

Commercial Production by VISCOTECS[®], Digital Printing onto Fabric

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1. Introduction

We, Seiren Co., Ltd. (Fukui, Japan) have started its commercial production of textile printing by using Ink Jet Printer since 1990, and have achieved its annual sales over 10million square meters.

This printing system is "VISCOTECS[®]" which is our brand name. Its products have greatly contributed to all over the fabric market, such as fashion, sports wear, underwear, casual, automotive (car seat), interior, and advertisement banners.

2. Background of Seiren

Seiren is one of the most major textile companies in Japan, founded in 1889. (Fig-1)

- Founded: 1889
- Business: Textile Converter and Dyeing, Printing, Finishing, Coating
- Capital: US\$150million
- Sales: US\$700million (March 2000)
- Employees: 2,800

Figure 1. Seiren Background

Seiren has all faculties which cover the followings, textile development, design creation, weaving, knitting, dyeing, printing, finishing coating, and finally to sawing. Its sales figures have 5 vectors which is shown in the graph of Fig. 2.

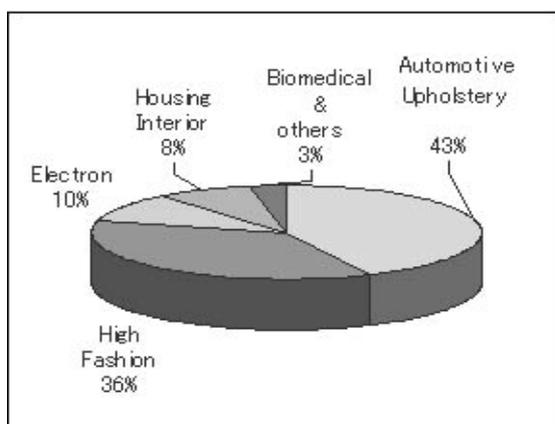


Figure 2. Sales Amount of Each Category

3. Development History and Composition

Now, we will get into the introduction of VISCOTECS[®]. VISCOTECS[®] is an abbreviation of "Visual Communication Technology System."

VISCOTECS[®] consist of 4 major systems shown in the Fig-3.

- **CAD**
Textile Design CAD
Apparel CAD (3D, Patterning, etc)
CR-CAD (Customer Response)
- **CAM**
Ink Jet Printer & Control Soft
- **Chemical**
Ink, Textile
- **Network**
Digital Data Communication

Figure 3. Composition of VISCOTECS[®]

VISCOTECS[®] is on stream in the exclusive plant of 300 thousands square meter site which is located in the middle of Japan. (Fig. 4)

This production site denies the entrance of outsiders without special permission, so its technical secret has been closely protected.



Figure 4. VISCOTECS[®] Plant

We, Seiren has started the development of VISCOTECS® since 1980, spending 10 years to build up the technology of CAD, CAM, ink, textile and their relative soft wears internally by ourselves.

Since 1970, CAD Image Processing, and CCM (Computer Color Matching) had been developed and used practically as an independent system in the field of conventional printing and dyeing.

These existing technologies have been integrated with the development of textile Ink Jet Printer as sole system, then this whole technology has completed as VISCOTECS®, digital inkjet printing system in 1990.

- 1980 Started development**
- 1983 Completed design CAD**
- 1986 Completed prototype of Ink-Jet Printer**
- 1987 Inauguration of Viscotecs development project**
- 1988 Completed prototype of Color Ink-Jet Printer**
- 1989 Publication of Viscotecs**
- 1990 Completed special factory (with over 20 Billion Yen)**
- Started commercial production mainly for ski wear**
- 1992 Started mass production of textile for fashion, casual, interior**
- 1994 Started mass production of automotive upholstery**
- 1995 Started mass production of textile for swim wear**
- 1997 Started development of technology for solid dyeing**
- Started production of advertisement banners**
- 1998 Achieved 10 million square meters/year of production (Fashion 2 million garments + Auto-Upholstery 0.5 million)**
- 2000 30% Sales increase against former year**
- 2001 Expansion of factory Achieved 12 million square meters/ year of production**

Figure 5. Development History of VISCOTECS®

4. Concept of VISCOTECS®

The Concept of VISCOTECS® is “to provide what consumers want” “at just timing they want” “to provide the just quantity they want”. The recent background of the market where customers seek for novelty, uniqueness on timely, has brought this concept.

