other design forums saw and were deeply interested in BODY & SPACE. We were invited to the Design week in Prague on the 1st – 14th of October 2006 by the people responsible for Innovative Material there. Some of our items were chosen for that event. Elodie Ternaux took care of the transportation.

The invitation from Futurotextile in Lille was surprising. The exhibition would last from 14th October 2006 to 14th January 2007. Elodie Ternaux had recommended us and somebody from Lille visited the exhibition in Paris and decided to invite us. We were also invited, together with MateriO, to show BODY & SPACE at the Brainport Material Laboratory Designers' Week in Eindhoven on the 21st to 29th of October. Duplicates had to be made to display our textiles in two places at the same time. At Futurotextile only two schools were invited: Central St. Martin's School, London and the THS.

We had to take care of the setting and presentation. Students went to Lille in advance to make the arrangements. Futurotextile was a huge exhibition, 3000 square metres of textiles, fashion, and space equipment from the 60's to new experiments and research of today. Together with Central St. Martin´s School, BODY & SPACE was placed in a rather dark space which allowed the glowing of the dark textiles to play with the soft light. The theatrical setting attracted visitors to look closely. The total number of visitors at Futurotextile was estimated to at least 200.000.

Textile microphones
In this project we work with sound transmission in textile and piezoelectric textile structure for recording of sound. The primarily aim is to develop a textile microphone element but the impact of sound transmission in textile is also an interesting issue. Examples of applications for this project are health monitoring, sound design and sound adsorbing appplikations
Lena Berglin, Phd student
Margaretha Zetterblom, Phd student

The Design Academy of Eindhoven is very well-known, situated in the old Philips building in Eindhoven. There are students from all around the world in their Master's programme. Li Edelkoort is director of the Design Academy and her influence is very strong. Every October the students display their examination works at the same time as the Technical University with educations in design and architecture. It was very interesting to take part in the designers' examination works, but textile was not a big topic at the Academy. The Design Week in Eindhoven is very important and about 60.000 people visit the shows and exhibitions during the week. There were several exhibition spaces in Eindhoven. We were represented at the most important space, the one where the seminars and ceremonies were held.

A big blue box, 15 metres long and 3 metres high, was designed to show new textiles in round openings. BODY & SPACE were given 65 % of one side of the box.
We were working together with Elodie Ternaux to place all materials on our side of the box. On the other side were samples from Materialenbibliotehk Eindhoven. Curator Simone de Waar from Holland was also responsible for printed flyers with extraordinary support to The Swedish School of Textiles.

In connection with this event a one-day workshop was held, called Material Tables and organised by Material Sense. Lena Berglin and Ulla Eson Bodin participated.
We took part in interesting discussions about the future of textile design and we also received an invitation to come back with new exhibitions another year.

Anaglyph

The thought of making something two-dimensional into an extra dimension using perception to fool the eyes or the brain, made me think of anaglyph glasses for 3D-pictures.
This is a digitally-printed anaglyph pattern which turns from two to three dimensions in a striking moment when you put your anaglyph glasses on.
Tina Carlsson. Bachelor student, The Swedish School of Textiles, University College of Borås.
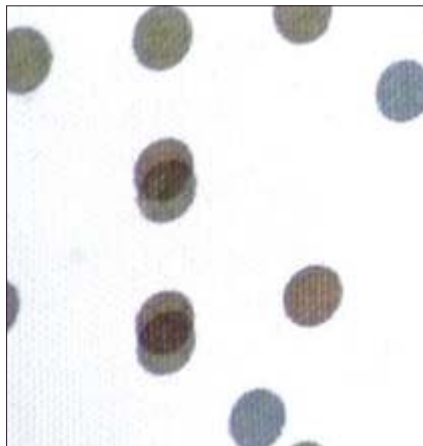
The fabrication bag: an accessory to a mobile phone

Would you like that your mobile phone sometimes expressed itself in another way than through sound and vibration signals? When you put your phone in the Fabrication Bag the phone´s sound and vibration signals will be replaced with changes in the dynamic textile pattern on the bag. The bag is designed to be personal and unobtrusive; where you see a missed call others will probably just see a bag. The bag is a part of the Fabrication project were we investigate the expressional possibilities of computational technology and textile patterns through a combination of the two.

