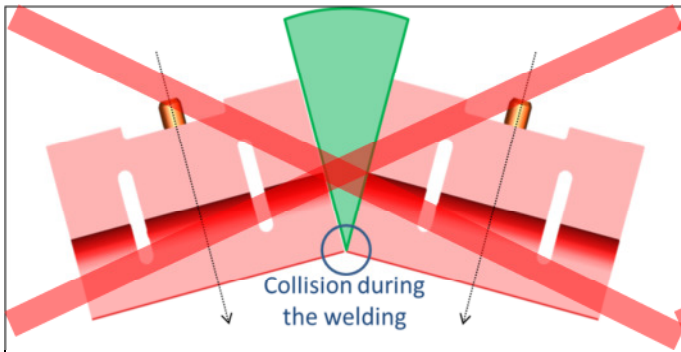
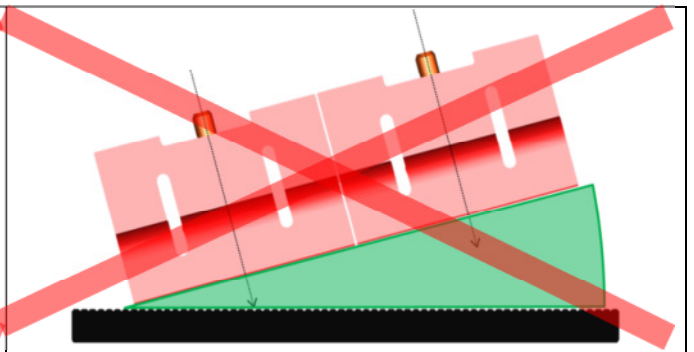

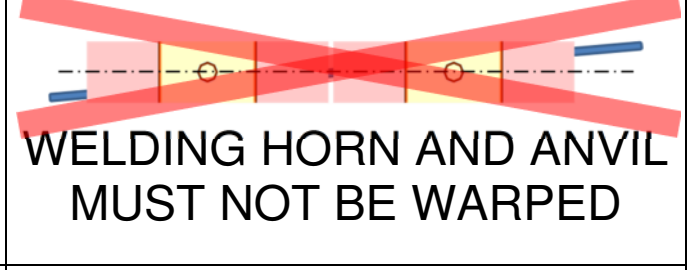
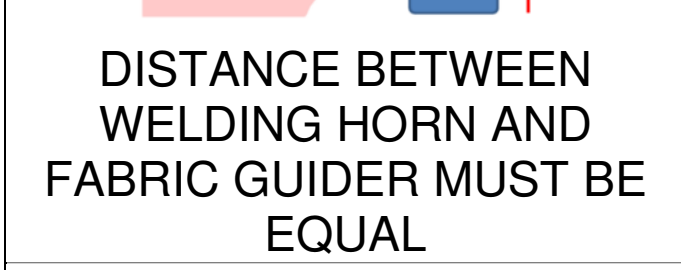

