CLAIMS

What is claimed is:

1. A component for a gas turbine engine, comprising:

a body portion;

a cooling circuit disposed within said body portion and including at least a first cavity, a core in fluid communication with said first cavity, and an exit surface that extends through an exterior surface of said body portion; and

at least one surface indicator visible near said exit surface.

2. The component as recited in claim 1, wherein said body portion is an airfoil of at least one of a blade and a vane.

3. The component as recited in claim 1, wherein said body portion is part of a blade outer air seal (BOAS).

4. The component as recited in claim 1, wherein said body portion is part of a mid-turbine frame.

5. The component as recited in claim 1, wherein said body portion is part of a combustor panel.

6. The component as recited in claim 1, wherein said exit surface includes at least one discharge opening.

7. The component as recited in claim 1, wherein said at least one surface indicator is visible near at least one of a leading edge, a trailing edge, an inner diameter and an outer diameter of a discharge opening of said exit surface.

8. The component as recited in claim 1, comprising a plurality of surface indicators visible near said exit surface.

9. The component as recited in claim 8, wherein a first portion of said plurality of surface indicators are located at a leading edge of a discharge opening of said exit

surface and a second portion of said plurality of surface indicators are located at a trailing edge of said discharge opening.

10. The component as recited in claim 1, wherein said at least one surface indicator is presented in a predetermined pattern that indicates whether the component is within an acceptable manufacturing tolerance.

11. The component as recited in claim 1, wherein said core is a microcircuit.

12. The component as recited in claim 1, wherein said core is a trailing edge, pressure side discharge core.

13. A method for determining whether a component is within an acceptable manufacturing tolerance, comprising the steps of:

inspecting the component to determine whether a surface indicator is visible in the component after the component has been manufactured; and

determining whether the component is within the acceptable manufacturing tolerance based on a predetermined pattern of the surface indicator that is visible in the component.

14. The method as recited in claim 13, wherein the component includes a cooling circuit having at least a first cavity, a core in fluid communication with the first cavity, and an exit surface that extends through an exterior surface of the component.

15. The method as recited in claim 14, wherein the surface indicator is visible near the exit surface.

16. The method as recited in claim 13, comprising the step of performing a secondary operation on the component where the predetermined pattern reveals that the exit surface is above or at an upper control limit of the acceptable manufacturing tolerance.

17. The method as recited in claim 13, comprising the step of rejecting the component where the predetermined pattern reveals that the exit surface is below or at a lower control limit of the acceptable manufacturing tolerance.

18. A casting system for manufacturing a component, comprising:

a casting article having:

a body;

a diffusion exit surface connected to a first portion of said body; and

at least one surface indicator feature that leaves a mark in said component.

19. The casting system as recited in claim 18, wherein said casting article is one of a ceramic core or a refractory metal core (RMC).

20. The casting system as recited in claim 18, comprising at least one entrance rod connected to a second portion of said body.

CLAIMS

1. A component for a gas turbine engine, comprising:

a body portion;

a cooling circuit disposed within said body portion and including at least a first cavity, a miniature cooling cavity positioned within an outer skin of said body portion and in fluid communication with said first cavity, said miniature cooling cavity including an exit surface that extends through an exterior surface of said body portion; and

at least one surface indicator visible near said exit surface.

2. The component as recited in claim 1, wherein said body portion is an airfoil of at least one of a blade and a vane.

3. The component as recited in claim 1, wherein said body portion is part of a blade outer air seal (BOAS).

4. The component as recited in claim 1, wherein said body portion is part of a mid-turbine frame.

5. The component as recited in claim 1, wherein said body portion is part of a combustor panel.

6. The component as recited in claim 1, wherein said exit surface includes at least one discharge opening.

7. The component as recited in claim 1, wherein said at least one surface indicator is visible near at least one of a leading edge, a trailing edge, an inner diameter and an outer diameter of a discharge opening of said exit surface.

8. The component as recited in claim 1, comprising a plurality of surface indicators visible near said exit surface.

9. The component as recited in claim 8, wherein a first portion of said plurality of surface indicators are located at a leading edge of a discharge opening of said exit surface and a second portion of said plurality of surface indicators are located at a trailing edge of said discharge opening.

10. The component as recited in claim 1, wherein said at least one surface indicator is presented in a predetermined pattern that indicates whether the component is within an acceptable manufacturing tolerance.

11. The component as recited in claim 1, wherein said miniature cooling cavity is a microcircuit.

12. The component as recited in claim 1, wherein said miniature cooling cavity is a trailing edge, pressure side discharge core.

13. A method for determining whether a component is within an acceptable manufacturing tolerance, comprising the steps of:

inspecting the component to determine whether a surface indicator is visible in the component after the component has been manufactured; and

determining a predetermined pattern of the surface indicator that is visible in the component, wherein a first predetermined pattern of the surface indicator signifies that an additional secondary operation is necessary, a second predetermined pattern of the surface indicator signifies that the component is outside of the acceptable manufacturing tolerance, and a third predetermined pattern of the surface indicator signifies that the component is within the acceptable manufacturing tolerance.

14. The method as recited in claim 13, wherein the component includes a cooling circuit having at least a first cavity, a core in fluid communication with the first cavity, and an exit surface that extends through an exterior surface of the component.

15. The method as recited in claim 14, wherein the surface indicator is visible near the exit surface.

16. The method as recited in claim 13, comprising the step of performing the secondary operation on the component where the first predetermined pattern reveals that the exit surface is above or at an upper control limit of the acceptable manufacturing tolerance.

17. The method as recited in claim 13, comprising the step of rejecting or scrapping the component where the second predetermined pattern reveals that the exit surface is below or at a lower control limit of the acceptable manufacturing tolerance.

18. A casting system for manufacturing a component, comprising:

a casting article having:

a body;

a diffusion exit surface connected to a first portion of said body; and

a first surface indicator feature that leaves a first mark in said component that signifies an upper control limit of an acceptable manufacturing tolerance; and

a second surface indicator feature that leaves a second mark in said component that signifies a lower control limit of said acceptable manufacturing tolerance.

19. The casting system as recited in claim 18, wherein said casting article is one of a ceramic core or a refractory metal core (RMC).

20. The casting system as recited in claim 18, comprising at least one entrance rod connected to a second portion of said body.