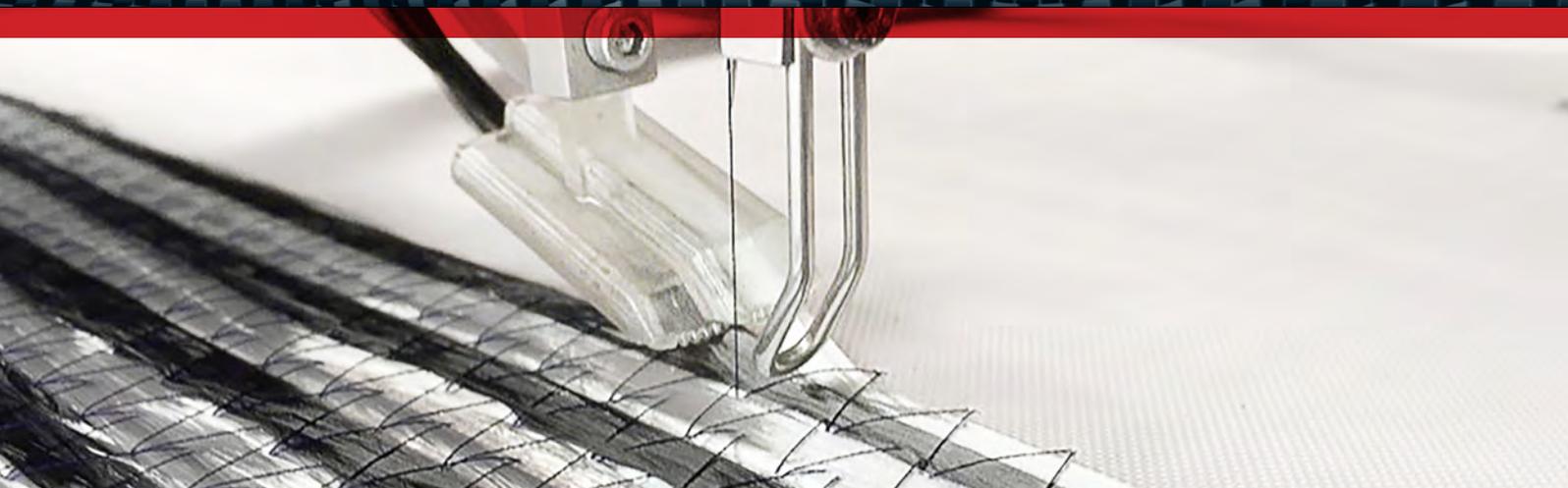


# TAILORED FIBER PLACEMENT (TFP)

Minimizing production time, waste and costs due to automated lay-up and precise fiber placement.





## TAILORED FIBER PLACEMENT (TFP)

Tailored Fiber Placement is a highly efficient method for creating automated composite lay-ups (TFP-preforms). The process offers numerous advantages compared to traditional methods.

- Drastically reducing waste of material, production costs and production time.
- High precise positioning of fibers making preforms with localized reinforced areas.
- Combining multiple fibers within the same preform.
- Create different thicknesses within the same preforms.
- Highly automated and scalable technology.
- Free orientation of fibers.

# PRODUCTION PROCESS



## TFP preforms

Automated composite preform lay-up via TFP technology on technical embroidery machine.



## STEP 1

## Molding

Turning TFP preforms into finished 3D components using different manufacturing techniques such as:

- Compression molding
- Resin transfer molding (RTM)
- Injection molding



## STEP 2



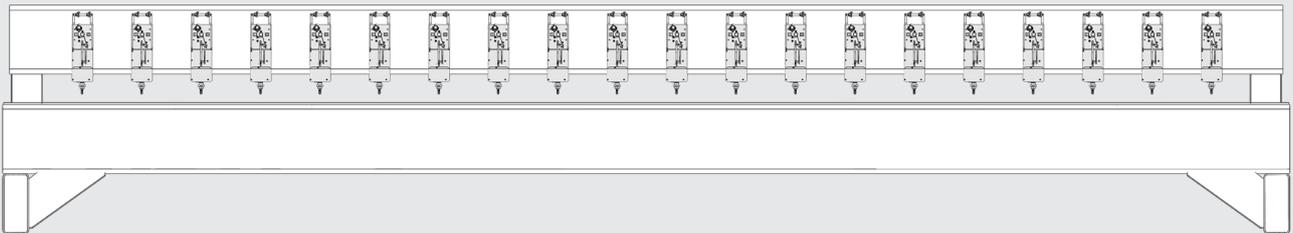
## HIGHLY SCALABLE PROCESS



### Scalability in quantity

- For mass production of relatively large components, 8-head or 10-head machines have been proven which can place 8 - 10 components at the same time.
- For smaller components, machines with up to 20 heads are available.

