WHAT IS CLAIMED IS:

1. A method for repairing an article, the method comprising:

removing a portion of a base component of the article, the base component being adjacent to a damaged portion of the base component to define a repair portion of the base component, wherein the base component comprises a cobalt- or nickel-based superalloy, and wherein the repair portion of the base component comprises a through-hole extending from a first surface of the base component to ~~a second~~ an inner surface of the base component;

forming a braze sintered preform to substantially reproduce a shape of the through-hole, wherein the braze sintered preform comprises a Ni- or Co-based alloy;

placing the braze sintered preform in the through-hole; and

heating at least the braze sintered preform to cause the braze sintered preform to join to the repair portion of the base component and change a microstructure of the braze sintered preform to a brazed and diffused microstructure,

wherein the braze sintered preform comprises three-dimensional surface features on a first side of the braze sintered preform, wherein the first side of the braze sintered preform in positioned adjacent the inner surface of the base component, and wherein the three-dimensional surface features substantially reproduce three-dimensional surface features of the damaged portion of the inner surface of the base component.

2. The method of claim 1, wherein the article further comprises a second component defining a surface opposing the inner surface of the base component.

3. The method of claim 2, wherein the article comprises a dual wall component, wherein the base component forms an outer wall of the dual wall component, and wherein the second component defines an inner wall with the inner surface opposing the inner surface of the base component.

4. The method of claim 3, wherein the three-dimensional surface features of the braze sintered preform comprise at least one of a pedestal or a cooling feature, wherein the at least one of the pedestals or the cooling feature substantially reproduce at least one of a pedestal or a cooling feature of the damaged portion of the inner surface of the outer wall.

5. The method of claim 2, wherein the three-dimensional features of the braze sintered preform extend out of a surface plane defined by the inner surface of the base component.

6. The method of claim 2, wherein the article comprises a turbine vane, wherein the base component defines a first wall of the turbine vane, and the second component defines a second wall of the turbine vane.

7. The method of claim 6, wherein the first wall of the turbine vane comprises one of a suction side airfoil wall or a pressure side airfoil wall, and the second wall of the turbine vane comprises another of the suction side airfoil wall or the pressure side airfoil wall.

8. The method of claim 6, wherein the three-dimensional surface features of the braze sintered preform comprise at least one of a pedestal or a cooling feature, wherein the at least one of the pedestals or the cooling feature substantially reproduce at least one of a pedestal or a cooling feature of the damaged portion of the inner surface of the first wall.

9. The method of claim 6, wherein the three-dimensional surface features of the braze sintered preform extend out of a surface plane defined by the inner surface of the first wall.

10. The method of claim 1, wherein placing the braze sintered preform in the through-hole comprising placing the braze sintered preform such that the first side is substantially parallel to the inner surface of the base component.

11. The method of claim 1, wherein the article further comprises a second component defining a surface opposing the inner surface of the base component, and wherein the damaged portion of the base component does not extend through the second component.

~~2. The method of claim 1, further comprising positioning additional braze material comprising the Ni- or Co-based alloy adjacent to the braze sintered preform prior to heating at least the braze sintered preform.~~

~~3. The method of claim 2, wherein the additional braze material comprises a second braze sintered preform.~~

~~4. The method of claim 3, wherein the second braze sintered preform comprises a sheet, and wherein the sheet overlies the braze sintered preform and at least part of the repair portion of the base component.~~

~~5. The method of claim 3, wherein the additional braze material comprises a braze paste, and wherein the additional braze material fills cracks adjacent to the through-hole.~~

~~6. The method of claim 2, wherein the additional braze material comprises a composition substantially similar to the braze sintered preform.~~

~~7. The method of claim 5, further comprising placing braze stop-off material adjacent to the additional braze material to maintain the additional braze material at desired locations of the base component.~~

~~8~~12. The method of claim 1, wherein the braze sintered preform substantially fills a depth of the through-hole.

~~9~~13. The method of claim 1, wherein ~~the braze sintered preform comprises three-dimensional surface features on a first side of the braze sintered preform, wherein the first side of the braze sintered preform in positioned adjacent the second side of the base component, and wherein the three-dimensional features substantially reproduce three-dimensional features of~~ the damaged portion of the base component is at least one of airfoil burn-through, platform burn-through, trailing edge burn out, trailing edge burn back, leading edge burn out, a through crack, a turbine vane internal pedestal damage, or blow-out failure of at least one of a pressure or suction sides of an airfoil.

