

# Carl

ZSK STICKMASCHINEN Customer Magazin

Autumn 2018 - N°1

## The ZSK Embroidery Technology Magazine

Embroidery | News | Technology | People | Trends | ZSK Worldwide



**WELCOME TO**  
**ZSK STICKMASCHINEN**  
**OPEN HOUSE**  
**21. - 22. SEPTEMBER 2018**

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# Hello & Welcome !!!

In September 2018, we are celebrating our 4<sup>th</sup> Edition of the ZSK STICKMASCHINEN OPEN HOUSE in Krefeld.

The previous years have shown a great increase in the numbers of visitors. In 2016 we have counted more than 1200 visitors from more than 45 countries. We hope that 2018 will be a similar success.

We have internally discussed new ways of communication with our customers and decided to launch "**Carl**" – our new customer magazine.

We are planning to publish the magazine twice per year to present updates about ZSK STICKMASCHINEN, our machines and accessories. Additionally, we will include interesting information around embroidery and technical embroidery, that you might find useful.

If you have suggestions, ideas, or topics of interest that you would like to find in our magazine, please reach out to anyone at ZSK.

Enjoy reading our first Edition of "**Carl**".

Best regards,

Your ZSK Team

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## ZSK STICKMASCHINEN **OPEN HOUSE**

The Embroidery Technology Show

21. + 22. SEPTEMBER 2018  
KREFELD • GERMANY

# News 2018

**The team of mechanical, electronic and application engineers have taken a lot of pride to work on improvements, new developments and new products since the last Open House in 2016.**

The range of offered machine models has been continuously growing over the last two years. The Challenger Series has been well accepted and represents today ca. 50% of the flat machines built by ZSK. The S, M, L, X, Y, Z-Series machines are continuing to be produced side by side.

In early 2018 ZSK introduced the SPRINT 7 with 18 needles and integrated servo motors. The SPRINT 7 family continues to grow with the number of models. The SPRINT 6 will be continued as ZSK's entry level model with 12 colours.

It is our pleasure to give you an overview of the changes adapted during the last two years and what we are showing at the 2018 Open House in Krefeld.

### **New Colour Changer**

ZSK is presenting a new colour change mechanism for the Challenger Series which reduces the time for needle changes by up to 75%. The new colour change system is offered optional, and the aim is to introduce it into every Challenger machine by the second half of 2019.

### **Time of Colour Change**

The colour change process in SPRINT, RACER, and Challenger machines with MCP 35 electronics has been simplified. A new catcher motor is installed that reduces the time of the catcher process. Additionally, the starting speed after a thread cut, as well as the speed of the last stitches prior to a thread cut, have been improved. The overall time saving is around 2 seconds per process. A partial benefit can be achieved even without the new catcher motor by installing the latest T8-2 software.

### **Increased Efficiency**

Due to the use of closed loop servo drives on the RACER Series, the machines can now achieve higher speeds at longer stitch lengths. The ramp files for the different models are recalculated step by step and will be part of future T8-2 software upgrades.

## HAC and EP-1.2

A new board has been developed that allows Hot Air Cutting device HAC and EP 1.2 to be installed alternately on the same side of the head on a machine. The devices can be switched on and off by using the head selection feature in BasePac or EPCwin.

## HAC Acut 450

The HAC device has been improved. The device now carries its own air compressor in each device and does not require a separate air compressor anymore.



New HAC without separate compressor

## Frame Connection

When Tajima customers switch to ZSK or start implementing ZSK in their factory, they often want to keep their existing frames. We are offering a connection plate for tubular frames that allows the operator to install Tajima arms on ZSK machines and to continue to use their existing Tajima frames.

## RACER Series

All RACER Series machines are equipped with MCP 35 electronics, closed loop servo drive systems and an extended field for tubular embroidery. In most models, the field has been extended by 92mm.



## Quick Change System II

In 2016 ZSK introduced a Quick Change System for the SPRINT Series. This system has been continuously improved and the newest version is now available for the RACER Series.

## Pneumatic Frame Clamping

When producing parts with low number of stitches where frames have to be exchanged continuously, ZSK is now offering a pneumatic frame clamping system. By pressing a button, the frame can be released and locked. This allows for a faster change.

## Stitch Plate Insert

ZSK has introduced a new stitch plate insert for the SPRINT and RACER Series. The tubular arm of these models does not require a cap insert anymore for the majority of hats. The new standard insert has a 0.3mm sunk centre and improves the stitch quality on filled stitch designs.



## Twin Sequin Device T7

The device now carries 2mm guides as a standard feature. The device has been improved to provide more stability during the embroidery process and is therefore capable of embroidering 2mm sequins at the highest known speed.

## T7 end of sequin recognition

This optional device can be installed on T6 and T7 sequin devices. The device recognizes when a sequin roll is empty and stops the machine automatically.

## T7 on 18 needles

ZSK is capable of installing up to 3 sequin devices of the T7 sequin device on a 18 needle machine. This allows up to 6 different sequins per head.

## Roll2Basket

The Roll2Basket solution has been extended by two additional products. Machines can be equipped with an optional Roll2Basket sensor that can detect design elements and ensures perfect placement of logos and lettering. The second product addition is a Roll2Basket winding station. This system allows the automatic winding of embroidered ribbons.



ROLL2BASKET Device on RACER 1W

## Shirt Collar Frame

A typical requirement for work wear and promotional embroidery is stitching a logo on the collar of a shirt. A very time consuming task is to take the shirt out of the packaging, to embroider it, and to fold it back together. ZSK has developed a new shirt collar frame that allows embroidery of the collar without having to take the shirt apart. The system can be supported by an optional pallet that can be installed on SPRINT machines that holds the shirt in the bag while the collar is being embroidered.

## Red Bobbins

ZSK now offers red bobbins. In case you use different bobbin yarns and want to avoid a mix up of the yarns, it can make a lot of sense to use different coloured bobbins.



## Tubular Arm

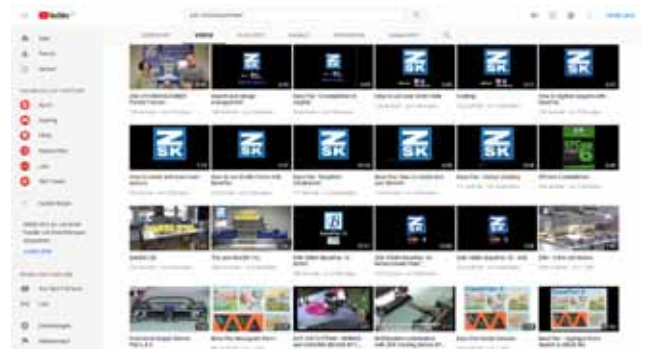
The casting of the tubular arm has been strengthened with additional internal material. The size of the tubular has not been increased. The strength of the tubular arm now exceeds the strength of the Jafa Series tubular arm.

## Extended Tubular Arms for SPRINT Series

The standard arms of the SPRINT 6 Series allow a frame width of 469mm. The extended arms allow a width of 514mm and therefore offer sufficient space for a 12"x15" Mighty Hoop. Extended tubular arms are a standard feature of the SPRINT 7 Series.

## BasePac and EPCwin Training Videos

The ZSK YouTube Channel "ZSK Stickmaschinen" is now offering a number of training videos for BasePac and EPCwin. The collection of videos will continue to grow. The video collection includes the presentation of all main features of a BasePac Premium.



## Auto Select Bobbin Changer

ZSK offers three versions of automatic bobbin changers. The latest development is the Auto Select Bobbin Changer.

The Auto Select Bobbin Changer constantly keeps track of the bobbin position within the magazine. Perfect matching of upper and bobbin yarn is therefore possible and automated.

The following applications strongly benefit from this development: matching yarn colours for upper and bobbin yarn, and matching yarn thickness for thicker and thinner yarns (i.e. for combination of thick and thin yarn in one design).

The Auto Select Bobbin Changer can be installed in any new ZSK machine running in border frame operation on F- and W-heads.

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## Quicktext with Head Selection

This new feature is part of GiS BasePac Professional Version 10. The feature allows embroidery of team names (Quicktext) with an efficiency currently unknown in the industry.

The machine feature used for this is Head Selection. All ZSK flat machines (S-Z Series and Challenger Series) are always equipped with Head Selection, for RACER machines it is an option. When a machine is equipped with Head Selection, the take up lever is no longer in motion when the head is switched off.

A typical embroidery job might involve patches with a company logo and name below it. A requirement might be 3 patches per person. In this case, the system allows all 4 heads to run the same logo. Afterwards one head is automatically switched off and the 3 equal names are embroidered. Afterwards, the last head is automatically switched on to embroider one name of the next three names in the queue.

The information can be exchanged via the ringbuffer between machine and the GiS system.

## Barcode Operations

Efficiency is key in every operation. Reducing loading and operational times increases the profit of the business.

The newly added T8-2 feature allows loading of designs via barcode, turning designs i.e. by 180° and many other functions purely by using a barcode scanner and scanning operations.

The new functionality does not require any strokes of keys on the T8-2 apart from the green button to safely start the embroidery process. ZSK has released a detailed manual on this functionality and its capability.

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# New Machine Models

## SPRINT 7

In 2018, ZSK has extended the SPRINT Series with three new models – the SPRINT 7, SPRINT 7L and SPRINT 7XL. The SPRINT 6 and SPRINT 6 XL are being continued as 12 needle models.

All SPRINT 7 models are equipped with 18 needles and servo drive systems. The SPRINT 7 machines are more efficient on longer stitch lengths compared to the SPRINT 6 Series.

Design starting points can now be saved in the design. A centre point can be saved in the machine and returned to after each embroidery cycle.

Another innovation is the drive system hanging from the top of the SPRINT 7L and the SPRINT 7XL. These two models therefore offer extended space to embroider large products like suitcases and golf bags.

The embroidery fields of 40 x 60cm on the SPRINT 7L and 40 x 140cm on the SPRINT 7XL, set a new benchmark and offer flexibility for the use of this machine series.



## RACER 2XL

The RACER 2XL is part of the RACER Series but only available as a border frame machine. The machine has an embroidery field (per head) of 700 x 700mm and is equipped with 24 needle heads.



## RACER 0218

The RACER 0218 is part of the RACER Series but only available as a border frame machine. The machine has an embroidery field (per head) of 550D x 700mm and is equipped with 18 needles per head. Due to the D-drive, one head is capable of producing designs of up to 1.100 x 700mm.



## JGVA 0109

The JGVA 0109 is the ideal sampling and small batch production machine for technical or high end design requirements. The machine is the smallest triple combination embroidery machine that exists. Due to its compact size of 3.44m x 1.84m it fits well into laboratories. The machine combines the standard embroidery head (F), the cording / taping / coiling head (W), and the moss / chain stitch head (K).

## JGW 0200

The JGW 0200 is equipped with 2 W-heads for cording / taping / coiling or laying of fibres, wires and tubes. The heads have a head distance of 550mm, where one head can embroider the entire border frame area of 1.100 x 700mm.



## Challenger Series

The new CHALLENGER models are the CYCF 2409-330D, CYCF 3606-200D, CXCF 1212-480, CYCF 1012-600D, and CYGF 1209-600.





# ZSK Bead Device

The existing ZSK sequin, cording, and hot air cutting devices have been extended by the new ZSK bead device in 2018.



ZSK Bead Device on a RACER 1XL - The F-Head (embroidery head) allows the installation of two devices per head.

The Bead Device allows embroidery of a variety of beads and to provide a more distinct expression of your embroidery designs. The newly developed bead device can be installed on the left and / or right side of the embroidery head for embroider single beads. The beads are placed into a small container on top of the device and are automatically pushed onto the wire that feeds them into the placing mechanism.

The beads can be embroidered with a speed of up to 800 RPM. The bead device can be installed on machines with MCP 30, MCP 31, and MCP 35.

The possible bead diameters are 2, 2.5, and 3.0mm. The bead height should be between 1.5 and 1.8mm. The min. diameter of the bead hole should be 0.9mm.

The head distance that each device requires is 80mm. When you install a device on the left and right side of the head, a head distance of at least 160mm is required.

The Bead Device allows the creation of designs with up to 4 colours when combining 2 heads equipped with in total 4 Bead Devices on a machine with D-drive and Head Selection.



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# **My.ZSK 4.0** **Your Embroidery** **Machine Cockpit**

My.ZSK 4.0 is a tool for collecting, archiving, processing and visualizing of all relevant data of the embroidery process in your company.

- Status dashboard of all ZSK machines
- Progress view of all orders
- Productivity and usage for each machine
- Analysis of thread breakages based on designs, machines, heads and needles
- Design analysis
- Operator- and daily reports
- Shift- and location reports
- Sensor- and RFID Data for each machine
- Alarms for user defined events  
i.e. by sending emails.

**This is an overview of the features that My.ZSK offers in the latest advanced version 4.0.**

The MY.ZSK system allows you not only to analyse current data, but also to compare and analyse historical data, to recognize tendencies, and to identify potential machine or design issues.

My.ZSK provides you with transparency that supports organizing production to optimise the usage of machines, and to strongly increase the efficiency of production.

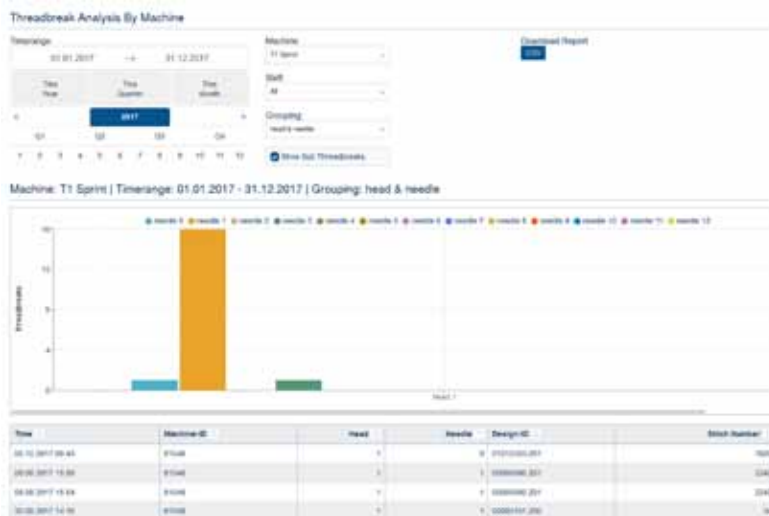
Optional sensors deliver information about the surrounding conditions under which production is carried out. Besides sensors for temperature, humidity and air pressure, any other sensor can be connected and integrated into our system to help you to comply with documentation requirements for your orders.

My.ZSK can trigger user defined alarms when certain defined events or values are exceeded.

All relevant data is collected by your personal Data Collector and the encrypted data is transferred to the My.ZSK Cloud. The available analysis tools can also be accessed via your mobile device from all over the world.

Alternatively, we are also offering My.ZSK as an OnPremise solution, where all data is stored in your network and data will never leave your environment.

Independent of your choice for My.ZSK in the Cloud or OnPremise, My.ZSK is using the industrial standard OPCUA-protocol to allow full integration in the "Internet of Things" in the future.



Threadbreak Analysis

Description	Condition	Alarm Type	Machine	Last triggered	Archived
Machine not responding	Machine stop > 10 min	MachineNotResponding	97 000 000	-	<input type="checkbox"/>
Thread broken in machine	Machine stop > 5 min	ThreadBroken	All machines	-	<input type="checkbox"/>
Thread loose and overheat	Temp. 10.00 off 170.000 degrees	ThreadLoose	97 000 000	-	<input type="checkbox"/>

Status	Triggered	Machine Location	Machine Name	Description	Alarm Type
<input type="checkbox"/>	01.01.2017 10:21	Zone 02 Stromhaus 020-00000	970 Threadloom Sprint 1 0000000001	Machine not responding	MachineNotResponding

Triggered Alarms



Stitches and Threadbreaks

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# **Automotive** **Interiors Expo** **2018, Stuttgart**



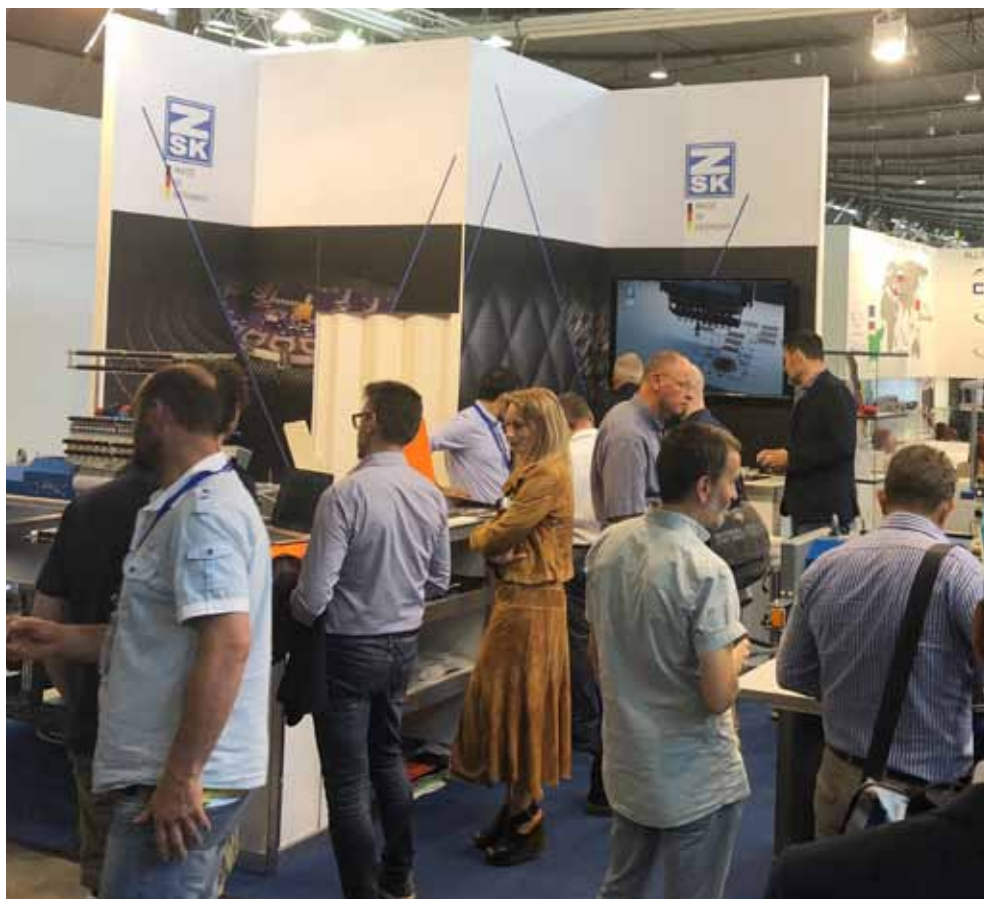
At this year's Automotive Interior Expo in Stuttgart ZSK STICKMASCHINEN presented a number of innovations

Groz-Beckert manufacturers a DH type needle with size 110 and 90 for ZSK STICKMASCHINEN.

This needle is ideal for the embroidery of thick yarns (size 10 - 30). The needle allows a very high stitch quality for straight stitches in all directions.

Typically, embroidery had the disadvantage compared to CNC sewing machines, that embroidery in different directions becomes visible. The use of this needle eliminates this disadvantage and lets the embroidery process shine with its potential to automatically switch between different colours and to combine a variety of yarn thicknesses in a design.

ZSK STICKMASCHINEN presented the Vision System that can detect perforation, colours, and objects on textiles and leather. The system can adjust the design in terms of placement and size to allow for shrinkage of leather as well as tolerances from the perforation or lamination process.



A further eye catcher was the ZSK STICKMASCHINEN e-textile board that was integrated in an embroidered dashboard with embroidered capacitive touch sensors.

## **Next Automotive Interiors Expo Euro 2019**

21- 23 May 2019  
Hall 4, Messe Stuttgart  
Germany

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# JGW 0200

## An Introduction



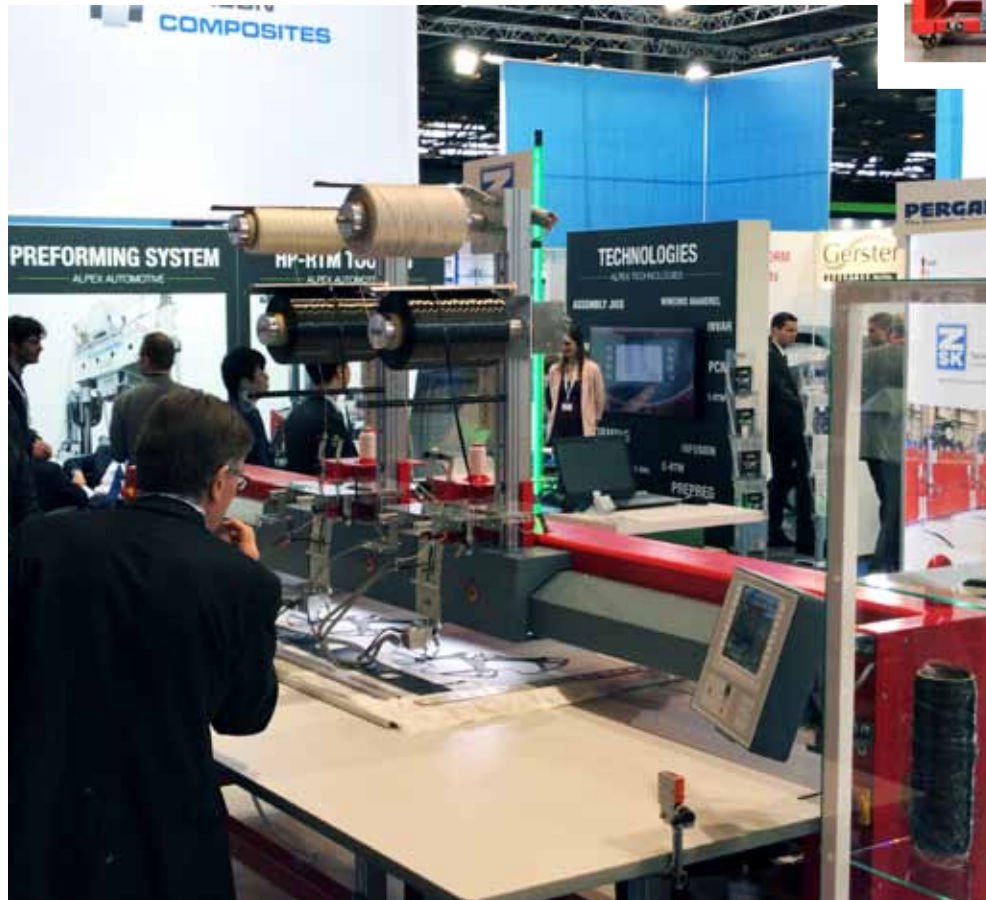
JGW 0200 stands for a 3.44m wide and 1.84m deep versatile sampling and small scale production machine.

This machine for technical applications is equipped with two W laying heads with a head distance of 550mm and a laying field of 550 x 600mm per head.

The machine is further equipped with a drive system that allows one head (with the second head switched off) to lay designs up to 1.100 x 600mm.

The machine can be equipped with all typical options that ZSK offers for technical embroidery machines.

The specialty of the machine is the capability to lay relatively large components considering the compact size of the machine.



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## **Future Project Industry 4.0**

# **TechTextil Innovation Night**

**In October 2017 the network DIGIHUB has invited to their “Textil Tech Innovation night”, which happened this time in the production hall of ZSK. It is a network to exchange ideas of smart textiles & products, innovative production methods as well as digital marketing and distribution draughts - to yourselves with experts and get to know new partners & customers.**

Fabrics with brains, smart textiles which are linked up digitally and can communicate therefore and collect data stood in the center of the first „TextilTech innovation Night“. The Chamber of commerce Middle Lower Rhine (IHK) together with DigiHub had invited to Dusseldorf / Rhineland and the economic support came from Krefeld through the ZSK Stickmaschinen GmbH.

The Location fitted to the evening, because Krefeld has a living textile tradition, and the textile industry in the region still plays an important role. Nine researchers and enterprises introduced in 5-minute “innovation pitches” which new functions can have smart textiles and which innovative products are possible in future.

The audience selected three best presentations, which were deepened then after the first pitch round once again.

Choice criterion was the volume of the applause, which was measured with the help of a decibel app.

The projects, product ideas and business models were varied: Jan Jordan of the institute of textile technology of the North-Rhine-Westphalian technical college (RWTH) Aachen introduced not only a sensor-based body air bag system, which can cushion falls of people, for example, from leaders or scaffolds, but also explained how energy memories function in fibre form.

Alexandra Glogowsky (college of the Lower Rhine) pointed which promising possibilities in future the 3D pressure will offer in the textile industry.

Vadim Tenner (Aachen RWTH) introduced textiles to input device which can be used, for example, as a remote control.



Gerd Willschütz of the Color Digital GmbH explained, like color systems and product color maps of leading manufacturers genuinely on screen, printer and product come.

Volker Neumann, manager of Stünings media Krefeld, described a software development which is able to procure working clothing individually and to provide, for example, with embroideries.

Björn Lang received the most loudly applause of the audience. Together with partners he has founded the enterprise of Physiosense. The original business idea were development, production and distribution of an office chair which contacts thanks to smart textiles if the user takes a back-damaging and injurious position. „Algorithms and smart sensors are our core competences“, So long.

On the place two landed landed Frank Giessmann of ZSK Stickmaschinen GmbH and Malin Obermann of the college of the Lower Rhine. Giessmann showed that the embroidery machines „MADE IN KREFELD“ can do much more than only decorating fashion: „We can also place fully automatically LEDs,

lay down electrical circuits and carbon fibres.“

Obermann also gave an overview about the different application possibilities of smart textiles: „You can be used, for example, in the medicine and in the wellness area, possibly for the measurement of body functions, or in the logistics to the tracking of goods.“

There was no 3<sup>rd</sup> place as the applause for both was identical.