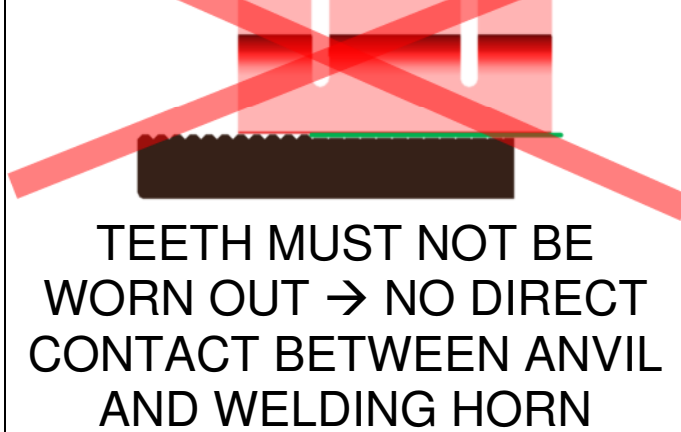

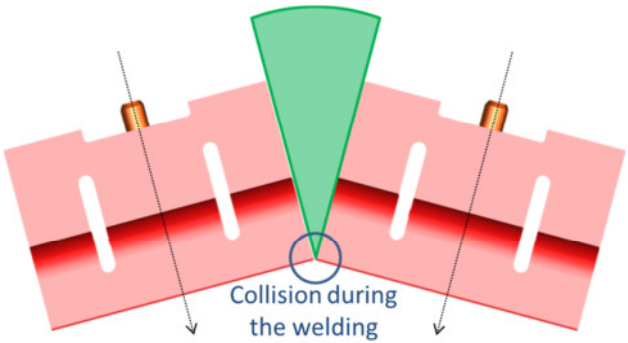
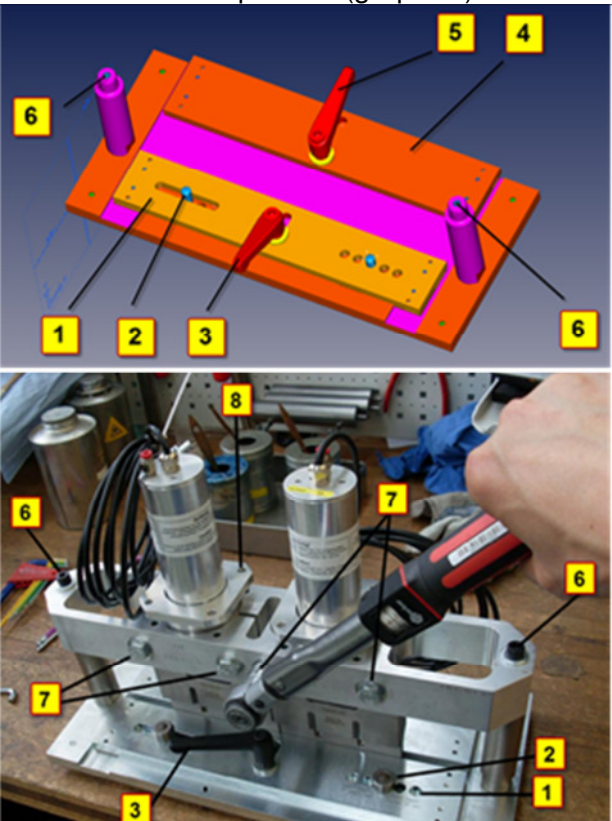


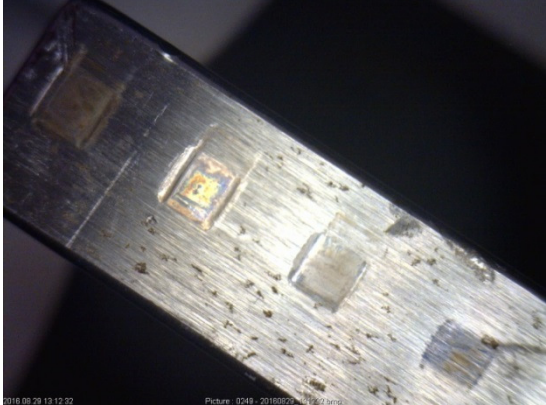
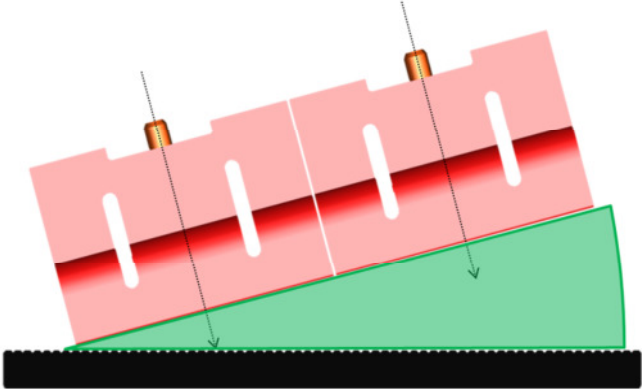
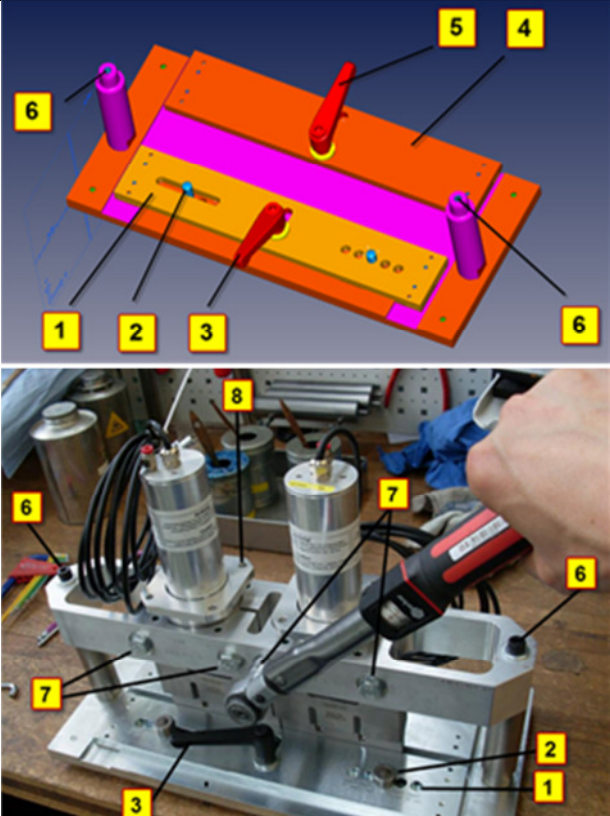
Welding Horn Failures