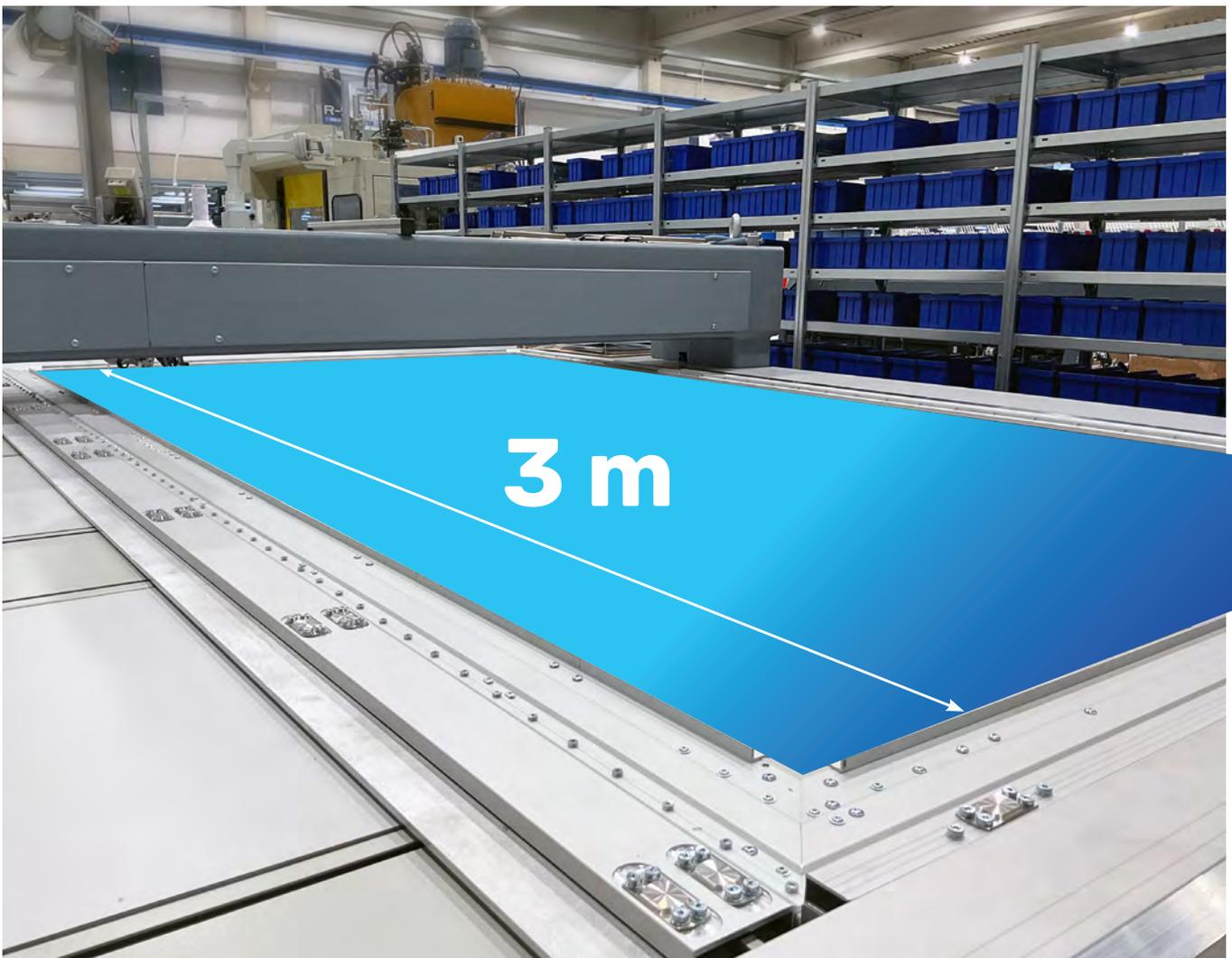
**up to 20** components at the same time