Linda Worbin PhD student,
The Swedish School of Textiles,
University College of Borås.
Hanna Landin, PhD student,
IDC, Interaction Design Collegium,
Department of Computer Science and
Engineering, Chalmers University of
Technology.
University College of Borås.
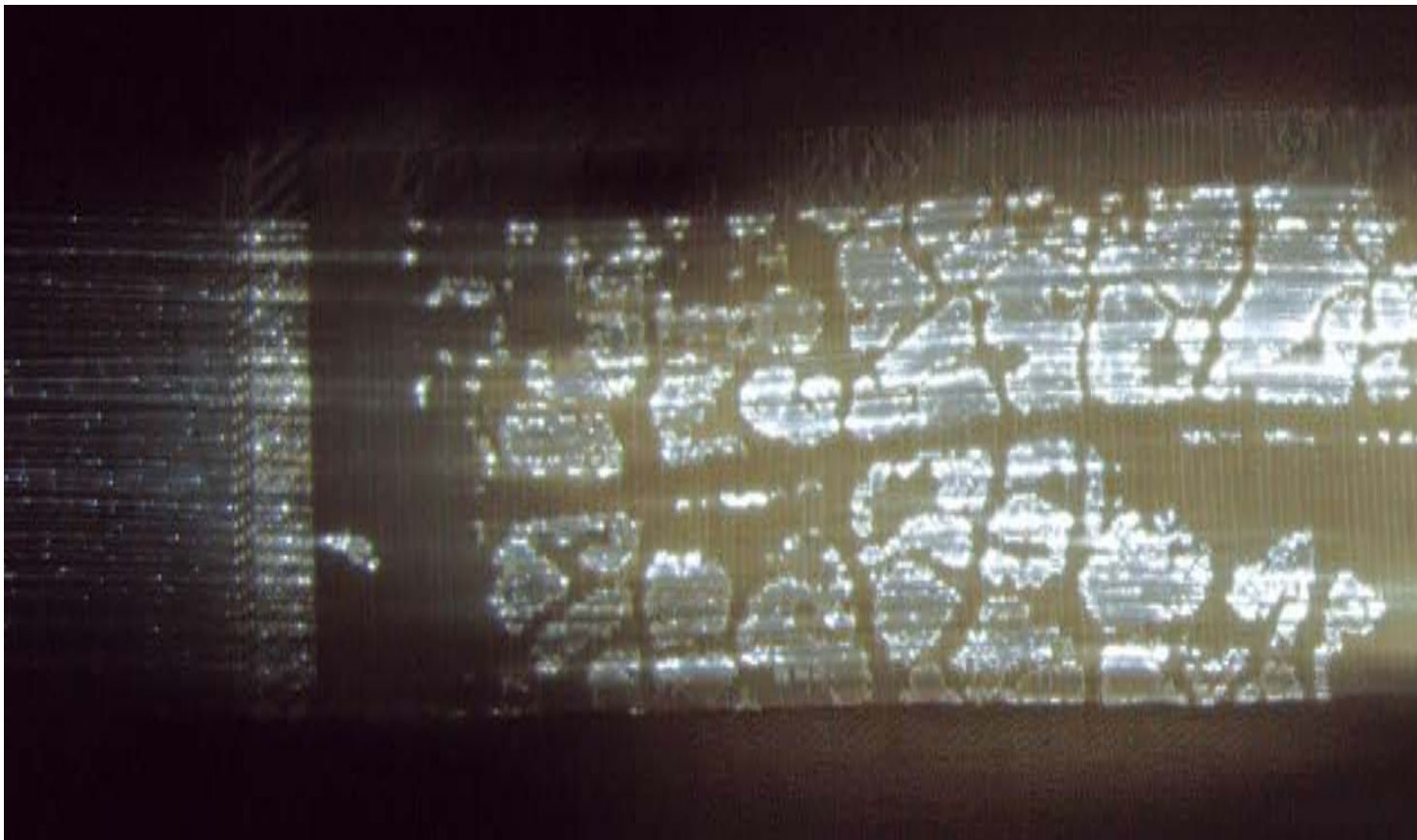
Light Textiles
Is a research work which focuses on the
development of light textiles based on the
integration of optical fibres into textile structures.
The aim is to create textile light designs which
offer big light surfaces that have an even all
over and strong light effect, thereby two groups
of light textile designs should be achieved:
monochrome and huge abstract organic
structures in light. Finally they could be used as
a big movable light screens in a space either
private or public.
Materials: optical fibres, metal wires, cotton
Technique: Jacquard weave
Barbara Jansen
Diploma Textile Designer, Berlin
Master student, Textile Design, Borås

Room experience
An experimental work with textiles in rooms.
This room should be a place for rest and for
taking a break from everyday doings.
In this project I wanted to make use of the
textile´s capacity. And, experimentally, see how
it can change the expression of a room. My
room models lack windows but with combi-
nations of textile and artificial light an illusion
of daylight is brought about, which makes the
room feel more open and deeper.
The purpose has also been to break the square
that many rooms are built upon.
Cecilia Andersson, Master student,
The Swedish School of Textiles,
University College of Borås.