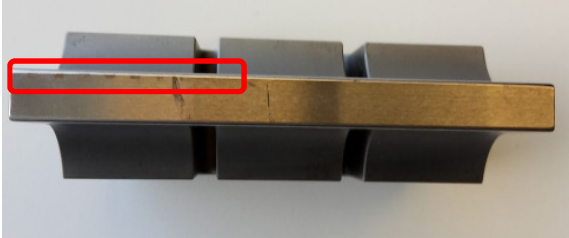
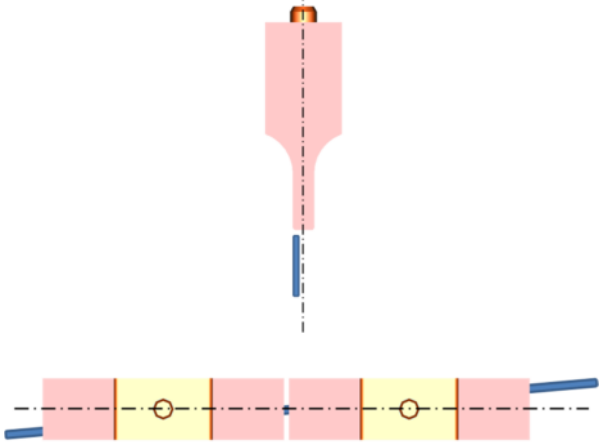
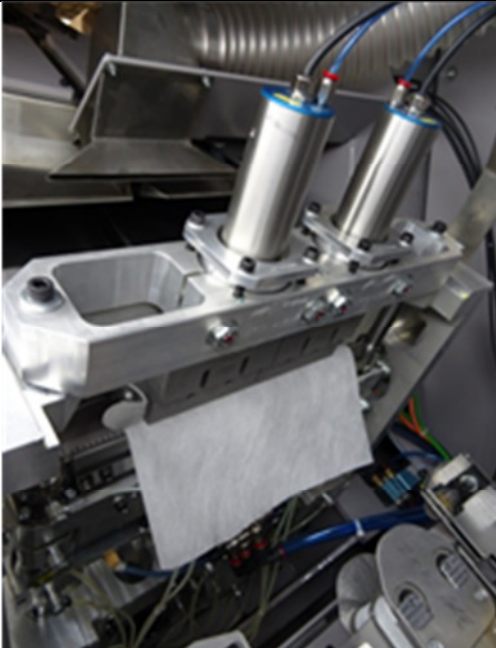
Due to several complains about catastrophic welding horn failures within only little days of production, Spühl GmbH examined together with SwissSonic failed parts and examined the reasons for failing. From these experiences, the following “lessons learned” points were derived:


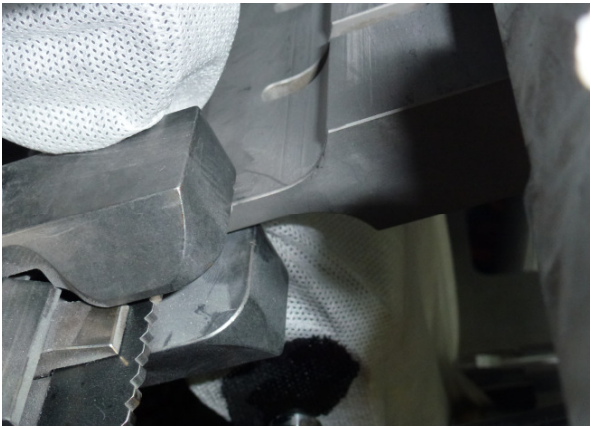
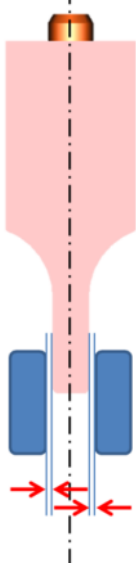
 <p>Collision during the welding</p>	
<p>WELDING HORNS HAVE TO BE PARALLEL</p>	<p>WELDING SURFACE HAS TO BE PARALLEL TO ANVIL</p>
	
