CLAIMS

~~In the Claims~~

~~What is claimed is:~~

1. A tool joint, comprising:

a body having a central axis, a first end, and a second end opposite the first end, wherein the body is made of a first material having a first hardness;

an annular hardband disposed about the body, wherein the hardband extends radially from the body to an outer surface of the tool joint;

wherein the hardband is made of a second material;

wherein the second material comprises a base material and a plurality of discrete pellets dispersed throughout the base material, wherein the pellets are uniformly distributed throughout the base material of the hardband between the body and the outer surface of the tool joint;

wherein the base material has a second hardness and each pellet dispersed in the base material has a third hardness;

wherein the second hardness is substantially the same as the first hardness;

wherein the third hardness of each pellet in the base material is greater than the second hardness and less than the hardness of tungsten carbide.

2. The tool joint of claim 1, wherein the pellets are spherical.

3. The tool joint of claim 2, wherein each pellet has a diameter between 707 micron and 2000 micron.

4. The tool joint of claim 1, wherein the first material has a coefficient of thermal expansion, and wherein the base material of the hardband has a coefficient of thermal expansion that is within 10% of the coefficient of thermal expansion of the first material.

5. The tool joint of claim 4, wherein the first material is the same as the base material, and wherein the first material and the base material each have a hardness less than 46 HRC.

6. The tool joint of claim 5, wherein the first material and the base material are both low alloy carbon steels having a hardness between 25 HRC and 40 HRC.

7. The tool joint of claim 5, wherein each pellet has a hardness between 35 HRC and 2300 HV.

8. The tool joint of claim 7, wherein the pellets are made of a material selected from a ceramic, niobium carbide, chromium carbide, and nickel-chromium carbide.

9. The tool joint of claim 1, wherein the base material of the hardband has a density in a liquid state, wherein the pellets have a density that is within 10% of the density of the base material in the liquid state.

10. The tool joint of claim 1, wherein the body has an outer surface including an annular recess, and wherein the hardband is disposed in the recess.

~~11. A system, comprising:~~

~~a blowout preventer including a body, a throughbore in fluid communication with a wellbore, a shear ram, and an actuator configured to move the shear ram from a first positioned retracted from the throughbore and a second position extending across the throughbore;~~

~~a tool joint disposed in the throughbore of the blowout preventer radially adjacent the shear ram;~~

~~wherein the tool joint comprises a body and an annular hardband disposed about the body;~~

~~wherein the body is made from a first material and the hardband is made from a second material;~~

~~wherein the second material includes a base material and a plurality of discrete pellets dispersed throughout the base material;~~

~~wherein the base material has substantially the same hardness as the first material, and the pellets have a hardness greater than 35 HRC and less than 2300 HV;~~

~~wherein the pellets are spherical, each having a diameter between 707 micron and 2000 micron and a density between 7.5 and 8.0 g/cm^3.~~

~~12. The system of claim 11, wherein the pellets are spherical, each pellet having a diameter between 707 micron and 2000 micron.~~

~~13. The system of claim 11, wherein the first material has a coefficient of thermal expansion, and wherein the base material has a coefficient of thermal expansion that is within 10% of the coefficient of thermal expansion of the first material.~~

~~14. The system of claim 13, wherein the first material and the base material comprise the same metal or metal alloy.~~

~~15. The system of claim 11, wherein the first material and the base material are both low alloy carbon steels having a hardness between 25 HRC and 40 HRC.~~

~~16. The system of claim 15, wherein each pellet is made of a material selected from a ceramic, niobium carbide, chromium carbide, and nickel-chromium carbide.~~

~~17. The system of claim 11, wherein the pellets have a density that is within 10% of the density of the base material in a liquid state.~~

~~18. (Cancelled).~~

~~19~~11. A method for forming a hardband on a body of a downhole tool, the body of the downhole tool being made of a first material, the method comprising:

(a) applying a molten base material onto the body of the downhole tool, wherein the base material has a coefficient of thermal expansion that is within 10% of the coefficient of thermal expansion of the first material;

(b) uniformly and evenly distributing a plurality of solid pellets throughout the molten base material, wherein each pellet in the base material has a hardness that is greater than a hardness of the base material and less than 2300 HV; and

(c) allowing the molten base material to cool and transition into a solid that extends from the body of the downhole tool to an outer surface of the downhole tool.

~~20~~12. The method of claim ~~19~~11, further comprising:

forming an annular recess on an outer surface of the downhole tool;

wherein (a) comprises disposing the molten base material in the recess.

~~21~~13. The method of claim ~~19~~11, wherein the pellets have a density that is within 10% of the density of the molten base material.

~~22~~14. The method of claim ~~21~~13, wherein the density of the pellets is between 6.0 and 8.5 g/cm^3.

~~23~~15. The method of claim ~~19~~11, wherein the first material is a low alloy carbon steel and the base material is a low alloy carbon steel; and

wherein each pellet is made of a material selected from a ceramic, niobium carbide, chromium carbide, and nickel-chromium carbide.