CLAIMS

1. A method ~~Method~~ for joining of at least two materials, non-weldable directly to each other with thermal joining processes in a lap joint configuration, **characterized** in that a two-~~-~~step sequence is used consisting of a first step to apply a ~~thermomechanical or mechanical~~ surface protective aluminium ~~protection~~ layer by thermal spraying on the surface of a ~~(stainless)~~ steel substrate ~~(1)~~ and a second step, where a ~~thermal joining~~welding process is used to weld the ~~sprayed~~ protective layer ~~(2) with~~ to an applied aluminum, aluminum alloy, magnesium or magnesium alloy sheet ~~(3)~~ without having brittle intermetallic phases in the whole material configuration, the ratio of the thermally sprayed layer thickness to the reached spot weld diameter being lower or equal to 0.25 and the temperature in the contact area between the substrate and the thermally sprayed coating layer being below 350 °C.

~~2. Method according to the claim 1, **characterized** in that only the aluminium sprayed layer (2) to aluminium sheet (3) contact area melts without having brittle intermetallic phases in the contact zone between the aluminium sprayed layer (2) and the (stainless) steel substrate (1).~~

~~3~~2. ~~Method~~ The method according to the claim 1 ~~or 2~~, **characterized** in that the surface protective aluminium ~~protection~~ layer is carried out by a thermomechanical coating method.

~~4. Method according to the claim 1, 2 or 3, **characterized** in that the surface protection layer is carried out by a thermal spraying method.~~

~~5. Method according to any of the preceding claims 1 – 2, **characterized** in that the welding configuration is set-up as a lap joint.~~

~~6~~3. ~~Method~~ The method according to any of the preceding claims ~~1 – 5~~, **characterized** in that the ~~thermal~~ thermally sprayed layer ~~(2)~~ is aluminum, an aluminum based alloy or a combination of aluminum with carbides.

~~7~~4. ~~Method~~ The method according to any of the preceding claims ~~1 – 6~~, **characterized** in that the thermally ~~thermal~~ sprayed layer ~~(2)~~ is welded with the applied sheet ~~(3)~~ by a resistance welding method like weldbonding, spot welding, projection welding or roller seam welding.

~~8. Method according to any of the preceding claims 1 – 7, **characterized** in that the ratio of the thermal sprayed layer (2) thickness to the reached spot weld (4) diameter is lower or equal to 0.25 mm.~~

~~9~~5. ~~Method~~ The method according to any of the preceding claims ~~1 – 8~~, **characterized** in that the total sheet thickness including substrate ~~(1)~~, ~~thermal~~ thermally sprayed layer ~~(2),~~and applied sheet ~~(3)~~, is ~~between~~ from 1.5 mm up to 6.0 mm.

~~10~~6. ~~Method~~ The method according to any of the preceding claims ~~1 – 9~~, **characterized** in that the thickness of the thermally ~~thermal~~ sprayed layer ~~(2)~~ is from 0.25 up to 1.5 mm.

~~11. Method according to any of the preceding claims 1 – 10, **characterized** in that transition zone between thermal sprayed layer (2) and the base material is under 350 ºC.~~

~~12~~7. ~~Method~~ The method according to any of the preceding claims ~~1 - 11~~, **characterized** in that the substrate ~~(1)~~ to be ~~thermal~~ thermally sprayed is a carbon steel having the carbon equivalent (CEV) more than 0,65 %, where CEV is calculated using a formula (element contents by weight %) CEV = C + Mn/6 + (Cu + Ni)/15 + (Cr + Mo + V)/5.

~~13~~8. ~~Method~~ The method according to any of the preceding claims ~~1 - 12~~, **characterized** in that the substrate ~~(1)~~ to be ~~thermal~~ thermally sprayed is a carbon steel material, preferably carbon steel with a galvanized surface coating.

~~14~~9. ~~Method~~ The method according to any of ~~the preceding~~ claims 1 – ~~13~~7, **characterized** in that the substrate ~~(1)~~ to be ~~thermal~~ thermally sprayed is a stainless steel.

~~15~~10. ~~Method~~ The method according to any of the preceding claims ~~1 – 14~~, **characterized** in that the substrate ~~(1)~~ surface is pretreated by cleaning and blasting.