<p>WELDING HORN AND ANVIL HAVE TO BE CENTERED</p>	<p>WELDING HORN AND ANVIL MUST NOT BE WARPED</p>
	
<p>DISTANCE BETWEEN WELDING HORN AND FABRIC GUIDER MUST BE EQUAL</p>	<p>PREVENT WIRE BETWEEN WELDING HORN AND ANVIL</p>
	
<p>TEETH MUST NOT BE WORN OUT → NO DIRECT CONTACT BETWEEN ANVIL AND WELDING HORN</p>	

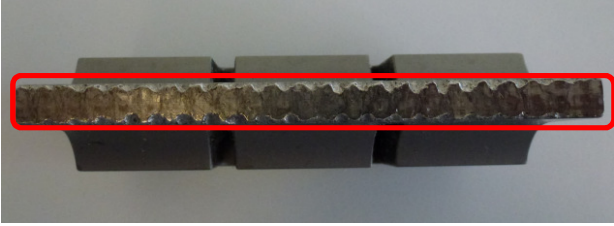
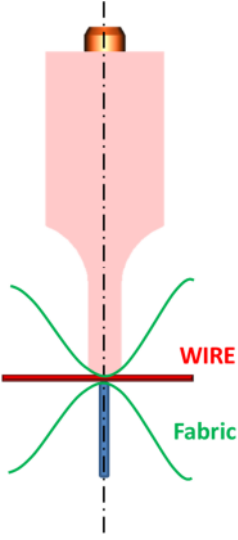
For Details – see below...

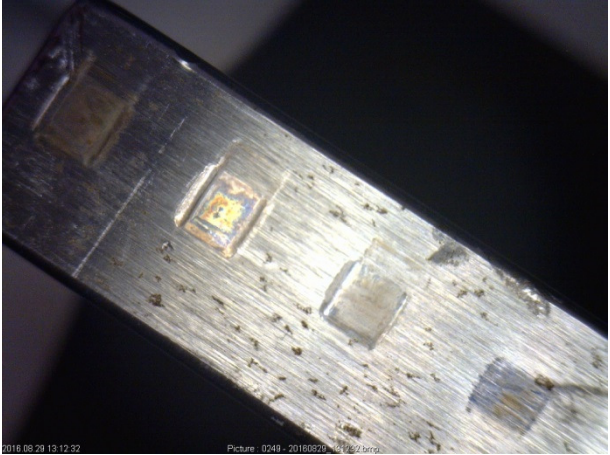
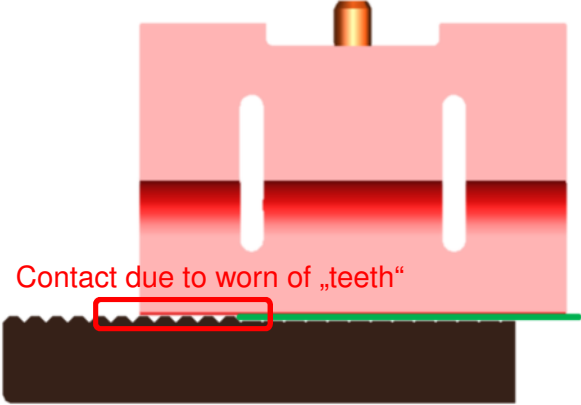
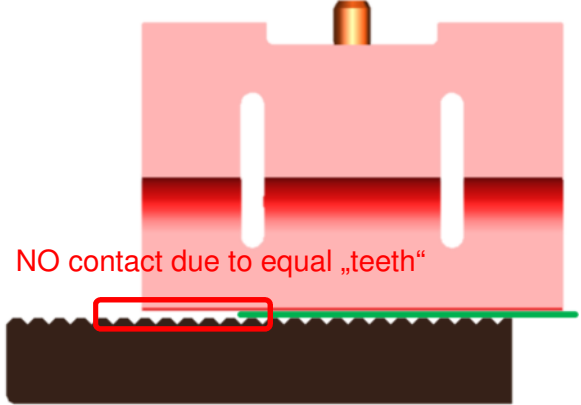
Mode of failure (description)	Mode of failure (picture)
<p>Corners of the welding surface get too hot → discoloration and crack starting.</p> <p>Error from the booster and the control because no proper resonance vibration can be reached.</p> <p>Corners would start break pretty soon.</p>	
Most probably cause of failure (description)	Most probably cause of failure (graphics)
<p>Instead of the two welding horns being installed parallel, there is an angle between the two horns.</p> <p>Even though they don't touch when they are not vibrating, with a positive amplitude of around 0.02 mm the gap might be too small, so there is contact between the two horns.</p>	
How to prevent (description)	How to prevent (graphics)
<p>Welding horns have to be installed 100% parallel to each other.</p> <p>Align welding horns / sonotrodes according the manual written by Spühl (Chapter 8.14.6 – newest version)</p> <p>Therefore use the special equipment from Spühl (part no 33.33588.40 (new version) for P-450)</p> <p>Procedure is explained in detail in chapter “8.14 Transverse welding equipment” in the Spühl manual for P-450</p>	