As we know, fashion industry has produced enormous “may be” salable products and then has wasted enormous dead stock.

On contrary, VISCOTECS® denies this negative habit. It achieved a great success with “small lot production with specialized design in short delivery” Now please see the comparison of VISCOTECS® and conventional printing on Fig-6.

To explain it in specifically, VISCOTECS® makes the following points possible.

“There is no limitation for the design creation, which will bring out special products”, “Managing designs in digital data makes it easy to do trials and errors for the satisfying design creation”, “reduce the stock risk to the minimum with short-run and quick delivery”.

	Conventional System	Viscotecs® System
Expressive Power	10-20colors	16.7million colors
Design Size	2mW x 1m	2mW x 50m
Lot Size	2,000m	1m to 1garment
Concept Time	Months	Hours to Days

Figure 6. Comparison with Conventional Printing

5. Success Story with VISCOTECS®

By using VISCOTECS®, one of major swim wear marker in Japan achieves great success in their sales. (Fig-7)

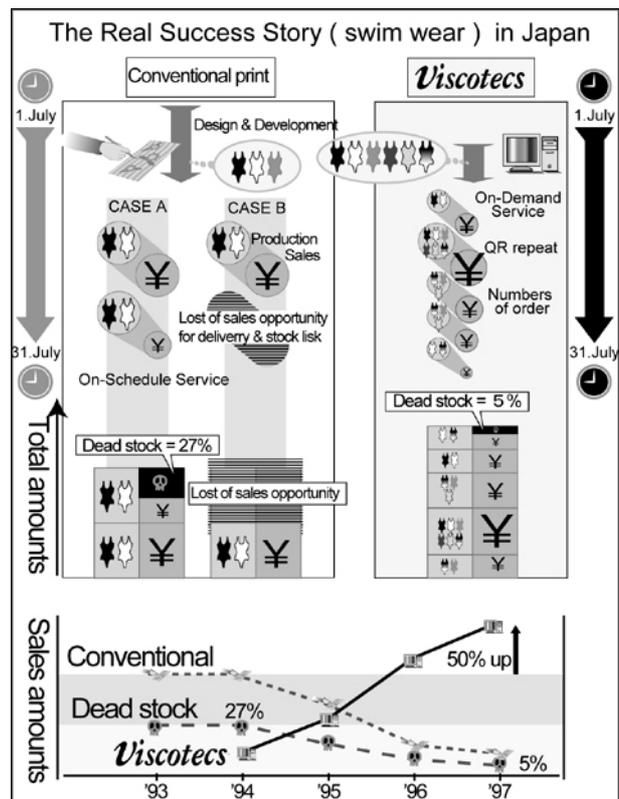


Figure 7. Success Story with VISCOTECS®

The company has been suffered from massive dead stock which is approximately 27% of their total production.

However, the turning point was in 1994. They introduced VISCOTECS[®] into their production management. In Japan, sales season of swim wear lasts just for 2 months starting from beg/May to beg/July.

In their ordinary distribution, swim wear makers had to produce massive amount of garments by April, so that they will not lose their sales chance and the garments would last for whole sales season. However, they did not have a confidence to sell them all out. As a consequence, as much as 27% of garment out of total production had been left as their dead stock.

However, after meeting with our VISCOTECS[®], they could reduce their first production down to 1/5 to 1/2 of planned sales of the season, and then placed repeat order just for the garment they could sell (sold out in shop) during the sales season.

This swim wear maker achieved 150% sales increase to former year and also reduced their dead stock down to 5% of the total production amount.

Recently, they begin to make best use of VISCOTECS[®] such as placing order on Monday, printing on Tuesday to Wednesday, sawing on Thursday to Friday and selling on Saturday.

Moreover to this, last year, they achieved “design creation during the sales season” i.e. as soon as they know the market trend of the season, they create another designs according to the trend and produced to sell the garments during that same season.

In spite of the general background in Japan where the conventional printing has been decreasing, VISCOTECS[®] has been increasing 20 to 30% of its production. Thanks to this increase, our factory is expanding its facility.

6. Special Feature of VISCOTECS[®]

One of the important features of VISCOTECS[®] is its Eco-Friendliness. Its consumption amount of water and energy is 1/5 to 1/20 comparing to the conventional printing. Reducing dead stock also lead to minimize the waste of resources. Because of these efforts, in 2000, our VISCOTECS[®] factory has obtained ISO14001.

