hardband material may be susceptible to cracking and spalling over extended use in the harsh downhole environment.

[0007] Accordingly, there remains a need in the art for improved hardband materials for downhole equipment such as tubulars, tools, and tool joints. Such hardband materials would be particularly well received if they were both shearable and casing friendly. Moreover, there remains a need in the art for improved BOP shear rams capable of reliably shearing downhole equipment. Such shear rams would be particularly well-received if they were capable of reliably shearing downhole equipment that included hardfacing and hardbanding.

BRIEF SUMMARY OF THE DISCLOSURE

[0007a] In one aspect, there is provided 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.

[0007b] In another aspect, there is provided 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.

[0008] These and other needs in the art are addressed in one embodiment by a tool joint. In an embodiment, the tool joint comprises 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. In addition, the tool joint comprises an annular hardband disposed about the body. The hardband is made of a second material. The second material comprises a base material and a plurality of discrete pellets dispersed throughout the base material. The base material has a second hardness and the pellets have a third hardness. The second hardness is substantially the same as the first hardness. The third hardness is greater than the second hardness and less than the hardness of tungsten carbide.

[0009] These and other needs in the art are addressed in another embodiment by a system. In an embodiment, the system comprises 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. In addition, the system comprises a tool joint disposed in the throughbore of the blowout preventer radially adjacent the shear ram. The tool joint comprises a body and an annular hardband disposed about the body. The body is made from a first material and the hardband is made from a second material. The second material includes a base material and a plurality of discrete pellets dispersed throughout the base material. 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.

[0010] These and other needs in the art are addressed in another embodiment by a method for forming a hardband on a downhole tool, the downhole tool being made of a first material. In an embodiment, the method comprises (a) applying a molten base material onto the downhole tool. The base material has a coefficient of thermal expansion that is within 10% of the coefficient of thermal expansion of the first material. In addition, the method comprises (b) dispersing a plurality of solid pellets throughout the molten base material. The pellets have a