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**At the last ZSK Open House, SMAKE was an eye-catcher with its trade fair stand made of white EU pallets. In 2016 SMAKE was an absolute pioneer with the SMAKE ValueProductionWorkflow for automation of one piece orders and small quantity production. ZSK invited SMAKE to the ZSK Open House 2018 and CARL interviewed Thomas Drees (COO) and Mark Busche (CEO) to learn about new developments at SMAKE.**

# **SMAKE**

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# **LIVES**

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# **IN THE**

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# **FUTURE**

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**Carl:**

Mr. Busche, please explain briefly for those who were not able to attend the last Open House or do not yet know Smake: Who and what is Smake?

**Mark Busche:**

We at Smake are a dedicated team of more than 30 employees. For many years, we have been operating our own in-house production with embroidery machines, textile lasers, and digital textile direct printing machines (Kornit, Brother and Epson).

The heart of Smake is our IT department, where we are currently perfecting shop systems and interfaces for automated production with 10 programmers. Our aim is that we and our customers, who have their own productions, can easily meet the requirements and ordering habits of the market today and in the future.

Smake offers the textile embroiderer and printer perfect solutions for the automated and maximum visualized production process. Software for the process, API, hardware systems and great production support systems for visualization and error prevention like EPS-Jump, EPS-Tree, EPS-Gate...

**Carl:**

Mr. Drees many people say that Smake is unique - why?

**Thomas Drees:**

Smake lives in the future. We know what our industry expects in 5 or 10 years. We have visions and implement them.

The perfect combination of young IT experts and 20 years of production know-how help us to achieve this. We are not just a 'development/programming house', we have an in-house live production in which all ideas, processes, programming etc. are developed and tested live. No show production for test purposes - no, we produce x-thousand finished and individualized textiles in the special Smake-ValueProductionWorkflow.



Our 'producer/customer' benefits from this, because we know his machines and the requirements of their customers in the B2B and B2C sector.

**Carl:**

**What has happened at Smake in the past 2 years?**

**Mark Busche:**

A lot - where should I start? The Smake VPW has been running clean in the cloud with us for years now. 2 years ago we started to open ourselves to the producer market and to share our experiences and developments. Actually, our competitors approached us and asked us if we could offer them our production solution as well. At this point I must emphasize that the Smake philosophy is not competitive thinking. We follow the spirit of the alliance idea - together we are strong and stronger - we share and win together.

**Thomas Drees:**

2 years ago we exhibited the basic framework of our VPW from the 1-part, personalized shop order routed via API into production plus quality control and error-free shipping.

In the last 2 years we have got to know and implemented many new requirements of our customers. The Smake Shop or the shop system for the production level has undergone enormous development. In small important details and in basic epic areas, which unfortunately I cannot all mention here - the time would not allow this.

In addition to the shop system, for example, some of the hardware for the operator at the workplace has been completely redeveloped. Where we used tablets/i-pads two years ago, we now have the Smake TouchBox, which is multiple, flexible and easy to use in different production areas.

The new Smake GreenBox allows production machines to be docked in a plug & play process.

The EPS-Jump was further perfected and the EPS-Family was joined by the EPS-Tree (Brother, Epson) and the EPS-Gate for the Kornit. (EPS=EasyPositioningSystem).

We owe this to the close cooperation with our customers and their valuable feedback.

**Carl:**

**What new products have been developed since the last ZSK OpenHouse by Smake?**

**Thomas Drees:**

Some of the further developments mentioned above lead directly into new products or evolutionary stages.

1. The API (application programming interface) is certainly groundbreaking, enabling us and our customers to run/produce orders from third-party shop systems securely from 1pc through the Smake VPW.

**S**make offers the textile embroiderer and printer perfect solutions for the automated and maximum visualized production process.

**Mark Busche**  
CEO SMAKE



2. The development of a POS shop system together with FOREVER. The licensees of the Smake/Forever shop can generate individual orders via the shop and produce them manually (textile embroidery, textile printing DTG, transfer print etc.).
3. The backend of the Smake Shop production level has skipped several evolutionary steps compared to 2016 in terms of width/depth of possibilities and usability.

4. Smake-TouchBox: For the operator at the machine or production area, the completely newly developed TouchBox is certainly the highlight. Here the operator has the possibility to easily and visually do exactly what he needs at that working station. The TouchBox is even visually attractive, yet absolutely robust, durable and suitable for production
5. The EPS-Jump for the embroidery also benefits greatly from the new TouchBox. New application systems have also been developed for the Jump.
6. The EPS tree for DTG printers such as Brother and Epson were newly developed after 2016 and offer the operator the possibility of perfect and error-free positioning. Lightning-fast and optimally visualized via beamer on the textile on the printing plate.
7. The new EPS gate for the Kornit Storm II/Avalanche is a logical consequence of printer's requirements and our experience with the Smake EPS-Beamer systems. The Smake-Gate already runs safely on many Kornit machines in different countries.

Smake also develops special solutions on request. In a joint venture with ZSK, Smake has developed a device (bridge) above an embroidery machine to project the graphic representation of .dst embroidery files. Thus enabling simple and precise positioning of i.e. a print or knit design and embroidery.

**Carl:**

**Which markets are interesting for Smake and who benefits from Smake solutions?**

**Mark Busche:**

Smake offers several products/services for textile embroidery and textile DTG printing that are interesting for different markets and target groups.

For printing and embroidery Smake offers a complete fulfillment package via the Smake Shop API, ensuring all tasks for our customers from goods procurement to production to neutral delivery to the end-customer/consumer. The customer only takes care of the communication and sales of the textiles (as well as non-textile products such as mugs etc.) and transmits the orders directly to our production via the Smake Shop API. The individual orders are automated in the Smake VPW and processed error-free without manual order preparation and order folders with sheets of paper.

For major customers we are converting production to the Smake VPW, so that they will continue to be competitive in terms of production in the on-demand business in the future. With all IT special programming, our full know-how in the areas of shop, shop



**S**make Satellite! This is our vision: The worldwide networking of production sites via the cloud.

**Thomas Drees**  
COO SMAKE



connection API, hardware EPS systems, production, IT - the full program. We currently have several major national projects. International projects are scheduled for 2019.

All of our EPS solutions are interesting for the target group of in-house producers in the printing/embroidery sector. The market has a strong focus on international availability. Smake EPS-Equipment is distributed around the globe.

For customers who also produce and sell directly at the POS (embroidery and DTG printing) we have developed a shop system which is distributed worldwide under license by FOREVER.

**Carl:**

**On which projects is Smake working particularly intensively?**

**Thomas Drees:**

We are not allowed to reveal the exact projects or project names. We are working intensively on major projects in which customers production is completely rebuilt in the Smake VPW. In addition, the entire networking of the ERP systems with the Smake solution.

A further focus is the POS shop systems with indirect production connection, which is distributed worldwide under license by our partner FOREVER. It will be released in September 2018 - exciting!

I don't need to mention at this point that we are constantly improving our EPS and workflow systems and introducing innovations - this is always what drives us.

**Carl:**

**What challenges does Smake see for the future?**

**Mark Busche:**

One of the challenges in future and now is to be even faster and precise in personalized online orders from 1 piece onwards. The processes must be further optimized and made more efficient. Due to the customer's expectations of speed and quality, the automation processes in the Industry 4.0 standard must be further optimized.

**Thomas Drees:**

Smake Satellite! This is our vision: The worldwide networking of production sites via the cloud. Same day delivery with globally synchronized production processes, production of online orders close to area where the customer awaiting his delivery.

E.g. order in the USA, place of delivery in Australia: Production of course in Australia! With Smake Satellite that's possible.

The challenge here is to connect and find the production sites that have these possibilities and IT understanding.

**Carl:**

Many thanks to Mr. Drees and Mr. Busche for the great insight into the Smake world. We at ZSK are looking forward to presenting such interesting partners to our international audience at the ZSK-Open-House. Together with a network we are strong!

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**E**mbroidery is certainly one of the embellishment techniques of choice that can provide a high quality statement on the outside of a mattress.

**Frank Giessmann**  
Sales Director ZSK



## Jump In Solutions for th

Mattress manufacturers are constantly looking for solutions to automate their process and for embellishment techniques that support their superior quality assurances.

Embroidery is certainly one of the embellishment techniques of choice that can provide a high quality statement on the outside of a mattress. There are three main regions on a mattress that offer potential for embellishment: the topping, the handle, and the border.

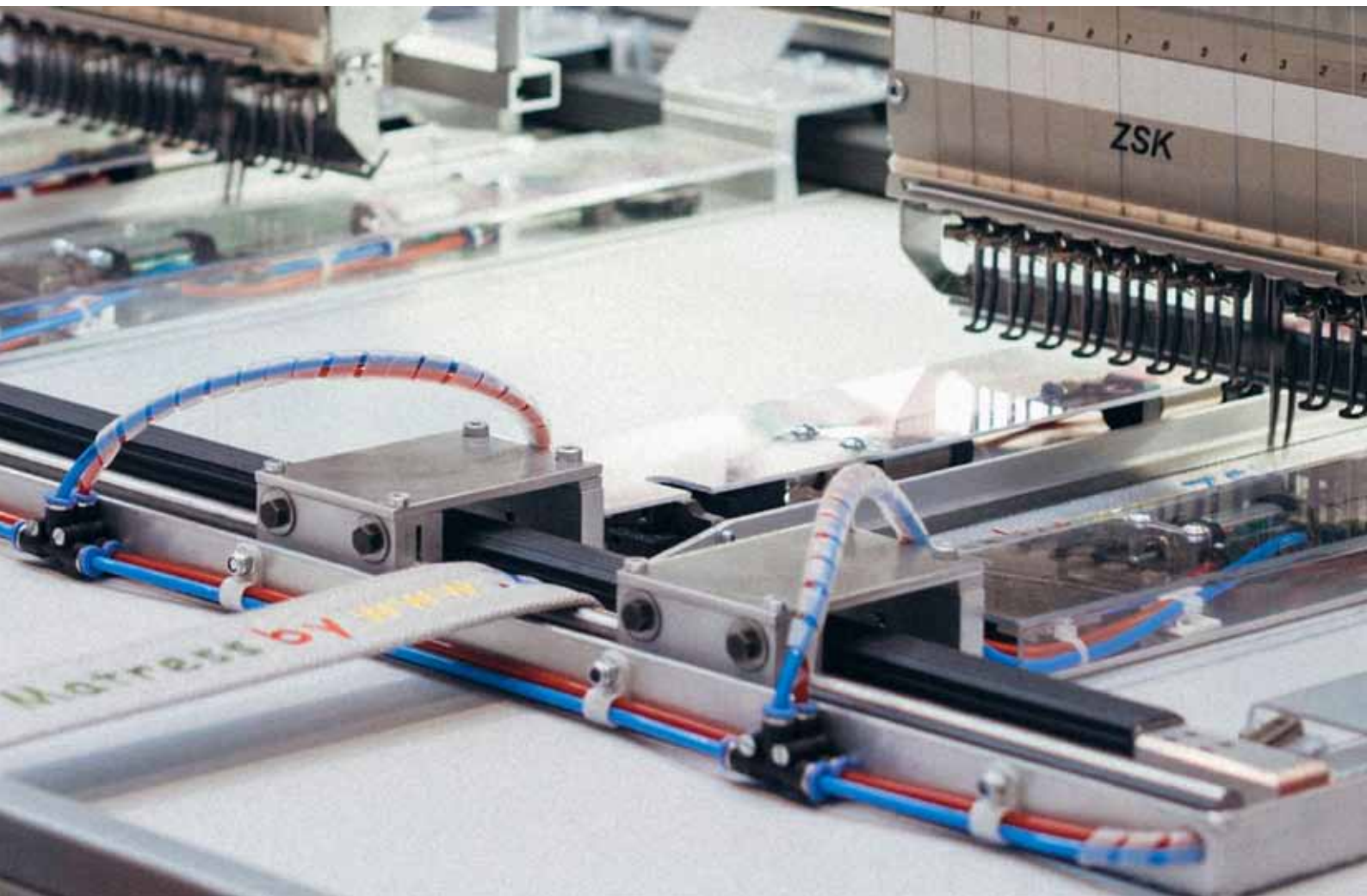
For the handle and border, ZSK can deliver automated solutions. The topping can be embroidered on a standard border frame. If handles only require embroidery in small quantities, customers can also use stencil frames made to size of the han-

dles. In such cases, ZSK needs the required dimensions and can customize a suitable stencil frame. Using the standardized reference points in the T8-2 control unit, production can be accomplished with ease.

### **ROLL2ROLL**

Automation can be achieved by using **ZSK STICKMASCHINEN**'s ROLL2ROLL solution.

Up to three rolls of fabric can be pulled through automatically. This allows for fabric, foam, and a backing to be pulled through automatically.



# e **Mattress Industry**

The machine embroiders logos, slogans, or personalized names while rolling up the entire product at the front.

To simplify the following cutting process, indication lines can be stitched by the machine as well.

Since releasing the Roll2Roll solution for the mattress industry in 2016, ZSK has completed several successful projects with large mattress manufacturers around the world.

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# Embroidery Machines

## Leasing, Hire Purchase, or Loan

Carl's recent interview with Dr. Paul G. Guggemoos from Amplus Lease Consult in Ludwigshafen investigated the optimal ways of financing a ZSK embroidery machine

**Carl:**

Dear Dr. Guggemoos, it is well known that you have been working with Heinz Walz in previous years in order to support ZSK STICKMASCHINEN customers in their financing of embroidery machines. What is the process you use and what information do you need from a customer in order to investigate the optimal funding method that fits their business specific needs?

**Dr. Guggemoos:**

In order to find suitable financing for the customer, a conversation in person or by phone initiates the process. In this initial conversation, we can clarify the individual situation of the customer. Does the customer find a high depreciation value important? Does the customer need to minimize the monthly burden? Has an investment deduction amount, previously accumulation depreciation, been made for the investment? These initial questions allow me to get an idea of their situation and financial plan. From there, we can investigate whether leasing, hire purchase, or a property loan makes sense.

If a different situation arises or our initial offer sparks a new thought, we can potentially adapt to fit the customer's needs.

**The procedure**

First, we prepare a financing offer before delivery. For this we need company data from the customer and information about the object to be financed including the net purchase price and optimally the offer of the machine supplier to the customer. The customer then provides feedback based on an offer we send out. If the customer agrees with our financing offer, we start the examination process. Often, we do not need any further documents for investments under € 75,000.

After successful verification, we will send the customer the financing contract. Immediately after the return of the signed contract by the customer, we inform the supplier to schedule a mandatory delivery date with the customer. If the customer then directly takes over ownership of the machine, we pay the machine supplier and the financing contract with the customer begins.

It is also possible that we can finance a machine that has already been delivered. However, for this process, the date of the supplier invoice must not be older than 3 months. Additionally, we also finance used machines. Details for this type of financing can be determined on a case by case basis.



**Carl:**

What are the most typical financing plans that customers choose for embroidery machines?

**Dr. Guggemoos:**

Most embroidery machines are financed by leasing with a term usually between 48 to 54 months. Sometimes, if a customer has formed an investment deduction amount, previously called an accumulation depreciation, a hire purchase is selected. If subsidies are available in the room, we also offer financing via property loans.

**Carl:**

If we assume a customer has a good credit rating, which terms are possible in the financing and which down payments are necessary?

**Dr. Guggemoos:**

If a company has been successful on the market for several years - and that is an important prerequisite for a good credit rating - we can offer financing without a down payment.

If leasing, we have to comply with all tax regulations and can offer individual terms of between 24 and 54 months. In the hire purchase, we can offer up to 60 month terms. We also provide an individual payment history, such as seasonal rates or a similar offer, so that the installment payments can be optimally adapted for the business over the year.

**Carl:**

So the customer can sell his used machine and has to pay less than the revenue from the used machine? Is this a method of developing additional liquidity?

**Dr. Guggemoos:**

Basically, a major advantage of leasing is the protection of liquidity, because the customer does not have to handle the investment in its entirety at once. Instead, the customer pays when the machine is in use and is earning money. This is known as the pay-as-you-earn method. Additionally, the bank's credit lines are spared by the lease. If the customer finances a new machine through leasing and sells a existing used machine, then he has even more liquidity from the machine sales. In this way, the customer could potentially use the income as a down payment to reduce the monthly installment in the lease.

**M**ost embroidery machines are financed by leasing with a term usually between 48 to 54 months



**Dr. Guggemoos**  
Managing Director Amplus

**Carl:**

If we assume a financing period of 54 months, what would typical monthly installments be for € 15,000, € 30,000, and € 50,000 investments?

**Dr. Guggemoos:**

There is not a typical rate because it depends, among other things, from the creditworthiness of the customer and the residual value of the machine.

A good credit rating and a 54-month lease would result in roughly the following rates:

Net Purchase Price	Monthly rate at 10% residual value	Monthly rate at 20% residual value
15.000€	ca. 290€	ca. 270 €
30.000€	ca. 570€	ca. 520 €
50.000€	ca. 950€	ca. 865 €

**Carl:**

Dear Dr. Guggemos, thank you for the interesting conversation.

**Please note:**

Dr. Guggemoos offers his services only to companies located in Germany. However, there are many other financial service and planning companies available with support globally.

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# Tips & Tricks

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## Frequent application problems and troubleshooting

**From material damage to puckering: With the right selected products and some helpful tips and tricks from Groz-Beckert, sewing problems are quickly remedied.**

This contribution (text and images) was taken by courtesy of Groz-Beckert KG, 72458 Albstadt, Germany from the brochure "Sewing - machine needles for single and multi-head embroidery". This brochure and much more helpful information can be found online at the Groz-Beckert website at [www.groz-beckert.com](http://www.groz-beckert.com)

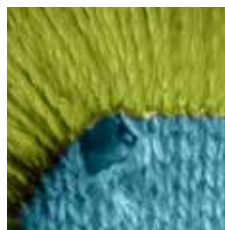
### Fabric damage during embroidery of knitted material

One of the most common problems in the embroidery of knitted goods is damage to the fabric. The causes can vary:

- Needle is too thick
- Wrong point style
- Damaged needle point

Excessive stitch density, incorrect orientation of the fabric and bad yarn quality – due to fibres that are too short or twisted – can damage the fabric. To prevent this, a needle with ball point is required.

The RG or FFG point is recommended for delicate knits, for more coarsely-knitted material the FG point



#### Example:

Knitting yarns tear when pierced by needle points that are too sharp or damaged. Needles that are too thick stretch the loops too wide and they burst.

#### Solution:

With needle system DB x K5 Nm 65 with RG point, knitted fabrics can be embroidered smoothly and trouble-free.



## Irregular embroidery appearance on woven fabric

Embroidery on woven fabric often results in irregular appearance of the embroidery design caused by irregular thread coverage. The causes include:

- Ball point too big
- Needle too thin
- Lettering too small
- Bad quality of fabric to be embroidered



### Example:

Needle deflection due to a needle that is too thin or a ball point that is too big leads to irregular embroidery appearance.

### Solution:

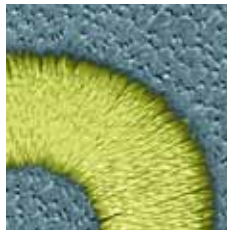
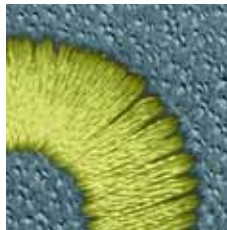
Using the DB x K5 Nm 75 with RG point ensures top results thanks to high stability and precise piercing of the needle.

## Recommendations for the embroidery on leather

Cutting points are not suited to embroidery of leather. Thread cutting, leather perforation and uneven needle hole openings when changing stitch direction would result. The RG point is a proven performer for delicate to medium-hard leather, and the R point for very hard leather. Moreover, the force required for the needle to pierce leather is relatively high, thus the needle must be highly stable.

## Irregular embroidery appearance on leather

A poor embroidery appearance on leather is often caused by lettering that is too small and stitch density that is too high. But a needle that is too thick or bad quality of the leather can also cause poor embroidery appearance.



### Example:

Using a cutting point, a length- and cross-wise cut is made in the leather. In extreme cases, the already embroidered leather can end up cut out.

### Solution:

Using DB x K5 SAN@ 1 GEBEDUR® Nm 75 leads to trouble-free embroidery of leather. The embroidery is even and compact.

## Puckering (distortion) during embroidery

Puckering occurs especially when very fine and dense fabric is embroidered, for example windbreaker jackets.



### Three factors must be considered:

1. High stitch density: The more stitches there are in a design, the stronger the puckering.
2. Thread size: The thicker the thread, the more pronounced is the puckering.
3. Thread tension: The higher the thread tension, the more the fabric draws together, especially in long satin embroidery.

Needle size, however, hardly influences the degree of puckering.

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**Debby France**  
Editor

# Embroidered E-Textiles

## **A playground for everyone**

Nowadays, the integration of electronics into textiles is a playground for textile, electronic and mechanical engineers as well as for people in the textile & fashion industry. However, the most prominent question asked by these developers regards how to integrate the electronics into the textile in a production efficient way. Embroidery is the answer!

Through a single embroidery process, the electronic boards can be placed on the fabric and connected with conductive threads. The connection is reliable and fully automatic. Existing electronic boards like the Adafruit Playground boards (see Piano) or the especially for embroidery developed ZSK-E-Tex-Boards (see Dashboard) can be integrated into the textile to functionalize the fabric.

The piano example shows a prototype for the integration of an Adafruit board into a textile embroidery design. The piano keys are embroidered with conductive thread (Madeira HC 40) and each piano key is connected by embroidery with the Adafruit Playground board. Once you touch the piano keys, the Adafruit board plays the corresponding tone of the music scale. This way you can use it like a small textile piano. All connections are automatically embroidered by a ZSK embroidery machine.

The conductive paths between the piano keys and the board connections are covered with a non-conductive embroidery thread to protect the conductive material against mechanical stress and to integrate even the connections into the design by using a color similar to the fabric color.

Even the USB cable, necessary for power supply, is integrated in the design by embroidery. A covering satin stitch over the USB cable integrates the cable into the design and protects the cable against unplugging. If you want to play with your own embroidered textile pianos, you can buy a piano for 175 € which includes cord, board, sensors and connections.

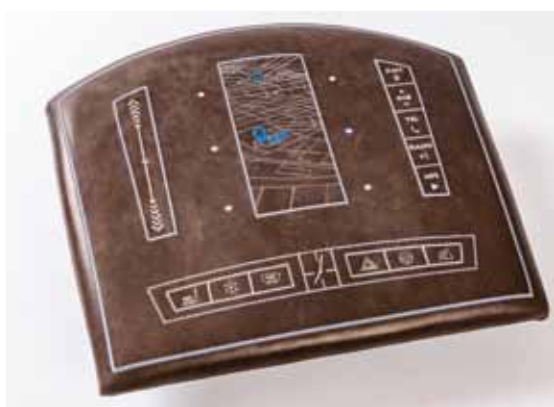
The Adafruit boards are electronic boards created for hobbists and developers. Their design is especially practical for manual connections through hand sewing. Therefore, the Adafruit boards are very rigid, thick, and not optimized for an embroidered electrical connections. Furthermore, many applications require an electronic board that can control more capacitive touch sensors or motion sliders than the Adafruit boards. Furthermore, the sensors must be electrically designed in a way that they work even through foam and leather to control integrated LEDs.

Because of the mentioned limitations of the existing boards, ZSK developed its own ZSK-E-Tex-Board. This board is especially designed to be used for embroidery. With its small size of Ø 40 mm and 2 mm thickness, the integration into a fabric is easier than ever. The power supply (Mini USB) and programmer port is on a separate board which can also be attached to the fabric by embroidery. The flex data cable between these two parts can easily be covered over and hidden with stand-

ard embroidery as well. The E-Tex Board can control up to 19 LEDs depending on how many of the 14 sensors for control you have in use.

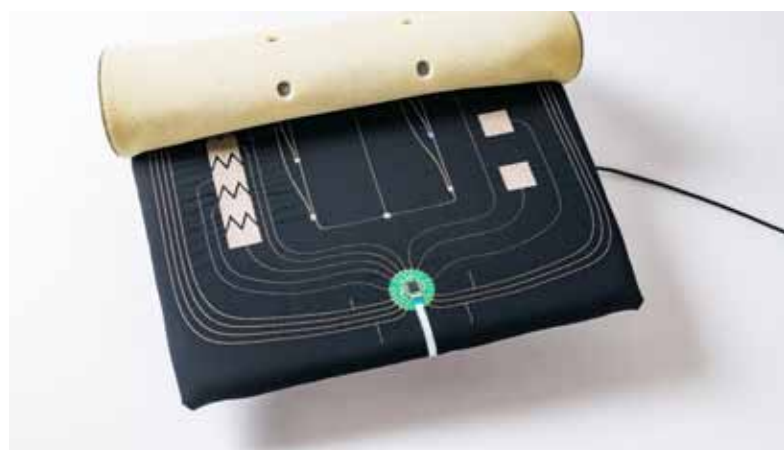
If you are interested in creating your own prototypes by using the ZSK-E-Tex-Board, you can buy this boards for 150 € at ZSK.

A sample prototype obtained with the ZSK-E-Tex-Board is used in a demonstration piece for a car dashboard with integrated LEDs.



Functions: By sliding a finger over button 1 (Navi), 2 (Tel) or 3 (MP3), the LED 1, 2 or 3 will light up.

By using the slider on the left side by sliding over it the LED 4, 5 and 6 will light up. These sensors inputs can be easily modified by the purchaser to match their own custom project requirements.



The electronic elements are on a separate layer under a leather and a foam layer.