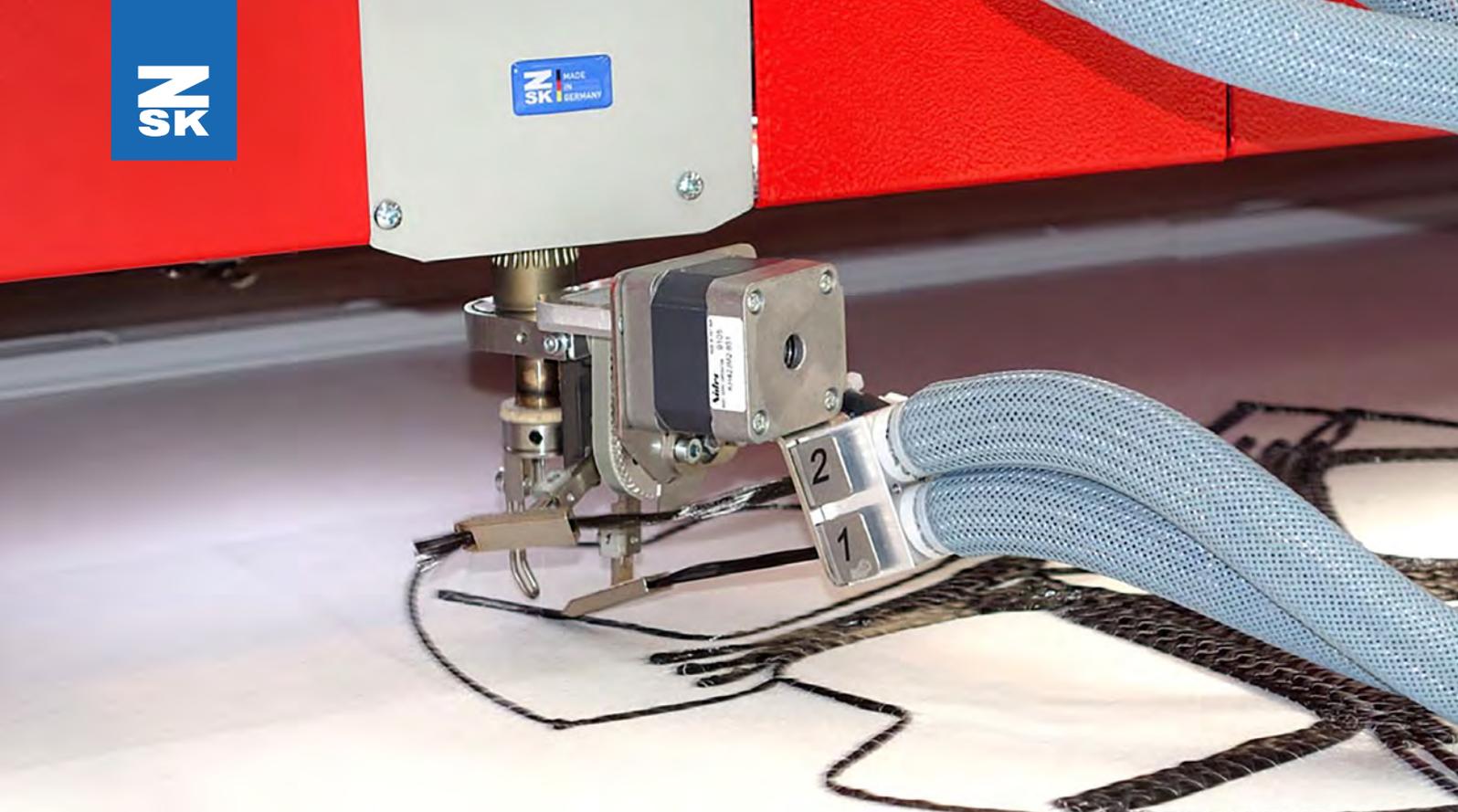


### Scalability in size

- ZSK offers machines with the largest laying field.
- The repertoire of ZSK technical embroidery machines ranges from the smallest TFP machine with a laying field of 600 x 400 mm to the largest of 3.000 x 2.100 mm.
- In case of multi-head machines, automatic head selection allows laying fields up to 7.200 x 3.000 mm.

