

Claims

1. A method of fabricating a graded metallic structure, the method comprising:
preparing a material powder in a supply container, the material powder
5 partitioned into a plurality of longitudinal volumes, the material powder
comprising different metallic powders in the longitudinal volumes; and
performing an additive manufacturing process comprising:
supplying layers of the material powder from the supply container;
displacing the layers of material powder to a fabrication platform;
10 and
fusing the layers of material powder on the fabrication platform to
form the graded metallic structure,
wherein at least one longitudinal volume has a varying transverse cross-
sectional area and at least one longitudinal volume has a varying longitudinal
15 cross-sectional area, such that the fused metallic powders in the graded
metallic structure are graded along the longitudinal and the transverse.
2. The method according to claim 1, wherein the longitudinal volumes are formed
by a number of dividers, at least one divider being inclined to the longitudinal and at
20 least one divider being inclined to the transverse.
3. The method according to claim 1 or 2, wherein preparing the material powder
comprises:
inserting a number of dividers into the supply container to form the
25 longitudinal volumes;
filling the longitudinal volumes with the respective metallic powders; and
removing the dividers from the supply container.
4. The method according to claim 3, wherein the dividers comprise a central
30 divider coincident with a centreline of the supply container.
5. The method according to claim 4, wherein the central divider is inclined to the
transverse.

6. The method according to any one of claims 3 to 5, wherein the dividers comprise a number of side dividers offset from a centreline of the supply container.
- 5 7. The method according to claim 6, wherein at least one side divider is inclined to the longitudinal.
8. The method according to any one of claims 3 to 7, wherein insertion of the dividers is facilitated by a support structure substantially congruent with an inner
10 perimeter of the supply container.
9. The method according to claim 8, wherein the support structure comprises a set of guides to facilitate insertion of the dividers.
- 15 10. The method according to any one of claims 1 to 9, wherein preparing the material powder comprises preparing the metallic powders for the respective longitudinal volumes, each metallic powder comprising a first metallic material and optionally a second metallic material.
- 20 11. The method according to claim 10, wherein preparing the metallic powder comprises mixing the first metallic material with the second metallic material by roller milling.
12. The method according to claim 10 or 11, wherein preparing the metallic powder
25 comprises forming the first metallic material by gas atomization.
13. The method according to any one of claims 10 to 12, wherein the first metallic material comprises a high entropy alloy.
- 30 14. The method according to any one of claims 10 to 13, wherein the second metallic material comprises titanium and/or aluminium.

15. The method according to any one of claims 1 to 14, wherein the additive manufacturing process is laser powder bed fusion.
16. A graded metallic structure fabricated by the method according to any one of
- 5 claims 1 to 15.