

Moment Weight of Turbine and Compressor Rotor Blades

RATIONALE

ARP510A has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

To standardize Turbine and Compressor rotor blade drawing data and blade marking requirements for the purpose of classifying blades with respect to their moment weight.

1.1 Purpose:

To permit blade selection which will maintain the balance of rotating assemblies within acceptable limits during initial assembly and in operational maintenance.

2. REFERENCES:

There are no referenced publications specified herein.

3. GENERAL:

The moment weight of a blade is the product of the pan weight of the blade and the distance of its C. G. from the axis of rotation.

3.1 The moment weight of the blade $M = R W = (L + B) W$.

3.2 In cases where it is desirable to utilize a datum-arm length other than "L" say "H", the moment weight obtained ($M_H = S \times W$) must be converted to actual moment weight.

Example: $M = M_H + W (L - H)$

3.2.1 For small differences between "L" and "H" the use of a mean blade weight in this calculation may give acceptable accuracy. Because of this possible use of the mean blade weight, it shall be specified on the drawing (See paragraph 4.1.2.2).

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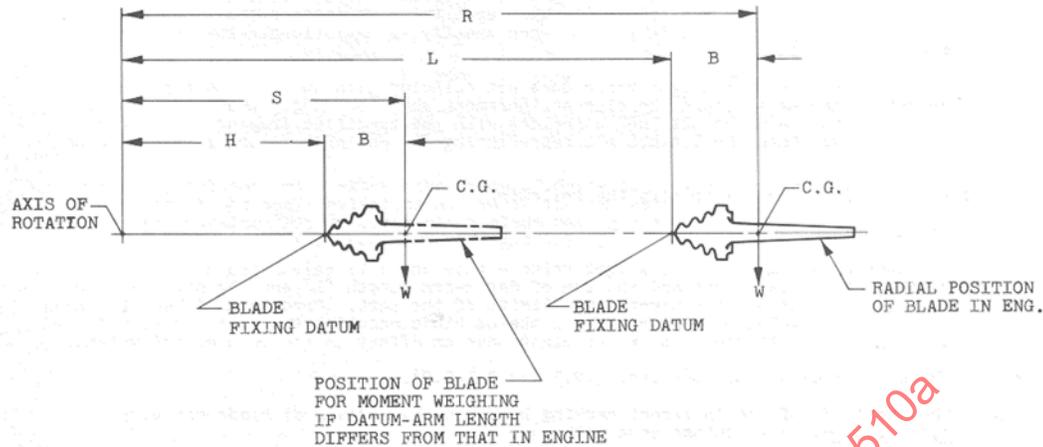


FIGURE 1

"B" - Distance from fixing datum to the C.G.

"W" - Pan weight of blade.

"L" - Datum-Arm length.

4. METHOD:

Two optional methods for classifying blades are given below:

4.1 The Direct Marking Method :

4.1.1 The moment weight value obtained shall be marked on the blade.

4.1.2 The blade drawing shall specify the following:

4.1.2.1 The datum-arm length.

4.1.2.2 The mean blade weight (See paragraph 3.2.1) - this shall be calculated from the average dimensional limits of the part.

4.1.2.3 The magnitude of increment marking by which the individual blade may vary:
Typical note: "MOMENT WEIGHT TO BE GIVEN IN .XX OZ IN."

4.1.2.4 The required accuracy of the moment weighing operation in terms of units selected.
Typical note: "THE ACCURACY OF THE MOMENT WEIGHING METHODS APPLIED MUST NOT INTRODUCE AN ERROR EXCEEDING .YY OZ IN."

4.1.2.5 The position of the moment weight identification on the blade and method of marking.

4.2 The Code Marking Method :

4.2.1 The moment weight in the form of a code shall be marked on the blade.

4.2.2 The code shall represent a deviation from the mean moment weight value specified on the drawing. It shall consist of a number of increments whose size is also given on the drawing preceded by the letter "A" when specifying deviations above the mean moment weight value, or by the letter "B" when specifying deviations below the mean moment weight value.

4.2.2.1 When an actual moment weight value does not coincide with an exact multiple of the selected increments, then the closest increment shall be used. When the closest moment weight value so obtained coincides with the specified drawing mean moment weight value, then the letters NIL representing "no deviation", shall be marked on the blade.

4.2.3 The blade drawing shall specify the following:

4.2.3.1 The datum-arm length.

4.2.3.2 The approximate mean moment weight value - this shall be calculated as the product of the mean blade weight and the sum of datum-arm length "L" and the mean value of "B" based on the average dimensional limits of the part. Once established, the mean moment weight value of a given part numbered blade should not be altered to reflect physical changes to the blade which might have an affect on the mean moment weight.

4.2.3.3 The mean blade weight (See paragraph 3.2.1 and 3.1.2.2).

4.2.3.4 The magnitude of the increment marking by which the individual blade may vary.
Typical note: (Percentage code method)

"DEVIATION FROM MEAN MOMENT WEIGHT TO BE MARKED IN INCREMENTS OF 1.0% OF MEAN MOMENT WEIGHT".
e.g., A20 - Indicating 2% above mean.

Typical note: (Arithmetic Increment Method)

"DEVIATION FROM MEAN MOMENT WEIGHT TO BE MARKED IN INCREMENTS OF 0.01 OZ IN."
e.g., A02 - Indicates 0.02 oz in. above mean.

4.2.3.5 The required accuracy of the moment weighing operation in terms of the units selected.
Typical note:

"THE ACCURACY OF THE MOMENT WEIGHING METHODS APPLIED MUST NOT INTRODUCE AN ERROR EXCEEDING .YY OZ IN.".

4.2.3.6 Position of moment weight code and method of marking.