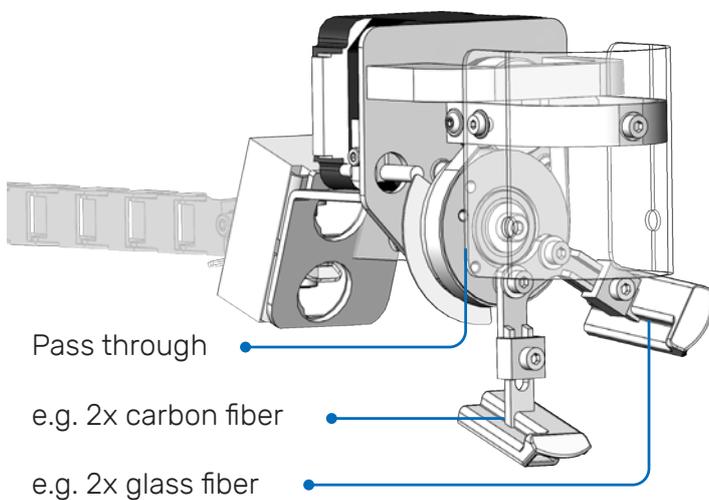
**up to 21,6 m<sup>2</sup>** possible laying field size





## SWITCHING BETWEEN FIBER STRANDS / MEDIA

- ZSK offers a patented method for automatic switching up to 4 fiber strands, which enables independent or parallel laying of fibers.
- Limitless selection of fiber type: carbon fiber, glass fiber, mineral fiber, natural fiber, thermoplastic fiber, commingled fiber.
- Automatic alternation enables integration of wires or fiber-optic cables.

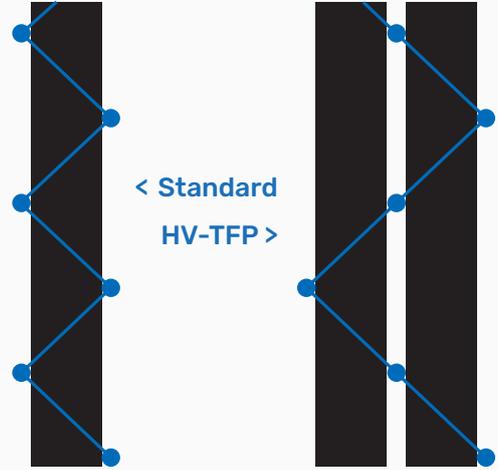


# HIGHLY EFFICIENT PROCESS

## High Volume - TFP (HV-TFP)

- ZSK, in collaboration with Nobrak SAS, has developed a patented process for the parallel placement of 2 or more fiber strands.
- The innovation doubles the placement volume of fiber strands, leading to a significant increase in productivity for mass production applications.

**200%** increase in volume



## Fast Fiber Laying

- Patented technology enables high-speed laying of fiber strands without stitches.
- Up to 8 layers can be laid at various angles; the last layer is fixed with continuous stitches, securing previous layers.

**75%** increase in output



## Combination of HV-TFP and Fast Fiber Laying

- The combination of HV-TFP and Fast Fiber Laying achieves performance increases of up to 300% compared to the conventional TFP technology.

