CLAIMS

1. A method for die casting a component, comprising the steps of:

(a) inserting at least one sacrificial core into a die cavity of a die comprised of a plurality of die elements;

(b) injecting molten metal into the die cavity;

(c) solidifying the molten metal within the die cavity to form the component;

(d) disassembling the plurality of die elements from the component; and

(e) destructively removing the at least one sacrificial core from the component.

2. The method as recited in claim 1, comprising the step of:

(f) applying vacuum to the die.

3. The method as recited in claim 1, comprising the step of:

(f) repeating said steps (a) through (e) to die cast a second component, wherein a new sacrificial core is used for the casting of the second component.

4. The method as recited in claim 1, wherein said step (e) includes:

performing a core leaching operation to remove the at least one sacrificial core.

5. The method as recited in claim 1, wherein said step (e) leaves an internal geometry within the component.

6. The method as recited in claim 5, wherein the internal geometry defines at least one cooling scheme.

7. The method as recited in claim 6, wherein the at least one cooling scheme is a microcircuit cooling scheme.

8. The method as recited in claim 1, wherein the at least one sacrificial core includes at least one refractory metal core.

9. The method as recited in claim 1, wherein said step (a) includes:

applying a die release agent to the die.

10. The method as recited in claim 1, wherein said step (a) includes:

preheating the die subsequent to inserting the at least one sacrificial core into the die cavity.

11. The method as recited in claim 1, wherein said step (b) includes:

melting the molten metal separate from the die prior to injecting the molten metal into the die cavity; and

injecting the molten metal into the die cavity with a shot tube plunger.

12. The method as recited in claim 1, wherein the component is an equiaxed component.

13. A method for replacing a baseline component comprised of one of a single-crystal alloy component and a directionally solidified alloy component with an equiaxed component, comprising the steps of:

(a) determining a cooling scheme required for replacing the baseline component with the equiaxed component;

(b) configuring a sacrificial core to provide the equiaxed component with an internal geometry that defines the cooling scheme;

(c) die casting the equiaxed component with the internal geometry using the sacrificial core; and

(d) replacing the baseline component with the equiaxed component.

14. The method as recited in claim 13, wherein said step (c) includes:

vacuum die casting the equiaxed component.

15. A die casting system, comprising:

a die comprised of a plurality of die components that define a die cavity;

a sacrificial core received within said die cavity;

a shot tube in fluid communication with said die cavity;

a shot tube plunger moveable within said shot tube to communicate a molten metal into said die cavity.

16. The die casting system as recited in claim 15, wherein said sacrificial core includes a refractory metal core.

17. The die casting system as recited in claim 16, wherein said refractory metal core includes a protective coating.

18. The die casting system as recited in claim 15, wherein said sacrificial core includes a ceramic core.

19. The die casting system as recited in claim 15, wherein said sacrificial core includes a hybrid core including a ceramic mated to a refractory metal core.

CLAIMS

1. A method for die casting a component, comprising the steps of:
   (a) inserting at least one sacrificial core into a die cavity of a die comprised of a plurality of die elements;
   (b) injecting molten metal into the die cavity, the molten metal comprising a high melting temperature material having a melting temperature of at least 1500° F (815° C);
   (c) solidifying the molten metal within the die cavity to form the component;
   (d) disassembling the plurality of die elements from the component; and
   (e) destructively removing the at least one sacrificial core from the component.

2. The method as recited in claim 1, comprising the step of:
   (f) applying vacuum to the die.

3. The method as recited in claim 1, comprising the step of:
   (f) repeating said steps (a) through (e) to die cast a second component, wherein a new sacrificial core is used for the casting of the second component.

4. The method as recited in claim 1, wherein said step (e) includes:
performing a core leaching operation to remove the at least one sacrificial core.

5. The method as recited in claim 1, wherein said step (e) leaves an internal geometry within the component.

6. The method as recited in claim 5, wherein the internal geometry defines at least one cooling scheme.

7. The method as recited in claim 6, wherein the at least one cooling scheme is a microcircuit cooling scheme.

8. The method as recited in claim 1, wherein the at least one sacrificial core includes at least one refractory metal core.

9. The method as recited in claim 1, wherein said step (a) includes:

applying a die release agent to the die.

10. The method as recited in claim 1, wherein said step (a) includes:

preheating the die subsequent to inserting the at least one sacrificial core into the die cavity.

11. The method as recited in claim 1, wherein said step (b) includes:

melting the molten metal separate from the die prior to injecting the molten metal into the die cavity; and

injecting the molten metal into the die cavity with a shot tube plunger.

12. The method as recited in claim 1, wherein the component is an equiaxed component.

13. A method for replacing a baseline component comprised of one of a single-crystal alloy component and a directionally solidified alloy component with an equiaxed component, comprising the steps of:

(a) determining a cooling scheme required for replacing the baseline component with the equiaxed component;

(b) configuring a sacrificial core to provide the equiaxed component with an internal geometry that defines the cooling scheme;

(c) die casting the equiaxed component with the internal geometry using the sacrificial core; and

(d) replacing the baseline component with the equiaxed component.

14. The method as recited in claim 13, wherein said step (c) includes:

vacuum die casting the equiaxed component.

15. A die casting system, comprising:

a die comprised of a plurality of die components that define a die cavity;

a sacrificial core received within said die cavity;

a shot tube in fluid communication with said die cavity;

a shot tube plunger moveable within said shot tube to communicate a molten metal into said die

cavity, the molten metal comprising a high melting temperature material having a melting temperature of at least 1500° F (815° C).

16. The die casting system as recited in claim 15, wherein said sacrificial core includes a refractory metal core.

17. The die casting system as recited in claim 16, wherein said refractory metal core includes a protective coating.

18. The die casting system as recited in claim 15, wherein said sacrificial core includes a ceramic core.

19. The die casting system as recited in claim 15, wherein said sacrificial core includes a hybrid core including a ceramic mated to a refractory metal core.

20. A method for die casting a gas turbine engine component, comprising:

positioning at least one sacrificial core within a die cavity of a die casting system, the at least one

sacrificial core including at least a refractory metal core;

injecting molten metal under pressure into the die cavity;

solidifying the molten metal within the die cavity to form the gas turbine engine component;

removing the at least one sacrificial core from the gas turbine engine component, and

wherein the step of removing forms an internal geometry inside of the gas turbine engine component.