Maschinenfabrik Herbert Meyer GmbH

Composites Europe 2013

Scattering, sintering and laminating of carbon multi-layered lattice

Stuttgart

17 Sep - 19 Sep 2013
Contents

Scattering:
  • Technology

Sintering / Tempering:
  • Technology

Scattering / Sintering:
  • Process

Laminating:
  • Technology
  • Process
Contents

Scattering:
  • Technology

Sintering / Tempering:
  • Technology

Scattering / Sintering:
  • Process

Laminating:
  • Technology
  • Process
Perfect drops
Technologie Scattering

Apply powder

- Specified weight per m²
- Equal distribution
- Flexible adjustments
  - Weight
  - Quantity
- Adjustable width
- Repetituous accuracy
Principe Scatterer

- Powder reservoir
- Ductor blade
- Quick change beam
- Brush beam
- Fill level sensor
- Scattering roller
- Quick change roller
Fine adjustment
Contents

Scattering:
  • Technology

Sintering / Tempering:
  • Technology

Scattering / Sintering:
  • Process

Laminating:
  • Technology
  • Process
Melt powder

- Right Temperatur
- Equal distribution
- Repetitious accuracy
Heating fields

- 12 Single IR heater
- Special for carbon
- Monitoring for defects
Heating area „cross run direction“
- Main zone with two pyrometers
- Edge zone with one pyrometer

Heating area „run direction“
- For smoother heating
- Better control of melting
Contents

Scattering:
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Sintering / Tempering:
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Scattering / Sintering:
• Process

Laminating:
• Technology
• Process
Suction IR
Suction scatterer
Automatic refill
Contents

Scattering:
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Sintering / Tempering:
  • Technology

Scattering / Sintering:
  • Process

Laminating:
  • Technology
  • Process
Double belt press (classic)

- Teflon belt top
- Heating top
- Material 1
- Material 2
- Material 3
- Heating bottom
- Teflon belt bottom
- Cooling top
- Cooling bottom

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Parameter double belt press 1

Temperature

Run direction

$T \, [\degree \text{C}]$

$X \, [\text{mm}]$

top

bottom
Parameter double belt press 2

Pressure

Run direction

![Diagram of pressure distribution](image)

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Parameter double belt press 3

Time
Interval
Contact
Contact Plus

KFK-E
KFK-EL
KFK-X
A  Hight adjustment 0mm – 150mm
B  Level –3mm - +7mm
C  Ref. hight heating register
D  Spring loaded heating elements
E  Pneumatic pressure generation

Reference level
Contents

Scattering:
  • Technology

Sintering / Tempering:
  • Technology

Scattering / Sintering:
  • Process

Laminating:
  • Technology
  • Process
Hardware

- Unwinding device for carbon
- Powder scatterer
  - Thermoplastic powder
  - Epoxid powder
- Standard double belt press
- Upwinding device / Cutter
**Precoating 2**

**Items**
1.0 Unwinding device  
2.0 Powder scatterer  
3.0 Double belt press  
4.0 Upwinding device
Hardware
• Standard double belt press

Means
• Several layers of precoated material
Hardware

- Unwinding device for carbon tapes
- Standard double belt press
- Upwinding device
Thermo bonding 2
Impregnation 1

Means
• Organosheet with thermoplastic matrix

Hardware
• Double belt press KFK-P
Hardware
• Precoating
• Unwinding device bottom
  Thermoplastic
• Unwinding device top
  Thermoplastic
• Unwinding device mid
  CFK
• Standard double belt press
• Upwinding device / cutter
Problem

- Top and bottom heating

Vacuum double belt press

Standard double belt press
Impregnation 4

Vacuum double belt press

KFK-V

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## Comparison

<table>
<thead>
<tr>
<th></th>
<th>Sintering Scattering</th>
<th>Laminating „classic“</th>
<th>Laminating „vacuum“</th>
<th>Laminating „high pressure“</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Width</strong></td>
<td>400mm – 5000mm</td>
<td>400mm – 3100mm</td>
<td>600mm – 1200mm*</td>
<td>1100mm – 2100mm*</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td>-</td>
<td>0mm – 150mm</td>
<td>1mm – 6mm</td>
<td>0mm – 150mm</td>
</tr>
<tr>
<td><strong>Gap</strong></td>
<td>-</td>
<td>0mm – 150mm</td>
<td>-</td>
<td>0mm – 150mm</td>
</tr>
<tr>
<td><strong>Level</strong></td>
<td>-</td>
<td>-3mm - +7mm</td>
<td>-</td>
<td>-5mm - +5mm</td>
</tr>
<tr>
<td><strong>Area pressure</strong></td>
<td>-</td>
<td>0,2N/cm² – 1N/cm²</td>
<td>0N/cm² – 8N/cm²</td>
<td>0,2N/cm² – 10N/cm²</td>
</tr>
<tr>
<td><strong>Linear pressure</strong></td>
<td>-</td>
<td>Up to 60N/cm²</td>
<td>Up to 5,5N/mm**</td>
<td>Up to 205N/mm**</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>1 – 30m/min***</td>
<td>0,5 – 25m/min***</td>
<td>0,1 – 7m/min***</td>
<td>0,1 – 10m/min***</td>
</tr>
</tbody>
</table>

* Larger working width on inquiry  
** Nip roller steel/steel  
*** Depending on process