## Contact Details

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A Division of ZSK STICKMASCHINEN

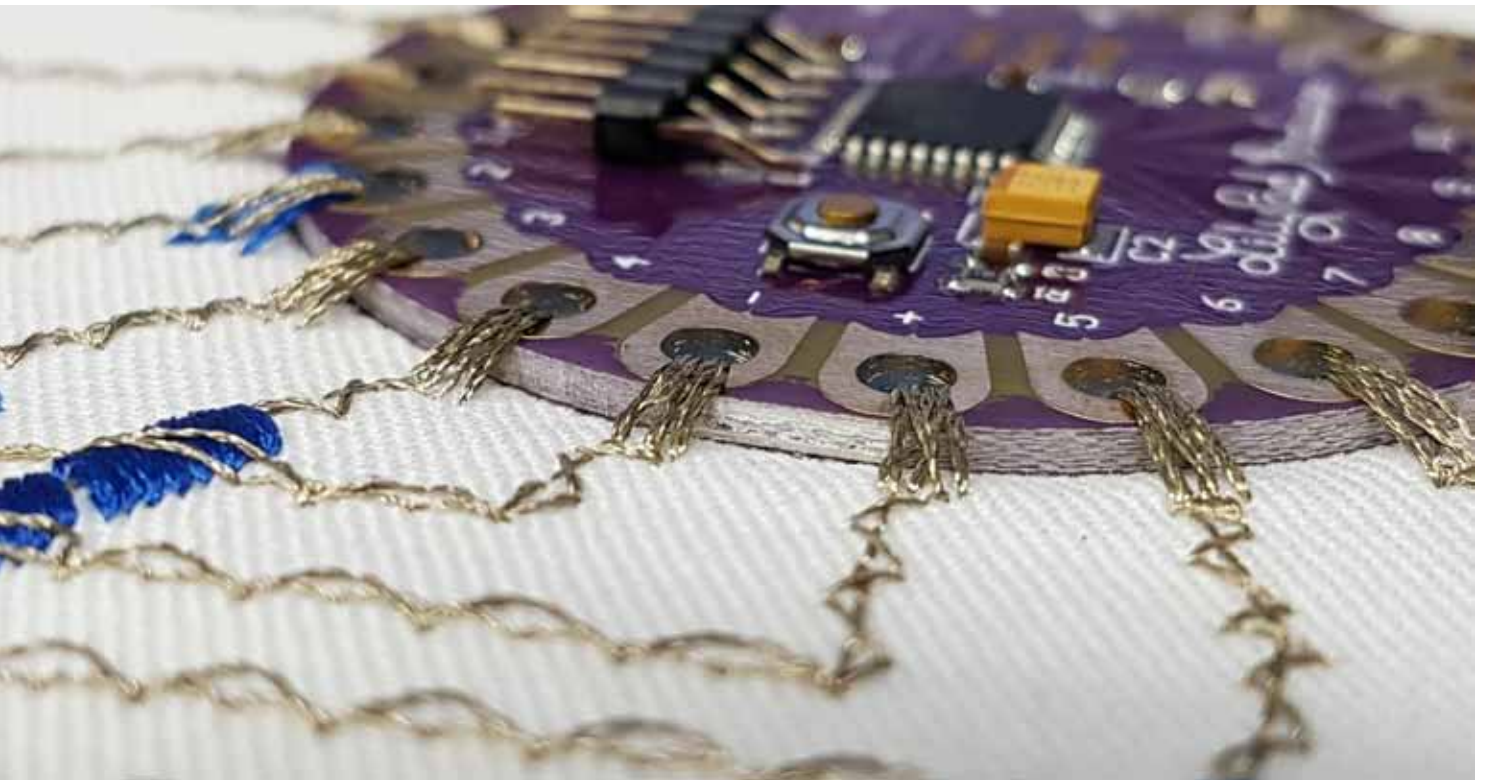
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# **Technical Embroidery** **for E-Textiles**

## **The missing stitch**

Recently, a class of technical textiles called e-textiles has begun to emerge as a way of further functionalizing traditional fabrics. E-textiles, or the ability to embed electronics and their electrical properties into fabrics, allow for a new class of self-aware materials. These materials can have internal sensing capabilities as well as the ability to adapt themselves to various changing environments opening doors to data collection that was not previously economic or even possible.

Technical embroidery offers a host of methods to create new e-textiles and push the entire field forward. Due to embroidery's high maneuverability, quick adaptability to new designs, and established scalability, embroidered systems are increasingly being sought after to create prototypes and solutions for this ever-growing e-textiles market.

Technical embroidery can allow traditional circuit boards to be mechanically mounted to fabrics, while automatically creating conductive textile connections them. Aspects of traditional circuit board design such as creating conductive traces can also be incorporated using technical embroidery. Sensors can be integrated exactly where they are needed in an automated process. Furthermore, due to the ever-decreasing size of electrical components, a renewed interest in mounting components to embroidered sequins has opened up design possibilities.

### **Embroidering full boards mechanically**

One of the most direct uses of technical embroidery is to quickly attach and stitch traditional printed circuit boards into fabric carriers. Stitching boards directly into the structure of the textile reduces mechanical strains on the connectors while allowing the control and processing electronics to be physically closer to their supporting electronics. This can have a range of benefits such as increased signal to noise ratio, decreased mechanical fatigue based failure, and reduced need for additional connectors.

If looked at from an electronics manufacturing standpoint, fabrics offer a new host of materials that not only carry the electronics, but also provide functional advantages over traditional materials and processes.

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## Embroidering connections to boards

Another advantage of technical embroidery in e-textiles manufacturing is the ability to embroider electrical connections automatically to the host board using various conductive threads. This process allows for the quick connection of potentially hundreds of electrical connections from a board to their fabric-hosted sensors. By registering the board during its embroidery to the host fabric, electrical connection points on the board are also registered for stitching. This can allow for a single stitched board to merge data from many sensor types into a single output.

## Embroidering traces

By using techniques such as tailored wire placement, highly conductive materials can be placed into the structure of the fabric in order to create low resistance traces that better mimic traditional circuit board function. Size AWG 10 to AWG 40 wire has been successfully laid in this process.

Additionally, wire coatings such as enamel or PVC are unaffected by the embroidery process, opening a wide variety of insulative and coating materials. Furthermore, customized wires such as multicore and multifilament wires can be used to run multiple signals through a single conductive pass. Up to 32 signals in a single multicore line can be run, with the capability of going much higher.

## Embroidered sensors

Traditional sensors such as temperature sensors can be embroidered into a textile by embroidering their host circuit board into the textile, or by including the sensor into a fibre carrier. Embroidering additional sensor boards into the fabric is a straight forward method of quickly integrating capability and function. Embroidering sensors within a fibre carrier can allow for a more elegant and compliant solution

However, more form fitting and haptic-sensitive textile based sensors are increasingly being investigated for their inclusion into a functional fabric. By using the properties of the conductive fibres themselves such as large surface areas, variable resistivity, and geometric conformability, solutions such as textile electrodes, stretch sensors, and sweat sensors can be reliably created.

## Embroidered LED sequins

Another method of functionalizing fabrics is the inclusion of embroidered LED sequins. By mounting the required electronics onto a traditional sequin carrier, LED's can robotically be sewn into a garment in automatically during its creation. This has significant advantages over other e-textile processes as it does not require post-process soldering or additional conductive epoxies. In this way, the embroidery machine serves as a hybrid between traditional pick and

place machines to select a component sequin off of a reel and a sequin machine as it stitches the component into the fabric's structure.

## Embroidered antennas

Technical embroidery can additionally be applied to radio frequency engineering through the use of new and geometrically tunable antennas. As the shape of textiles in garments can vary dramatically from when the textile is being stored to when it is being worn, limitless possibilities generated by embroidering antennas of various tunable shapes exist. These designed textile antennas can have uniquely directional properties that traditional hard antennas do not have. As our world becomes increasingly wireless, textile antennas are an open and exciting area of research.

## Scalability

Finally, one of the more important thoughts to have when evaluating any e-textile prototype is its ability to quickly and cost effectively scale. As embroidery is a well-established textile process with many configurations for production machines, the risk to scaling is much lower than when compared to other less known e-textile processes. In fact, many traditional embroidery companies can even utilize their existing equipment setup to turn their machines from traditional embroidery to technical e-textiles embroidery.

Technical embroidery offers multiple solutions that can help to advance the field of e-textiles. In combination with electronics manufacturers, new boards can be designed that best take advantage of the embroidery process. Additionally, the inclusion of new functionalized conductive threads and materials can rapidly speed development time and electrical source-ability.

## Contact Details

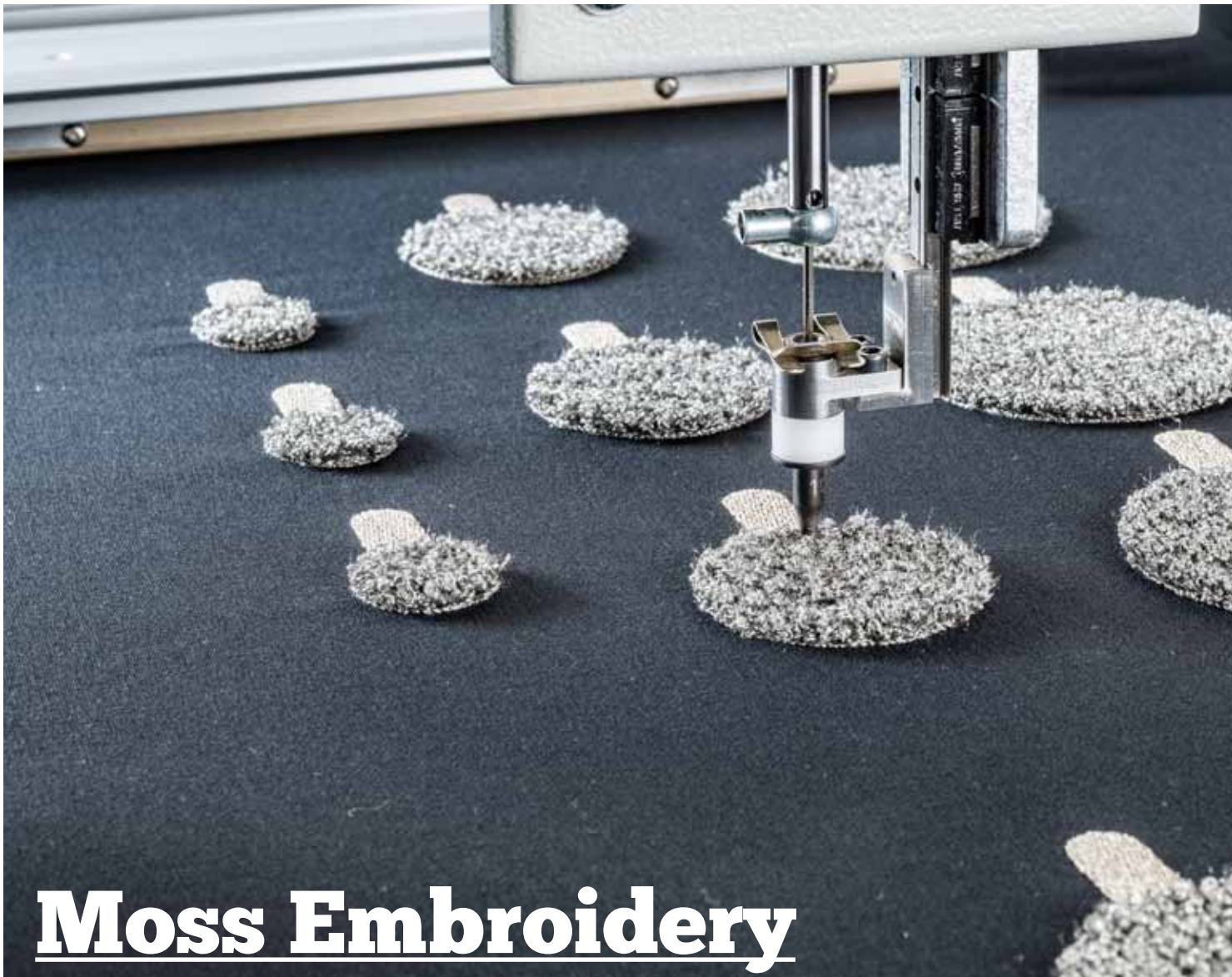
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# Moss Embroidery

## Methods and applications for biomedical signal collection

**Moss embroidery has increasingly been used as a method of collecting biomedical signals from patients. Its versatility and use for eclectic signal types and biometrics has further inspired interest in the technology. Additionally, due to its low cost, high customization, and automatic embroidered production, moss electrodes are increasingly relevant in biometric signal collection.**

Traditional electrodes utilize a conductive pad, usually copper, as the electrical receptor with a thin layer of saline gel between the pad and the skin in order to boost interfacial conductivity. Often, the perimeter of traditional electrodes includes an adhesive to help hold the electrode against the skin. While functional, this traditional method of electrode placement has significant drawbacks.

The first drawback observed in longer electrode tests, reveals that the saline gel can begin to dry thereby decreasing the conductivity over the course of the test. As the material dries, it can also cause skin irritation under the

electrode. This is particularly undesirable in tests where the patient takes the equipment home for an extended period of time. Another drawback of traditional electrodes is the geometry of the wide copper pads, which can decrease the available electrode density. This is particularly important with infants and high-density multi-signal technologies like electroencephalograms. Finally, the adhesives used to secure the electrode to the skin can occasionally cause skin irritations for some skin types.

Moss embroidery techniques are derived from traditional chenille fabric techniques where tufts of thread were

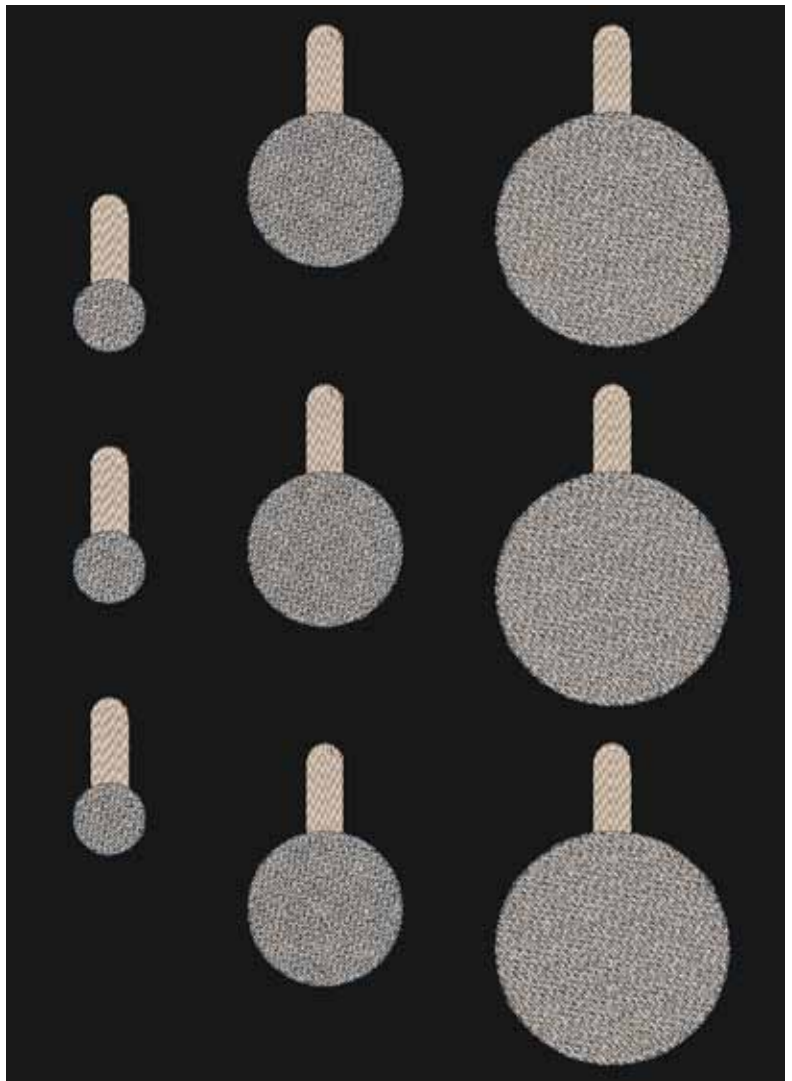


used to create thicker materials such as towels and piled carpet. By creating long loops of material protruding from the base material, different textures and geometric compliance can be controlled. This creates a form-fitting electrode within an additional stabilization structure.

Moss embroidery with conductive thread is particularly useful when applied as an electrode due to its high surface area. As the conductive fibres are compressed against the tissue, they spread across the surface compliantly. Conductive thread already has an extremely high surface area, however its conductivity is increased as the individual thread tufts are compressed against the skin's surface conformingly. This creates a robust and form fitting electrode that can be incorporated into a garment or additional carrier structure.

Textile based electrodes do not require additional saline or conductive gels due to the thread's high surface area. Furthermore, adhesives are not required as the sensor can be directly embroidered into a compressive garment that comfortably holds the sensor in the correct location. This can be particularly useful with infants.

Furthermore, the application field of moss embroidered electrodes is not limited to body signal monitoring and input. They can also be used as an output device for electro-stimulation therapy of muscles and nerves for physical therapy and tissue rehabilitation.



Light Grey: Conductive connection area | Dark Grey: Moss embroidered electrodes

#### Development Kit Textile Moss Embroidered

Electrodes - round - 33/10 with embroidered connection area

Content: 3 x Ø 20 mm • 3 x Ø 43 mm • 3 x Ø 65 mm

Material: STATEX Shieldex® 33/10

Price: 200€ + Tax & Shipping

#### Development Kit Textile Moss Embroidered

Electrodes - round - 78/18 with embroidered connection area

Content: 3 x Ø 20 mm • 3 x Ø 43 mm • 3 x Ø 65 mm

Material: STATEX Shieldex® 78/18

Price: 200€ + Tax & Shipping

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# LED Sequins

## Shine bright like a diamond

The robotic and automated placement of shiny plastic sequins onto fabric is a well known and well documented process. Integrating sequins into fabric for increased visual and design properties has been implemented for over 50 years.

However, recently new developments in electronics have re-invigorated this old technique..

By redesigning and functionalizing the sequin from ground up, new garment capabilities are being discovered that never existed before. Instead of the sequin being just a shiny piece of plastic, new developments have utilized the area and space on a sequin to serve as a host material for new electronics. In a sense, the sequin becomes a micro-circuit board. As the size of electronics decreases, it becomes easier to put more of them onto sequin-based circuit boards. These small circuits add exciting electrical and sensor possibilities to fabrics.

Currently, LED sequins have been developed that can each hold an LED and some of the corresponding electronics. Each sequin contains a 2.7 volt 20 milli-amp high Lumosity white LED with corresponding electronics, however the technology can quickly be adapted further for additional design specifications. By utilizing ZSK's existing optimized sequin placing technology, adding sequins is fast, time efficient, and automated. LED sequins are stored on rolls that are fed into the embroidery machine. When the design calls for an LED sequin to be placed, a fresh sequin is chopped off of the spool, placed onto the fabric, and embroidered down.

With the newest generation of the LED sequins the mechanical fixation process is completed with conductive thread. Importantly, this means the additional step of mechanical fixation is no longer necessary before the electrical connections are made. By combining these two steps into a single production step with a single conductive material and single machine, the quality, repeatability, and speed of production is dramatically increased. This further supports the increasing trend of automated e-textile production methods.



Even more excitingly, the electrical connections required to provide power to the LED sequin, can also be automatically embroidered with conductive thread. This step is critical when moving from a prototyped solution to a scalable product. Eliminating the need for hand soldering, or application of conductive epoxies, greatly reduces the amount of labor required and risk of human error. Automation allows for the LED sequin fabric to come off the machine functioning without additional steps.

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Left:  
Embroidery with Functional Sequins.  
Design by Jacky Puzzey, UK.  
Developed for ZSK STICKMASCHINEN.

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# **World's first 'Embroidered' Composite Bicycle Saddle**

## **using ShapeTex™ Manufacturing Technology**

The pedal bike has now become the eco-friendly mode of transport of choice, and over the past 10 years the sector has seen an unprecedented growth alongside technological development of various aspects of push-bike design from cutting edge aero frames to lightweight components such as handle-bars, wheels and saddles to name a few.

In October 2017, design and research work in the area of bicycle saddles was started by two mechanical engineering students in the School of Engineering and Computing at Oxford Brookes University. Industrial collaboration with Shape Machining Ltd. based in Witney has led to the development of a lightweight bicycle saddle over seven months that makes use of the ShapeTex™ composite manufacturing method whereby carbon and nylon commingled yarns are embroidered onto a nylon film to produce a net-shaped preform which can then be press moulded in under 5 minutes.

The initial phase of the development included some research on aspects of saddle shape that provides comfort, for example inclusion of a central cut-out that helps reduce perineal compression. Studies involving the effects on stability of different shell geometries were also considered. Four different preform designs were modelled in ANSYS FEA software using composite modelling tools. This stage helped gain an insight into an optimal shape and fibre orientations in order to maximise shell strength and inform laminate design. As part of the modelling process some of the mechanical properties were determined experimentally by means of simple pull-tests of unidirectional carbon fibre test specimens that were manufactured using the ShapeTex™ process.

In parallel, an extensive two-part press-tool mould design process was carried out by the students with limited guidance from SHAPE's experienced engineering team. This process did pose some challenges due to some complex geometrical features of the saddle shape such as curved surfaces, central-cut out etc. The metallic moulds were CNC machined out of an aluminium billet alloy by another project partner, Borga Cycles based near Milan in Italy. The high curing temperatures for the preforms were taken into account of as part of the design process. To further the visual aesthetic and provide a consistent surface contact in the mould, a non-woven fabric blend of recycled short carbon and nylon fibres was stitched onto the 2D preform. The

finalised preform was placed inside the mould and subjected to high pressures and temperatures.

The use of MarkForge 2 composite 3D printer was used to produce composite filament saddle rails. In this instance this proved more cost effective and less complex as opposed to producing moulds. A combination of an appropriate continuous carbon fibre percentage infill, and optimal fibre orientation within the rails provided the required stiffness and strength. The printed rails were bonded to the shell



using acrylic adhesive 3M DP8405. Prior to this a number of lap shear tests were carried out using the aforementioned acrylic adhesive in order to assess its strength.

Finally, the bonded prototype saddle was attached to a bicycle seat post for some preliminary testing. Four different cyclists rode the bike and the saddle structure remained integral. Although the testing was very limited in scope it did demonstrate the potential of using such manufacturing technology for load bearing applications.

In summary, the bicycle saddle project has proved to be an excellent example that demonstrates the potential of academic and industrial collaboration to further explore the ShapeTex manufacturing technology and produce tailored composite preforms for specific applications.

## About SHAPE

SHAPE Machining specialises in machining metallic tools, epoxy tooling block patterns, Rohacell foams and the trimming of carbon fibre parts for the automotive, motorsport, and aerospace industry.

SHAPE Engineering offers a full range of design, analysis, and project management services to support composite part and tool manufacturing projects.

SHAPE Composites supplies thermoset and thermoplastic composite preforms and parts ranging from bespoke autoclave cured carbon parts to larger volumes of hot pressed formed carbon parts.

ShapeTex – Optimised carbon fibre preform design & manufacture.

Contact [info@shape-group.com](mailto:info@shape-group.com) for more information.  
[www.shape-group.com](http://www.shape-group.com)



Fotos: SHAPE, UK

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# 6 Methods of

## Optimizing Carbon Fibre Composites with Tailored Fibre Placement

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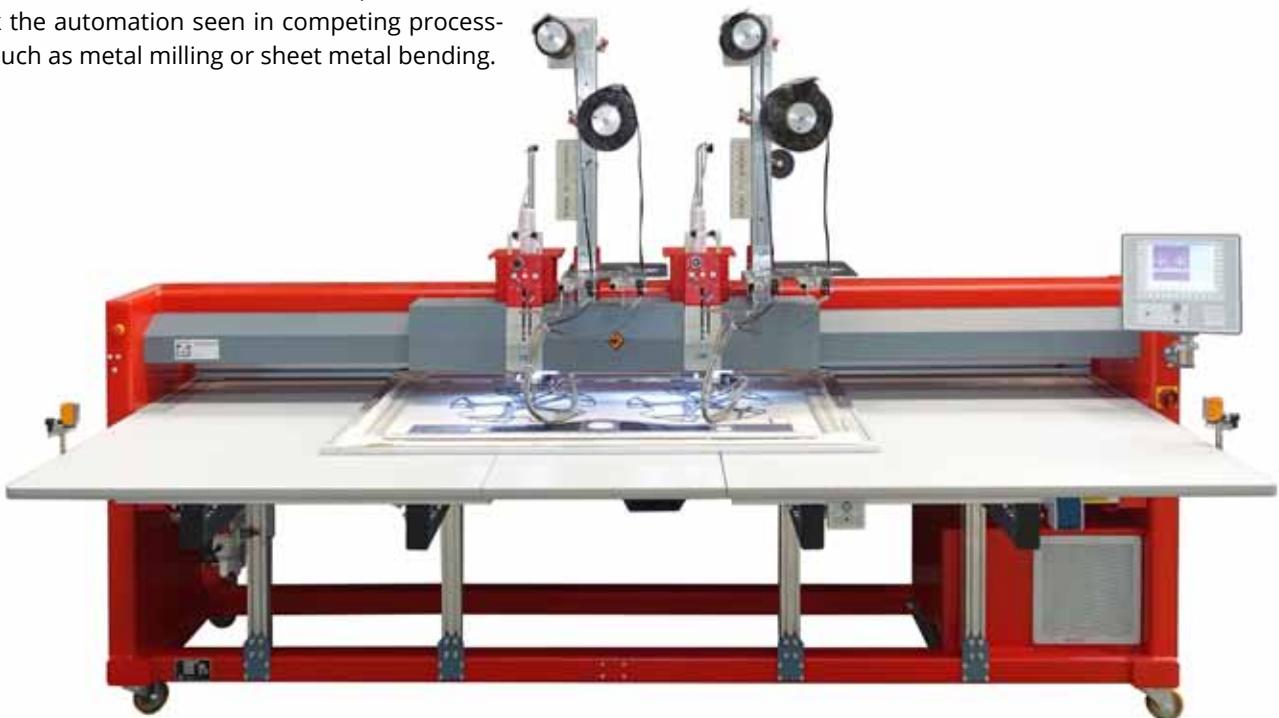
While the price of carbon fibre has been rapidly decreasing in recent years, it still remains an expensive and highly sought-after material.

