Friction Spot Joining (FSpJ) of Polymer-Metal Hybrid Structures

**Motivation**

- Increased use of polymer-metal hybrid structures in the transportation industry
- Available joining methods for those structures are either complex, expensive or not environmental friendly
- Process Advantages: high energy efficiency, reduced process steps, short welding cycles

**Friction Spot Joining**

RPS 100 – Friction Spot Welding/Joining Machine and tools used in this work

**Joint Properties and Characteristics**

**MICROSTRUCTURE**

- Mechanical interlocking at the P/M interface
- Adhesion forces between consolidated polymer and metal

**PPS-Carbon Fiber / AAM754-H24**

**Joining Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rot. Speed</td>
<td>950-3000 rpm</td>
</tr>
<tr>
<td>Joining Time</td>
<td>1.5-10 s</td>
</tr>
<tr>
<td>Plunge Depth</td>
<td>0.25-0.5 mm</td>
</tr>
<tr>
<td>Holding Pressure</td>
<td>2-3 bar</td>
</tr>
</tbody>
</table>

**SHEAR STRENGTH**

Lap-shear Strength of FSpJ Polymer-Metal Joints compared to joints produced by other joining technologies.

**Final Remarks**

- The new Friction Spot Joining is an alternative technology for Thermoplastic, CFRP/ Al, Mg Hybrid Joints
- Strong joints produced within fast joining cycles without complex surface preparation.
- Bonding mechanisms relying on mechanical interlocking and adhesive forces