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Study on the replacement of last moving blade at lower pressure turbine

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Key Words: Blade(), Moment weight(), Cover and band(), Dove tail()

Abstract

Vibration of turbine is concerned with array of last moving blade at lower pressure turbine. When last moving blade at lower pressure turbine was replaced, we must consider mass unbalance problems of blades. If mass unbalance happened at rotor, it is impossible to operate turbine. In this paper, we have how to minimize the mass unbalance problems of last moving blade at lower pressure turbine.

가

가

1.

가

2. (Blade)

2.1

(Rotor)

(Blade)가

- Dove tail :

- Vane : Torque

- Cover : Vane

- Tenon : Vane

가

Rivet

Cover

†

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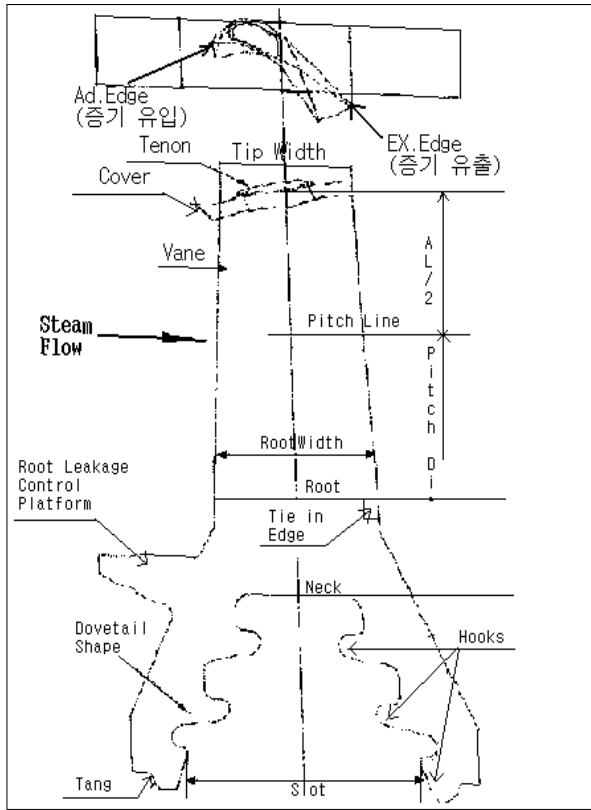


Fig. 1 Parts of Blade

2.2 Dove tail

Dovetail

- Tangential entry(Pine tree) dovetail
- Gas turbine(Axial entry) dovetail
- Pinned finger dovetail
- Keyed axial entry dovetail

2.2.1 Tangential entry(Pine tree) dovetail

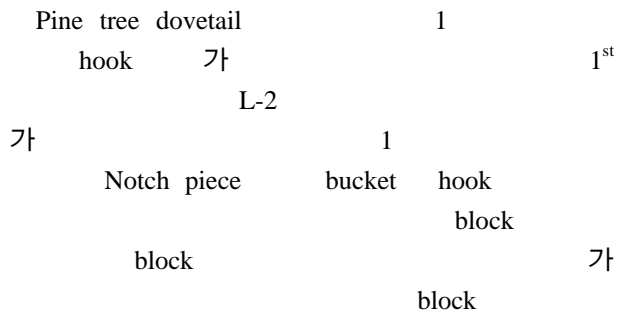
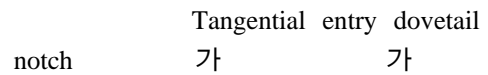