Carbon fibre composite material properties such as a high strength to weight ratio, are increasingly being sought to be applied to the next generation of fuel efficient transportation. Decreasing the weight of a vehicle, plane, or spacecraft, can significantly impact its fuel efficiency over its expected lifetime. Increasingly, carbon fibre is being researched as a replacement to some aluminum structures specifically due to the weight savings it holds. However, the high upfront materials cost of carbon fibre composites can dissuade potential users from adaptation.

Additionally, the manufacturing of traditional carbon fibre composites has required more processing involvement than aluminum. In one traditional process, woven carbon fibre fabrics have been traced in CAD, cut to scale, wetted with matrix material, and allowed to cure to shape in processes such as Resin Transfer Molding (RTM). However, these processes are often more labor expensive, and lack the automation seen in competing processes such as metal milling or sheet metal bending.

Dr. Christopher Anderson  
Editor

The technique of tailored fibre placement can be applied to the creation of new carbon fibre composite parts in a material and process efficient manner to significantly reduce cost. Tailored fibre placement allows for the reduction of waste carbon fibre material reducing material costs. It also allows for the combination of other fibrous materials in select locations, allows for the fibres to be tailored to the specific loading applied, allows for variable thickness through the parts, and can easily be used with new classes of fibrous technical materials. Additionally, tailored fibre placement machines require little to no retooling to produce vastly different parts from batch to batch allowing a more versatile manufacturing process. The optimizations provided by tailored fibre placement can help carbon fibre composites increasingly become more cost competitive.



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### **Optimization one: reduce waste material**

One of the leading material costs of many traditional carbon fibre composite construction techniques, includes the large amount of waste material generated. In many hand lay-up processes that use carbon fibre woven material, waste materials can easily account for 50% or more of the total weight of carbon used. This waste is generated as the fabric is initially cut before impregnation with the matrix material. Additional waste is generated after the composite has cured during the post processing steps where the shape is further refined.

Tailored fibre placement is unique in its ability to reduce waste material and thereby optimize material cost. By controlling the path of the tow material as it is stitched into the desired geometry, material is only placed where it is needed in the final preform. Areas of fabric that would have to be cut out in traditional laminate design are simply left unstitched. This process reduces both the initial waste produced when cutting woven fabrics to shape, and also reduces post processing waste due to the ability to conform to complex geometries.

### **Optimization two: hybrid carbon fibre and glass fibre composites**

An additional drawback of traditional laminate processes is the inability to rapidly change materials volumetrically to benefit from their combined advantages. Tailored fibre placement is a method for quickly and effectively creating these multi-material composites.

For example, when a structural analysis is performed on a part, it might be discovered that the part only requires areas of localized stiffness. In this case, carbon fibre, with its properties of high stiffness, can be placed exactly at the areas and geometries of the part requiring high stiffness. It would be cost-inefficient to fill the entire part with highly stiff carbon fibre, especially when that stiffness is not required in certain locations. Therefore, to further reduce cost, the areas around the carbon fibre stiffened geometry that do not require high stiffness can be filled in with lower cost materials such as glass fibre or even hemp fibres. Tailored fibre placement allows these material transitions to seamlessly occur.



### **Optimization three: tunable fibre alignment and geometric tailor-ability**

Once of the largest benefits of using tailored fibre placement to optimize a design, is the ability to precisely control where each tow of carbon fibre is placed in a design. This allows the composites designer to further optimize the materials properties, reducing the need for additional material.

For example, complex tow paths of carbon fibre can be embroidered to perfectly resist the applied loads. By aligning fibres to their principal stresses, additional mechanical support is provided without using additional material. Further optimizations can occur by selectively reinforcing holes and circular drill points. In traditional laminate design, these holes can serve as areas of crack propagation due to the orthogonal nature of the woven fabric used. Tailored fibre placement can be used to selectively reinforce around these holes with curvilinear patterns reducing the effective initial crack propagation locations. This can allow for a thinner material at the hole's location, and even potentially the removal of metal reinforcing washers.

Carbon fibre is being researched as a replacement to some aluminum structures specifically due to the weight savings.



### Optimization four: tunable localized thickness

Another interesting optimization that can occur when using tailored fibre placement in carbon fibre composites utilizes tunable thickness of the process over a given area. In traditional laminate design, carbon fibre composites are presumed to have even thickness. However, tailored fibre placement does not have such a height restriction. In combination with well designed molding and fixtures, carbon fibre preforms can create localized thickness in highly complicated and varied geometries.

In classical beam theory, the moment of inertia for a rectangular beam can be calculated by:

$$I = \int y^2 dA = b \int_{-\frac{h}{2}}^{+\frac{h}{2}} y^2 dy = \frac{bh^3}{12}$$

Where the height of the material (h) is shown to have cubic influence on the moment of inertia when compared to the base (b) length. This means that localized areas of height can be created with tailored fibre placement that significantly can help to better resist bending at that location. This optimization allows for decreased material usage to achieve the same, if not improved, bulk material properties when compared to other composite processes.

ZSK offers machines that can lay fibres up to 8 mm thick. This averages out to about 8 layers of 50 K carbon fibre roving. This thickness can be uniform over the entire surface of the preform part, or can be selectively placed in key structural areas for additional material conscience mechanical support.

### Optimization five: comingled fibrous materials

One of the drawbacks of traditional composite laminate manufacturing can be the long cycle times required to properly cure a thermoset resin. New materials, called comingled fibres, have been created to decrease the processing time. In comingled fibres, a carbon fibre tow has additional thermoplastic matrix materials added directly into its fibre structure.

These comingled materials can be stitched in the same manner as other tailored fibre placement composite materials. However, these preforms can quickly be thermocycled in heated presses to rapidly reduce the cycle processing time. Traditional thermoset composite materials using resin transfer molding can require between 30 minutes to 40 hours to properly set and cure a single piece.

Tailored fibre placement of comingled materials allows for the placement of both the reinforcing fibre, and the matrix material in the same preform. As the preform is heated, the liquid matrix is distributed directly into the carbon fibre allowing proper wetting. The tailored fibre placement of comingled fibres eliminates the need for additional resins and can significantly reduce materials cost. Additionally, the desired fibre to volume fraction is created during the comingling step, increasing the uniformity of the composite material from batch to batch.

Finally, these comingled fibre composites are a step towards a more sustainable carbon fibre composite due to their ability to be re-melted into new forms at the end of their lifecycle.



Figure 1: Thickness is built around the perimeter and in the center of the part above. This additional thickness allows the part to better resist an applied bending moment while reducing material cost by not reinforcing areas that do not require additional support. Additionally, curvilinear placement of carbon around the holes helps to minimize crack propagation often seen in orthogonal woven sheet laminate design while also reducing potential post processing and waste material.

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## **Optimization six: machine versatility without retooling**

Another significant process optimization that occurs with tailored fibre placement when compared with other composite processes, is the ability for the production machine to rapidly change its production from one design to a completely different design without any additional retooling of the machine. This can allow the same machine to seamlessly transfer from producing car parts in the morning shift to sporting equipment in the afternoon shift.

Additionally, tailored fibre placement can allow the same machine to produce one prototype design at a time to investigate a process and troubleshoot it without wasting excess material, to creating a full production run simultaneously. This rapid prototyping to production capability, in combination with the ability for a machine to run many different types and geometries of parts in rapid succession, allows for more versatile projects to be run on the same machine. This reduces the cost of setting up a new machine each time a new design is generated.

In conclusion, the six methods of optimization for carbon fibre composites briefly presented show some of the advantages of tailored fibre placement over traditional composite processes. It is hoped that the combination of these optimization methods, in conjunction with a trend of decreasing carbon fibre material costs, will allow a new class of ubiquitous and highly engineered materials to further improve consumer use cases like fuel efficiency.

ZSK offers machines for tailored fibre placement (or TFP) for a variety of part sizes and base case scenarios. Prototyping machines are available with 1 head to quickly produce new prototypes with minimal setup time or material commitment, while production machines are available with up to 11 heads that can simultaneously lay fibres for mass production. The usable machine field area for an 8 head machine is 900 mm x 1,900 mm per head. This means, as long as the part fits within the 900 mm x 1,900 mm area, it can be created and duplicated 8 times simultaneously per run. For larger parts that do not fit within this area requirement, an 8 head machine can be reconfigured to a 4 head extended machine within a few minutes on-the-fly. This allows a maximum part size of 1,800 mm by 1,900 mm. Other customizable solutions exist including roll to roll, and specialty placement machines for even larger parts.

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# ZSK Technical Embroidery Systems

An interview with Michael Metzler, Sales Director for Technical Embroidery Systems and for 30 years with heart and soul committed to ZSK STICKMASCHINEN.

**Carl:**

During the last 3 decades at ZSK STICKMASCHINEN you have been the key person to develop the Design Software (EPCwin) department and lately the Technical Embroidery department. What is it that drives you?

**Michael Metzler:**

I had the pleasure to be part of and to shape two generations of embroidery at ZSK. The break through to move from mechanical creation of paper cards to electronic digitizing systems and in parallel the development of the first electronic controls of an embroidery machine was an extremely interesting time. What we are seeing today in the field of Technical Embroidery is the second evolution. 10 years ago I would have never imagined in which areas we can reach with embroidery technology.

The variety of applications is fascinating. In the field of Technical Embroidery, we are using all three embroidery heads (F, W and K) for different applications. To give you an idea of the achievements and applications that our equipment can handle,

I would like to provide a few examples:

- The laying of wires on flexible materials for car seat heaters, steering wheel heating, infra-red heating for the living area, heating mats, heating of shoes, jackets, gloves and diving gear, flexible heating system for laboratories, patient observation via wires in bed sheets or safety systems for safe rooms in banks. Laying of wires for RFID antennas including the precise positioning and fixing of RFID chips.
- Laying of preforms for composites. By laying and fixing of fibres like carbon or glass in direction of force (TFP – Tailored Fibre Placement) one achieves optimal usage of the fibre characteristics with almost zero waste.
- Embroidering of capacitive sensors and touch sensors that can be placed below foam and



leather and can be contacted to electronic boards by using conductive threads. Placing and fixing of LED sequins.

- Embroidering of moss electrodes that provide a very good contact to the human skin and therefore present a very good solution to observe body functions and to stimulate muscles.

**Carl:**

This field has originally been called Technical Embroidery. Today one is talking more precisely about E-Textiles, Smart Textiles, TFP, and TWP. What is unique about embroidery machines that there are so many fields where the technology can be used?

**Michael Metzler:**

Technical Embroidery Machines provide the benefit of extremely low cycle times to create prototypes. When you have the right machine and the right material, you have first results after an extremely short time that can then be further developed. This is something that you do not find in any other technical application.

When looking at textiles, there have not been any drastic innovations over many years. Textiles are products that we wear every day and are therefore extremely interesting to implement technology. Textiles are flexible and therefore technology needs to be chosen that can handle this requirement. Considering the technology itself, the accessories we offer around our

The fact that many large companies are considering the capabilities of this technology is a good sign for us.



**Michael Metzler**  
ZSK Sales Director  
Technical Embroidery Systems

equipment as well as also the relatively low cost of embroidery and laying machines makes the embroidery technology extremely interesting.

**Carl:**

As you say, when comparing embroidery machines to other technologies, embroidery machines are rather cheap. Increases in efficiency of the embroidery technology is certainly an important topic. How do you envision efficiency increases in the future without huge increases in the speed of the machines?

**Michael Metzler:**

When considering mass production using the embroidery technology, there are a number of ways to be cost efficient.

We offer multi head machines, where up to 11 laying heads work in parallel. We can handle wire and fibre from rolls of up to 10Kg and supply the material without tension and even with active feeding. We offer solutions that automatically switch between two medias i.e. wires and fibres or thermoplastic fibres. ZSK offers solutions for the pneumatic cutting of wires and fibres. Material can be automatically pulled through from back to front or side to side. The material can be pneumatically clamped and stre-

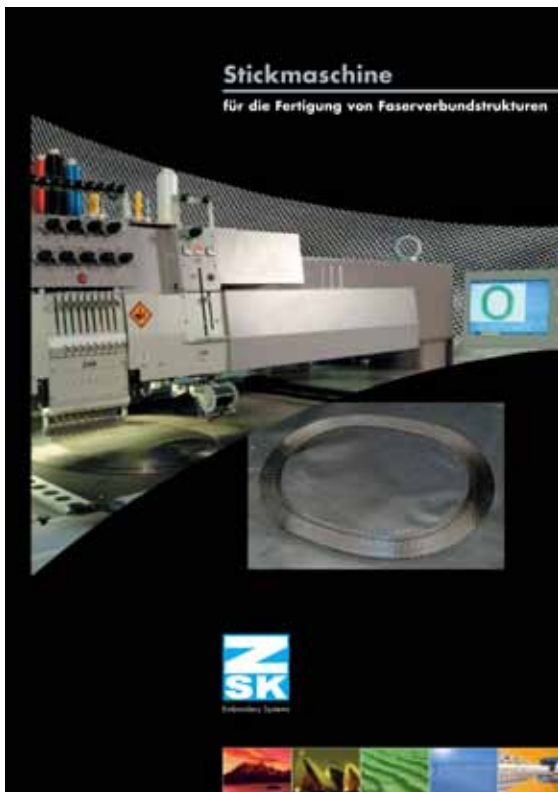


Fig.: Brochure from 2004 - "Embroidery Machines for the Production of Fiber Composites"

cheduled without any human intervention. The automatic bobbin changer can change all bobbins on a machine in around 12 seconds. Considering all these options, technical embroidery has been highly optimized. At the same time, the labour requirement has been reduced.

In the field of TFP, we have developed the fast fibre laying to increase the amount of fibre laid per time period. In this mode, fibres are only fixed with a few stitches every few centimetres. This reduces the number of stitches and therefore increases the throughput. Further new developments that will increase the efficiency and amount that can be laid down per time period are under development. We expect to show interesting new developments during the JEC 2019 in Paris.

**Carl:**

Lately **ZSK STICKMASCHINEN** has opened the Training and Education Centre TEC in Seattle. What is your idea behind this move?

**Michael Metzler:**

During the last few years we have supplied large software and hardware companies as well as major sporting good suppliers, which all have their head offices around the west coast of the US. Every new customer requires a lot of training and education – the requirement is typically not only for a short time, but an ongoing requirement. The majority of the companies had so far very little interaction with textile machines for such applications. Our specialists have therefore spent a lot of their time in the US. For the continuous cooperation with these customers, the time difference of up to 9 hours is certainly a disadvantage.

In May 2018, we were able to win Dr. Christopher Anderson to join our team and to become responsible for our TEC Centre in Seattle. Topher studied at the University of Philadelphia and RWTH Aachen.



ZSK TEC, Seattle

He knows our technology for several years and has gained very good experience in the field of E-Textiles and TFP during his past career.

The training centre is equipped with four technical embroidery machines and with several software training spaces.

From my perspective, we have now a very good basis to support our US customers in the field of technical embroidery.

**Carl:**

How do you envision the future of Technical Embroidery at **ZSK STICKMASCHINEN**?

**Michael Metzler:**

Technical Embroidery offers huge potential. The fact that many large companies are considering the capabilities of this technology is a good sign for us.

We have to work extremely closely with our customers to understand trends and requirements for further innovations. Only through continuous development, we will have a chance to achieve a long-term success with this technology. We have 100% support from our investor to push this development further. This is of course a very good basis for us.

**Carl:**

Dear Mr. Metzler, thank you very much for talking about this fascinating new area for embroidery machines.

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## **Did you know it?**



## **Braille in BasePac**

It is not a new development, but often creates a “wow” moment.

ZSK offers the Braille Option for BasePac 10. This option is a patented solution to automatically digitize the typed letters into a Braille embroidery design.

In 2009 the German newspaper FAZ reported that worldwide there are 40 million blind people that read Braille. This is almost the same number as the population of Spain. Inclusion is a huge topic worldwide.

Embroidery can be used to enable blind people to read and match the colour of their clothing, it can enable blind people to receive instructions or to ensure that it is their jacket.

The market, the potential and the benefit to the user is huge.

## **Efficient and precise production in the home textile industry**

One of the most difficult tasks for home textile manufacturers is the embroidery of straight borders on a seam or parallel to the folded edge.

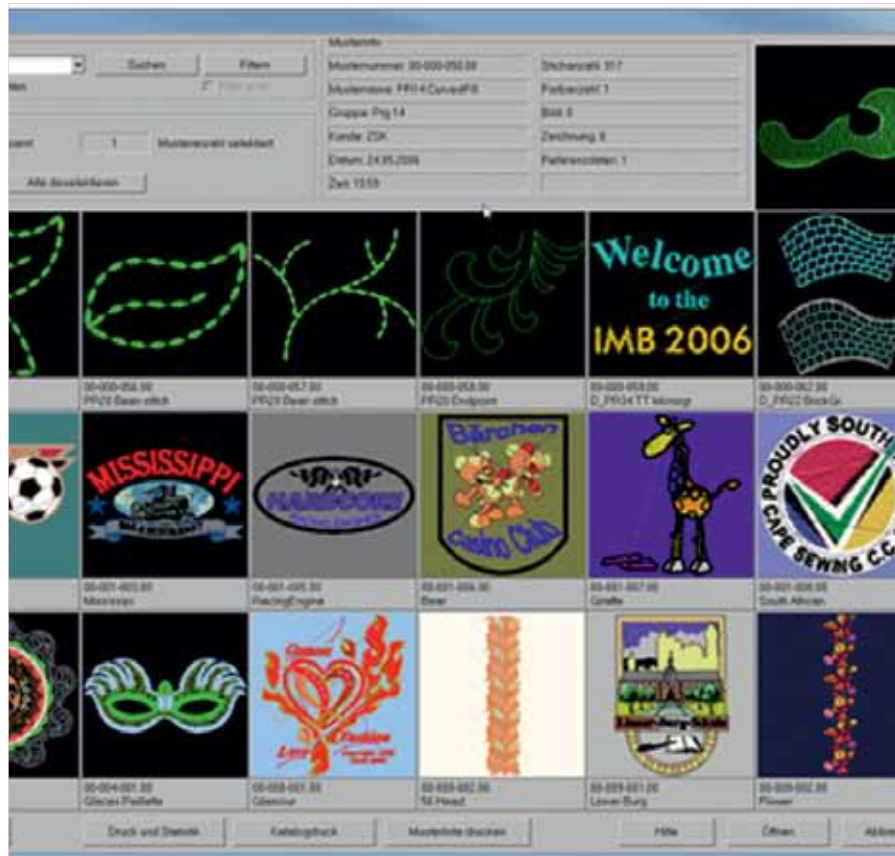
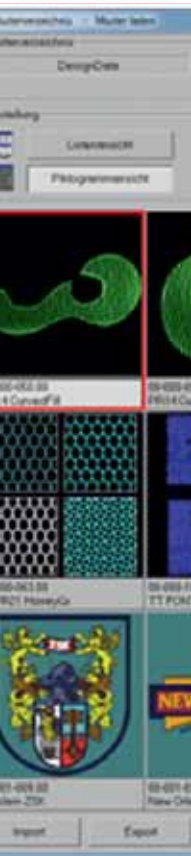
ZSK has developed and installed a solution for an American home textile manufacturer with a factory in Bahrain. The company produces rolls of fabric with a loop at the top.

To save weight, a carbon fibre bar is pulled through the loop and pneumatic clamps hold the material at the top of the border frame. At the front of the machine the fabric is clamped with regular ZSK clips.

This system allows extremely quick pull through and cycle times and achieves an extremely high quality standard at the same time.



# Preview EPCwin 7



## Atelier software EPCwin

**EPCwin** has been developed and marketed by **ZSK STICKMASCHINEN** since 1985.

**The new version 7 will replace version 6 in spring 2019.**

### Creation of ZEPL Files for ZSK Vision System

ZEPL stands for ZSK Embroidery Programming Language. EPCwin 7 supports the creation of ZEPL files.

In the first step, one divides the design in elements that need to be scanned. In a second step, one defines for each part a start point and an alignment point. In addition one specifies the information, where the Vision System should look for the reference point on the material during the embroidery procedure.

In the Global Editor, you can edit the parts and reorder the sequence of the parts of the design.

### Ringbuffer of the T8

EPCwin now supports the ringbuffer function of the ZSK embroidery machine. It is possible to export the design directly into the machine buffer. The design is added at the end of the design queue.

If you use the Input/Output function in the main menu you export an open design directly into the machine ringbuffer without saving. For example, if you want

to create labels with a same design but individual names you can open the basic design. After that, you enter the first name and export the design in the ring-buffer. Then change the name and export the next design and so on.

### Recycle bin

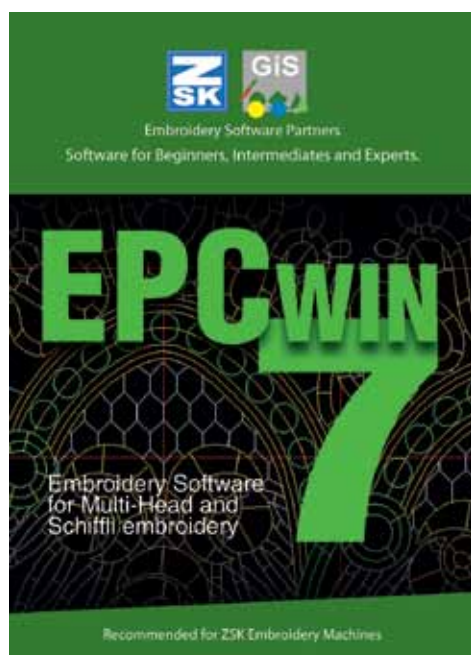
A recycle bin has been added to the EPCwin. If a design is deleted, it will be stored in the recycle bin. The action can be undone by opening the recycle bin and restoring the design into the source directory.

### Design storage in the Windows file system

The EPCwin has an encapsulated design storage. Some companies prefer to organize designs in Windows directories. By activating individual design storage, this is now possible with EPCwin. To load or to save a design, you will use the windows dialogue and navigate to the desired folder.

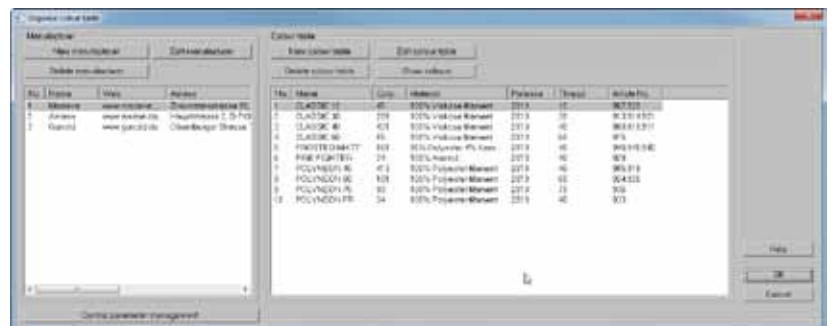
### Export TC with thread cone matching

If your machine is connected with the network and is equipped with the thread cone scanner you can now export a design with the correct needle sequence. EPCwin recalculates the needle change according to machine thread assignment. See also the article Thread Cone Matching System.



### New color table management

In the new version of EPCwin, we have implemented a new color table management system. Now it is easier to select the colors of the design in the design head.



First, you select the manufacturer on the left side of the dialogue. In the right list you will see the different color tables. With a double click you select the product. Of course, you can save the color tables on a file server in your company network. If you own several EPCwin systems, each EPCwin has access to this color table pool.

For each color table in the list, you can open a detailed overview.



You select the color by a double click.

### Other features that we are planning to introduce in EPCwin 7:

- New "Print and Statistics" function
- Sequin Functionality:  
Today EPCwin can place sequins on a line (program 35). The new version allows to spread sequins over an area.
- Sequin Functionality:  
EPCwin 7 allows creation of your own sequin shapes.
- Technical Embroidery:  
Curvy filling with a larger inclusion angle over 180°
- Technical Embroidery:  
Cutting of existing objects at freely selectable positions
- Technical Embroidery:  
Larger row spacing in the filling program
- Technical Embroidery:  
Advanced support of the Roll2Roll device

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## Overview of Improvements

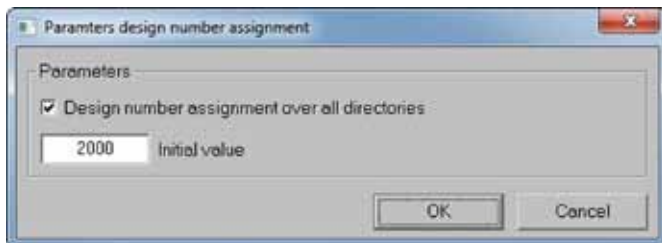
### Design Directory

*Search:* In the pictogram directory, the located design will be displayed coloured; all others are black and white.

In the dialogue "Organize design directories", you can now activate the function "Automatically transfer new design directories to directory group".

Thereafter, every newly created directory is automatically included in the directory group. Within the directory group, when creating new designs, the design numbers are prevented from being duplicated. Otherwise, the check will only take place within the current directory.

In the pre-list for the next free design number, all directories of the group are now taken into account. In addition, a start value for the next free design number can be specified. To make the setting, please click „Parameter for design number assignment“



In the selection dialogue for design directories, under "Organized design directories" you can create a directory group. We added the buttons: "All on" and "All off".

The designs that contain only manual stitches are now displayed in the directory. For this purpose, the column "Stitch Data" must be activated.

Do you want to assign *Customer Name, Group, Base Material* or even *Tags* for several designs in one-step?

Open the directory and mark a specific number of designs. Use the right mouse button on one of the selected designs and choose *Data List Assistant*. Fill the assistant, as you would do in the *Design Head*.

### Design Head

The design head can now also be edited in the design directory. To do this, use right-click on the design and then select the menu item "Design Head." Now you can make the changes.

With "OK" the changes will be in the design.

An image you imported before can now be exported too. To do this, go to the design head and select "Organize attachments". Here is a button "export image". Now you can save the image in the desired location in your system.

### Machine list:

- Entries for border width, speed, and comments have been added.
- The columns of the list can now be sorted.
- A search function has been implemented.
- The ZSK list has been updated.

