CLAIMS

1. A material removal method comprising:
   in a first step, directing an energy beam toward a component to ablate a first region of material to form a gap extending through the component between a repair region and a base region of the component, wherein subsequent to the first step, the repair region and base region are joined by a connecting portion; and
   in a second step, directing an energy beam toward the component to ablate the repair region to remove the repair region from the component.

2. A method according to claim 1, wherein the gap has a sufficient width to provide a heat barrier between the repair region and the base region during the second step such that substantially no heat affected zone is formed in the base region by the ablation of the repair region.

3. A method according to claim 2, wherein the gap has a width of between 0.1mm and 1mm.

4. A method according to claim 3, wherein the gap has a width of approximately 0.5 mm.

5. A method according to any of the preceding claims, wherein the connecting portion has a width sufficient to provide a structural connection between the base region and the repair region such that substantially no material from the repair region is dislodged during the second step.

6. A method according to claim 5, wherein the connecting portion has a width of less than 1 mm, and may have a width of between 0.5 and 0.1 mm, and may have a width of substantially 0.5 mm.

7. A method according to any of the preceding claims, wherein the first step is carried out using first beam parameters such that substantially no heat affected zone is formed in the first region.

8. A method according to any of the preceding claims, wherein the second step is carried out using second beam parameters.

9. A method according to claim 7 or claim 8, wherein the beam parameters comprise any of incident energy density, beam fluence, beam power, scan speed, pulse repetition frequency, electromagnetic beam wavelength and incident beam diameter.

10. A method according to claim 9, wherein the first beam parameters comprise one or more of a relatively low power, a relatively fast scan speed, a relatively high pulse repetition frequency, and a relatively large beam diameter, and the second beam parameters comprise one or more of a relatively high power, a relatively slow scan speed, a relatively low pulse repetition frequency, and a relatively small beam diameter.

11. A method according to any of the preceding claims further comprising a third step carried out subsequent to the second step, comprising ablating an edge of the base region.

12. A method according to claim 11, wherein the third step further comprises removing the connecting portion.

13. A method according to any of the preceding claims wherein the energy beam is provided by a pulsed laser beam.

14. A method according to any of the preceding claims wherein the method is applied to a component of a gas turbine engine.

CLAIMS

1. A material removal method comprising:
   in a first step, directing an energy beam toward a component to ablate a first region of material to form a gap extending through the component between a repair region and a base region of the component, wherein subsequent to the first step, the repair region and base region are joined by a connecting portion; and
   in a second step, directing an energy beam toward the component to ablate the repair region to remove the repair region from the component.

2. A method according to claim 1, wherein the gap has a sufficient width to provide a heat barrier between the repair region and the base region during the second step such that substantially no heat affected zone is formed in the base region by the ablation of the repair region.

3. A method according to claim 2, wherein the gap has a width of less than 1mm.

4. A method according to claim 3, wherein the gap has a width of approximately 0.5 mm.

5. A method according to any of the preceding claims, wherein the connecting portion has a width sufficient to provide a structural connection between the base region and the repair region such that substantially no material from the repair region is dislodged during the second step.

6. A method according to claim 5, wherein the connecting portion has a width of less than 1 mm.

7. A method according to any of the preceding claims, wherein the first step is carried out using first beam parameters such that substantially no heat affected zone is formed in the first region.

8. A method according to any of the preceding claims, wherein the second step is carried out using second beam parameters.

9. A method according to claim 7 or claim 8, wherein the beam parameters comprise any of incident energy density, beam fluence, beam power, scan speed, pulse repetition frequency, electromagnetic beam wavelength and incident beam diameter.

10. A method according to claim 9, wherein the first beam parameters comprise one or more of a relatively low power, a relatively fast scan speed, a relatively high pulse repetition frequency, and a relatively large beam diameter, and the second beam parameters comprise one or more of a relatively high power, a relatively slow scan speed, a relatively low pulse repetition frequency, and a relatively small beam diameter.

11. A method according to any of the preceding claims further comprising a third step carried out subsequent to the second step, comprising ablating an edge of the base region.

12. A method according to claim 11, wherein the third step further comprises removing the connecting portion.

13. A method according to any of the preceding claims wherein the energy beam is provided by a pulsed laser beam.

14. A method according to any of the preceding claims wherein the method is applied to a component of a gas turbine engine.

15. A method according to claim 5 or any claim dependent thereon, wherein the connecting portion has a width of between 0.5 and 0.1 mm.

16. A method according to claim 5 or any claim dependent thereon, wherein the connecting portion has a width of 0.5 mm.