CLAIMS:

1. A process for heat treating selected portions of an integrally bladed rotor (IBR) having a plurality of blades, the process comprising:

mounting an IBR on a fixture having a rotor engaging portion;

mounting an IR heater on one of the IBR blades;

moving the fixture having an IBR into an environmental chamber;

evacuating air from the chamber and adding an inert gas;

heat treating the blade having the IR heater;

lifting the IR heater from the blade and indexing the IBR to position another blade in alignment with the IR heater;

mounting the IR heater on the another blade and heat treating the another blade,

repeating the steps including indexing and heat treating of the IBR blades until all its blades are heat treated; and

removing the IBR from the chamber.

2. The process of claim 1, wherein the inert gas is selected from argon, helium and mixtures thereof.

3. The process of claim 1, wherein the fixture mounting an IBR is adapted to move into and out of the chamber.

4. The process of claim 1, wherein the IR heater comprises a device for heat treating a metal component having:

at least one parabolic mirror formed in the axially extending cavity; and

at least one IR heat source for providing IR heat rays in a direction toward the at least one parabolic mirror;

such that the at least one parabolic mirror is positioned to focus a band of the IR heat rays onto the metal component.

5. The process of claim 4, wherein the IR heat source and parabolic mirror are sized to direct the IR heat rays along the junction between the airfoil and the integrally bladed rotor device.

6. The process of claim 5, which includes a pair of housings on opposite sides of the entire area of contact between the airfoil and the integrally bladed rotor device, with each housing having an IR heat source and a parabolic mirror formed in the housing for each IR heat source.

7. The process of claim 6, wherein the IR heat rays are focused into an elongated band having a band width of from about 6 mm to about 18 mm.

8. A apparatus for heat treating selected portions of an integrally bladed rotor (IBR) having a plurality of blades, the apparatus comprising:

a fixture for mounting an IBR having a rotor engaging portion;

the fixture having an IBR being moveable into an environmental chamber;

an IR heater mounted on a heater support unit adapted to moveably mounting the heater on one of the IBR blades and removing it from the blade;

the chamber having a vent for evacuating air and adding an inert gas;

the heater support united being adapted to lift the IR heater from the blade and the fixture being adapted to index the IBR to position another blade on the IBR; and

a control unit for controlling the heater support unit and the heater position on or off the IBR blade.

9. The apparatus of claim 8, wherein the inert gas is selected from argon, helium and mixtures thereof.

10. The apparatus of claim 8, wherein the IR heater comprises a device for heat treating a metal component having:

at least one parabolic mirror formed in the axially extending cavity; and

at least one IR heat source for providing IR heat rays in a direction toward the at least one parabolic mirror;

such that the at least one parabolic mirror is positioned to focus a band of the IR heat rays onto the metal component.

11. The apparatus of claim 10, wherein the IR heat source and parabolic mirror are sized to direct the IR heat rays along the junction between the airfoil and the integrally bladed rotor apparatus.

12. The apparatus of claim 11, which includes a pair of housings on opposite sides of the entire area of contact between the airfoil and the integrally bladed rotor apparatus, with each housing having an IR heat source and a parabolic mirror formed in the housing for each IR heat source.

13. The apparatus of claim 12, wherein the IR heat rays are focused into an elongated band having a band width of from about 6 mm to about 18 mm.

14. A system for heat treating selected portions of an integrally bladed rotor (IBR) having a plurality of blades, the system comprising:

an IBR on a mounting fixture having a rotor engaging portion for mounting an IBR thereon;

an environmental chamber for receiving the mounting fixture having an IBR thereon, the chamber being adapted to evacuate air from the chamber and add an inert gas;

a heater support unit for attaching an IR heater on one of the IBR blades and lifting the IR heater from the blade and indexing the IBR to position another blade on the IBR;

a control unit for operating the IR heater for heat treating the blade heater and operating the heater support unit to index and heat treat all of the IBR blades;.

15. The system of claim 14, wherein the inert gas is selected from argon, helium and mixtures thereof.

16. The system of claim 14, wherein the fixture is mounted on at least one track and adapted to move into and out of the chamber.

17. The system of claim 14, wherein the IR heater comprises a device for heat treating a metal component having:

at least one parabolic mirror formed in the axially extending cavity; and

at least one IR heat source for providing IR heat rays in a direction toward the at least one parabolic mirror;

such that the at least one parabolic mirror is positioned to focus a band of the IR heat rays onto the metal component.

18. The system of claim 17, wherein the IR heat source and parabolic mirror are sized to direct the IR heat rays along the junction between the airfoil and the integrally bladed rotor device.

19. The system of claim 18, which includes a pair of housings on opposite sides of the entire area of contact between the airfoil and the integrally bladed rotor device, with each housing having an IR heat source and a parabolic mirror formed in the housing for each IR heat source.

20. The system of claim 19, wherein the IR heat rays are focused into an elongated band having a bandwidth of from about 6 mm to about 18 mm.

