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# Touch and Technology: An Individual Perspective

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NEW

DIRECTIONS: Examining the Past,  
Creating the Future.

## Touch and Technology: An Individual Perspective

Vibeke Vestby

This presentation is about the development of the hand operated jacquard looms named TC-1 and TC2: I will start with how it began more than 20 years ago, and how the project also changed my career and the careers of many other weavers! Looking back, we actually have redefined what's possible to accomplish in a handloom!

In the late 70-ies and -80ies Norway found oil in the North Sea: This resulted in a new income source for the country: As a consequence, the Norwegian government initiated many projects to share the new wealth. One of them was the IT project, initiated in 1990: University and college employees were encouraged to propose new research projects, either to develop new products or new expertise for Norway as a nation. I was a teacher at the College of Art and Design in Oslo: The invitation letter from the government had one paragraph saying that special priority would be given to projects involving traditional crafts, as well as projects targeting women! I knew that this was my chance! Over years, I had seen talented students abandon weaving in favor of painting or graphic arts; weaving was too time consuming and too rigid. At the same time, industry had just started to introduce electronic jacquards, and I felt like a child outside a candy store: I could see what possibilities the computer controlled looms offered, but the technology was so expensive that one could not even dream about it.

The research project I proposed was to build the answer to 'Every Weaver's Dream:' A loom without design limitations, and technologically possible to control by a hand weaver! I wanted the loom to be like a sketchbook –a tool for generating and visualizing ideas in a creative flow. I wanted to be able to weave clouds, dragons and peonies, just like one can see in Chinese silks:



*Figure 1. Yunjin brocade Photo: Silkeveen/Guo Yaxiang*

Beatrijs Sterk / ETN organized the Art-and -Industry project in 1991: This was the first time I saw textile artists allowed into a state-of-the-art weaving mill, the Bavarian Müller-Zell. The results were stunning! Soon after Philadelphia School of Textiles and Science/Bhakti Ziek carried out a similar project, involving a number of American textile artists. This project went on for two

years, and culminated in an exhibition with all the industrially woven pieces. What these two events demonstrated, was that once artists got their hands on the electronic industrial jacquards, magic could happen!

I started out by making a survey of the various handloom technologies available for hand weavers: Some of the technologies available were actually offering almost limitless design freedom, but they were slow to operate: When shed making devices were developed in different cultures and times, they had many common factors: All weaving is based on a system of lifting /lowering warp threads – either with sticks, strings or combinations. Some looms had a special pattern warp, which only purpose was to store the patterns, either as sticks or bundles of strings.

In the summer 1992 I spent 3 months at Lisio in Italy in order to learn more about the coarse pitch Jacquard loom. It was a shock to discover how much more thorough the hand weaving education was in France, Italy, Switzerland and Austria than in Norway. In Norway, weaving was taught more like survival skills - similar to baking bread or cooking! I have never learnt so much and so fast in my life!

Type of loom	Freedom of Creation	Time to prepare	Time to weave
Tapestry loom	Maximum	Minimum	Maximum
Shaft loom	Limited	Medium	Minimum
Jacquard (hard cards)	Limited /Maximum	Maximum	Minimum
Electronic Jacquard	Maximum	Medium	Minimum
TC1/TC2	Maximum	Minimum	Minimum

*Figure 2. Table of shed making devices*

The two year period 1990-1992 was a steep learning curve: I had gotten the equivalent of 200 000 US\$ and I had to learn how to run a project on the go! Where do one for example go to build prototypes? What are critical technology factors? How do you make flow diagrams, and Pseudo-code! How do you get software and hardware experts to collaborate, and how to transfer the essential hand weaving skills to a piece of equipment!

In 1990 an industrial Jacquard program could typically cost 75-150 000 US dollars! Since this was totally out of reach for textile artists and freelance designers, we started out developing a tiny jacquard-like program that was based on Windows Paint! We had challenged ourselves that the total package of loom and software should not cost more than 30 000 US\$. What compromises had to be made? In the spring of 1991 we had a working prototype, and I felt like a religious: I “had seen the light”! There was no turning back!

For two years I tried to develop the prototype further without governmental funding: I got just enough grants to keep the project afloat, but not enough to make any breakthroughs. It was not until 1994 that the project gained speed again: Tronrud Engineering had decided to develop the prototype into a finished product without external financial support. We decided to call the loom

TC-1, meaning Thread Controller number 1. This was to signal that we used another principle for shed making than the patented jacquard mechanism. The TC-1s were in production from 1995. Two years later I left my safe job at the university in order to work full-time for Tronrud Engineering, marketing the TC-1.



*Figure 3. TC-1 modules in tapestry loom, weaving width 10' Artist: Lise Frølund, DK*



*Figure 4. TC-1 loom frame and modules (1995-2012)*





*Figure 5. Machine hall at Tronrud Engineering*



*Figure 6. Assembly of TC2 looms in Tronrud Engineering assembly hall*

Those early days, selling a TC-1 loom meant spending most of the time on teaching how to use a computer. It is therefore amazing to see how diversified the picture is now! Textiles are not only used as 2-D art on walls: Textile installations involve a timeline, as in Abu Dhabi last year: 55 meters of fabric was woven in 8 days – on a TC2 loom! The weaver was Katja Huhmarkangas, Finland. The installation was a tribute to the Bedouin culture in Saudi Arabia.



*Figure 7. Qasr al Hosn, Abu Dhabi 2013 GSMRJCT © Martine Dignard*



*Figure 8. Outi Martikainen, Finland Polypropylene rope at 5 epi Photo: O.Martikainen*





**Figure 9.** Lise Frølund, Denmark Paper yarn Photo: L. Frølund



**Figure 10.** Grethe Sørensen, Denmark: Millions of Colors (wool upholstery for Tronrud Engineering)



**Figure 11.** Cathryn Amidei, MI: 'Painting' with 8 shuttles + 2 brocading sheds.



**Figure 12.** Philippa Brock, UK: Elastic materials, Reflective yarns



I wanted to show examples of very different types of textiles and expressions. We also have customers who design for fashion industry, automotive industry and interior textiles. Some of our customers cannot share what they weave because of patents and competition. But it is a fact that technical textiles will contain a lot of great challenges for weave designers/textile creators in the years to come!

TC2 looms are also about to be introduced in cultures where low-tech industry is dominating: We are in the process of furnishing a mobile weaving studio in three 20' containers heading for Cambodia. It will be a self-sufficient unit with power generator! More about this at a later time!

*Where no photographer is listed: Photo by V. Vestby*

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[https://www.youtube.com/watch?v=E9a3gTz\\_3IU](https://www.youtube.com/watch?v=E9a3gTz_3IU)