In June the schedule said to visit the Avantex fair in Frankfurt. A very compact and exact plan had to be devised because of the nominal space, 3x3 metres. The small space had to convey a very strong expression. Using very strong colours that nobody expected would make sure the exhibition attracted attention. The neon colours were brought together with silver metal materials and black and white to get a strong design. These good intentions worked out well. The small THS exhibition place was crowded all the time.
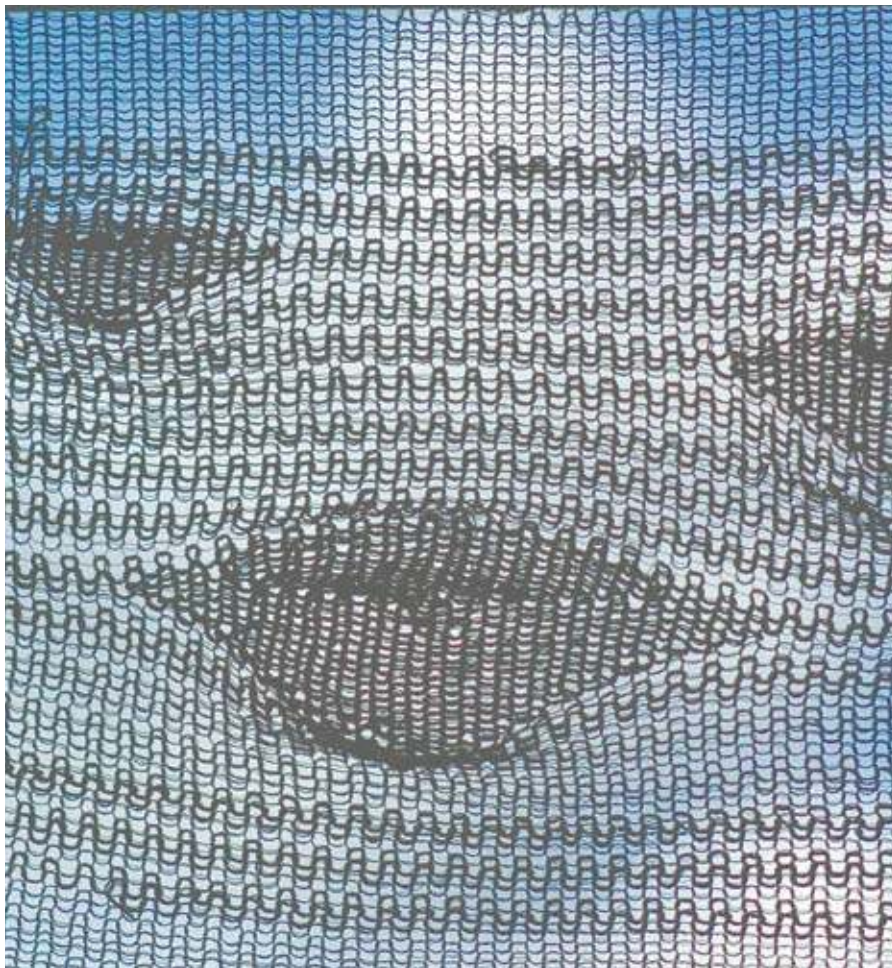
Sensitive skin

The Sensitive Skin collection shows the possibilities of textiles to act as a protective skin sensitive to the outside stimuli. The project explores the relation between glass, textile and natural light. The aim of the project was to design a textile substitute for both the esthetic and functional layers in the glass. Here the esthetics is combined with a specific function regarding sun as heat reflective due to the metal inside.

Partial knitting has been used as technique on flat knitting machines to give surface relief. The pattern design in the collection is expressing also the idea of the skin, a protective surface with cellular structure.

The materials that used are on the border between building and textile design as metal yarns and plastic polymers as monofilament but also yarns with special proprieties regarding light like light reflective and light emitting.

Delia Dumitrescu,
Masterstudent in Textile design, Swedish School of Textiles

Since April a dialog is going on with Dr Zane Berzina, researcher in Textile Art at Goldsmith, London University. She was invited to the THS in March 2007 to hold a workshop with the master students and was very interested in how the THS presents textiles in BODY & SPACE. Zane Berzina, born in Latvia, lives in London, works internationally, and takes a special interest in initiating collaboration projects between the Baltic States and other foreign universities. The THS has been invited to exhibit BODY & SPACE at the National Gallery in Riga in February 2008. Zane Berzina will be the local curator in Riga together with Ulla Eson Bodin, curator from the THS.