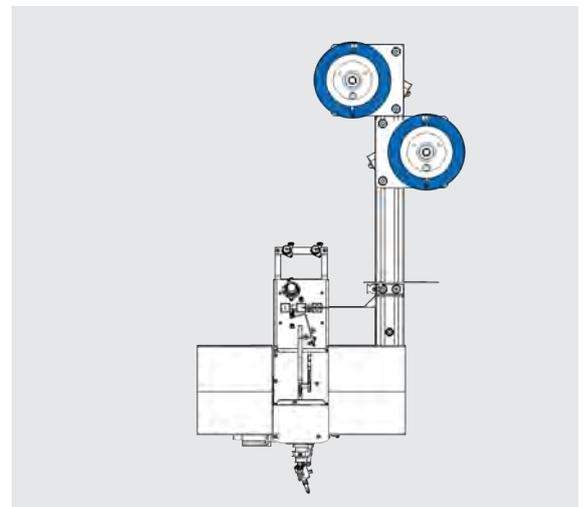
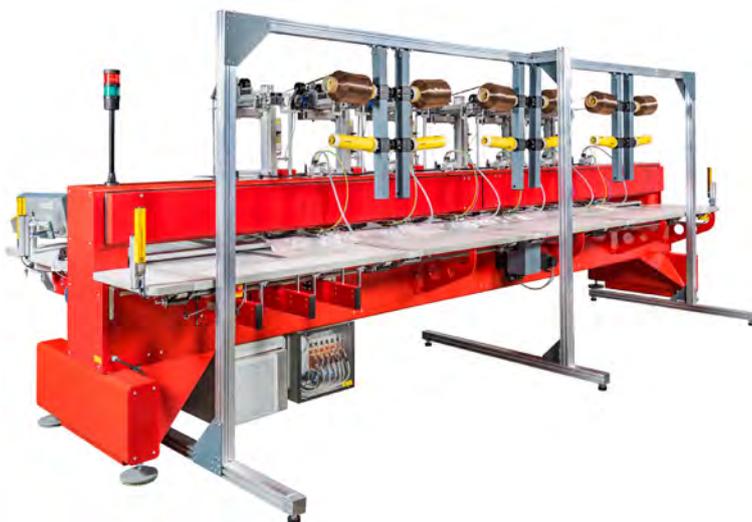
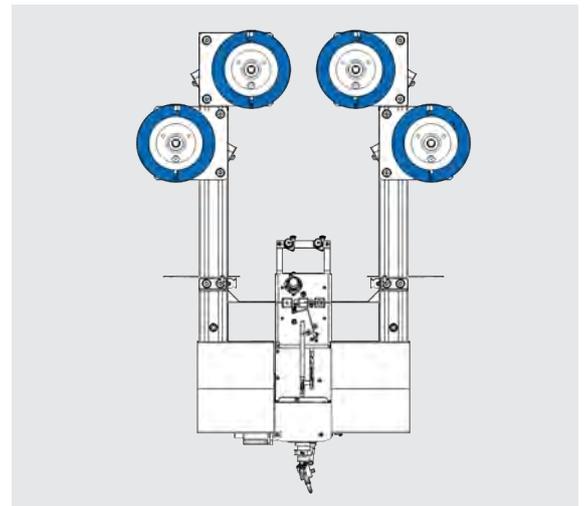
**300%** increase in performance





## MEDIA SUPPLY

- Up to 4 fiber strands per head can be fed via a rack from behind the machine.
- Ergonomic access for changing heavy fiber rolls.
- Active fiber take-off.
- Automatic material cutter.
- End-of-fiber detection.

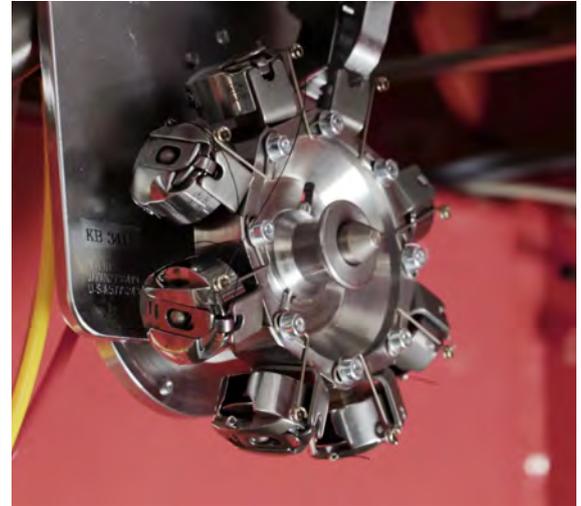


## AUTOMATED PROCESS

### Automatic bobbin changer

- The automatic bobbin changer has a magazine for 8 bobbins.
- In the T8-2 control unit you can set marker when bobbin changes should take place automatically.

**12%** increase in up-time



### Large capacity rotary hook and suitable Auto Select bobbin changer

- ZSK offers bobbins with about 50% more thread capacity compared to the ZSK standard bobbin.
- Even this standard bobbin offers more thread in comparison to competitors bobbins.