~~10~~14. The method of claim 1, further comprising spot welding the braze sintered preform in place relative to the base component prior to heating at least the braze sintered preform.

~~11~~15. The method of claim 1, wherein the braze sintered preform comprises a substantially homogeneous mixture of a high melt Ni- or Co-based superalloy powder and a low melt braze powder.

~~12~~16. The method of claim 1, wherein the braze sintered preform comprises between 0.05 and 0.116 wt. % carbon, between 0.11 and 0.376 wt. % silicon, between 8.424 wt. % and 11.640 wt. % chromium, between 0.284 wt. % and 0.835 wt. % boron, between 4.8 wt. % and 5. 8 wt. % aluminum, between 2.675 wt. % and 4.232 wt. % tungsten, between 0.650 wt. % and 1.362 wt. % molybdenum, between 1.4 wt. % and 2.462 wt. % rhenium, between 7.184 wt. % and 8.942 wt. % tantalum, between 0.690 wt. % and 1.386 wt. % hafnium, and between 8.725 wt. % and 10.964 wt. % cobalt, and nickel.

~~13~~17. The method of claim ~~11~~16, wherein the braze sintered preform comprises a maximum of 0.082 wt. % manganese, a maximum of 0.003 wt. % sulfur, a maximum of 0.013 wt. % phosphorus, a maximum of 0.018 wt. % titanium, a maximum of 0.161 wt.

% yttrium, a maximum of 0.034 wt. % zirconium, a maximum of 0.180 wt. % iron, a maximum of 0.093 wt. % vanadium, a maximum of 0.10 wt. % copper, a maximum of 0.007 wt. % magnesium, a maximum of 0.084 wt. % oxygen, a maximum of 0.030 wt. % nitrogen, a maximum of 0.242 wt. % platinum, and a maximum of 0.150 wt. % other elements.

~~14. The method of claim 12, wherein the braze sintered preform comprises about 0.3 wt. % silicon, about 11.4 wt. % chromium, about 0.8 wt. % boron, about 4.9 wt. % aluminum, about 2.8 wt. % tungsten, about 0.8 wt. % molybdenum, about 1.5 wt. % rhenium, about 52 wt. % nickel, about 0.2 wt. % niobium, about 8.8 wt. % tantalum, about 0.8 wt. % hafnium, and about 9 wt. % Co.~~

~~15~~18. The method of claim ~~12~~16, wherein the braze sintered preform comprises about 0.3 wt. % silicon, about 10.2 wt. % chromium, about 0.6 wt. % boron, about 5.2 wt. % aluminum, about 3.3 wt. % tungsten, about 0.9 wt. % molybdenum, about 1.8 wt. % rhenium, about 52.1 wt. % nickel, about 0.2 wt. % niobium, about 8.1 wt. % tantalum, about 1.0 wt. % hafnium, and about 9.6 wt. % Co.

~~16~~19. The method of claim ~~12~~16, wherein the braze sintered preform comprises about 0.2 wt. % silicon, about 8.6 wt. % chromium, about 0.3 wt. % boron, about 5.7 wt. % aluminum, about 4.1 wt. % tungsten, about 1.2 wt. % molybdenum, about 2.3 wt. % rhenium, about 52.2 wt. % nickel, about 0.1 wt. % niobium, about 7.3 wt. % tantalum, about 1.2 wt. % hafnium, and about 10.7 wt. % Co.

~~17~~20. The method of claim 1, wherein heating at least the braze sintered preform comprises heating at least the braze sintered preform in a vacuum furnace at a temperature between about 1093 degrees Celsius~~°C~~ and about 1260 degrees Celsius~~°C~~.

~~18. The method of claim 1, further comprising subjecting at least the braze sintered preform to a diffusion heat treatment cycle in a vacuum furnace back filled with argon~~

~~gas at a pressure between 100 to 800 microns Hg at a temperature between about 1038°C and about 1149°C for at least 17 hours.~~

~~19. The method of claim 1, further comprising machining at least the braze sintered preform to remove excess braze sintered preform material and restore the base component to a nominal part geometry.~~