CLAIMS:

1. A method comprising:

grit blasting a polycrystalline super alloy bond coating on a single crystal nickel base superalloy base metal;

soaking the part in a concentrated hydrochloric acid solution at an elevated temperature for at least one hour;

rinsing the soaked part,

visually inspecting the part to determine if the coating is removed; and

repeating the grit blasting, soaking and rinsing steps until a visual inspection determines the coating is removed.

2. The method of claim 1, wherein the grit blasting is performed with aluminum oxide grit.

3. The method of claim 2, wherein the aluminum oxide is 240 aluminum oxide and the grit blasting is done at reduced pressure below atmospheric pressure.

4. The method of claim 3, wherein the reduced pressure is about 30 to about 60 psi.

5. The method of claim 1, wherein the hydrochloric acid solution is from about 55% to about 100% acid in water.

6. The method of claim 5, wherein the solution is maintained at a temperature of about 150°F (65.6°C), plus or minus 10°F (5.5°C).

7. The method of claim 1, wherein the visual inspection comprises a smut check in which the rinsed part is repositioned in the concentrated hydrochloric acid solution for a short period of time and removed, such that the presence of remaining coating will be shown as a soot like film.

8. The method of claim 1, wherein the visual inspection comprises a heat tint check in which the rinsed part is placed in an air circulation oven for up to one hour at a temperature ranging from about 1075°F, ± 25°F (579.4 °C ± 13.9°C) to about 1300 °F, ± 25°F (704.4 ± 13.9°C).

9. The method of claim 1, wherein the coating is selected from a coating identified in FIGS. 2 and 3.

10. The method of claim 1, wherein the total soak time ranges from about 5 to about 9 hours.

11. A method comprising:

grit blasting a polycrystalline super alloy bond coating on a single crystal nickel base superalloy base metal with aluminum oxide grit;

soaking the part in a concentrated hydrochloric acid solution of about 55% to about 100% acid in water at a temperature of about 150 °F (65.6°C), plus or minus 10°F (5.5°C) for at least one hour;

rinsing the soaked part;,

visually inspecting the part to determine if the coating is removed; and

repeating the repeating the grit blasting, soaking and rinsing steps until a visual inspection determines the coating is removed.

12. The method of claim 11, wherein the visual inspection comprises a smut check in which the rinsed part is repositioned in the concentrated hydrochloric acid solution for a short period of time and removed, such that the presence of remaining coating will be shown as a smut like film.

13. The method of claim 11, wherein the visual inspection additionally comprises a heat tint check in which the rinsed part is placed in an air circulation oven for one hour ± 15 minutes at a temperature ranging from about 1075°F, ± 25°F (579.4°C ±13.9°C) to about 1300°F, ± 25°F (704.4°C ± 13.9°C) .

14. The method of claim 11, wherein the coating is selected from a coating identified in FIGS. 2 and 3.

15. The method of claim 11 wherein the total soak time ranges from about 4 to about 9 hours.

16. The method of claim 11 wherein the total soak time ranges from about 5 to about 7 hours.

17. A method comprising:

grit blasting a polycrystalline super alloy bond coat having the composition selected from a coating identified in FIG. 2 or FIG. 3 on a single crystal nickel base superalloy base metal the coating with 240 aluminum oxide grit and the grit blasting is done at given pressure;

soaking the part in a concentrated hydrochloric acid solution of about 55% to about 100% acid in water at a temperature of about 150°F (65.6°C), plus or minus 10°F (5.5°C)for at least one hour;

rinsing the soaked part;

visually inspecting the part with a smut check in which the rinsed part is repositioned in the concentrated hydrochloric acid solution for a short period of time to determine if the coating is removed; and

repeating the repeating the grit blasting, soaking and rinsing steps for about six to about nine hours of total soak time, until a visual inspection determines the coating is removed.

18. The method of claim 16, wherein the visual inspection further comprises a heat tint check in which the rinsed part is placed in an air circulation oven for up to one hour at a temperature ranging from about 1050 °F, ± 25 °F (565.6 °C ±1 3.9 °C) to about 1300 °F, ± 25 °F (704.4 °C ± 13.9 °C) after the smut test indicates the absence of the coating.

CLAIMS

1. A method comprising:

grit blasting a part that includes a polycrystalline super alloy bond coating on a single crystal, nickel superalloy base;

soaking the part in a concentrated hydrochloric acid solution of about 55% to about 100% hydrochloric acid at a temperature greater than room temperature for at least one hour;

rinsing the soaked part; and

repeating the grit blasting, soaking and rinsing steps until inspection of the part determines the coating is removed.

2. The method of claim 1, wherein the grit blasting is performed with aluminum oxide grit.

3. The method of claim 2, wherein the aluminum oxide is 240 grit aluminum oxide.

4. The method of claim 3, wherein the grit blasting is done at a pressure of about 30 to about 60 psi.

5. The method of claim 1, wherein the hydrochloric acid solution is maintained at a temperature ranging between approximately 140°F (60°C) to 160°F (71.1°C).

6. The method of claim 1, wherein the inspection comprises a smut check in which the rinsed part is repositioned in the concentrated hydrochloric acid solution for a short period of time and removed, such that any remaining coating will be shown as a black or gray color on at least a portion of the part.