In Remarks as well as in base material: Two new buttons are available: "Delete text" and "Copy text to clipboard"

The inputs for customer, group, remarks and base material can now also be selected from a selection list. For this settings, a check mark has to be set in the "Data List Assistant" at "Selection list for Customer, Group, Remarks and Base Material". With Remarks and Base Material the new text is appended to the existing one.

### Text module for Remarks:

The Text modules can be created and managed in the "Data List Assistant".

A "Price" can now be entered for each design. It can be entered in the "Design Header" -> "Data List Assistant". The currency can be chosen freely.

### Schiffli

*Schiffli export:* With "Lässer" the subprograms 26 - 30 for thread cutting can now be set.

*Design Head:* With regular repeats in the operating mode "Repeat & Color change" will now show the "Repeat numbers" instead of "Needle numbers".

### Editor

*Program 14* (step fill) can be converted into Program 20 (step line).

Contour points in reference data, design lines or stitches can be moved in a raster while holding down the ALT key.

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The point after a straight line segment can now be shifted in the specified direction by holding the [Ctrl] key down. Stitches can be moved in the grid while holding down the ALT key. If [Ctrl] is additionally pressed, the stitch direction is retained. The *grid function* can be set with the letter [G]

*Block / Bounding Box*: The absolute size in mm is now displayed instead of the percentage change.

### Connect Lines:

The function to connect two lines has been extended. First, select one of the two end points of the lines you want to join. Now there are different versions available (0-4).

0: Works as before. Move the selected point to the end point of the second line. Press [F8] [0]. Now the two lines are connected in a curve.

1: Like the function 0. Press [F8] [1] instead. Now both lines are connected. The connection point is angular.

2: After selecting an end point, you can select the connection type "obtuse" with [F8] [2]. Now select the end point of the second line.

Both endpoints remain at their original positions and are connected by a straight line segment.

3: After selecting an end point from the line, you can use [F8] [3] to select the connection type "Pointed (automatic)". Now select the end point of the second line.

Both endpoints remain in their original position. The EPC calculates an intersection point from the extension of the line ends. This forms the connection point of both lines. If both lines are parallel, it will go automatically to method 4, as no intersection can be calculated.

4: After you have selected an end point, you can use [F8] [4] to select the connection type "Pointed (manual)". Now select the end point of the second line.

Both endpoints remain in their original position. You can now specify the connection point yourself. The cursor can move on the imaginary center line.

### Close Lines:

5: Select the line anywhere you want. By pressing [F8] [5], the second end point of the line is placed on the selected point and the line is curvy closed.

6: Select the line anywhere you want. By pressing [F8] [6], the other end point of the line is placed on the selected point and the line is closed angularly.

7: The line is closed in an obtuse angle. Select the

line anywhere you want. By pressing [F8] [7] the two end points of the line are connected by a straight line segment. The end-points stay at their original position.

8: The line is closed in a sharp corner. Select the line anywhere you want. By pressing [F8] [8] the two endpoints the connection will be done via another point. This is calculated from the intersection of the respective line extensions.

9: The line is closed sharply. Select the line anywhere you want. By pressing [F8] [8] the two endpoints the connection will be done via another point. You can determine the target of this point yourself. The cursor can move on the imaginary center line.

### Export / Import

**FORTRON**: PAT code is now available and can be imported and exported.

**Tajima**: TBF code is now available and can be imported and exported.

The export dialogue can now be left after entry. The same applies to the import dialogue after an import. The option can be selected in the dialogue.

### General

The [G] key in the Editor, Punch and Design opens the adjustment dialog for the raster angle. Now the raster angle can be set as you like. So far, only the default values 15°, 30° and 45° were possible.

In the measuring function, the measured values are now displayed near the cursor. Length and angle are displayed.

**Key V**: The view function can now be called up anywhere with [V].

The button [I] can be used to call up and change the design head during punching, editing and in the drawing function.

### Ideas

Do you have ideas how we can further improve features and functionality of EPCwin? Please do not hesitate to get in touch with us. We are looking forward to hear your ideas!

## Contact Details

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#### Your Contact

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# ZSK for a lifetime

## - Keeping it true!

ZSK machines are known to last 30 years and longer. To extend the lifetime and the capability of its machines, ZSK offers a wide range of upgrades.

ZSK is the only manufacturer worldwide that supports its machines over such a long life cycle by providing spare parts and upgrades. Upgrades can also be a way to increase the value of your machines, prior to an upgrade to new machines.

### TFT and LCD Monitors

TFT and LCD monitors can be upgraded to T8-2 monitors. Since 1998 (MSCI/J Series) ZSK can upgrade machines to the latest control monitor series. The software for the V40 module has been updated until early 2017. By investing into this update one can benefit from all T8-2 updates until early 2017. All T8-2 updates since this point are only available for SPRINT 5/6/7 and machines with MCP-35 electronics.

Item Nr.: 396.041.015

### Upgrade for Power Drive

ZSK machines that are equipped the large, one piece power drive (starting with MSCI/J) can replace this unit in case of damage against a box with

three electronic cards that are used in today's embroidery machines. In case of a future damage, typically only one card would fail at a time (if at all) and therefore reducing the potential cost and at the same time extending the lifetime of this machine.

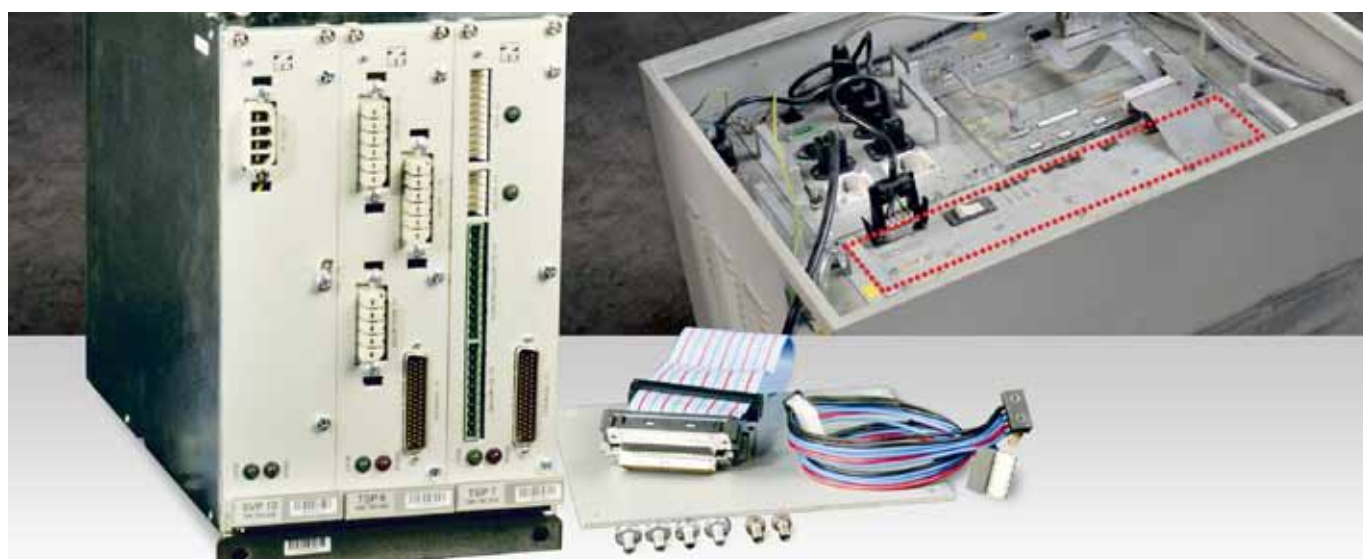
### USB Drive for MSCD and MSCA Machines

A growing issue for many embroidery houses is the supply of floppy disks. A simple replacement solves this issue for all times and reduces the risk of data loss, as design storage can be moved to a server and the machine can receive designs via a USB.

Item Nr.: 396.041.019



Retrofit Kit USB Drive for MSCD / MSCA/MSCC



The new power module replaces the old power module.





Overvoltage Protection avoid damages.



Retrofit Kit - ZSK Cross Hair Laser

### MCSA Monitors

MCSA monitors can be upgraded with a TFT upgrade kit. The monitor gets replaced by a cable and a cover. A typical cathode ray tube monitor with 256 colours can be connected to the machine.

Item Nr.: 396.120.013

### Jafa Series

#### Tubular Arm Protection

When embroidering a lot of products with inner lining, there is a risk when loading the machine without sufficient care that lining can be pulled by the picker into the hook. This cover assembly is installed at the front of the tubular arm and avoids this risk.

Item Nr.: 360.002.944

#### Jafa Stitch Plate

Stitch plate inserts in the RACER Series are screwable. This presents the benefit of quicker changes for different modes (i.e. cap and tubular). The new RACER Series comes with a new insert that is sunk in by 0,3mm. This improves the embroidery quality for fill stitches. This insert can also be used in the Jafa Series after upgrading the stitch plates.

Item Nr.: 360.002.253

### Overvoltage Protection

If your factory is located in areas that are likely to have issues with overvoltage and there is no protection installed in your factory, this upgrade might be a cheap solution to avoid damages to more expensive boards. After the protector breaks due to overvoltage, it has to be replaced immediately to avoid potential damage to boards from a future overvoltage situation.

Item Nr.: E-001-9393

### Cross Laser for Tubular Machines

This upgrade shows the location of the needle entry and makes tracing and locating a design starting point easier.

Item Nr.: 270.999.983

### LED Light Upgrade

When upgrading to LED lights, not only the light becomes brighter for the operator, but also the energy consumption is reduced. In the case of a 15 head machine, this will lead to energy savings of ca. 100 Euro per year.

### Switch Off of Lightning

A switch can be installed on the embroidery machine to allow the light to be switched on and off. Certain works require quality inspection that prefers to perform the check while the machine light is switched off.

Item Nr.: 396.120.020

### Jafa/RACER Noise Reduction

When operating a machine in a shop environment, the cooler noise might be considered too loud. This additional board controls the cooler behaviour when the machine is not operating and reduces the noise by switching off the cooler, when not needed.

Item Nr.: 396.105.014

## Contact Details

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# Thread Cone Matching

## - The perfect way to correct design colors

Customers like to order their textiles with the desired designs and colors. Often these orders are unique parts and each order has its own colors or different color sequences. Automation is needed to work on these orders in an economical and practical way that avoids errors due to incorrect textiles or colors.

Figure 1 displays the principle of the **Thread Cone Matching System**. In this example two SPRINT machines are working. Each machine is equipped with a barcode reader and the machines are connected to the **Thread Cone Matching System** via the network functionality the T8 provides.

### How will it work? Here is the description:

1. At the initialization phase all machines will get a set of thread cones at their needles in any order. All cones are equipped with a data matrix code that reflects the thread article number. At each machine the cone article number is taught to the **Cone Database** in respect to the dedicated needle number by using the barcode reader.
2. Customers order their desired textile with an embroidery design and the desired colors. Maybe this is done by an internet shop system. The orders are filled in the **Order Database**.
3. The next step is to label the desired textile with a barcode that belongs to the order. Then the labeled textile is given to the production area.
4. One of the machine operators takes the labeled textile and it does not matter if it is the operator at machine 1 or 2. The operator scans the order barcode and this information is given to the **Thread Cone Matching System** via the network connection.
5. The **Thread Cone Matching Systems** compares the colors that belongs to the order to the cones at the specific machine. If all colors are available the needle change information in the embroidery design is corrected in a way that the color sequence matches the customers wish (Figure 2). The embroidery design is then ready for embroidery and each needle change in the embroidery design leads to the correct color. Hence it is given to the machine and the machine operator can start to work.
6. Maybe one or more colors of the customers wish are not in the set of thread colors the machine is equipped with. In this case the machine operator will be informed that he has to change the missing thread cones to needle numbers which are calculated from the **Thread Cone Matching System**. This information is directly displayed at the T8.
7. The machine operator threads the missing cones to the calculated needle number as specified. Thereby he has to teach in the cone article number by using the barcode reader. After this action the new state of thread cones at this machine is stored in the **Cone Database**.
8. The machine operator scans the labeled textile again and now all desired colors are available. Now it is possible to embroider the textile because the **Thread Cone Matching System** restarts at step 5.

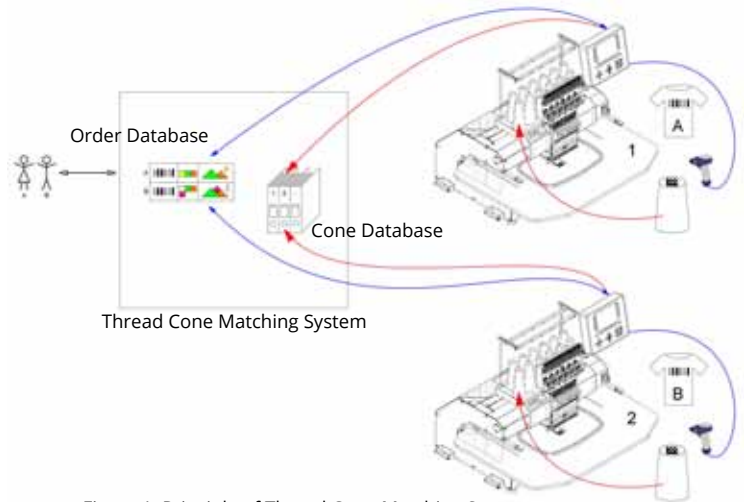


Figure 1: Principle of Thread Cone Matching System

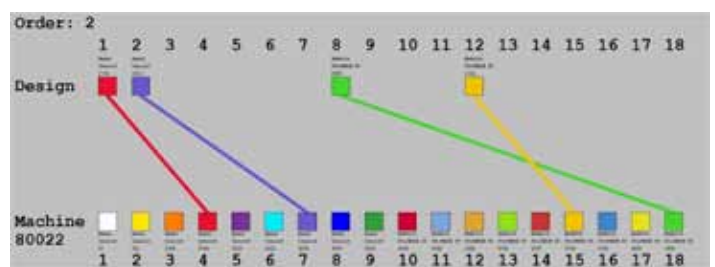


Figure 2: Calculated Thread Cone Matching

# Thick Yarns

## Advancing the potential application for ZSK embroidery machines

When comparing sewing and embroidery machines, the key difference is that sewing machines are used for joining of materials and can only move forward and backwards while embroidery machines are used for decoration and functionalization and can stitch in all directions. CNC sewing machines have slightly changed this, as they are able to stitch in all directions as well. A further benefit of sewing machines is the sewing of thick yarns. A strong point of embroidery machines is the automatic colour change and the large number of needles.

ZSK is offering a thick yarn option for all its embroidery machines. The option includes a different hook, changes to the tension system of the machine and, depending on the material, stronger springs. In the case of very thick materials, for example in the upholstery industry, a special presser foot might be required (about 2mm longer) to compress the material and to avoid missing stitches. The solution that ZSK offers opens a broad range of markets for embroidery machines and can help manufacturers to reduce process steps. In many applications embroidery machines and sewing machines are used side by side to include thin and thick yarns. A typical example of this would be car seats.

The hook that ZSK has developed with the Italian manufacturer Cerliani is capable to run yarns from size 10 (thick) to size 75 (very thin). Combining this potential with ZSK's 18 and 24 needle heads, it allows different yarn colours and sizes to be integrated into one design. The system not only works well with sewing yarns, but offers home textile manufacturers to use thicker woollen yarns that bring a new look. Additionally, it allows one to fill designs with a reduced number of stitches. This leads to the achievement that by using ZSK technology, the stitch number of the design can be drastically reduced. This can achieve a look that might be more sought after than heavy embroidery designs.

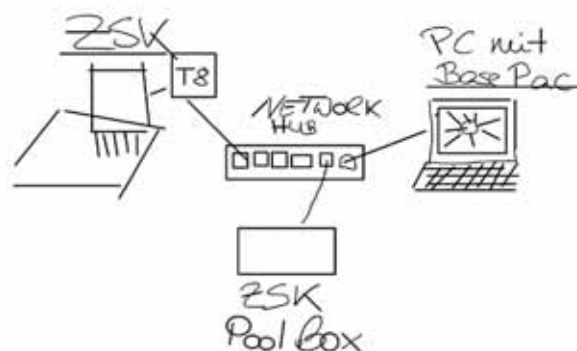
# ZSK Pool Box

The ZSK Pool Box is a connector between your ZSK embroidery machine and your company network.

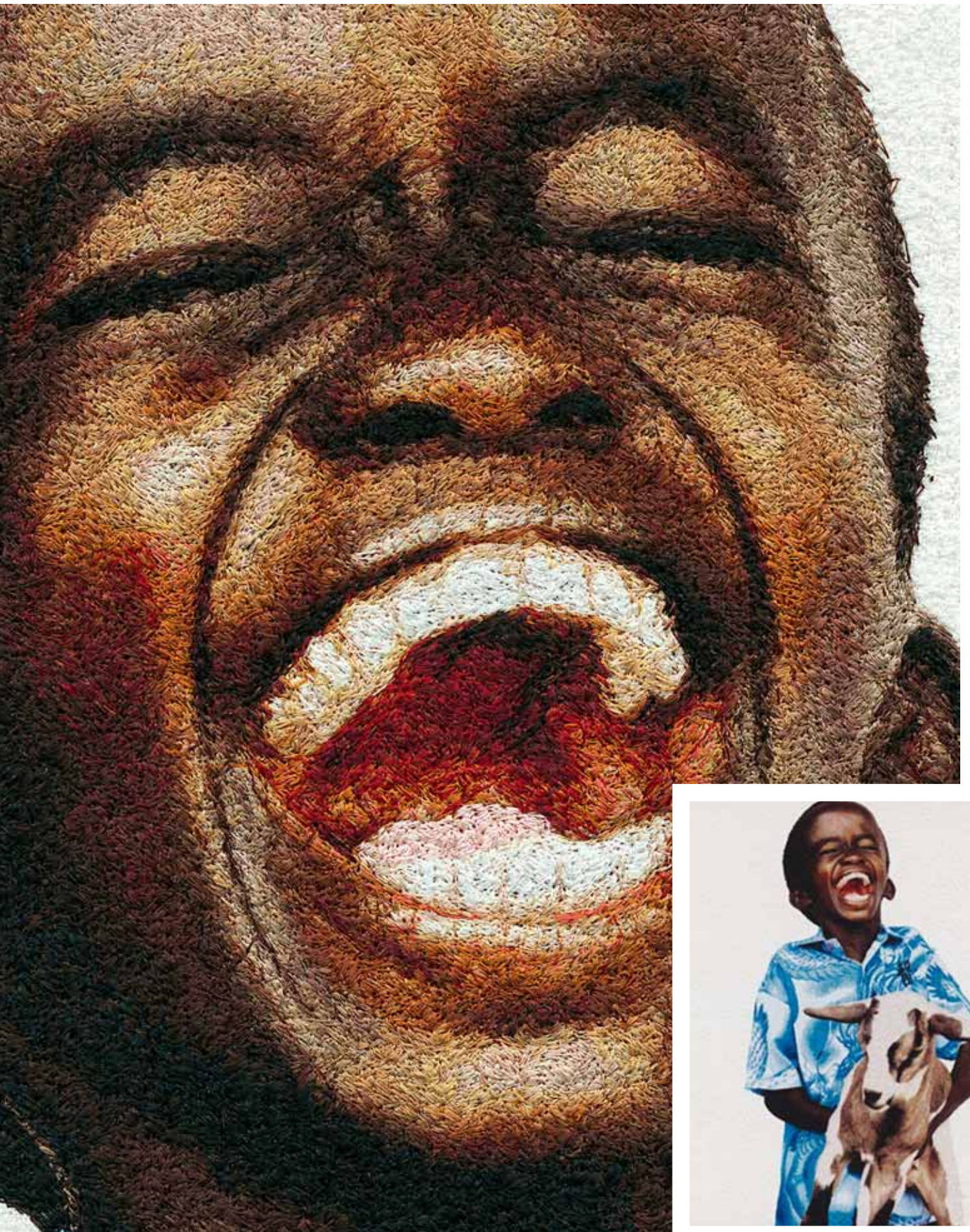
The ZSK Pool Box includes a Zotac PC, a router and a network cable. The system will ease the networking between Windows PCs (incl. Windows 10) and ZSK embroidery machines. You can connect all your ZSK embroidery machines with T8 and T8-2 as well as all PC's in your company network. Any files that should be accessed by the machines are stored in the ZSK Pool Box. The ZSK machines are networked to the Pool Box and designs can be loaded via Barcode or via the T8-2.

The Windows CE that is operating on the ZSK T8-2 control unit requires them SMB 1 protocol for networking. Latest Windows 10 versions do not include the SMB 1 version anymore. Early Windows 10 versions include the SMB 1 protocol. If a ZSK machine should be networked directly to a Windows 10 computer, then one should first install an early Windows 10 version and load all updates afterwards. Following this routine, the protocol will remain on the computer and networking works without any issue. Otherwise the Pool Box will be the solution and a requirement to network Windows 10 computer with ZSK embroidery machines.

The ZSK Pool Box has two benefits in one. Beside acting as a design sever for the ZSK machines, the system can also act as a Data Collector for My.ZSK 4.0 (for the Cloud Version).



Sketch to show a network with ZSK's Pool Box



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# Gardening the Future

## History

ZSK looks back on more than one hundred years of a successful history in textile engineering. Founded in 1984 by former employees of Zangs, a renowned company with great tradition based in Krefeld, ZSK has acquired the market leadership in a highly competitive line of industry: German high-class workmanship has always been their focus, each customer gets a machine in accordance with his individual requirements, the production is subject to rigid acceptance standards, each machine is made to measure to some extent.

The roots of Ercigoj date back to the year 1923 when the company was first established to sell church products and to produce embroidered chasubles. After World War II, Marija Ercigoj was among the first to pass the exam to obtain the master's degree in embroidery. Over decades, basic embroidery techniques have been combined with modern technological solutions. Since 1980's mechanical machines have transformed to computer guided ones and large format embroidery art started to be developed.

Ercigoj and ZSK have a decades long friendship from the days of Zangs, when Ercigoj owned Zangs embroidery machines. In the 1990's Ercigoj company purchased the GIS digitizing software, with the help of which they have been creating large format embroideries for a while, and also cooperated with ZSK during the ZSK Open House exhibitions in order to show to the world more than just embroidery of promotional items: to show that embroidery can be true art. Ercigoj also works with the Racer 1XL machine by ZSK.

Ercigoj became a regular exhibitor, displaying embroidered artworks in Krefeld with several million stitches and hundreds of different thread colours. Pieces of embroidered art by Ercigoj have been sold for six digit figures and are today decorating offices and homes of well known people all over the world.

### JOSEPH

Motif by Chris de Bode, 80 x 80 cm, over 2.3 million stitches, 90 thread colours, over 27 km thread length, limited edition of 10



Ercigoj embroidery team in the 1930s

## Charity

The idea for "Gardening the Future" was created at the ZSK Open House 2016 with the release of the ZSK Racer 1XL. Ercigoj and ZSK are starting a project that makes the craft of digitizing and the potential of embroidered art more accessible and to continue the proud history of embroidery. The aim of the project is to support children around the world and grow awareness for the beauty of our craft.

An artwork based on a motif by Franz Marc was digitised over a course of several months. The result with more than 1 million stitches and 41 colours will be produced in a limited edition of 99 pieces. 50 pieces will be donated as part of "Gardening the Future" and 49 pieces are distributed by Ercigoj. "Gardening the Future" will collect donations at fairs and events at 25 locations around the world. Every person or organization that donates to the cause during one of the events will have a chance to win one artwork in a lottery draw, and another piece will be donated to each institution that will receive the financial donation collected at the event.



**BLUE HORSE I BY ERCIGOJ**

Embroidered art based on a detail from the original oil painting by Franz Marc, 70 x 70 cm, 41 thread colours, over 1 million stitches

## ART

### Franz Marc

The painter Franz Marc was one of the key figures of the German Expressionist movement. His work is characterized by bright primary color, abstracted portrayal of subjects, stark simplicity and profound emotion.

He is most famous for his images of brightly colored animals, especially horses, which he used to convey profound messages about humanity nearing its downfall. He looked to the primeval world as an antidote to modern civilisation, from which he felt increasingly alienated. Nature and animals were more than just pleasing to him; they were spiritual and a means of relocating what had been lost in toxic modern times. Thus, his paintings of animals are suffused with an almost meditative reverence.

The vibrant colours of the horse and landscape are not chosen just for their striking effects. Marc used color symbolism in his compositions; blue usually represents things male, severe, and spiritual, while yellow represents feminine joy, and red encases violence and danger. The horse is also youthful, its skin smooth and unblemished and it radiates muscular potency and energy. The creature is a being of a



higher order with ethereal, otherworldly power. An innocent natural force that opposes being corrupted by man. The painting therefore celebrates the idea of spirituality battling materialism.

Ercigoj in cooperation with ZSK recreated this motif as embroidered art, emphasizing the vibrancy of colours that Franz Marc himself focused on, while adding a third dimension to the image: embroidery threads give the art a life of its own, reflecting light in different directions and adding depth

## Knowledge



Embroidered banner

Experience and knowledge helped us to bring an idea to life – to create something extraordinary, an embroidered piece of art in large format. The measures of these embroideries can sum up to several square metres. Considering they are made in one piece, with millions of stitches – something unheard of – it is a truly pioneer project in a global sense.

The warm texture of the artworks is just calling out to be touched and experienced under different angles of light as the interwoven threads breathe new life into images. With threads and needles we can create photorealistic embroideries, replicas of photographic motifs or make high art pieces in collaboration with renowned artists that demand painters solutions.

We always strive for perfection, and perhaps more importantly, we always welcome a challenge: projects that anyone else might deem impossible, we will undertake and deliver the very best quality.



GIRL WITH THE GREEN SHAWL

Motif by Steve McCurry, 68 x 101 cm, over 2,4 million stitches, 93 thread colours, limited edition of 10



EMBROIDERED CHASUBLE  
Design by Matej Metlikovič

## Tradition

The family company Ercigoj Embroidery is led by the owner Boštjan Vidmar and is built on tradition. We have been passing knowledge from generation to generation since 1923, combining proven practices with modern technology.

Throughout history, we have been creating the highest quality embroidered products, ranging from banners and ecclesiastical embroidery, to various unique and made to order projects for customers who demand perfection.



