CLAIMS

1. A procedure for defining a rotor balancing strategy to reduce mass eccentricity imbalances produced by a first rotor module which in use is attached to one or more further rotor modules to form a spool of a gas turbine engine, the procedure including the steps of:

providing a computer model which predicts the vibration amplitude at a given axial position along the spool when the spool is rotated at a given rotational speed;

using the model to predict respective vibration amplitudes at the given axial position for different axial positions of a unit unbalance applied to the spool;

plotting the predicted vibration amplitudes as data points on a graph of vibration amplitude against axial position of the applied unit unbalance;

using the graph to identify axial positions which are more or less likely to contribute to flexing of the spool at the given rotational speed when mass is added or removed from the first rotor module to reduce imbalances at the axial positions; and

defining a rotor balancing strategy based on the identification of those axial positions.

2. A procedure according to claim 1, wherein the given rotational speed is in a speed range in which the spool is susceptible to resonant vibration.

3. A procedure according to claim 1 or 2 further including the step of:

including indicators on the graph, at different axial positions, of likely average unbalance due to module component mass eccentricity at the respective axial position;

wherein the defined balancing strategy is also based on the likely average unbalances.

4. A procedure according to any one of the previous claims, wherein:

the first rotor module has two axially spaced apart balancing planes;

the data points include a pair of data points for the predicted/measured vibration amplitudes when the unit unbalance is applied to the spool at the balancing planes; and

the graph includes a straight line which extends through the data points at the balancing planes.

5. A procedure according to claim 4, wherein:

the graph has a range of axial positions (a “rigid response range”) in which the data points lie on the straight line; and

when the first rotor module has an imbalance (a “rigid response imbalance”) which is

identified to lie within the rigid response range, a balancing strategy to address the rigid response imbalance is defined in which, to the maximum extent possible, mass is added or removed from the first rotor module at the balancing planes to correct the rigid response imbalance.

6. A procedure according to claim 4 or 5, wherein:

the graph has one or more ranges of axial position ("flexible response ranges") in which the data points do not lie on the straight line; and

when the first rotor module has an imbalance (a "flexible response imbalance") which is identified to lie within such a flexible response range, a balancing strategy to address the flexible response imbalance is defined in which, to the minimum extent possible, mass is added or removed from the first rotor module at the balancing planes to correct the flexible response imbalance.

7. A procedure according to claim 6, wherein the balancing strategy includes component balancing, straight building and/or blade distribution procedures to correct the flexible response imbalance.

8. A procedure according to claim 4 or 5, wherein:

the graph has one or more ranges of axial position ("flexible response ranges") in which the data points within the flexible response range(s) do not lie on the straight line; and

when the first rotor module has an imbalance (a "flexible response imbalance") which is identified to lie within such a flexible response range, a balancing strategy to address the flexible response imbalance is defined in which the first rotor module is reconfigured to move the straight line closer to a data point at the axial location of the flexible response imbalance.

9. A procedure according to claim 8 including repeating the steps of any one of claims 1 to 7 for the reconfigured first rotor module.

10. A method of reducing dynamic imbalance produced by a first rotor module, which in use is attached to one or more further rotor modules to form a spool of a gas turbine engine, the method including:

performing the procedure according to any one of the previous claims; and

balancing the first rotor module according to the defined balancing strategy.