In addition to these features, VISCOTECS[®] has great adaptability to various fabric materials such as cotton, silk, wool, nylon, polyester, rayon, and acetate. It will be adaptable not only to such thin fabric like ordinary woven and knitted fabric, CG, tricot-half, but also to such materials and tissues as mesh fabric like lace, flexible fabric which uses Lycra, brushed fabric like velor and moquette, and artificial skin.

From designer's aspect, VISCOTECS[®] allow them to take sufficient time for satisfying design creation. They will be able to develop sample fabrics from their 3D-CAD designs in short time, making some trials and errors by producing actual sample garments. This is a big advantage for designers.

Concerning the selling price, it is important to be competitive to the price of ordinary printing. The price will be dependent on the production lot size. Please see our test calculation on Fig. 8.

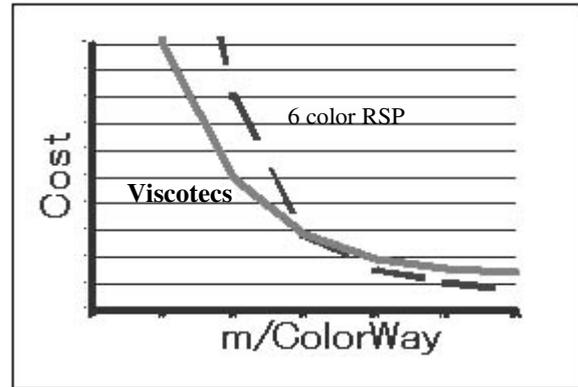


Figure 8. Price / Lot Size

7. New Project

In 1998, we have launched new project. That is production/sales of advertisement banners. (Fig-9) Most of the existing banners are made of paper and vinyl chloride sheet, but we made cloth-media sheet debut to the market.

These media sheets are made of polyester woven and knitted fabric, so the sheet has a soft handling, and hardly to be wrinkled. Moreover, this cloth-media make it possible to reduce the construction cost because of its lightness. By sawing cloth-media together, there is no limitation of the size for large advertisement banners. This cloth-media does not include any chloride, so it will never produce dioxin when they are burned, so it is Eco-friendly.

This new business gives great impact to this industry and its sales has been growing tremendously.



Figure 9. Large Banner (360 square meter)

8. VISCOTECS[®] in Near Future

We, Seiren have been considering to make further step, the globalization of its business. Today, we have exclusive faculties in Thai, where we produce automotive upholstery, and in U.S.A. where we produce/distribute swim wear, home furnishing items, and advertisement banners. We aim to expand our next step to the EU market.

Here is another future business model shown in Fig-10, which is business through internet, specifically, supplying sole product of the just quantity client need, from anywhere in the world at anytime they need.

In Japan, we have distributed T-shirts and Japanese *Yukata* and etc produced by VISCOTECS®, on internet site and also at our antenna shops by using this web system.

We estimate this business will be expanded to the world in around the year 2003. Then, thanks to the improved data and optical communication infrastructure, massive design data will be transferred instantly in low cost.

Also, we expect the price of solid printing could be reasonable in near future.

And, VISCOTECS® can be the global standard at this stage.

Please forgive us for not opening technical issues in here.

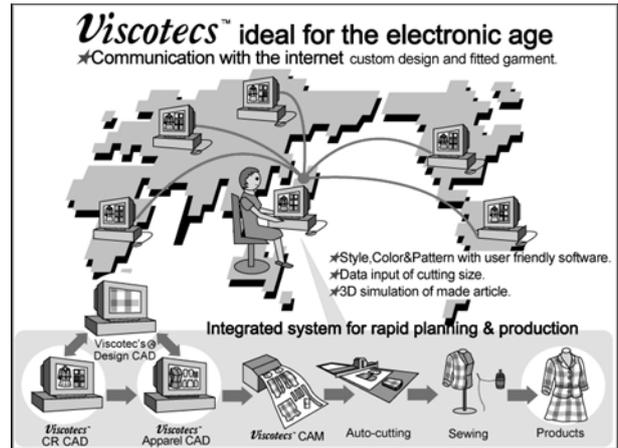


Figure 10. Communication with the Internet