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[facebook.com/ErcigojArt](https://facebook.com/ErcigojArt)



# **Twelve**

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## **to creating sm**



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# steps

## small embroideries



**Bonnie Nielsen**  
Embroidery Specialist

By: **Bonnie Nielsen • Embroidery Specialist AMANN Group**

Over the last few years, I have been working on very small embroidery designs. What seemed impossible to me in the 1980s and 1990s is now becoming possible. This is because thread companies like AMANN have produced very thin threads, which makes it possible to realize very small and detailed embroidery.

There seems to be hidden competition in the industry amongst manufactures of all branches, who can produce on an embroidery machine the smallest letters or detailed designs to spark the interest of customers. The results of this effort have been very impressive including letters 1mm tall and button size embroideries with super small detail. As interesting and nice all this is, there are critics who say this is not reality; the fabric used in demos is one where every embroidered design looks great. Alternatively, how will this thread, with such small stitches and thinness perform under production conditions?

### **The reality check!**

#### **1. Consider types of fabrics**

To consider which types of fabrics have the best surface to realize small or detailed embroidery designs, here are some suggestions.

- Woven fabric like for work wear, dress shirts or lightweight woven for backpacks and jackets.
- Badge – emblem materials.
- Denim.
- Softshell.

#### **2. Design size**

- This will be the first factor in which one would decide the correct thread weight to choose.

#### **3. The design type**

- A compacted design in which the design elements are widely spaced.
- Fine thin details
- Lettering font type, script, block, serif or letters with thick thin bars just to name a few.

Check for the above 3 points before starting to digitize the design. This will help in choosing the correct thread weight and design adjustments, which need to be made in order for it to be embroidery friendly.

**Here is an overview  
of the product line Serafil from AMANN.**

Serafil fine is a thread line produced by AMANN. There are three-thread weights in which you can choose,

- 100% Polyester multifilament
- Ticket 120/2 is equal to embroidery # 60
- Ticket 200/2 is equal to embroidery # 75
- Ticket 300/2 is equal to embroidery # 100
- Colour range: 100
- Application:
  - for finest details and smallest lettering up to 1.5 mm lettering
  - for fixing sequins (instead of using scratching nylon thread)
- Needle size:
  - DBxK5 Nm 60 – 65
  - DB x 1 Nm 55 (singer numbers may vary)

The thinner the thread, the more stitches you will need to fill in. Hence, it is better to consider which of the thread weights will give you the optimum coverage without sacrificing too much of the details. In some cases, this would be the Serafil fine ticket 60. If you see the details are not defined enough, then the next logical choice is Serafil fine ticket 75. With both of these thread weights the width of satin stitch bars should be at least 1mm in width, in order to have a quality result.

The Serafil fine ticket 100 is perfectly suited to create super fine embroidery details. The emphasis is on the words SUPER FINE. With this thread weight, you can create satin bars less than 1mm in width or running lines forming small integrate designs.

There are no real restrictions or rules which say that you must use this particular thread weight for this or that design and design size. The article is just to give you a guideline to help you with your decisions. You will find out on your own what works or doesn't work for your embroidery project. Like most things in embroidery, in the beginning, it is always trial and error until you find your way. Each embroidery project brings with it a new playing field.



Serafil fine

Some tips on digitizing for thin thread weights.

#### 4. Stitch distance break down

Stitch distance break down could look like this.

- Serafil fine ticket 60-stitch distance 3.0 to 2.5 = 1/10 mm not advised to go lower.
- Serafil fine ticket 75-stitch distance 2.5 to 2.0 = 1/10 mm not advised to go lower but in some cases up to 3.0.
- Serafil fine ticket 100 stitch distance 2.0 to 1.0 = 1/10 mm 1.0 this the limit but in some cases can be 3.0.

These stitch distances listed above are relative. For larger shapes, the full stitch distance can be applied. The smaller and narrower the shape, the less amount of stitches are needed because there is not enough space for them.



Sample made with Serafil fine ticket 100 on soft shell material.

## 5. Underlay Stitches

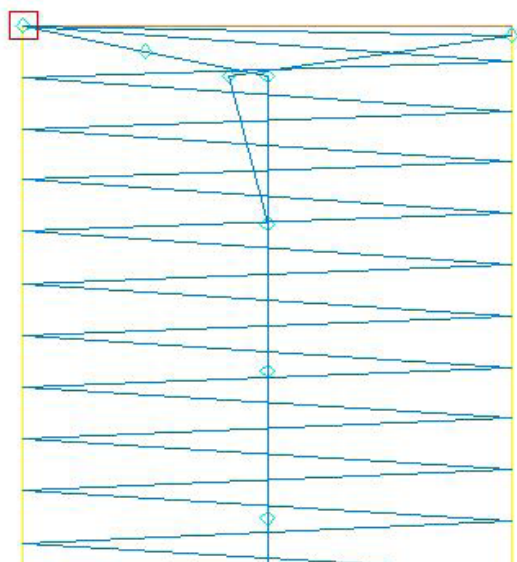
Underlay stitches are the stitches which are placed under the top stitches.

The underlay stitching does two things; it connects the topstitching to the backing, which prevents the fabric from moving. Additionally, it stabilizes the top stitches and prevents distortion in the embroidery process.

For optimal result, this means that even on the thinnest satin stitch under 1 mm, you should place at least a single line of running stitches.

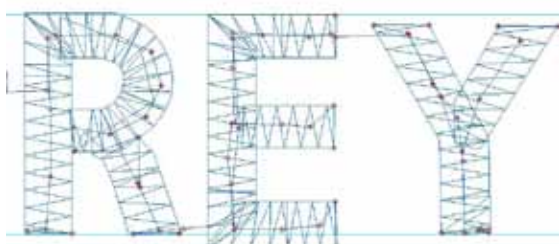
Tie-in stitches and lockstitches need to be placed with care. The standard ones are too large and make knots.

Tie-in stitches are used to pick up the bobbin thread, when digitizing small thin satin. For letters or other elements, it is advised to start with small manual stitches as if you were digitizing a running line.

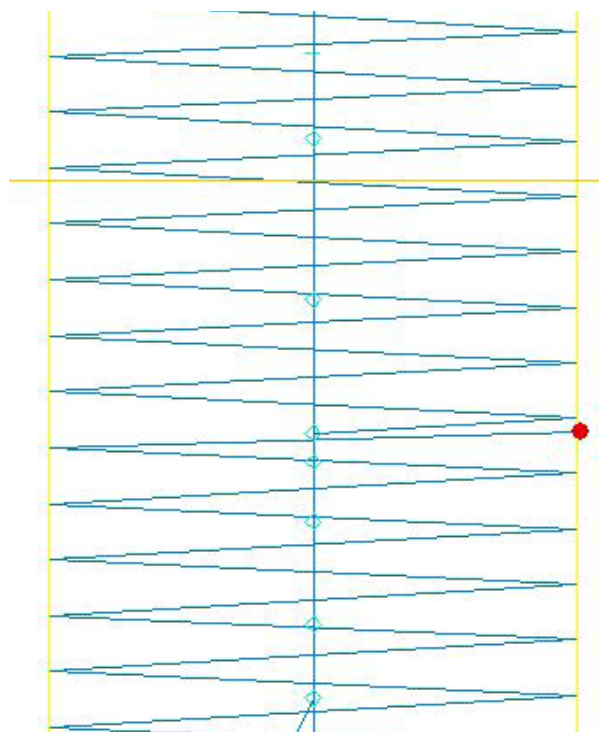


Sample of a satin stitch column and a center underlay stitch line going through the middle of the column.

This type of underlay is very important even on very small letters, as shown in the sample of the letters R,E,Y. These letters are 3 mm Tall. Sample of digitizing data from software.



When digitizing a small graphic, start in a place where the tie-in stitches have more space than you can use for the normal tie-in forms. I try to avoid the lockstitch on very small segments. If not possible, you will only have a chance to place one or two stitches to tie the end. Some embroiderers prefer to hand trim between letters instead of using the machine trimmers. This happens when the letters are so small that the machine has no chance to get up to speed before the letter is finished. When trimming on the machine at the place where it is trimmed, the thread pulls down to the back of the embroidered fabric. In the case of very small letters, this can distort them, especially if you end at the base or top of a letter. To avoid this, make the tie and trim code a few stitches up on the satin bar. The best is to trim them out by hand afterwards.



The sample of stop point on the letter is located where the red dot is on the right side of the column. Only do this when you need to trim on very small letters.

## 6. Small designs and letters on knits, pique

In most cases, knits are not the best base material for small logos or designs. There are some exceptions but it is hard to get it correctly. The exception would be a very compact design. Here, a thread size of ticket 75 can be used. Small letterings will sink in and disappear in most cases. With texturized surfaces, you would need to use a water-soluble topping to hold the stitches of thread from sinking into the fabric.

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## 7. Bobbin thread

The thicker the bobbin thread (underthread), the more pronounced the topstitching will be. A thicker bobbin thread like a saba 120 or 150 can help hold the thinner weight thread on top of the fabric. This is acceptable if the embroidery is sewn on a thick fabric or a pique knit. The ISABOB 190 is the one to use when embroidering on fine thinner fabrics. Here, the thicker bobbin sizes are not recommend. The thinner bobbin keeps the embroidery fine and not bulky.

8.) The correct needles, needle tips, and the correct thread tension must be used.

The thinner thread sizes need smaller needle sizes #65 to #55. In most cases, a RG tip works for most woven fabrics and FFG for knits.

## 9. Thread tension

This depends on how tight you normally run your machine tension. In most cases, you may have to loosen the top tensions a bit, but not a lot. Make first small adjustments to the tension, as you are embroidering. You will learn how your machine works with the thread tension as you gain experience.

## 10. Backings

If you believe you have done everything correctly and the result is still not acceptable, then it could be the type of backing which was used. It is better to embroider stretchy materials with a cut away backing, because the backing holds the embroidery in place even after washing. For the woven fabric, use a

backing which can be torn away. Problems can occur, when you use multiple layers or very thick backing. Then, the embroidery becomes hard and bulky. Thinner fabrics need lighter backing but the backing should not perforate.

If it is perforating during embroidering, then there most likely are fabric movements, which take place even if you cannot see them with your eye. Tip: Adhesive embroidery spray helps to bond the fabric better to the backing. I find this is important when working with small designs.

## 11. Machine speed

The designs that are made with these thinner thread weights are normally super small, so, slowing down the machine to 700 stitches per minute helps ensure that the thinner needle is not swinging too much. The designs are usually small, therefore the run time is not long.

## 12. Cleaning

Pattern optimizing or also called cleaning. This is the most important!

Check to see if the cleaning option on the machine is activated, in most cases it is. Here you have to change the setting or turn it off. If you do not, you will see when the design is loaded into the machine, the stitch count will be less. This means stitches are deleted. If the cleaning is set at 0.5 mm, all stitches of this size and smaller are deleted by the system. They say, small stitches are not good for embroidery, but not in the case of working with thinner thread weights.

I enjoy the challenge of creating small embroidery after years of using the standard thread size 40. Using the correct thread and thinner weights has made a big difference.

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# Monogram Wizard

## PC **interconnection** to Sprint

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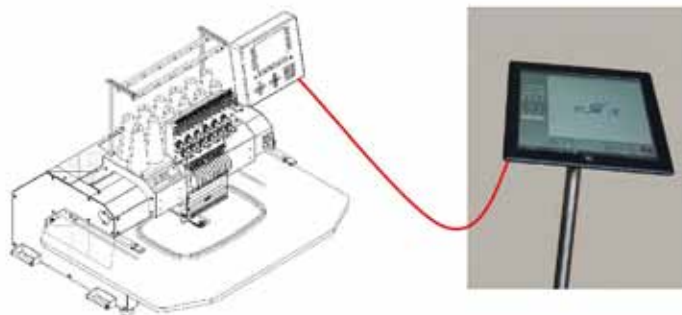


Figure: The Monogram Wizard PC is connected to the T8.

A new opportunity is available by the interconnection of the Monogram Wizard software to ZSK embroidery machines including the SPRINT Series.

The Monogram Wizard PC is connected to the T8 via a network cross cable and the T8 is set to the monogramming mode (Figure 1).

A small wrapper software at the PC converts the embroidery design which is generated by the Monogram Wizard software to a ZSK Transport Code design. After this conversion, the ZSK Transport Code design is filled into the monogram buffer at the PC.

From the operator side it is very easy to use. The operator designs the monogram in the Monogram Wizard software at the PC and save it as a PES design in a specified folder. Then automatically the embroidery design appears at the T8 display and the design is ready to embroider.

# **Sublimation**

## **A solution for endless colours in embroidery designs**

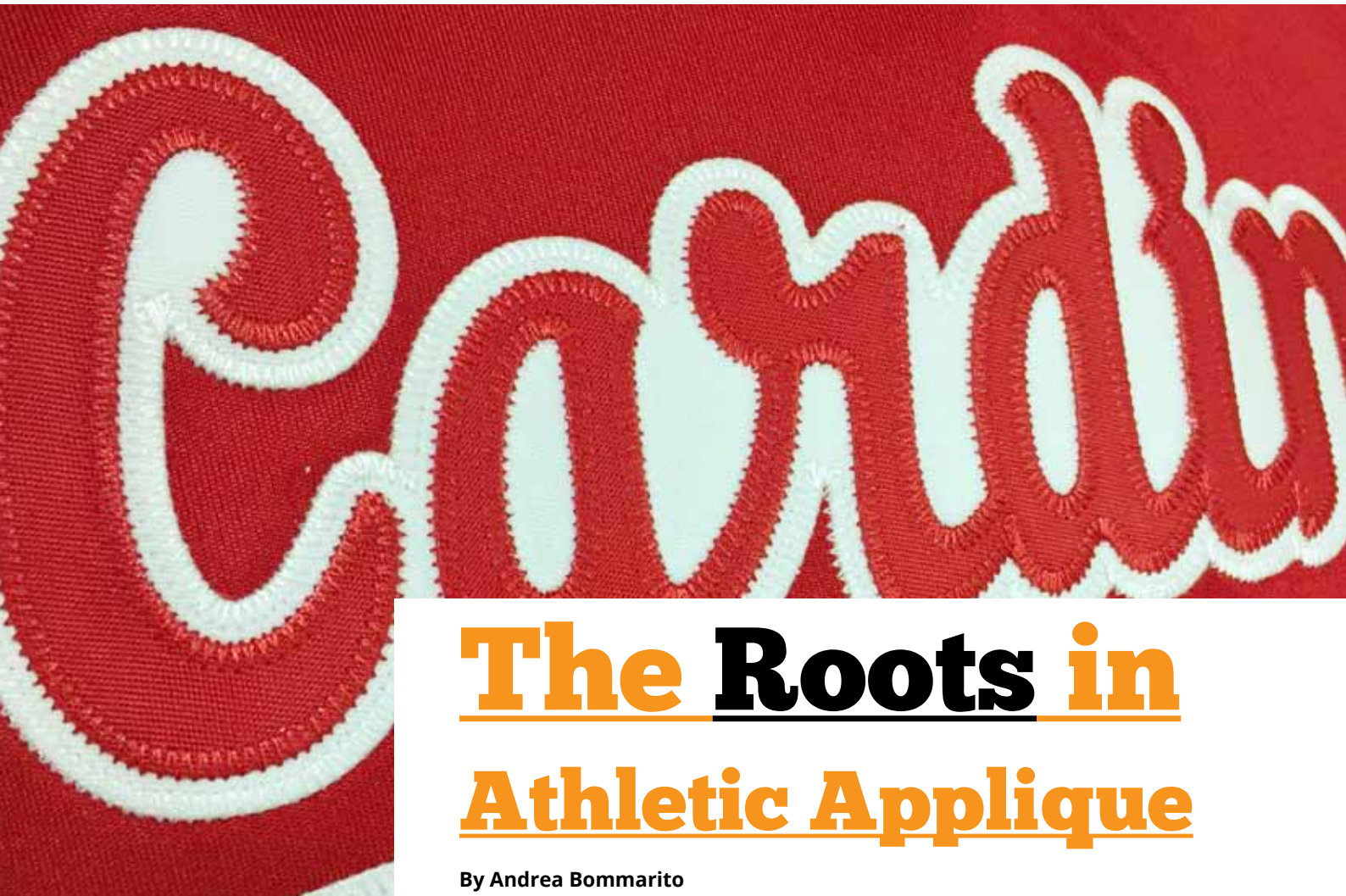
Embroidery machines are limited to anything between 6 and 24 colours per embroidery head. When the aim are smooth colour shifts and gradients, embroidery is typically limited in its ability to achieve this. A Scandinavian (Coloreel) and an Israeli company have presented colouring solutions for just in time colouring of yarn during the embroidery process. The solutions sound interesting and promising, but also cause concerns in terms of practicability. Designs have to go through a digitizing software and later through the software of the dyeing unit. When imagining the solution on a multi-head machine, a perfect restart after a thread breakage across all heads appear to be difficult.

Sometimes one is missing the simplest solutions. Sublimation is a cheap and easy solution that requires only affordable systems and very little training to achieve the aim of smooth colour shifts.

Using white polyester yarn for the design, the design can be embroidered without any colour changes in one go. The design is printed with suitable ink on transfer paper. When placing the printed paper onto the embroidery under a heat press, the ink vaporizes and connects with the polyester yarn. The result is an artwork that has the benefits and appearance of embroidery and colour gradients of printing.



Figure: No Display Error: Printed on transfer paper, colours can be fixed onto embroidery via heat press.



# The Roots in Athletic Applique

By Andrea Bommarito

**Athletic uniforms, namely baseball uniforms, sparked a new market in the sewing industry back in the mid-1800s. This became especially successful due to Elias Howe's development and patent of the sewing machine in 1846.**

Deemed as one of America's beloved pastimes, baseball was one of the first sports that rose in popularity back in the early 1800's. The New York Knickerbockers officially formed the first social club in 1845 – and – by 1849 they adopted an official uniform with team colors. By 1867, there were over 400 members in the National Association of Base Ball Players. As baseball grew in popularity, the uniform helped shape the fraternal bond by branding

each team with its own unique name and color family.

One of the earliest forms of applique was incorporated into the early club uniforms of the mid-1800's. Typically, the first letter (or couple letters) of the team would be proudly displayed on the uniform by an applique method usually using Old English or similar ornate-style letter. Towards the late 1800's, jerseys would display full team names on the front. Eventually, in the early 1900's, teams started to experiment in numbering the players. The clubs also began uniting the team name with various motifs to enhance and develop the team logo and create a team brand. Not only did they brand the entire team, but they personalized each player's jersey with his name and number on the back. From then until now, baseball uniforms build excite-

ment among fans creating "hometown" comradery and a sense of community.

Other sports, such as football and hockey, have followed suit with uniform decoration depending heavily on embroidery applique and tackle twill techniques. So much so that businesses have been built on these services alone. For example, there are companies that do not manufacture the final product but provide the consumables and/or services needed for creating the applied garment. Applique uniform jerseys commonly use polyester twill for team decoration – this material is both durable and brilliant making it desirable for athletic wear. Many of these twills offer different appearances, such as glossy, matte, patterned, metallic, etc., which lend to creative opportunity. There are other fabrics



The first step of the process is typically a running stitch that follows the exact size and shape of the appliqué design.



Appliqué comes in various materials such as patterned to create a different appearance.



The third and last step is the finished edge, typically a solid satin stitch, that covers the exterior of the raw fabric.



Appliqué provides a clean finish and unique appearance.

and products available to use for athletic applique (like felt) but twill seems to be the most popular option.

## Stitching Applique

The applique method is a two or three step process, usually produced on an automated embroidery machine, that involves stitching a piece or pieces of fabric onto another garment or textile. The first step of the process is a placement stitch on the garment, typically a running stitch, that follows the exact size and shape of the applique design. The stitching needs to follow the shape of the design precisely so that the machine operator knows where to place the applique fabric on the garment.

After this placement step is programmed, the machine should stop and the operator will lay the applique fabric on top of this outline to make sure the design is in place and covers

the garment properly. Once the fabric is in place, the machine will run again and perform step two – or – advance directly to step three (if “step three” necessitates an open density cover stitch).

The second step is the tack-down stitch – this step anchors the applique to the fabric before the final edge stitching. The tack-down stitch runs just a bit to the inside of the applique fabric to hold it in place on the garment and gives the operator a chance to inspect the applique before the cover stitch. If the design requires an open zig zag cover stitch, then this second step is usually eliminated.

The third and last step is the finished edge, typically a solid satin stitch, that covers the exterior of the raw fabric. It's important that the applique fabric is covered with enough stitching to ad-

here properly to the garment. If there is not enough coverage, the material may pull away and fall apart.

## Baseball Jersey Applique Methods

Most often with baseball, the front of the jersey presents a large, full-size team name across the chest and the back is setup with the player's name and number. When creating the design, there are certain decisions that must be made prior to setup – such as font type, tail option, multiple colors / outlines, and, of course, the jersey style. Of all these options, the more important ones include the amount of colors as well as the jersey style.

First, the colors / outlines play a significant role in the design creation because the layers must be assembled in the proper order. Second, the

jersey style will dictate the applique technique to use – split front or not. The split front method is reserved for garments that have an opening in the front that fastens with buttons or zippers.

Single color applique is fairly straightforward in that it only requires the 3-step process once. Although, with multi-color applique, the process follows the same idea for each layer, but may require a different approach or sequence. There are several techniques that are used for multi-color applique as it depends on the design as well as the equipment and materials that are available (ie: cutters, laser, manual cutting, twill, rip away, etc.). Typically, the outer color is an offset of the design (outline) and covers the entire area(s) underneath the top layer(s). This color embroiders first with the placement, tack-down, and cover stitches; from there, the design will work itself inwards with each layer using the 3-step process. Although, this can become more efficient by removing steps if you are utilizing a service or have the ability to do a “kiss cut.”

A kiss cut can cut down the steps in the multi-color process as it cuts all the applique fabrics together with pressure sensitive material. That means that the material is pre-aligned and assembled in layers before it is stitched. By using the kiss cut, certain steps (ie: placement & tack-down stitching) can be eliminated from each color and the embroidery becomes more efficient.

As the colors / layers of the applique are an important aspect in regards to preparation and materials, the jersey style is as well. Split front jerseys have to be designed by a different method that involves splitting the applique with correct overlap and/or spacing. The jersey must look complete when it is fastened and also show well when it is unfastened. In regards to a button-down jersey, they are usually designed with a larger gap between the second and third buttons to accommodate the decoration. This space aids in the



When creating the design, there are certain decisions that must be made prior to set up, such as font type, tail option, multiple colors/ outlines, and, of course, the jersey style.



It's important that the appliqué fabric is covered with enough stitching to adhere properly to the garment. If there is not enough coverage, the material may pull away and fall apart.



The tack-down stitch runs just a bit to the inside of the appliqué fabric to hold it in place on the garment and gives the operator a chance to inspect the appliqué before the cover stitch.



Single-color appliqué is fairly straightforward in that it only requires the three-step process.

process in that buttons do not have to be removed prior to stitching. Furthermore, this area helps determine the size of the applique.

Once the design is created with the team colors and size requirements, the file must be split properly for the

particular jersey. In splitting the design, the designer will end up digitizing 2 files – one for the left side and one for the right side. First, verify which side fastens on top and on bottom (left over right or right over left) – most men's jerseys are left over right. Then, measure the placket – or the overlap



for the fasteners. Plackets usually are marked with stitching and can range in size especially when working with adult and youth sizes. In this example, I will refer to the jersey buttoning left over right (buttons on the right side) and a placket of 2 inches wide.

Since there is an overlap of material, the design cannot be split in half (although it would make our lives a lot easier). Instead, we have to divide the design into 2 sides that have overlapping sections in the middle.

To do this you must first layout the full design and mark the center point. From the center of the design (using the example of a 2-inch placket), you will need to expand each side of the applique 1 inch from the design center to the opposite side – then divide ac-

on the placket's vertical line, most digitizers will insert a column (satin) stitch on each respective edge for a tailored look. It is also recommended to set the origin point of the left side design to right center and the right side design to left center.

When it comes time to do the embroidery, it may have to be completed in 2 hoopings, but sometimes it can be accomplished in just one. Either way, alignment is essential – if it isn't lined up properly, it's a failed jersey. Make certain to print out the worksheets / proofs of the applique – at 100% with the origin points marked – and use these worksheets as your templates when hooping. Before applying the hoop, lay out the proof on the jersey and confirm that it will not stitch

edge from shifting. Always trace before starting the embroidery and once everything is triple checked, start the embroidery.

## Uniforms & More

Although jerseys have been the focus of this piece, there are so many complimentary items within the uniform realm. Anything the player wears to represent the team – or as an accessory – is another opportunity for embroidery applique. Items such as warm ups and letterman jackets are great examples of what players need to complete the uniform.

In addition, spirit wear is an entire world full of applique possibility. Not only replicating team apparel, but also creating garments for the fans that match team colors in some very inventive ways. Applique fabrics are available in various colors, patterns, prints, etc.; but, rip away materials have become a game changer in this embroidery process as it eliminates the need to cut any fabric for the design. When these materials (normally heat sensitive film) are embroidered, the needle penetrations in the cover stitch perforate the film which allows the operator to rip away the excess. With this process, the final product does need to be heat sealed to finish the garment. Rip away applique products come in such a wide range of styles and prints that it allows for more possibility and has set a new decoration method in the industry.



From the center of the design (using the example of a 2-inch placket), you will need to expand each side of the applique 1" from the design center to the opposite side, then divide according to those expanded areas.



Before applying the hoop, lay out the proof on the jersey, and confirm that it will not stitch over any buttons.