Lena Berglin, PhD student and researcher at the THS has been invited to Riga by the Swedish Embassy in Latvia in November 2007 to do a three-day introduction of the coming exhibition BODY & SPACE.

In September 2007 Ulla Eson Bodin visited the National Art Gallery in Riga together with Zane Bersina to see the space and discuss the design and artistic expression of the exhibition. Everywhere the BODY & SPACE exhibition is displayed presents it with a different expression. At the National Art Gallery in Riga, an architecture exhibition will be displayed at the same time as BODY & SPACE and the exhibition will be adapted in an appropriate way.

Ulla Eson Bodin
Curator of BODY & SPACE
Professor in Textile Design

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- Swedish Textile and Clothing Industries Association
- UNIVA
- Örebro University - Department of Technology
- Gijón Polytehnic College

E-fashion – ICT-knowledge for Textile and Fashion Education

Erik Bresky
The Swedish School of Textiles, THS
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www.e-fashion.se

There are numerous opportunities to work with IT and Multimedia within the fashion and textile industry, which has meant that new working methods have been developed. The use of computer aids within the fashion and textile industry is widespread and due to the high level of outsourcing the main part of communication is done through ICT-aids. Everything from design, first samples to production is today computerized. At the same time the vocational education and training of clothing and textile design has not developed as fast and is now struggling to offer up to date teaching methods.

The E-Fashion project

In October the 15th 2004 a project founded by the European Union was launched in order to investigate how to overcome the gaps between vocational education and training and the fashion and textile industry. The project was called E-fashion and involved seven European countries and 18 organisations in total.

The main outcomes of this project includes a learning package for vocational teachers and trainers, a self-learning package for students in vocational education and a general guide including a strategy on how to integrate ICT and multimedia in design oriented textile and fashion education, 5 national workshop-based seminars and a European conference on the innovative use of ICT and Multimedia in vocational training.

Where are we now?

Step one in the project was a research report where an analysis of the industry (and a description of the textile value chain) and their need of ICT-knowledge where described together with a report of the present knowledge and programme use by students and teachers in textile- and fashion education. The research process included a survey among companies in the fashion and textile industry and a survey among vocational educational schools. Small-case studies were also carried out.

The research report showed that teachers and staff did not use available software to the fullest. Often the software was used only to produce teaching material. The use of software within the participating schools varied and the report showed the importance of continuously implementation of IT-skills within fashion and textile education and training.

The report also showed that students have more and more computer knowledge when they begin their higher education but that their knowledge varies. Much of the knowledge are self learned which makes it hard to know which level to expect from students.

The survey directed to the industry showed that it is not only the apparel companies who have realized the advantages in having a demand-driven supply-chain. Also the suppliers of software seem to work hard in promoting both "the new supply-chain flow" and the software supposed to improve it.

The companies spoken to all agreed that knowledge of a specific programme was of less importance than an employers understanding of what data to work with in each area.

Learning packages

One of the aims of the e-fashion project has been to create a flexible teaching aid that can be used by both teachers and students. The result is an educational package for both teachers and students with various software programmes for presentation of textile and fashion.

The learning packages combined with the e-Fashion website offers teachers the chance to create courses that are flexible and creative. By combining self-studies with support and feedback teachers can design their own learning package and adjust their teaching to their students' specific needs. This can be further emphasized by the use of case studies.

To be able to evaluate the project six schools have tested the e-fashion teaching material. The evaluation showed that many schools found the e-fashion programme as easy to follow from the start. The interactive approach made learning much more interesting for the students who picked up how to use the programme quickly and were able to get immediate feedback if they were doing something wrong. The students also seemed more motivated and the products gave slow learners a chance to catch up with their fellow students because they could reach the instructions at any time.

The negative aspects were language obstacles since the teaching materials on the e-Fashion website are in English and also the lack of student tasks with various levels of difficulty.

The Swedish School of Textiles, University College of Borås developed a short course, Computer Aided Design in Fashion Sketching 7.5 ECTS by using the e-fashion teaching material as a starting point.

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The Nordic Textile Journal

The Nordic Textile Journal collects and publishes articles of interest within the fields of textile, design management, engineering and craft. Although the Journal is mainly for Nordic readership, many articles are published in English, in order to feature new and interesting research outside the Nordic countries.

Articles should cover subjects of wide interest within and between the fields mentioned above. They can also be summaries of lectures and seminars. All material is subject to consideration by the editorial Board.

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The Nordic Textile Journal includes illustrations in four-colour printing. Authors should therefore indicate which pictures are required in colour. These can be submitted as slides, photos, or sent on a disk or e-mail, preferably in TIF or EPS. Final decisions on colour illustrations to be included are taken by the editors.

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