7. The method of claim 1, wherein the inspection comprises a heat tint check in which the rinsed part is placed in an air circulation oven for up to one hour at a temperature ranging between approximately 1050°F (565.6°C) to 1325°F (718.3°C).

8. The method of claim 1, wherein the coating is selected from a composition consisting by weight of approximately i) between 7.5 and 11.1 percent aluminum, 11.0 and 14.0 percent cobalt, 9.7 and 14.6 percent chromium, 0.1 and 0.4 hafnium, 0.1 and 0.4 percent silicon, 0.2 and 0.7 percent yttrium, 0.1 and 0.2 zirconium, and the balance nickel and ii) between 8.6 and 13.3 percent aluminum, 10.0 and 13.0 percent cobalt, 5.4 and 7.8 percent chromium, 0.2 and 0.8 percent hafnium, 1.1 and 1.7 percent molybdenum, 0.1 and 0.4 percent silicon, 2.6 and 5.4 percent tantalum, 2.6 and 3.9 percent tungsten, 0.3 and 0.8 yttrium, 0.1 and 0.2 zirconium, and the balance nickel.

9. The method of claim 1, wherein soaking the part in a concentrated hydrochloric acid solution totals a time ranging from about 5 to about 9 hours.

10. A method comprising:

grit blasting a polycrystalline super alloy bond coating on a single crystal, nickel superalloy base with aluminum oxide grit;

soaking the part in a concentrated hydrochloric acid solution of about 55% to about 100% hydrochloric acid at a temperature ranging between approximately 140°F (60°C) to 160°F (71.1°C) for at least one hour;

rinsing the soaked part; and

repeating the grit blasting, soaking and rinsing steps until a visual inspection determines the coating is removed.

11. The method of claim 10, wherein the visual inspection comprises a smut check in which the rinsed part is repositioned in the concentrated hydrochloric acid solution for a short period of time and removed, such that a presence of any remaining coating will be shown as a black or gray color on at least a portion of the part.

12. The method of claim 10, wherein the visual inspection additionally comprises a heat tint check in which the rinsed part is placed in an air circulation oven for a time ranging between 45 minutes to one hour and 15 minutes at a temperature ranging between approximately 1050°F (565.6°C) to 1325°F (718.3°C).

13. The method of claim 10, wherein the coating is selected from a composition consisting of approximately by weight i) between 7.5 and 11.1 percent aluminum, 11.0 and 14.0 percent cobalt, 9.7 and 14.6 percent chromium, 0.1 and 0.4 hafnium, 0.1 and 0.4 percent silicon, 0.2 and 0.7 percent yttrium, 0.1 and 0.2 zirconium, and the balance nickel and ii) between 8.6 and 13.3 percent aluminum, 10.0 and 13.0 percent cobalt, 5.4 and 7.8 percent chromium, 0.2 and 0.8 percent hafnium, 1.1 and 1.7 percent molybdenum, 0.1 and 0.4 percent silicon, 2.6 and 5.4 percent tantalum, 2.6 and 3.9 percent tungsten, 0.3 and 0.8 yttrium, 0.1 and 0.2 zirconium, and the balance nickel.

14. The method of claim 10 wherein soaking the part in a concentrated hydrochloric acid solution totals a time ranging from about 4 to about 9 hours.

15. The method of claim 10 wherein soaking the part in a concentrated hydrochloric acid solution total a time ranging from about 5 to about 7 hours.

16. A method comprising:

grit blasting a part which includes a polycrystalline super alloy bond coat having the composition selected from a coating consisting of approximately by weight i) between 7.5 and 11.1 percent aluminum, 11.0 and 14.0 percent cobalt, 9.7 and 14.6 percent chromium, 0.1 and 0.4 hafnium, 0.1 and 0.4 percent silicon, 0.2 and 0.7 percent yttrium, 0.1 and 0.2 zirconium, and the balance nickel and ii) between 8.6 and 13.3 percent aluminum, 10.0 and 13.0 percent cobalt, 5.4 and 7.8 percent chromium, 0.2 and 0.8 percent hafnium, 1.1 and 1.7 percent molybdenum, 0.1 and 0.4 percent silicon, 2.6 and 5.4 percent tantalum, 2.6 and 3.9 percent tungsten, 0.3 and 0.8 yttrium, 0.1 and 0.2 zirconium, and the balance nickel, the coating being on a single crystal, nickel superalloy base, wherein the grit blasting uses 240 aluminum oxide grit and is done at a given pressure;

soaking the part in a concentrated hydrochloric acid solution of about 55% to about 100% acid in water at a temperature ranging between approximately 140°F (60°C) to 160°F (71.1°C) for at least one hour;

rinsing the soaked part; and

repeating the grit blasting, soaking and rinsing steps, wherein soaking totals a time ranging from about 6 to 9 hours, until inspection of the part determines the coating is removed.

17. The method of claim 15, wherein inspection of the part further comprises a heat tint check in which the rinsed part is placed in an air circulation oven for up to one hour at a temperature ranging between approximately 1025°F (551.7°C) to 1325°F (718.3°C).