shell having a casting core protruding from a first metal piece; and deshelling and decoring to remove the shell and core and leave the first region formed by the first metal piece and the second region formed by the casted alloy.

[0014] In one or more embodiments of any of the foregoing embodiments, the decoring leaves one or more passageways spanning between the first region and the second region.

[0015] In one or more embodiments of any of the foregoing embodiments, the casting core is interfittingly mated with passageways in the first metal piece.

[0016] In one or more embodiments of any of the foregoing embodiments, the method further comprises adhesive bonding the casting core to the first metal piece.

[0017] In one or more embodiments of any of the foregoing embodiments, the first region forms a first portion of an airfoil and the second region forms a second region of said airfoil.

[0018] In one or more embodiments of any of the foregoing embodiments, the first region and the second region have different compositions of nickel-based superalloy.

[0019] In one or more embodiments of any of the foregoing embodiments, the first region and the second region have a shared crystalline structure.

[0020] In one or more embodiments of any of the foregoing embodiments, the method further comprises forming the first metal piece by casting the first metal piece in a first shell containing a first casting core and at least partially deshelling and decoring the first metal piece.

[0021] In one or more embodiments of any of the foregoing embodiments, the method further comprises mating the casting core to the first metal piece; placing the first metal piece and the casting core in a die; overmolding a sacrificial pattern material to the casting core in the die; removing a combination of the first metal piece, casting core, and

pattern material from the die; and shelling the combination to form the shell.

[0022] In one or more embodiments of any of the foregoing embodiments, the method further comprises placing the casting core in a die; overmolding a sacrificial pattern material to the casting core in the die; removing the casting core and pattern material from the die; mating the casting core to the first metal piece; and shelling a combination of the first metal piece, casting core, and pattern material to form the shell.

[0023] In one or more embodiments of any of the foregoing embodiments, the method further comprises wax welding the pattern material to the first metal piece.

[0024] In one or more embodiments of any of the foregoing embodiments, the method further comprises locally melting a portion of the first metal piece prior to the casting so as to propagate a crystalline structure of the first region into the second region upon solidification of the second region.

[0025] In one or more embodiments of any of the foregoing embodiments, the locally melting melts no more than 30% (e.g., 10% to 30%), by weight of the first metal piece.

[0026] In one or more embodiments of any of the foregoing embodiments, the article is a blade. The first region comprises a first spanwise region of an airfoil of the blade. The second region comprises a second spanwise region of the airfoil of the blade.

[0027] In one or more embodiments of any of the foregoing embodiments, the first region and second region share a crystalline orientation.

[0028] In one or more embodiments of any of the foregoing embodiments, the first region and the second region are of different densities.

[0029] The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other

CLAIMS

~~What is claimed is:~~

1. A method for casting an article (60;60-2) comprising a first region (82;82-2) and a second region (80;81), the method comprising:

casting an alloy in a shell(290), the shell having a casting core (232) protruding from a first metal piece (220); and

deshelling and decoring to remove the shell and core and leave the first region formed by the first metal piece and the second region formed by the casted alloy.

2. The method of claim 1 wherein:

the decoring leaves one or more passageways (90) spanning between the first region and the second region.

3. The method of claim 1 wherein:

the casting core (232) is interfittingly mated with passageways (226) in the first metal piece.

4. The method of claim 3 further comprising:

adhesive bonding the casting core to the first metal piece.

5. The method of claim 1 wherein:

the first region forms a first portion of an airfoil (61) and the second region forms a second region of said airfoil.

6. The method of claim 1 wherein:

the first region and the second region have different compositions of nickel-based superalloy.

7. The method of claim 1 wherein:

the first region and the second region have a shared crystalline structure.

8. The method of claim 1 further comprising:
forming the first metal piece by:
casting the first metal piece in a first shell (170) containing a first casting core (122); and
at least partially deshelling and decoring the first metal piece.

9. The method of claim 1 further comprising:
mating the casting core to the first metal piece;
placing the first metal piece and the casting core in a die;
overmolding a sacrificial pattern material to the casting core in the die;
removing a combination of the first metal piece, casting core, and pattern material from the die; and
shelling the combination to form the shell.

10. The method of claim 1 further comprising:
placing the casting core in a die;
overmolding a sacrificial pattern material to the casting core in the die;
removing the casting core and pattern material from the die;
mating the casting core to the first metal piece; and
shelling a combination of the first metal piece, casting core, and pattern material to form the shell.

11. The method of claim 10 further comprising:
wax welding the pattern material to the first metal piece.

12. The method of claim 1 further comprising:
locally melting a portion (224) of the first metal piece prior to the casting so as to propagate a crystalline structure of the first region into the second region upon solidification of the second region.

13. The method of claim 12 wherein:
the locally melting melts no more than 30%, by weight of the first metal piece.

14. The method of claim 12 wherein:
the locally melting melts 10% to 30%, by weight of the first metal piece.

15. The ~~metal~~ method of claim 1 wherein:
the article is a blade (60;60-2);
the first region comprises a first spanwise region of an airfoil of the blade; and
the second region comprises a second spanwise region of the airfoil of the blade.

16. The method of claim 15 wherein:
the first region and second region share a crystalline orientation.

17. The method of claim 15 wherein:
the first region and the second region are of different densities.