**50%** additional bobbin thread



### End of thread detection

- End of the thread is detected directly at the cone.
- Prevents need for new threading.
- Optimized upper thread guidance.
- Quick upgrade for existing machines.





## CONTINUOUS PRODUCTION

Various automation solutions enable laying up continuous fibers in a continuous production process.

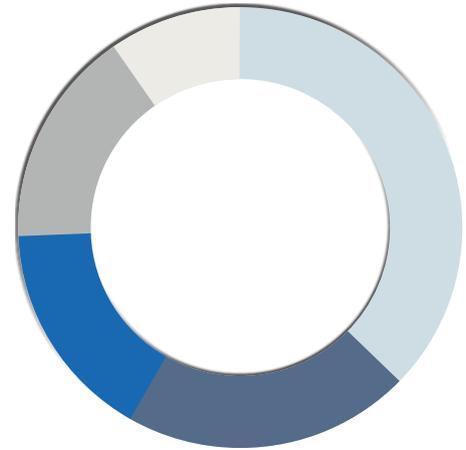
- Roll2Cut pull through system.
- Roll2Roll pull through from back to front and reverse.
- Pneumatic clamping system.
- Pneumatic fiber cutter.



## INDUSTRIES

ZSK has significantly advanced Tailored Fiber Placement (TFP) technology, making it appealing across various industries.

-  Research
-  Aerospace
-  Sports & Leisure
-  Automotive
-  General Industry



### JGW 0200-550D (700) Research

Heads:	2x W-Head
Head Distance:	550 mm / 21,6"
Max. Embroidery Field Width:	2x 550 mm / 21,6" 1x 1.100 mm / 43,3"
Max. Embroidery Field Depth:	700 mm / 27,6"
Max. Speed:	850 rpm
Machine Length:	3.400 mm / 133,9"
Machine Depth:	1.840 mm / 72,4"
Machine Height:	2.145 mm / 84,4"



### CMCW 0200-900D-2500 Aerospace

Heads:	2x W-Head
Head Distance:	900 mm / 35,5"
Max. Embroidery Field Width:	2x 900 mm / 35,5" 1x 1.800 mm / 71"
Max. Embroidery Field Depth:	2.500 mm / 98,4"
Max. Speed:	800 rpm
Machine Length:	5.690 mm / 224"
Machine Depth:	5.460 mm / 215"
Machine Height:	2.150 mm / 84,6"



### CMCW 0600-600-700

#### Automotive

Heads:	6x W-Head
Head Distance:	600 mm / 23,6"
Max. Embroidery Field Width:	6x 600 mm / 23,6"
Max. Embroidery Field Depth:	600 mm / 23,6"
Max. Speed:	850 rpm
Machine Length:	5.690 mm / 224"
Machine Depth:	1.860 mm / 73,2"
Machine Height:	2.150 mm / 84,6"



### CZCW 0800-900D-1500

#### Automotive

Heads:	8x W-Head
Head Distance:	900 mm / 35,5"
Max. Embroidery Field Width:	8x 900 mm / 35,5" 4x 1.800 mm / 71"
Max. Embroidery Field Depth:	1.500 mm / 59"
Max. Speed:	750 rpm
Machine Length:	11.560 mm / 455,1"
Machine Depth:	3.460 mm / 136,2"
Machine Height:	1.690 mm / 66,5"



### CZCW 0800-900D-2000

#### Automotive

Heads:	8x W-Head
Head Distance:	900 mm / 35,5"
Max. Embroidery Field Width:	8x 900 mm / 35,5" 4x 1.800 mm / 71"
Max. Embroidery Field Depth:	2.000 mm / 78,7"
Max. Speed:	850 rpm
Machine Length:	11.560 mm / 455,1"
Machine Depth:	4.460 mm / 175,6"
Machine Height:	1.690 mm / 66,5"



### **CZBW 1000-750D-1500+100** **Automotive**

Heads:	10x W-Head
Head Distance:	750 mm / 29,5"
Max. Embroidery Field Width:	10x 750 mm / 29,5" 5x 1.500 / 59"
Max. Embroidery Field Depth:	1.500 mm / 59"
Max. Speed:	800 rpm
Machine Length:	11.235 mm / 442,3"
Machine Depth:	4.460 mm / 215"
Machine Height:	2.100 mm / 82,7"



