WELDING

A SEAMING ALTERNATIVE?
Contents of Presentation

- Sewing vs. Welding
- Weldability
- Available Technologies
- Applications
- Possibilities
- Limitations
Sewing vs. Welding

Common Aim:

Permanently join material plies together
Sewing vs. Welding

Differences

Sewing is continuous joining of two or more plies of material by penetrating the material with a needle and use of a third material (thread) to join.

The seam is elastic!
Sewing vs. Welding

Differences

Welding is clocked or continuous joining of two plies of material by liquefying the material and pressing it together. Material is not penetrated and no third material (thread, glue) is required. The seam has limited elasticity.
Weldability

What Materials can be welded?

“All flexible, laminar thermoplastics”
Weldability

What are thermoplastics?

“All plastics that liquefy when exposed to heat”

Such as

PVC (Polyvinyl chloride)
PU (Polyurethane)
PA (Polyamide / Nylon)
PES (Polyester)
PE (Polyethylene)
PP (Polypropylene)
Weldability

Thumb Rule

“You can only weld materials of the same type!”

Weldable:
PES with PES, PVC with PVC, etc.

Not weldable:
PES with PVC, PU with PES, etc.
Weldability

Welding Parameters
(Only for continuous welding processes in apparel manufacturing)

1. Heat
2. Pressure
3. Speed
Available Technologies

Hot Wedge

- Upper Feeding Wheel
- Lower Feeding Wheel
- Heating Element
- Upper Material Ply
- Lower Material Ply
Available Technologies

Hot Air

Upper Feeding Wheel

Lower Feeding Wheel

Upper Material Ply

Heating Element

Lower Material Ply
Available Technologies

Hot Air Tape Welding
(Seam Sealing)

- Upper Feeding Wheel
- Lower Feeding Wheel
- Heating Element
- Sealing Tape
- Sewn Material (Seam)
Available Technologies

Ultrasound

Anvil Wheel (Upper Feeding Wheel)

Sonotrode or Horn (Lower Feeding Wheel)

Upper Material Ply

Lower Material Ply
Available Technologies

Ultrasound (Available Sonotrodes)

Vertically rotating sonotrode and anvil wheel
35kHz technology
Inaudible to the human ear

Standing sonotrode and vertically rotating anvil wheel
20kHz technology
Audible to the human ear
Potentially noxious effect!

Horizontally rotating sonotrode and vertically rotating anvil wheel
20kHz technology
Audible to the human ear
Potentially noxious effect!
Available Technologies

Ultrasound (Welding Methods)

- Regular Welding
- Cut and Seal
- Dual System: Cut and Seal with simultaneous welding
## Available Technologies Differences

<table>
<thead>
<tr>
<th>Available Technologies</th>
<th>Hot Wedge</th>
<th>Hot Air</th>
<th>Ultrasonic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fabric thickness</strong></td>
<td>0.2mm – 2.0mm</td>
<td>0.2mm – 2.0mm</td>
<td>0.05mm – 0.4mm</td>
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<tr>
<td><strong>High seam strength</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Welding only</strong></td>
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### Available Technologies

#### Hot Wedge
- Low fume emission (esp. on PVC)
- Very low noise emission
- Low air consumption

#### Hot Air
- Very fast
- Very little wear
- Very simple adjustments
- Advantageous for cross seams

#### Ultrasonic
- Inaudible (35kHz technology only)
- Instant heat and cool off
- Easy handling
## Available Technologies

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<tr>
<td><strong>Cons</strong></td>
<td>Requires precise setting</td>
<td>Comparatively high fume emission (PVC)</td>
<td>Processing heavier fabric is difficult</td>
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<tr>
<td></td>
<td>Wedge needs to be replaced annually</td>
<td>Comparatively high noise emission</td>
<td>Cross seams and T-seams difficult</td>
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<td>Cross seams and T-seams difficult</td>
<td>High air consumption</td>
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Applications in Apparel Manufacturing

 Seam Sealing:

- Outdoor Clothing (e.g. Goretex®)
- Protective Clothing (Hazmat Suits)
- Survival Gear
- Shoe Manufacturing
Applications in Apparel Manufacturing

Ultrasonic Welding:

- Outdoor Clothing
- Sportswear / Active Wear
- Protective Clothing (Hazmat Suits)
- Survival Gear
- Medical Garments
- Lingerie, Bras
Possibilities

• Creating a water- and airtight seam

• Programming of seam sequences with different seam values / parameters

• Reproducible seam settings (especially for safety relevant seams, e.g. on Hazmat suits)

• Settings are transferable from machine to machine
Limitations

• Welding more than two plies of material is difficult

• It is not possible to join different materials

• Binding or hemming of material is difficult
WELDING

A SEAMING ALTERNATIVE!
Welding – A Seaming Alternative

Contact Information:

DAP America, Inc.
Patrick Weissgerber

Phone: 770 446 8162, ext. 1140
Cell 770 344 8501

Pweissgerber@dapamerica.com