CLAIMS

What is claimed is:

1. A method for pre-stressing a compressor blade or a fan blade of a gas turbine engine, the method comprising:

pre-stressing the compressor blade or the fan blade by rotating the compressor blade or the fan blade relative to an axis; and

controlling rotational speed of the compressor blade or the fan blade to generate residual stress in the compressor blade or the fan blade, wherein the pre-stressing applies loads to or stresses to the compressor blade or the fan blade before the compressor blade or the fan blade is used or operated in an intended application.

2. The method of claim 1, wherein the compressor blade or the fan blade is hollow and/or a shrouded blade.

3. The method of claim 1, wherein the axis is perpendicular to a central axis of the compressor blade or the fan blade.

4. The method of claim 1, wherein controlling rotational speed includes rotating the compressor blade or the fan blade to exceed a maximum operating speed of the compressor blade or the fan blade to 109.5% of the maximum operating speed.

5. The method of claim 1, wherein controlling rotational speed includes controlling rotation of the compressor blade or the fan blade to exceed a maximum operation speed of the compressor blade or the fan blade for a predetermined time period.

6. The method of claim 1, wherein the compressor blade or the fan blade is a plurality of compressor blades or a plurality of fan blades.

7. The method of claim 1, wherein the residual stress includes residual compressive stress in one or more regions of the compressor blade or the fan blade.

8. The method as in claim 1, wherein the compressor blade or the fan blade is formed from titanium.

9. A method for pre-stressing compressor blades or fan blades of a gas turbine engine, the method comprising:

pre-stressing the compressor blades or the fan blades by rotating the compressor blades or the fan blades element relative to an axis; and

controlling rotational speed of the compressor blades or the fan blades to generate residual stress in the compressor blades or the fan blades, wherein the compressor blades or the fan blades are located on a plurality of fan blade units, and the pre-stressing applies loads to or stresses to the compressor blades or the fan blades before the compressor blades or the fan blades are used or operated in an intended application.

10. The method as in claim 9, wherein the compressor blades or the fan blades are formed from titanium.

11. A system for pre-stressing compressor blades or fan blades of a gas turbine engine, the system comprising:

a rotation unit configured to rotate and pre-stress a compressor blade or a fan blade relative to an axis; and

a control unit configured to control rotation speed of the compressor blade or the fan blade to generate residual stress in the compressor blade or the fan blade, wherein pre-stress of the compressor blade or the fan blade applies loads to or stresses to the compressor blade or the fan blade before the compressor blade or the fan blade is used or operated in an intended application.

12. The system of claim 11, wherein the compressor blade or the fan blade is a hollow blade and/or a shrouded blade.

13. The system of claim 11, wherein the axis is perpendicular to a central axis of the compressor blade or the fan blade.

14. The system of claim 11, wherein controlling rotational speed includes rotating the control blade or the fan blade to exceed a maximum operating speed of the compressor blade or the fan blade to 109.5% of the maximum operating speed.

15. The system of claim 11, wherein controlling rotation speed includes controlling rotation of the compressor blade or the fan blade to exceed a maximum operational speed for a predetermined time period.

16. The system of claim 11, wherein the compressor blade or the fan blade is a plurality of compressor blades or a plurality of fan blades mounted to the rotation unit.

17. The system of claim 11, wherein the compressor blade or the fan blade is a plurality of fan blade units.

18. The system of claim 11, wherein the residual stress includes residual compressive stress in one or more regions of the compressor blade or the fan blade.

19. The system as in claim 11, wherein the compressor blades or the fan blades are formed from titanium.