WELDING

A SEAMING ALTERNATIVE?
Contents of Presentation

- Sewing X Welding
- Weldability
- Available Technologies
- Applications
- Possibilities
- Limitations
Sewing  X  Welding

Common Aim:

Permanently join material plies together
Sewing X 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 X 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)

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

Ultrasonic

- Anvil Wheel (Upper Feeding Wheel)
- Sonotrode or Horn (Lower Feeding Wheel)
- Upper Material Ply
- Lower Material Ply
Available Technologies

Ultrasonic - 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

Ultrasonic - Welding Methods

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

<table>
<thead>
<tr>
<th>Available Technology</th>
<th>Fabric Thickness</th>
<th>Seam Strength</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Wedge</td>
<td>0.2mm – 2.0mm</td>
<td>High</td>
<td>Welding only</td>
</tr>
<tr>
<td>Hot Air</td>
<td>0.2mm – 2.0mm</td>
<td>High</td>
<td>Welding only</td>
</tr>
<tr>
<td>Ultrasonic</td>
<td>0.05mm – 0.4mm</td>
<td>Average</td>
<td>Welding only</td>
</tr>
</tbody>
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- **Cut and Seal**: Simultaneous Welding and Cut and Seal
# Available Technologies

<table>
<thead>
<tr>
<th>Pros</th>
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<tbody>
<tr>
<td><strong>Hot Wedge</strong></td>
</tr>
<tr>
<td>Low fume emission (esp. on PVC)</td>
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<tr>
<td>Very low noise emission</td>
</tr>
<tr>
<td>Low air consumption</td>
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<tr>
<td><strong>Hot Air</strong></td>
</tr>
<tr>
<td>Very fast</td>
</tr>
<tr>
<td>Very little wear</td>
</tr>
<tr>
<td>Very simple adjustments</td>
</tr>
<tr>
<td>Advantageous for cross seams</td>
</tr>
<tr>
<td><strong>Ultrasonic</strong></td>
</tr>
<tr>
<td>Inaudible (35kHz technology)</td>
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<tr>
<td>Instant heat and cool off</td>
</tr>
<tr>
<td>Easy handling</td>
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</tbody>
</table>
## Available Technologies

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

Seam Sealing:

- Outdoor Clothing
- 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!
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