CLAIMS

What is claimed is:

1. A method of manufacturing a shot sleeve for a die casting machine, the method comprising:

engaging an intermediate sleeve layer with one of an outer sleeve layer and an inner sleeve layer; and

shrink fitting the other of the outer sleeve layer and an inner sleeve layer into engagement with the intermediate sleeve layer.

2. The method according to claim 1, wherein the engaging step includes shrink fitting the outer sleeve layer onto the intermediate sleeve layer, and other shrink fitting step includes shrink fitting an inner sleeve layer into the intermediate sleeve layer.

3. The method according to claim 2, wherein the inner sleeve layer shrink fitting step is performed after the outer sleeve layer shrink fitting step.

4. The method according to claim 3, wherein the inner sleeve layer shrink fitting step generates a first radial compressive force on the intermediate sleeve layer, and the outer sleeve layer shrink fitting step generates a second radial compressive force on the intermediate sleeve layer.

5. The method according to claim 4, wherein the first and second radial compressive forces generate a compressive stress of 35-45 MPa on the intermediate sleeve layer.

6. The method according to claim 1, wherein the intermediate sleeve layer is ceramic.

7. The method according to claim 7, wherein the intermediate sleeve layer is provided by ring segments.

8. The method according to claim 1, wherein the inner sleeve layer is metal.

9. The method according to claim 1, wherein the outer sleeve layer is metal.

10. The method according to claim 1, wherein the shot sleeve consists of three layers provided by the outer, intermediate and inner sleeve layers.

11. The method according to claim 1, wherein outer sleeve layer shrink fitting step is performed by providing the outer sleeve layer at a higher temperature than the intermediate sleeve layer, and inserting the intermediate sleeve layer into the outer sleeve layer.

12. The method according to claim 1, wherein inner sleeve layer shrink fitting step is performed by providing the inner sleeve layer at a lower temperature than the intermediate sleeve layer, and inserting the inner sleeve layer into the intermediate sleeve layer.

13. The method according to claim 1, comprising the step of replacing a worn inner sleeve layer by heating the outer sleeve layer and removing the intermediate and inner sleeve layers from the outer sleeve layer.

14. The method according to claim 1, wherein the engaging includes spraying the intermediate sleeve layer onto the one of an outer sleeve layer and an inner sleeve layer.

15. The method according to claim 14, wherein the intermediate sleeve layer is ceramic.

16. The method according to claim 15, wherein the shrink fitting step generates a compressive stress of 35-45 MPa on the intermediate sleeve layer.

17. The method according to claim 15, comprising the step of machining the inner sleeve surface to provide a plunger surface configured to receive a plunger.

18. The method according to claim 17, comprising the step of replacing a worn inner sleeve layer by heating the outer sleeve layer and removing the intermediate and inner sleeve layers from the outer sleeve layer.

19. The method according to claim 1, wherein the shrink fitting step provides an interference fit in the amount of 0.0024 inch.

20. A shot sleeve for a die casting machine comprising:

an intermediate sleeve layer in engagement with and arranged radially between inner and outer sleeve layers, a pour opening provided through the intermediate, inner and outer sleeve layers, and the intermediate layer is ceramic and subjected to a compressive stress of 35-45 MPa from the inner and outer sleeve layers.

CLAIMS

1. A method of manufacturing a shot sleeve for a die casting machine, the method comprising:

engaging an intermediate sleeve layer with one of an outer sleeve layer and an inner sleeve layer; and

shrink fitting the other of the outer sleeve layer and an inner sleeve layer into engagement with the intermediate sleeve layer, wherein the inner sleeve layer is metal and the intermediate sleeve layer is ceramic and wherein the first and second radial compressive forces generate a compressive stress of 35-45 MPa on the intermediate sleeve layer.

2. The method according to claim 1, wherein the engaging step includes shrink fitting the outer sleeve layer onto the intermediate sleeve layer, and other shrink fitting step includes shrink fitting an inner sleeve layer into the intermediate sleeve layer.

3. The method according to claim 2, wherein the inner sleeve layer shrink fitting step is performed after the outer sleeve layer shrink fitting step.

4. The method according to claim 3, wherein the inner sleeve layer shrink fitting step generates a first radial compressive force on the intermediate sleeve layer, and the outer sleeve layer shrink fitting step generates a second radial compressive force on the intermediate sleeve layer.

5. The method according to claim 1, wherein the intermediate sleeve layer is provided by ring segments.

6. The method according to claim 1, wherein the outer sleeve layer is metal.

7. The method according to claim 1, wherein the shot sleeve consists of three layers provided by the outer, intermediate and inner sleeve layers.

8. The method according to claim 1, wherein outer sleeve layer shrink fitting step is performed by providing the outer sleeve layer at a higher temperature than the intermediate sleeve layer, and inserting the intermediate sleeve layer into the outer sleeve layer.

9. The method according to claim 1, wherein inner sleeve layer shrink fitting step is performed by providing the inner sleeve layer at a lower temperature than the intermediate sleeve layer, and inserting the inner sleeve layer into the intermediate sleeve layer.

10. The method according to claim 1, comprising the step of replacing a worn inner sleeve layer by heating the outer sleeve layer and removing the intermediate and inner sleeve layers from the outer sleeve layer.

11. The method according to claim 1, wherein the engaging includes spraying the intermediate sleeve layer onto the one of an outer sleeve layer and an inner sleeve layer.

12. The method according to claim 11, wherein the intermediate sleeve layer is ceramic.

13. The method according to claim 12, wherein the shrink fitting step generates a compressive stress of 35-45 MPa on the intermediate sleeve layer.

14. The method according to claim 12, comprising the step of machining the inner sleeve surface to provide a plunger surface configured to receive a plunger.

15. The method according to claim 14, comprising the step of replacing a worn inner sleeve layer by heating the outer sleeve layer and removing the intermediate and inner sleeve layers from the outer sleeve layer.

16. The method according to claim 1, wherein the shrink fitting step provides an interference fit in the amount of 0.0024 inch (0.006096 centimetres).

17. A shot sleeve for a die casting machine comprising:

an intermediate sleeve layer in engagement with and arranged radially between inner and outer sleeve layers, a pour opening provided through the intermediate, inner and outer sleeve layers, wherein the inner sleeve layer is metal and the intermediate layer is ceramic and subjected to a compressive stress of 35-45 MPa from the inner and outer sleeve layers.