CLAIMS

1. A process for heat treating selected portions of an integrally bladed rotor (IBR) having a plurality of blades, the process comprising:

mounting an IBR on a fixture having a rotor engaging portion;

mounting an IR heater on one of the IBR blades;

moving the fixture having an IBR into an environmental chamber;

evacuating air from the chamber and adding an inert gas;

heat treating the blade having the IR heater;

lifting the IR heater from the blade and indexing the IBR to position another blade in alignment with the IR heater;

mounting the IR heater on the another blade and heat treating the another blade,

repeating the steps including indexing and heat treating of the IBR blades until all its blades are heat treated; and

removing the IBR from the chamber.

2. The process of claim **1**, wherein the inert gas is selected from argon, helium and mixtures thereof.

3. The process of claim **1**, wherein the fixture mounting an IBR is adapted to move into and out of the chamber.

4. The process of claim **1**, wherein the IR heater comprises a device for heat treating a metal component having:

at least one parabolic mirror formed in the axially extending cavity; and

at least one IR heat source for providing IR heat rays in a direction toward the at least one parabolic mirror;

such that the at least one parabolic mirror is positioned to focus a band of the IR heat rays onto the metal component.

5. The process of claim **4**, wherein the IR heat source and parabolic mirror are sized to direct the IR heat rays along the junction between the airfoil and the integrally bladed rotor device.

6. The process of claim **5**, which includes a pair of housings on opposite sides of the entire area of contact between the airfoil and the integrally bladed rotor device, with each housing having an IR heat source and a parabolic mirror formed in the housing for each IR heat source.

7. The process of claim **6**, wherein the IR heat rays are focused into an elongated band having a band width of from about 6 mm to about 18 mm.

8. A apparatus for heat treating selected portions of an integrally bladed rotor (IBR) having a plurality of blades, the apparatus comprising:

a fixture for mounting an IBR having a rotor engaging portion;

the fixture having an IBR being moveable into an environmental chamber;

an IR heater mounted on a heater support unit adapted to moveably mounting the heater on one of the IBR blades and removing it from the blade;

the chamber having a vent for evacuating air and adding an inert gas;

the heater support united being adapted to lift the IR heater from the blade and the fixture being adapted to index the IBR to position another blade on the IBR; and

a control unit for controlling the heater support unit and the heater position on or off the IBR blade.

9. The apparatus of claim **8**, wherein the inert gas is selected from argon, helium and mixtures thereof.

10. The apparatus of claim **8**, wherein the IR heater comprises a device for heat treating a metal component having:

at least one parabolic mirror formed in the axially extending cavity; and

at least one IR heat source for providing IR heat rays in a direction toward the at least one parabolic mirror;

such that the at least one parabolic mirror is positioned to focus a band of the IR heat rays onto the metal component.

11. The apparatus of claim **10**, wherein the IR heat source and parabolic mirror are sized to direct the IR heat rays along the junction between the airfoil and the integrally bladed rotor apparatus.

12. The apparatus of claim **11**, which includes a pair of housings on opposite sides of the entire area of contact between the airfoil and the integrally bladed rotor apparatus, with each housing having an IR heat source and a parabolic mirror formed in the housing for each IR heat source.

13. The apparatus of claim **12**, wherein the IR heat rays are focused into an elongated band having a band width of from about 6 mm to about 18 mm.

14. A system for heat treating selected portions of an integrally bladed rotor (IBR) having a plurality of blades, the system comprising:

an IBR on a mounting fixture having a rotor engaging portion for mounting an IBR thereon;

an environmental chamber for receiving the mounting fixture having an IBR thereon, the chamber being adapted to evacuate air from the chamber and add an inert gas;

a heater support unit for attaching an IR heater on one of the IBR blades and lifting the IR heater from the blade and indexing the IBR to position another blade on the IBR;

a control unit for operating the IR heater for heat treating the blade heater and operating the heater support unit to index and heat treat all of the IBR blades.

15. The system of claim **14**, wherein the inert gas is selected from argon, helium and mixtures thereof.

16. The system of claim **14**, wherein the fixture is mounted on at least one track and adapted to move into and out of the chamber.

17. The system of claim **14**, wherein the IR heater comprises a device for heat treating a metal component having:

at least one parabolic mirror formed in the axially extending cavity; and

at least one IR heat source for providing IR heat rays in a direction toward the at least one parabolic mirror;

such that the at least one parabolic mirror is positioned to focus a band of the IR heat rays onto the metal component.

18. The system of claim **17**, wherein the IR heat source and parabolic mirror are sized to direct the IR heat rays along the junction between the airfoil and the integrally bladed rotor device.

19. The system of claim **18**, which includes a pair of housings on opposite sides of the entire area of contact between the airfoil and the integrally bladed rotor device, with each housing having an IR heat source and a parabolic mirror formed in the housing for each IR heat source.

20. The system of claim **19**, wherein the IR heat rays are focused into an elongated band having a band width of from about 6 mm to about 18 mm.