Since there is an overlap of material, the design cannot be split in half. Instead, the design must be divided into two sides that have overlapping sections in the middle.

cording to those expanded areas. The center of the entire design will lay in the center of the placket and each side's overlap will expand to the edge of both plackets. After they are correctly split into the appropriate sides, each side will be a separate embroidery applique file. Since each design will end

over any buttons. Once it is in place, I suggest pinning the worksheet to the jersey or mark it with tailor's chalk. Once everything is in check, hoop the garment and if necessary, use tape, straight pins (ensure that they are not in the way of the embroidery path) or spray adhesive to keep the open

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# Eugenio Micheletti

## A Life for and with ZSK



From left: Mr Micheletti Sr. , Mrs Melli, Mr. Rudolf Zangs

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## Carl:

Dear Mr. Micheletti, your family stands for a life for and with ZSK. How and when did the partnership between your father and ZSK begin?

### Mr. Micheletti:

It is very difficult to summarize a period from 1959 until today in a few sentences. I will tell you about the most important events. The "marriage" of Micheletti and Embroidery Machines started in the early 1950's. Mr. Oscar Micheletti worked at company Sartori as an accountant. Dr. Sartori had a second company, a stocking factory at the Lago Maggiore, which required his time and therefore he wanted to sell the agency business. He found no one who was interested and therefore it was decided to setup a limited partnership. Dr. Sartori was the limited partner (3.000 Deutsche Mark in spare parts) with two employees as general partners. These two employees were Mr. Micheletti and Mrs. Melli (see picture with Mr. Zangs). I was 14 years of age and I remember very well how many nights my father did not sleep. He was asked to decide to change from being an employee to becoming an employer. Will we succeed? What happens when there is no more demand? These were our biggest concerns.

The company Micheletti KG was founded on the 1st July 1959.

## Carl:

You have started to work in your fathers company at a very young age and have developed the company over all of Italy. What are your most interesting memories from this time?

### Mr. Micheletti:

After a few years Mrs Melli decided to leave the business, as her husband had a very good income. My father had to liquidate the business, which was not very easy. Due to this my father had psychological difficulties and I was

more of a moral help than a real help (even though I had started to attend a technical university). After 5 days of university I had to come to the company. At that time I did not even know what an invoice or a delivery note was.

We had two technicians for the support of our customers. One of our technicians became sick and my father asked for a technician from Germany (Mr. Nolden). I have driven the technician to all our customers. As the technician from Germany was very expensive for a small company like ours, I drove to Krefeld to learn in 2 weeks about repairs of machines. The machines at that time were rather simple. After those 14 days of training, I had to visit the customers. The training was good, but I had no experience.

It was a nice time. I was welcomed very well by our customers. A few months later our technician returned and I returned to the office. I started to look after the distribution of a different product, but I continued to look after technical issues of embroidery machines. Even in those years there were issues from time to time.

In the year 1969 the embroidery machine #1.000 was delivered to Italy (Lake Garda) to Sirmione and celebrated. My father received a wood model of an embroidery machine, as Mr Zangs had promised my father to give the machine #1.000 as a present. When my father turned pale, the director of Zangs told him that below the model he had fixed a credit note.

In the following years the sale of embroidery machines worked very well. The company only had one location in Milan and we had to hire 6 new technicians to look after customers all over Italy. The technicians came on Monday morning to the office, collected spare parts for the coming week as well as their work instructions and gave feedback about the work in the previous week. Afterwards we all had lunch to-



Eugenio Micheletti, 2018

gether and everyone went off to our customers. The technician that had to go to Tuscany had to drive for 3 hours. He would not go to the customer, but straight to the hotel, so we lost an entire day.

During this time embroidery and knitting was very popular. One Japanese competitor already offered multi needle machines where we only had a single needle head. We were able to show customers that loading of the machine with several needles was more time consuming than with a single needle machine. This argument worked very well and we sold many machines.

In order to service our customers well, we had to hire a technician in Carpi, who could be with customers on Monday morning at 8. In 1981 we hired a sales person for the region and a lady for accounting and thread sales, as well as a person for the warehouse to look after spare parts. This was the start of our location Centro Ricamo. The customers were very pleased and we decided to open further locations: Puntoricamo, Filmont, Tuttoricamo and Gammafil.

**Carl:**

Only few people know that you and Mr Walz have saved 1983 the survival of ZSK after ZANGS went into insolvency. How did you start with ZSK in 1983/84?

**Mr. Micheletti:**

After we had finished the built up phase in Italy, the shock happened and ZANGS went bankrupt in December 1983 and we were without a product to sell.

I cannot recall how many train and flight trips I did to Stuttgart to meet with Mr. Walz and his advisor to find an agreement. In the end we found an agreement with Mr. Walz and Mr. Sültmann, so that we were to be able to receive the permission from the insolvency court to continue building multi head embroidery machines. We started with 39 people and the company ZSK Stickmaschinen GmbH was founded.

The story does not stop here. A few months later, Husquarna decided to close their factory in Schweinfurt (Meister). This factory delivered ZSK with the embroidery heads and was therefore key for the future of ZSK. After several negotiations with Husquarna, Walz and Micheletti also had to buy this company and found the company Meccanica. Mr. Walz later continued this company. Overall it was a difficult birth, but one needs to remember that ZSK had taken the best employees and the best distributors from ZANGS. The company developed very well, even if at the beginning 50% of the machines were delivered to Italy and 25% to Germany.

A few years later ZSK Stickmaschinen GmbH was honoured to be the best developing company (GmbH) in Germany!

**Carl:**

In the 80s and 90s you had huge successes in Italy. ZSK was not able to built enough machines and



Jubiläumsfeier anlässlich der Auslieferung des 10.000. Mehrkopf Stickautomaten am 21. Januar 1982

there was not sufficient thread. Please tell us about this time.

**Mr. Micheletti:**

Due to the very good situation in Italy, all of our locations had a huge stock of spare parts and whenever ZSK released a new model we were able to buy parts and boards at a one-time special price. The customers were well serviced and we constantly ordered 15 head machines, which were sold immediately.

Those years were certainly a different time than today. It even happened once that a ZSK engineer had to do the final check of a machine after it had been loaded on a truck. Everything was scarce at that time. We did not have enough technicians, frames for the embroidery machines were sold out and especially the thread was a huge problem. MADEIRA was not able to produce as much thread as we were selling. Some customers, especially those of our competitors complained to MADEIRA about us. They thought

that we wanted to support ZSK customers and would not supply them with thread. Actually this was not the truth. The truth is that there was no thread – everything was sold.

We always supported the embroidery companies over ready-to-wear factories. These companies had typically their own issues and embroidery is-



Micheletti's thread stock is well prepared for the next big run.

sues could best be solved by embroidery companies and specialists. Also we did not want to upset the embroidery companies. We had learned that ready-to-wear factories would sooner or later decide to outsource embroidery again, as there were such good embroidery companies.

A huge problem was the import of embroidered fabrics and clothing from East. The cost of these products was less than cost of the pure fabric from Italy. The factories started to move to Romania, afterwards to Bulgaria, Ukraine and North Africa. Many embroidery companies, especially from Veneto, brought their machines to Romania. In Timisoara they spoke the dialect from Veneto. At the beginning the companies continued buying thread in Italy, later they bought it directly in Romania.

#### **Carl:**

**In contrast to your competition, you have one of the largest embroidery machine spare part stock in the world. Supply of parts for machines of more than 30 years is no problem.**

**Are still many of your customers using brown machines from the 80s and early 90s?**

#### **Mr. Micheletti:**

You have to keep in mind that many, many used machines have been sold to Turkey. This country had an economical boom for a very long time. The number of brown machines in Italy is not very high anymore. Some embroidery companies do not want to give up on the brown machines as they allow very fast change over from thick to very thin threads. During a certain time even more new machines were shipped to Turkey than to Italy.

Our warehouses are still able to supply spare parts for machines with more than 30 years of age. Sometimes we also receive international requests for such parts.

#### **Carl:**

**Italy has gone through difficult times in the textile industry. The last 2-3 years have shown a good recovery. What is your forecast for embroidery in Italy in the coming years?**

#### **Mr. Micheletti:**

To give a forecast today about the future is not easy. The huge amounts of clothing are produced in China. For Italy there are only exclusive products. The ready-to-wear industry is no longer in Italy, the orders are coming from other countries.

One has to see that ZSK has introduced a lot of novelties to the market to make the machines interesting for the customers such as: different sequin devices, cording device, automatic bobbin changers, application of beads, hot air cutting, embroidery of thick yarns,... Beside having only machines for the textile industry, ZSK has extended its offering to other industries.

In the automotive industry, ZSK can recognize perforation and place embroidery and quilting extremely precise on seat covers, even if the material slightly shrinks in the frame.

I am sure that these sectors will show very good growth in the coming years. I hope that the traditional embroidery machines "Made in Germany" will re-



New ZSK Vision System

main of highest quality standards and success due to their efficiency, strength and flexibility.

I wish ZSK all the very best for its future.

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# Pretty Sporty

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## **Challenges embroidering functional wear**

**Sportswear and performance wear fabrics are the subject of continual progress, posing new challenges for garment manufacturers, textile processors, textile finishers and embroiderers.**

As specialists in embroidery threads and their applications, we define sportswear and performance wear as garments made of functional fabrics and we understand their versatile properties. Whether lightweight, breathable or water resistant, every fabric has a different structure and different characteristics, and designers and embroiderers need to adapt to the fabric being used.

MADEIRA not only offers a large range of premium-quality threads, backings, toppings and accessories, but can also support you through the entire embroidery process to produce the perfect finish on each particular fabric.

Embroidery on functional fabrics requires careful planning and good communication between designer, manufacturer, and embroiderer to ensure a high-quality finish that adds value to and enhances your brand.

For successful embroidery onto active wear, it is essential to adapt the digitising to the fabric, select the correct embroidery thread and choose the right stabilizer.



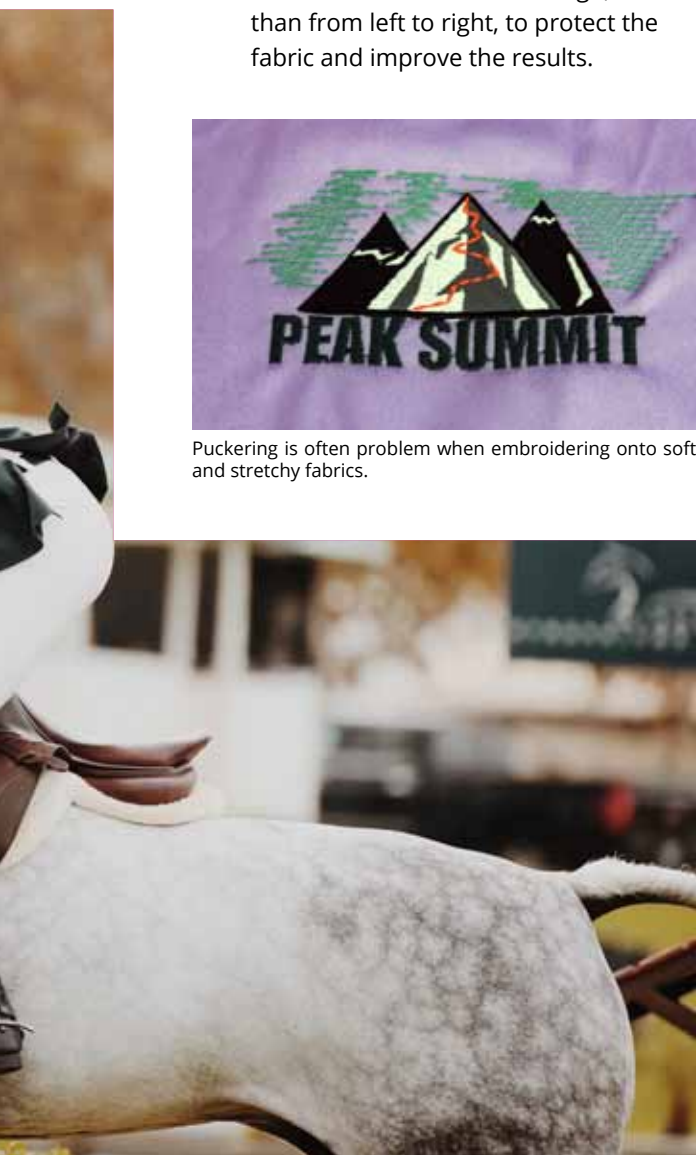
## Adaption – The key to success for embroidery on high tech fabrics

Puckering and inflexible embroidery are well-known problems when faced with embroidering onto soft, stretchy sportswear fabrics. By continually testing new fabrics, the MADEIRA research and development team is able to offer useful advice for digitising your design:

- Reduce stitch density around corners and small curves, especially for intricate designs and text.
- Keep underlay stitches light and select the correct style to suitably stabilize the design.
- Use a stitch direction slightly diagonal to the fabric's warp and weft to help keep the fabric flat during the embroidery process.
- Start at the centre of the design, rather than from left to right, to protect the fabric and improve the results.



Puckering is often a problem when embroidering onto soft and stretchy fabrics.



## The best needles and threads for sportswear and performance wear embroidery

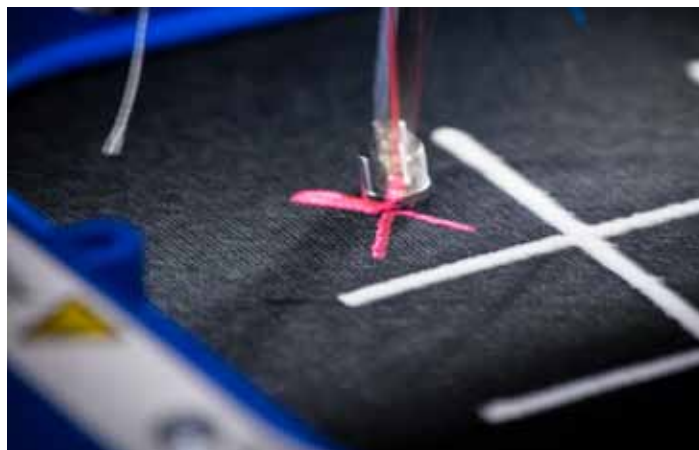
When embroidering onto high-tech fabrics, it is important to select the correct thread thickness and needle style to protect the material's structure and achieve soft embroidery. Additionally, this will increase the wearing comfort of the garment, whether the design is positioned on the sleeve, collar, leg or elsewhere. The general rule is the thinner the fabric, the thinner the needle and thread.

- The fine but robust polyester thread POLYNEON is available in 94 colours for thickness 60, and 89 current colours for thickness 75, including 12 trendy fluorescent shades and the basic colours black and white.
- The fine premium rayon thread MADEIRA CLASSIC 60 is available in 85 stylish colours and provides high-quality embroidery on functional fabrics.
- The lightfast polyester thread FROSTED MATT, with its 176 plain and 13 fluorescent colours and special diameter, is a universal eye catcher for performance fabrics.

## Small embroidery needles for better results on tightly woven fabrics

When a needle penetrates the material's structure, fibres are displaced and the fabric might pucker. By using finer thread and smaller needles, puckering can be avoided. Needle sizes NM 60 or NM 70 are perfectly suited for functional fabrics.

Essential to not damaging the material is the needle point. While light ballpoint needles (such as RG or FFG) displace the fibres without damage, regular round point R-needles might destroy fibres. Titanium-coated needles have less mechanical vibration and are perfect for high-precision stitch insertion. They will produce a more refined embroidery finish on smooth or stiff fabrics, especially caps, bags and shoes.



## Backings and toppings by MADEIRA

For embroidering onto functional fabrics, we recommend lightweight cut-away backings with 30-55 g/m<sup>2</sup>.

A structural backing offers the additional advantage of not showing through the fabric on light-coloured textiles. The upper side of the embroidery can also be enhanced by using a water-soluble topping to stop stitches sinking into the fabric. The topping supports the stitches, especially in fine details and lettering, and will significantly improve the quality of the embroidery.

We recommend the following two stabilisers:

- WEBLON structural backings are soft and supple, keeping the embroidery stable even after many washing cycles.
- The 20-micron thick water-soluble topping AV-ALON helps create crisp and clear embroidery.

**Tip 1:** Avoid overstretching when framing the garment to reduce puckering.

**Tip 2:** While the embroidery is still in the frame, cut away the backing with a seam ripper to get a clean finish on the back of the embroidery.

## Embroidering sports and performance wear with MADEIRA

With a wide variety of threads and supplies, MADEIRA supports designers and helps them to accomplish their innovative ideas.

Fulfilling all technical and ecological requirements as well as ensuring global availability at the desired time, MADEIRA is a popular partner of the sports and performance wear industry around the world.



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**Personalization is the future of industry**

# **THE TECHNO-ECOLOGICAL “ATTACHÉ CASE”**

NOBRAK is an industrial startup developing innovative technologies around TFP and which has the goal of becoming a major preform manufacturer.

The first object we developed for demonstration purposes in an embroidered, sustainable, resistant and personalized “Attaché Case” made in France.

**Sustainable:** We have chosen natural material. The structure is made of flax fibres produced by Depestele Group and the interior is made of recycled cork.

**Resistant:** The design has always to serve the user and here you can easily stand on your Attaché Case even if you approach 100 kg.

**Personalized:** We can of course integrate your own design but also technology inside such as RFID chips, localization devices or sensors.



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# The Allied Journey

## Manufacturing wooden and plastic embroidery frames (hoops) for ZSK for 30+ years!

Having roots in a family embroidery business since the 1960's (which is still in successful operation today), the founders of Allied International, Inc. established their embroidery frame business in 1982.

Using their real-world embroidery experience, they set out to create superior embroidery frames to address the issues they faced with the frames available at the time. For more than 35 years, Allied has been manufacturing the highest-quality and best-featured plastic and wooden embroidery hoops for all major brands of machines, which are supplied on the OEM level to machine manufacturers and distributors worldwide. All users of Allied embroidery frames recognize their superior quality, durable construction and exclusive patented features, saving them time and money every day!

Allied is very proud of the fact that ZSK Montagetechnik GmbH is one of their oldest and most-valued partners, offering Allied frames with ZSK machines and for aftermarket sales for over three decades!

### Allied Wooden Embroidery Frames

Allied International started its embroidery frame business manufacturing wooden frames for flat table embroidery machines. Wooden frames available at the time were mainly round or oval-shape and came in limited sizes. Furthermore, they tended to have rough finishes and sharp edges which caused increased fabric abrasion & snagging and were hard on users' hands during hand hooping.

Since the beginning, Allied has produced notably the best hand-finished wooden hoops in the industry with rounded edges and smoother surfaces on exterior faces and an appropriately coarser finish on fabric gripping faces. Allied hoops are always gentle on the hands while providing an optimum grip of fabric!

As embroiderers worldwide started asking for a larger variety of frame sizes to accommodate their specific embroidery applications, Allied was able to offer customized hoop solutions quickly. Allied consistently received requests for new frames which offered more embroidery area for a given size.

Allied pioneered the development of square & rectangular-shape wooden frames which provide additional sewing area in the corner sections (FIGURE 1) as compared to equivalently-sized round & oval frames – a simple but extremely effective solution. Rectangular hoops enable embroiderers to sew larger designs, team/corporate logos with names, etc. in one operation, rather than splitting the design into multiple steps which would take additional framing time, backing waste and could introduce design misalignment.

For customers needing to securely hoop more difficult fabrics such as thin & slippery satins or silks as well as thicker garments like sweatshirts & winter jackets, Allied was the first company to create "double height" frames (FIGURE 2). These extra thick frames provide additional wall surface area, signifi-

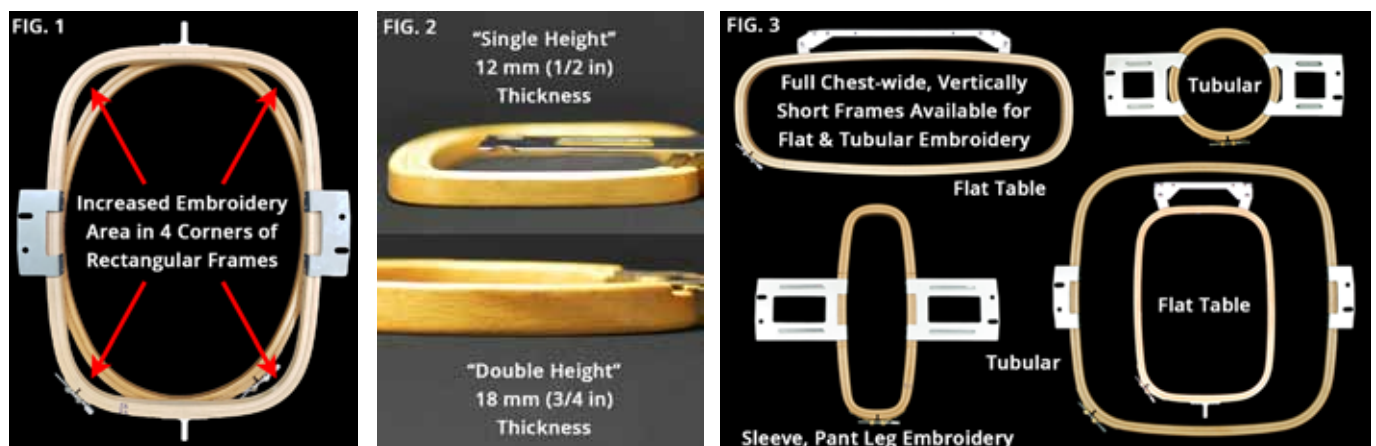


FIG. 1 – Rectangular vs. oval 420 x 300 mm frames. Rectangular shape provides additional sewing area in 4 corners. FIG. 2. – "Single Height" (12 mm thick) vs. "Double Height" (18 mm thick) frames. The added thickness of "double height" frames increases fabric gripping power substantially. FIG. 3 – Examples of some of Allied's 300+ available wooden frame sizes.

cantly increasing their fabric gripping power as compared to “single height” frames which were the only option available for decades.

Embroidery machine manufacturers and distributors relied on Allied for their ability to quickly manufacture custom frame sizes per their customers’ needs. This allowed Allied to grow its catalog of available frame sizes. Allied now has ready capability to manufacture 300+ different sizes of wooden frames ranging in sizes from 50 mm (2”) all the way up to 1200 mm+ (48”+) in a variety of round, oval, square & rectangular shapes (FIGURE 3).

Allied’s innovations and proficiency in developing new customized frames enabled many OEM companies and distributors to sell more machines because they helped expand the capabilities of the machines. Allied’s reputation grew to be the “best frame manufacturer in the world” due to their wide variety of frames which help embroiderers grow their businesses. Once tubular embroidery machines became available, Allied started offering tubular wooden frames as well.

As part of an ongoing focus to develop new hoops which enable embroiderers to offer new applications to their customers, Allied has developed a variety of specialty frames, such as tall, narrow shapes for embroidering on sleeves, pant legs and for designs of this shape. Allied also offers many sizes of short, wide frames for embroidery and appliqué across the full chest or back of a garment, etc. (FIGURE 4). Normally, an embroiderer would have to use an extra-large jacket back frame to accommodate a full-width design, even if the design is not tall. By using a wide but short Allied frame which would fit the design, embroiderers would achieve not only improved stitch registration and embroidery quality, but also greatly reduce wastage of backing – a real saving of money in every cycle! Also, the overall hooping process would be much easier.

Allied also manufactures special wooden frames for ZSK embroidery machines having an add-on sequin device or other attachment (FIGURE 5). With normal frames, part of the available sewing area is lost to accommodate space for the device. Allied’s specialty hoops for these applications are engineered to provide extra clearance at the bottom for the device, thereby offering much increased area within the hoop for the design.

Allied has also uniquely developed frames having unconventional shapes such as triangles and trapezoids. A trapezoidal shape allows the frame to be inserted from the waist of a pant down one leg, allowing more embroidery area compared to a regular rectangular frame which would otherwise have to be narrow enough to fit in the pant leg (FIGURE 6).

FIG. 4



FIG. 4 – Short & wide frames for full chest designs provide easier hooping, better stitch registration and reduce backing wastage compared to jumbo jacket-back frames yielding significant cost savings.

FIG. 5



FIG. 5 – Specially developed frames having off-set connectors provide clearance for add-on attachments like a sequin device.

FIG. 6

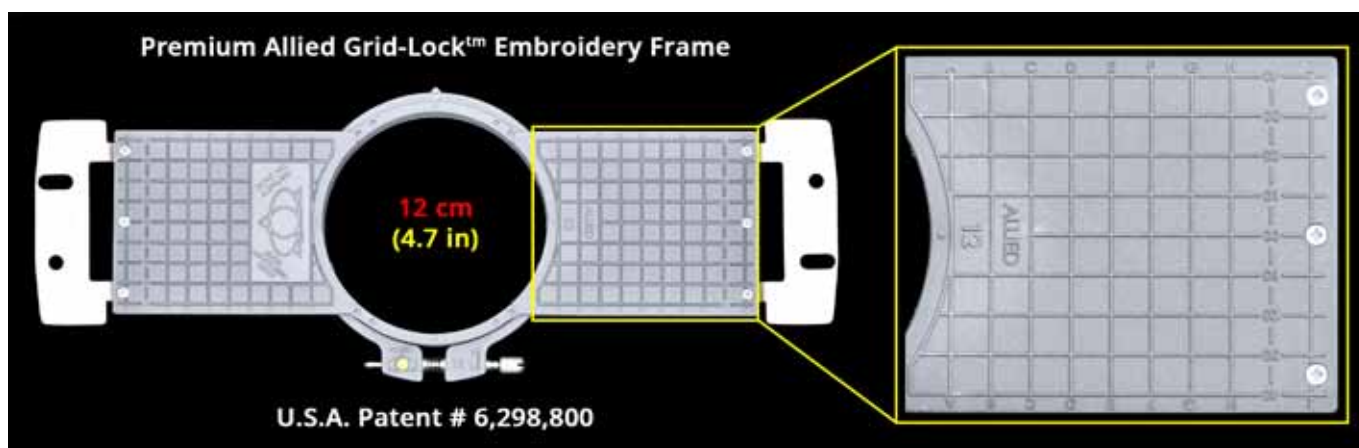


FIG. 6 – Special trapezoid-shaped frame provides optimum sewing area in the upper thigh section of a pant.

