metallurgical integrity bond, but is very expensive. Mechanical cladding includes forming the cladding material into a tube, inserting this tube into the candidate pipe, and mechanically expanding the liner. This is a more cost effective method of lining pipe, but no metallurgical bond is formed between the liner and the substrate. Thus, there is an ongoing need for a more effective, less expensive method for creating clad pipe for use in oil and gas applications.

SUMMARY OF THE INVENTION

[0004] The following provides a summary of certain exemplary embodiments of the present invention. This summary is not an extensive overview and is not intended to identify key or critical aspects or elements of the present invention or to delineate its scope.

[0005] In accordance with one aspect of the present invention, a first system for creating a clad material is provided. This system includes at least one substrate; at least one cladding layer; at least one surface activation layer disposed between the at least one substrate and the at least one cladding layer; and a resistance seam welder, wherein the resistance seam welder is operative to generate heat and pressure sufficient to react the at least one surface activation layer and form a bond between the at least one substrate and the at least one cladding layer when the at least one surface activation layer is sufficiently cooled.

[0006] In accordance with another aspect of the present invention, a second system for creating a clad material is provided. This system includes at least one metal substrate; at least one oxidation and corrosion resistant cladding layer; at least one surface activation layer disposed between the at least one substrate and the at least one cladding layer, wherein the at least one surface activation layer further includes at least one ~~Ni-Cr-Fe-B~~ eutectic alloy; and a resistance seam welder. The resistance seam welder is operative to generate heat and pressure sufficient to ~~melt or otherwise~~ react the at least one surface activation layer and form a bond between the at least one substrate and the at least one cladding layer when the at least one surface activation layer is sufficiently cooled.

[0007] In yet another aspect of this invention, a clad material is provided. This clad material includes at least one substrate; at least one cladding layer; and at least one surface

activation layer disposed between the at least one substrate and the at least one cladding layer. The at least one surface activation layer is adapted to be responsive to a resistance seam welder, wherein the resistance seam welder is operative to generate heat and pressure sufficient to ~~melt or otherwise~~ react the at least one surface activation layer and form a bond between the at least one substrate and the at least one cladding layer when the at least one surface activation layer is sufficiently cooled.

[0008] Additional features and aspects of the present invention will become apparent to those of ordinary skill in the art upon reading and understanding the following detailed description of the exemplary embodiments. As will be appreciated by the skilled artisan, further embodiments of the invention are possible without departing from the scope and spirit of the invention. Accordingly, the drawings and associated descriptions are to be regarded as illustrative and not restrictive in nature.

DESCRIPTION OF THE DRAWINGS

[0009] The accompanying drawings, which are incorporated into and form a part of the specification, schematically illustrate one or more exemplary embodiments of the invention and, together with the general description given above and detailed description given below, serve to explain the principles of the invention, and wherein:

[0010] FIG. 1 is a first perspective view of a clad structure in accordance with an exemplary embodiment of the present invention;

[0011] FIG. 2 is a second perspective view of a clad structure in accordance with an exemplary embodiment of the present invention showing the placement of a welding wheel on the interior of the structure;

[0012] FIG. 3 is a third perspective view of a clad structure in accordance with an exemplary embodiment of the present invention showing the placement of a welding wheel on the interior of the structure, a welding wheel on the exterior of the structure, and a base plate and rollers on one end of the structure; and