Mode of failure (description)	Mode of failure (picture)
<p>There are grooves caused by the anvil → the grooves are not over the whole width visible. On one side there are only small marks – on the other are deeper grooves</p>	
Most probably cause of failure (description)	Most probably cause of failure (graphics)
<p>The anvil and the welding horns are not perfectly aligned in a parallel way. There is an angle between the welding surface and the anvil surface</p>	
How to prevent (description)	How to prevent (graphics)
<p>Align welding horns / sonotrodes according the manual written by Spühl (Chapter 8.14.6 – newest version)</p> <p>Therefore use the special equipment from Spühl (part no 33.33588.40 (new version) for P-450)</p> <p>Procedure is explained in detail in chapter “8.14 Transverse welding equipment” in the Spühl manual for P-450</p>	

Mode of failure (description)	Mode of failure (picture)
<p>The welding horn is not aligned in the center towards the anvil. The anvil is off center and has only contact at the edge.</p>	
Most probably cause of failure (description)	Most probably cause of failure (graphics)
<p>Two possible errors can occur regarding the center line of the anvil.</p> <p>When the anvil is off center – there is an additional bending moment on the holding fixture and the welding horn at the screw position. When there is an additional angle between the center line of the anvil and the center line of the welding surface, the contact area is getting smaller and smaller. Therefore the contact stress is getting higher and higher.</p> <p>The result is a bad welding (if there is welding at all) and a failure of the welding horn after a short period of production</p>	
How to prevent (description)	How to prevent (graphics)
<p>The relative alignment between welding horn and anvil has to be checked in the machine after assembling all parts!</p> <p>The anvil has to be in the center of the welding surface when the device is closed!</p>	

Mode of failure (description)	Mode of failure (picture)
<p>Edge of the welding horn is braking off</p> <p>Scratches from contact to other tools on the side of the welding horn.</p>	
Most probably cause of failure (description)	Most probably cause of failure (graphics)
<p>There is contact between other machine parts and the welding horn.</p> <p>A sidewise contact between welding horn and machine parts are causing a catastrophic failure in a short period of time!</p>	
How to prevent (description)	How to prevent (graphics)
<p>Control the gap between machine parts (especially the tools to prevent "pig ears")</p> <p>The gap should be on both sides of the welding horn the same (with the current tools at least 1mm or more)</p>	

Mode of failure (description)	Mode of failure (picture)
<p>Surface of the welding horn has deep grooves on both edges – the distance is regular between each notch</p>	
Most probably cause of failure (description)	Most probably cause of failure (graphics)
<p>Spring is not positioned correctly – the wire is between the anvil and the welding horn...</p> <p>The anvil and the welding horn are pushed together with a high force – and the anvil starts vibrating. Due to the high Hertzian stress, the welding horn starts getting grooves.</p> <p>Over a long period of production – the regular pattern occurs caused by the probability of the position of the wire between anvil and welding horn...</p>	
How to prevent (description)	How to prevent (graphics)
<p>Try to prevent having a wire between anvil and welding horn by checking:</p> <p>fabric channel – and fabric guidance spring transport – and spring releasing into fabric channel</p>	<p>How to prevent (graphics)</p>

Mode of failure (description)	Mode of failure (picture)
<p>There are grooves cause by the anvil – but the grooves are not over the whole width of the welding surface the same</p> <p>Most of the times, the grooves start usually where the fabric ends.</p>	
Most probably cause of failure (description)	Most probably cause of failure (graphics)
<p>The anvil is worn out in a way, that in the middle position, the “teeth” are lower than at the end.</p> <p>This can result in a direct contact between anvil and welding horn, because the distance given by the fabric cannot prevent a direct contact.</p> <p>Direct contact between welding horn and anvil causes a huge stress which will cause a failure in a short amount of time!</p>	 <p>Contact due to worn of „teeth“</p>
How to prevent (description)	How to prevent (graphics)
<p>The anvil is the wear part of the whole system!</p> <p>It is highly recommended to change the anvil and assembly a new one each time the welding horn has to be replaced!</p> <p>A regular check of the wear of all teeth on the anvil is recommended each time a new fabric role is inserted!</p>	 <p>NO contact due to equal „teeth“</p>