## Premium Allied Grid-Lock™ Plastic Embroidery Frames (Patented)

As the embroidery frame market shifted to plastic frames for tubular machines, Allied continued to innovate. They again looked at the limitations of the ordinary plastic frames available at the time, which were very basic in design and made from grades of plastics that were often prone to cracking easily. Furthermore, doing large production runs on finished goods meant that embroiderers had to spend a great deal of time ensuring that each garment was framed uniformly and that the frames were properly aligned on each garment to avoid rejections.

In response to these limitations, the iconic Allied Grid-Lock™ line of embroidery frames was invented. The key feature of Premium Allied Grid-Lock™ (PAGL) frames is the built-in design of alignment reference lines and markings on the top face and along the inside wall:



Allied's patented design of alignment tools built into PAGL frames includes a 1-cm spaced grid on the top face (on most sizes).

This tool integrated into each PAGL frame was so unique that the design earned U.S.A. Patent # 6,298,800. It allows embroiderers to quickly and easily check for proper frame placement and alignment using a simple 3-step process:

### • STEP 1:

Select a specific reference point on a garment, such as a button, seam intersection or other suitable locator

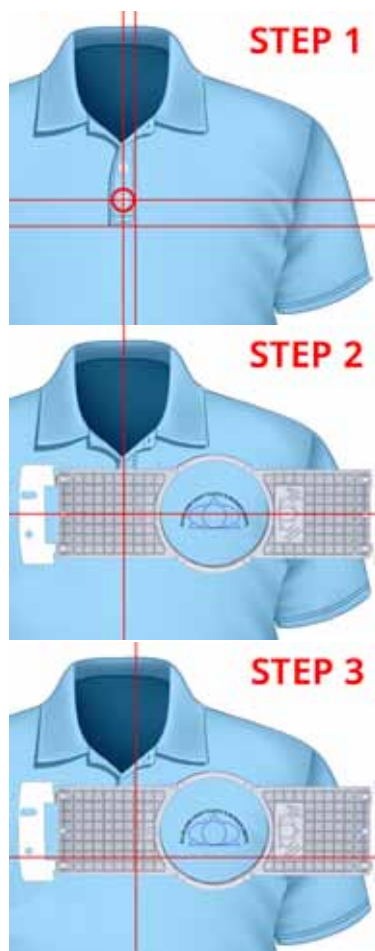
### • STEP 2:

Use the alignment lines on the frame to determine the desired horizontal and vertical distance away from the reference point to place the center of the embroidery design

### • STEP 3:

Use the frame alignment markings to compare against a seam or pattern line to ensure that the frame is straight

This simple 3-step process saves embroiderers a significant amount of framing time since you no longer need to mark up garments or use separate alignment grids. PAGL frames ensure consistency throughout production runs and help reduce costs by preventing rejections due to improper embroidery location and/or orientation. Premium Allied Grid-Lock™ frames have earned the reputation worldwide as industry's highest quality, best featured frames that help increase embroidery productivity and profitability, every day!



Overview of 3-step process for consistent frame placement using the built-in alignment tools.

### Additional unique features of PAGL frames:

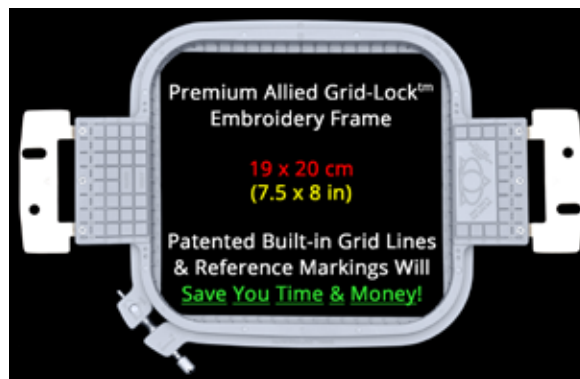
- 79 mm (3-1/8 in) long bolt-style outer frame adjustment screw provides added open-ability to more easily frame thicker fabrics
- Square & rectangular PAGL frames have added “lips” along all four inner frame walls with reference lines to provide straight edges inside the frame window to further help with frame alignment
- PAGL frames are made from a unique non-brittle plastic composition which provides durability and flexibility
- Instead of the smooth finish found on lesser-quality frames, PAGL frames have a slightly textured finish to increase their gripping power which helps prevent frame “pop-out”

PAGL frames are available in the following sizes:

Round – 7 cm (2.8 in), 9 cm (3.5 in), 12 cm (4.7 in), 15 cm (5.9 in), 18 cm (7.1 in), 21 cm (8.3 in)

Square/Rectangular – NEW SIZE 11 x 12 cm (4.5 x 5 in), 14 x 15 cm (5.5 x 6 in), 16 x 17 cm (6.5 x 7 in), 19 x 20 cm (7.5 x 8 in), 24 x 24 cm (9 x 9 in), 24 x 30 cm (9 x 12 in), 30 x 30 cm (12 x 12 in)

Allied's wide variety of industrial grade plastic and wooden frames allow embroiderers to select optimum frames based on their specific embroidery applications. Allied frames represent the very best values in the industry, making them the top choice of discerning customers in the long run. Enhance your embroidery operation and experience real-world savings of time and money every day by using Allied embroidery frames, as thousands of other embroiderers do all over the world!



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# Midwest Products

## Home of the HoopMaster

By Jesse Mack

**Midwest Products is a family owned company. Jesse, Tiffany, Charlie, Margie and Andy Mack have been in the embroidery industry since 1983.**

Our company started as a small home embroidery business called **Midwest Embroidery**. It quickly grew into a large embroidery company that did contract embroidery for companies like McDonalds, Coca-Cola, American Airlines, and even the Olympic Games.

We needed to be able to quickly and accurately hoop garments to keep our embroidery machines running. That led us to developing our own hooping device.

The idea of patenting and manufacturing the hooping device we developed never entered our minds until an embroidery machine dealer visited our shop. When he told us that all embroiderers could benefit from the device we had made for our own shop,

we did some research and found that there was a serious need for a hooping system that really worked.

### **A new name for the company**

In 1998, the **HoopMaster** was patented, and began being manufactured under our new company name, **Midwest Products**. The **HoopMaster** was so well received within the embroidery community, that in 2004 we needed to expand **Midwest Products** to a 16,000 square foot facility to keep up with demand.

Since 1998, we have sold over 50,000 hooping devices, and have exported our products to over 80 countries. Today, **HoopMaster** is the #1 selling commercial hooping system in the world.



## The Mighty Hoop

Knowing the demand for more intuitive hooping aids, in 2010, Midwest Products patented and introduced the Mighty Hoop to the embroidery industry.

Normal hoops weren't made with the intention of hooping items like thick work wear, horse blankets, leather, or delicate fabrics. The Mighty Hoop, a magnetic hoop, was designed to specifically address these issues, but also make normal, everyday hooping easier. The feedback we have received from customers using the Mighty Hoop has been extraordinary.

Although the HoopMaster and Mighty Hoop may seem like a significant investment, our customers find that our products help to keep the machines

running and reduce damaged garments. They are designed to make the hooping process quicker and more accurate. This all adds up to a quick return on their investment.

HoopMaster and Mighty Hoop work perfectly in small single head shops all the way to the largest production shops. They have been fully adopted by shops with over 600 embroidery heads.

## Still a family project

Currently, Midwest Products manufactures most parts for both the HoopMaster and Mighty Hoop in house and employs 20 full-time employees and 10 part time employees. Although the company continues to grow, we are proud that we remain a small, family-run operation.

It is our mission to invent and manufacture products to help the embroidery industry become more efficient, accurate and profitable!

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# How to

## make fixing stitches that avoid loops at the start of objects

In the following examples, the red dot indicates the very first stitch, the green dot indicates its running direction. The yellow/green dot is the start of the automatic object, when the yellow/red indicates an objects end.

### General solution:

- Make around 6 stitches of app. 0.7 mm length from right to left (see the red stitches)
- Make a back stitch and another one downwards over the first stitches



Figure 1 Fixing stitches in red with length on side

### If the object is small:

- Try to keep the fixing stitch area in the centre and the stitch length quite small (around 0.4-0.5mm)
- The very first stitches build a small triangle so that the first stitch (where the loop would appear) is covered by the third one going on top
- The triangle should be followed by a running stitch with quite small stitches, depending on the object (here a 2mm wide satin stitch has fixing stitches of around 0.4mm)
- The running stitches should go into the start of the object, so that they are immediately covered (satin direction marked in yellow)

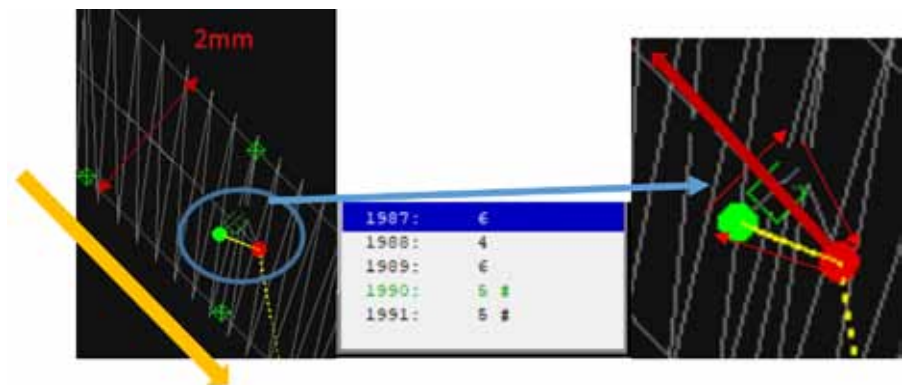


Figure 2 Fixing stitches before a 2mm satin stitch object    Figure 3 Close up of the start triangle

### If the objects ends in the start (complete shapes)

- Especially if the embroidery is done on slippery elastic, or thick material (e.g. a satin stitch onto leather on foam) the first stitches will be pulled out again “on the way back”
- Here a running stitch with small stitches goes over the whole corner and starts in the middle of the corner, so that a big area is “dragged down”
- In the following example, a stitching line has been placed over the entire start / end corner, so that the “pressed-down area is big enough and does not yield too much.
- This stitch line should end in the start of the object and this should cover the stitching line directly (the yellow arrow indicates the starting direction of the cover stitches)
- The following example shows a stepping line, that has been placed over the entire start / end corner, so that the “pressed-down area is big enough and does not yield too much.
- This stitch line should end at the start of the object and this should cover the stitching line directly (the yellow arrow indicates the starting direction of the cover stitches).

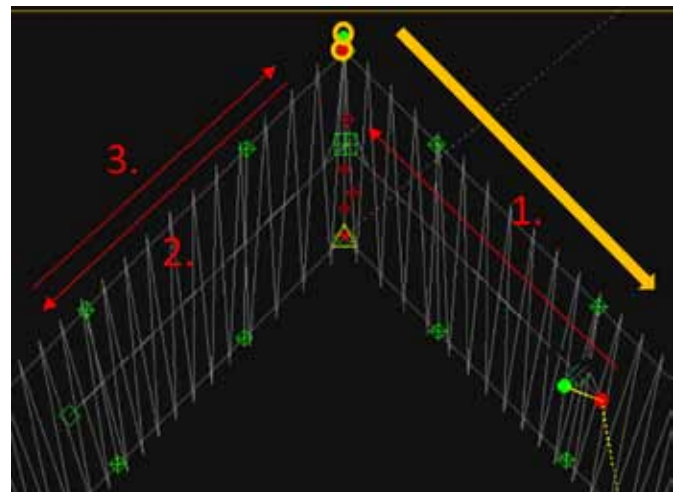


Figure 4 Fixing stitches are a complete running stitch over the start/end corner



---

# **TGEE Cutting Machine** **for Fleece**



## **Are you still cutting or are you already embroidering?**

**The cutting machine for your fleece cuts in one operation, which used to be time-consuming manual. Efficiency and competence go hand in hand here, you save a lot of time and unnecessary material loss with our fleece cutting machine.**

Our nonwoven cutting machines simultaneously cut six nonwoven rolls of 90 cm width or three nonwoven rolls with a width of 150 cm or more. In this way, you can fully automatically produce between 6,000 and 10,000 fleece blanks in one hour. This is cost-effective, time and material saving, quick and easy production for your embroidery business.

Rangable model, the upper table can be easily used as a work table. The fleece blanks can be used directly in your embroidery or stock and put on an order stick and produce immediately.

Your employees can fully concentrate on embroidery production and work efficiently.

Have we piqued your interest?? Let us inform and demonstrate you at our stand during the ZSK in-house exhibition.

TGEE International has been active in mechanical engineering for over 20 years, mainly in the textile sector. We develop our (patented) machines ourselves, produce in Holland, everything from one source!

Our machines are used in the industrial sectors of embroidery, automotive, textile & furniture.



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# Extensions T8-2

## Evolution 2016 to 2018

The control unit T8-2 is the main control of ZSK embroidery machines.

ZSK embroidery machines are valued and used all over the world. Of course, the T8-2 supports this with a user interface that can be viewed and operated in 13 different languages.

The languages are: German, English, Italian, French, Russian, Portuguese, Dutch, Spanish, Turkish, Polish, Hungarian, Greek and Bulgarian.

Just as diverse as the available languages are the data formats with which the T8-2 can work with:

Barudan (*.DSB)	Tajima (*.TBF)
Barudan (*.Uxx)	Tajima (*.DST)
Brother (*.PEC)	Tajima (*.EXX)
Brother (*.PES)	Zangs / Marco (*.DSZ)
Fortron (*.DSG)	Zangs / Marco (*.FXX)
Melco (*.EXP)	Zangs / Marco (*.ZSK)
Pfaff (*.KSM)	



### Integration of Auto Select Bobbin Changer

ZSK offers three types of bobbin changers, the 1-1 bobbin changer, the standard bobbin changer with space for 8 bobbin cases and the auto select bobbin changer with space for 8 bobbin cases.

The Auto Select Bobbin Changer knows the position of each bobbin at any time. Using this knowledge, one can match upper yarn and bobbin yarn via the T8 control unit. This enables one to combine thick upper yarn with thick bobbin yarn or to match colours of upper and bobbin yarn.

Spulenkapitelwechler V2								
Needel	zugeordnete Spulenkapitel							
	1	2	3	4	5	6	7	8
1	1	2	3	4	5	6	7	8
2	1	2	3	4	5	6	7	8
3	1	2	3	4	5	6	7	8
4	1	2	3	4	5	6	7	8
5	1	2	3	4	5	6	7	8
6	1	2	3	4	5	6	7	8
7	1	2	3	4	5	6	7	8
8	1	2	3	4	5	6	7	8
9	1	2	3	4	5	6	7	8
10	1	2	3	4	5	6	7	8
11	1	2	3	4	5	6	7	8
12	1	2	3	4	5	6	7	8
13	1	2	3	4	5	6	7	8
14	1	2	3	4	5	6	7	8
15	1	2	3	4	5	6	7	8
16	1	2	3	4	5	6	7	8

Grundstellung  #status #Spulenkapitel

Bestätigung  Zurück

1 2 3 4 5 6 7 8

Auto select bobbin changer assignment of bobbin cases to needles

## Loading of designs via network with barcode scanner

This functionality enables the operator to partially control the machine via a barcode scanner.

The barcode scanner can be used to load a design (without the need to press any buttons), via scanning a barcode the design can be turned 180° (i.e. for cap applications) and the design can be confirmed. Only for starting the embroidery process, the operator has to press the green button.

For detailed descriptions, please review the manual for this solution.



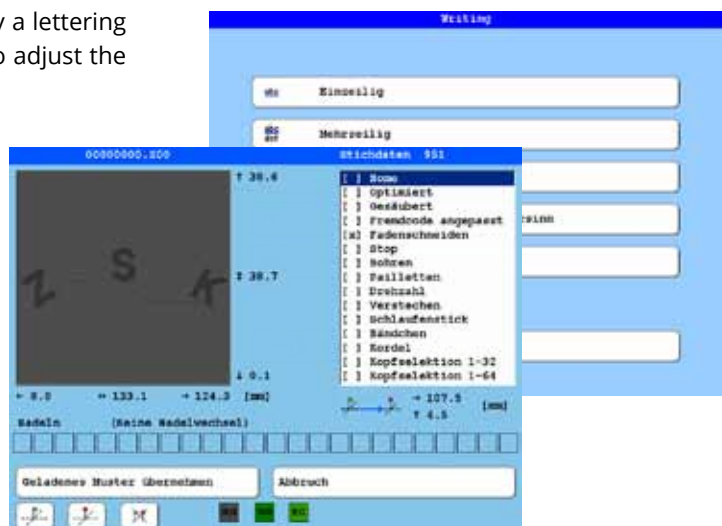
Supports design loading via network thru barcode functions

## ZSK Writing – creation of lettering within the T8-2

The T8-2 functionality has been extended by a lettering option with a few fonts, sizes and options to adjust the letters.

The offered solution is no replacement of BasePac lettering capabilities, but it can help when a quick solution is needed.

For detailed descriptions, please review the manual for this solution.



Writing, single and multi line, straight or curve arrangement

## Embroidery of Barcodes

ZSK Writing has been extended to create barcodes that can be embroidered.

After entering numbers or letters, the system creates the barcode as a stitch file. The file can then be stitched on a suitable fabric and can be used to mark products that require identification for follow up processes.



Writing, embroidery of barcodes

## Thread Cone and Design Matching

In combination with EPCwin integration, the machine can scan the barcodes on the yarn cone and can match the colours with the colour in the design.

For a detailed description, please read the article about this solution found earlier in this magazine.



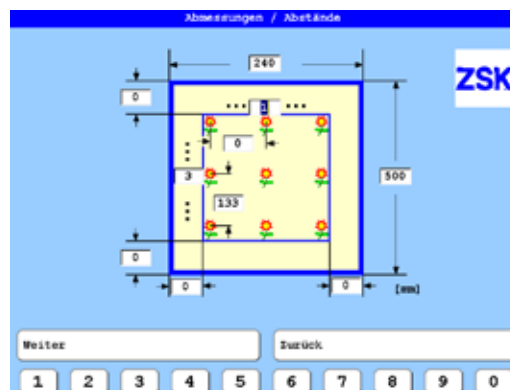
Supports thread cone matching system

## New Function – automatic design repetition XY with reference to design starting point

The automatic design repetition XY is used to bring two different designs in two processes onto a blank.

The process is the following: in step one, one embroiders a guideline with a starting point in the centre – with x columns and y rows – onto a carrier material in the border frame. These guidelines can now be used to place objects like appliques onto those positions. In step two, one embroiders the logo (with the same starting point) to decorate the applique. The same design repetition with the same number of columns and rows is used. The horizontal and vertical distances also must remain the same.

The existing design repetition does not allow this functionality, because the current functionality is used to fix the vertical and horizontal distance between designs. This distance is used to have sufficient space to cut the designs into pieces.



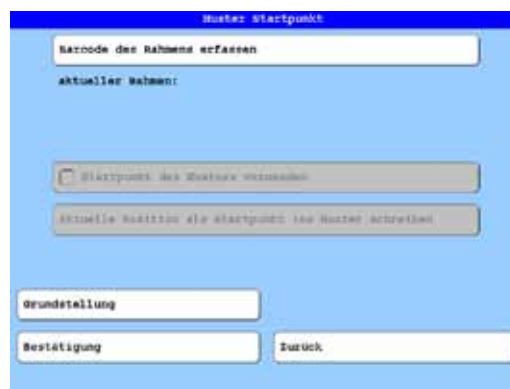
New automatic design repetition XY based on design starting point

## Save a starting point in a design

The T8-2 allows saving a starting point in a design.

When loading the design again, it can be embroidered at the same starting point. This information can also be transferred to another ZSK machine.

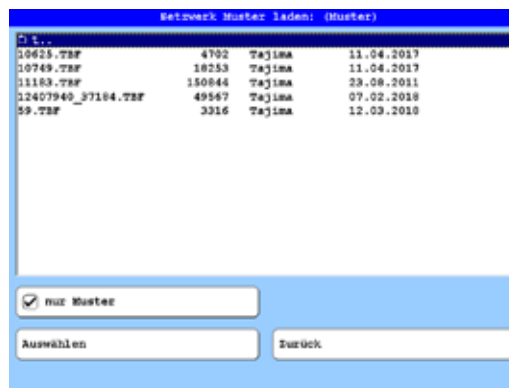
This feature only works on machines with the same head distance. When the information is transferred to a machine with a different head distance, the feature will not find the correct starting point.



Possibility to save the starting point in the design

## T8-2 supports Tajima TBF Code

The T8-2 now supports loading TBF codes.

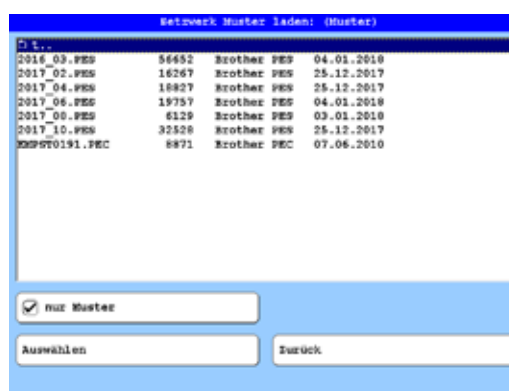


Supports Tajima TBF designs

## T8-2 supports Brother PEC and PES Code

For customers that have started originally with a Brother machine, switching to ZSK now becomes easier.

Another benefit is the free of charge design database from Brother online. These designs can be downloaded and run on the ZSK machine.



Supports Brother PEC and PES designs

## Support of Optical Positioning System 1

The OPS 1 is used on machines with ROLL2ROLL.

The system can recognize a part of an image (i.e. a woven emblem) and can then correctly place the embroidery file in x and y direction.



Supports OPS1 – Optical Positioning System 1

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## Support of Optical Positioning System 2 (ZSK Vision System)

The T8-2 supports the ZSK Vision System and allows the recognition of perforation, different colours or design elements.

The Vision System can relocate the design in x, y and z direction. When needed it can shrink or enlarge the design.

For this functionality the camera as well as a separate laptop with the Vision System software is required.



Supports OPS2 – Optical Positioning System 2

## Extension of Advanced Software Settings in the T8-2



Advanced software settings

## Support of new Colour Change System

ZSK has introduced a new (optional) colour change system on Challenger series machines. This system reduced the colour change time by about 75%.

The T8-2 now supports this feature.



# Legals

## Editor (V.i. S. d. P.)

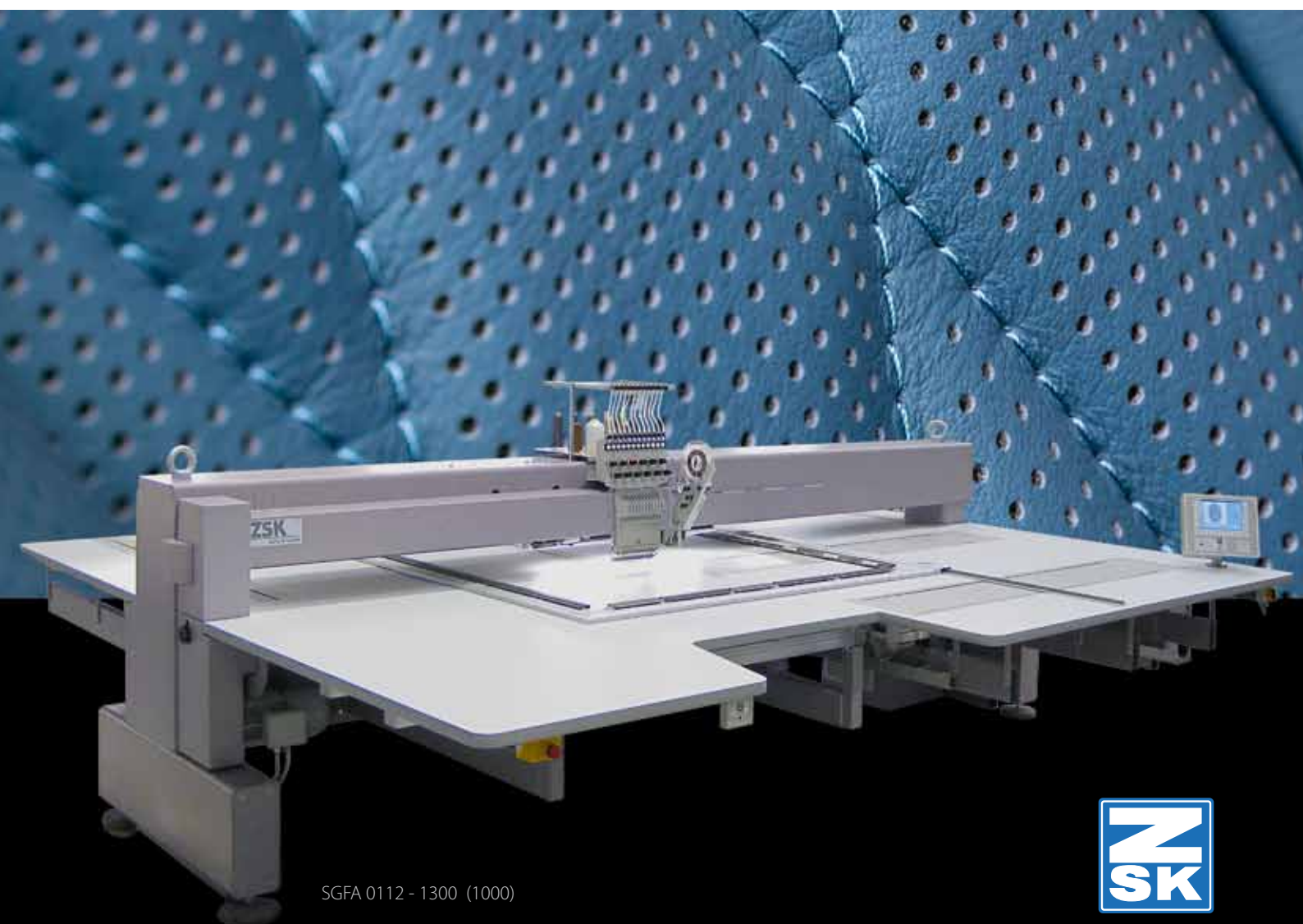
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IN  
GERMANY

**ZSK STICKMASCHINEN**

Computerized Embroidery Machines MADE IN GERMANY

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