### **CZCW 0800-900D-1500** **General Industry**

Heads:	8x W-Head
Head Distance:	900 mm / 35,5"
Max. Embroidery Field Width:	8x 900 mm / 35,5" 4x 1.800 mm / 71"
Max. Embroidery Field Depth:	1.500 mm / 59"
Max. Speed:	750 rpm
Machine Length:	11.560 mm / 455,1"
Machine Depth:	3.460 mm / 136,2"
Machine Height:	1.690 mm / 66,5"



### **CMCW 0600-600-700** **Sports Industry**

Heads:	6x W-Head
Head Distance:	600 mm / 23,6"
Max. Embroidery Field Width:	6x 600 mm / 23,6"
Max. Embroidery Field Depth:	600 mm / 23,6"
Max. Speed:	850 rpm
Machine Length:	5.690 mm / 224"
Machine Depth:	1.860 mm / 73,2"
Machine Height:	2.100 mm / 82,7"





## ZSK SERVICE AND SUPPORT

Behind the success of ZSK's technical embroidery machines is a team with many years of experience. We do not only sell a machine, we are ready to share our experience with our customer.

Because only the success of our customers ultimately leads to our success.

- Exchange of knowledge
- Training
- Prototyping
- Production support

## UNWIND3D a division of ZSK

Discover UNWIND3D - materials, engineering, machinery - you partner for bespoke manufacturing solutions for advanced thermoplastic composites.

### Get in touch

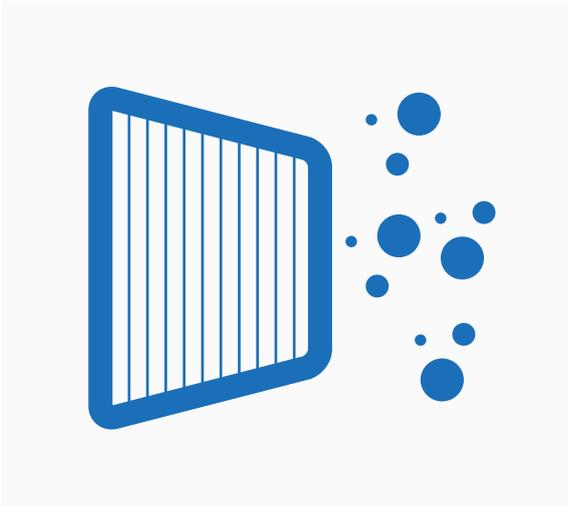
Unwind3D Srl  
Via Boccaccio 8, 21010 Arsago Seprio (VA), Italy  
info@unwind3d.com



Unwind 3D Website

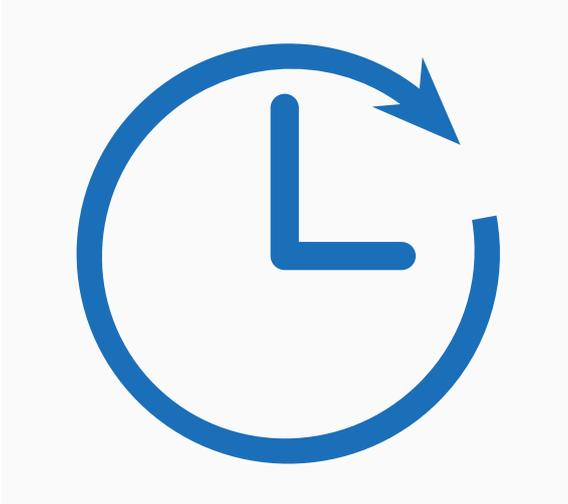
**Carbon protection of the electronics**

- The electronics of the machine are protected against carbon dust by filters and other preventions.



**Reliability**

- ZSK technical embroidery machines are developed and manufactured in Krefeld. Machines Made in Germany.
- Decades of reliable operation in 24/7 production is not uncommon.



**Decades** of 24/7 usage



ZSK Website



Youtube



Catalogs

# ZSK PASSION 4 EMBROIDERY



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ZSK\_Stickmaschinen



zskfilm



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