Fig. 2 Tangential entry(Pine tree) dovetail

2.2.2 Gas turbine(Axial entry) dovetail

Axial entry dovetail



Reheat section Tangential force

Fig. 3 Gas turbine(Axial entry) dovetail

2.2.3 Pinned finger dovetail

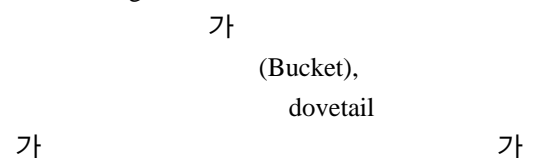




Fig. 4 Pinned finger dovetail

2.3 Bucket vane

가 가

Torque

2.3.1 Conventional type(Standard vane)

tip , concave vane type conve

2.3.2 Laminar vortex type

Vane root tip
Vortex
twist

Vortex flow

twist

가 tip

2.3.3 SCHLICT type

Laminar vortex type

program

가

2.3.4 Super type

SCHLICT type

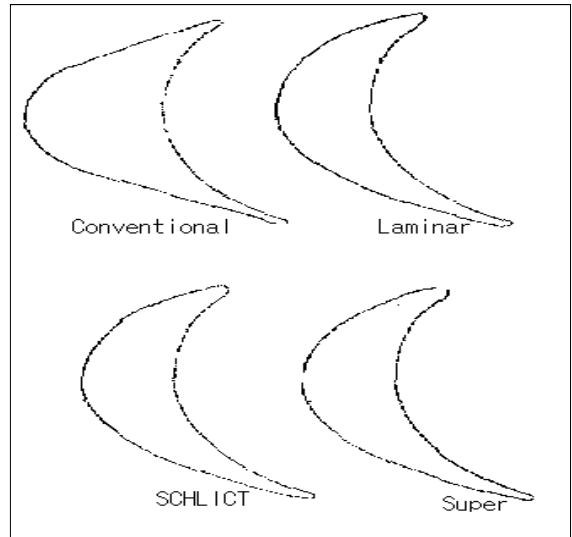


Fig. 5 Vane type

2.4 Cover and Tenon

가

tip

가

stage

load factor stage

1st

tip
flutter

(Damper)

3.

3.1

Serrated root

root wedge

wedge가

116

1

root

wedge

3.2

Moment weight

moment weight

SCHENCK

Moment weight
 - 가
 - Old 가
 - 2 “L” Zig W1
 W2
 - Moment 가 ±5gr

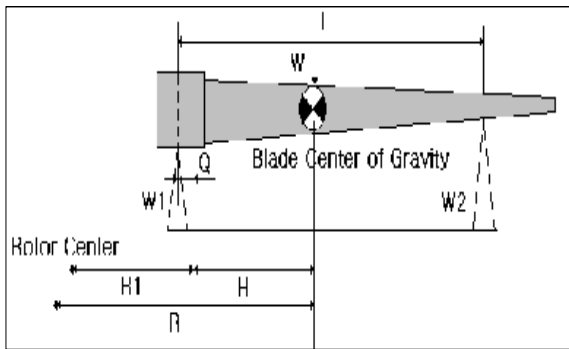


Fig. 6 Measurement of blade moment

3.2 Moment weight

$$\text{Moment} = W1 \times (R1 - Q) + W2 \times (R1 - Q + L)$$

W :

L : W1 W2

R :

W

R1 : Platform

H : W1 W

W1 : 1, W2 :

Q : W1 Platform

3.2 Blade moment

Fig. 7 Moment

가 , Moment가 Disc Rim 가 Fig. 8 Moment 가 Blade 가

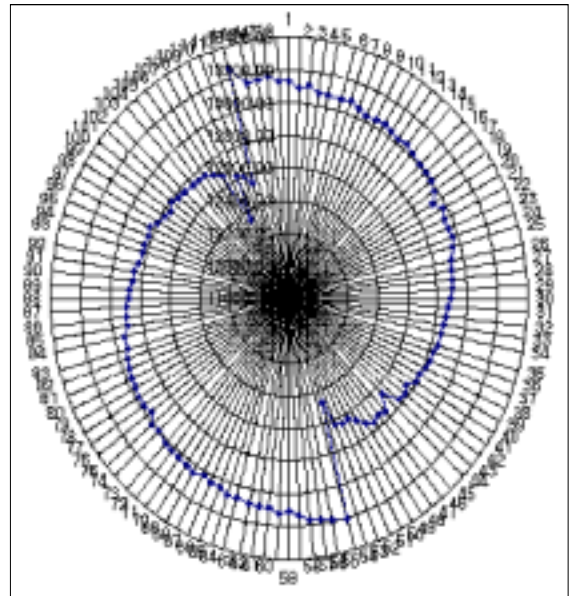


Fig. 7 Old distribution of blade moment

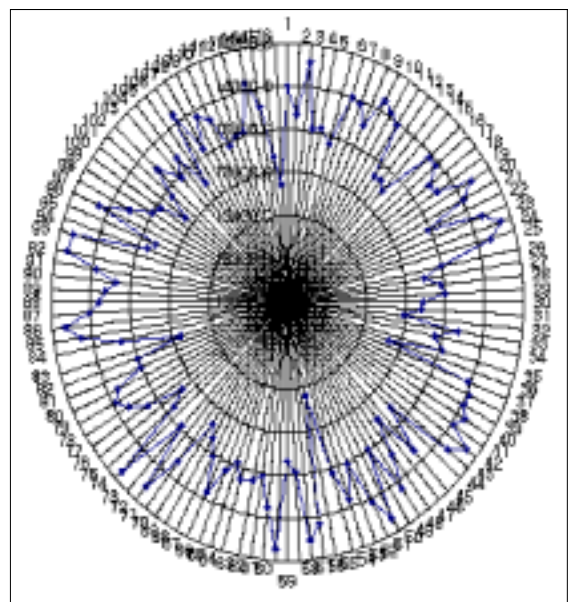
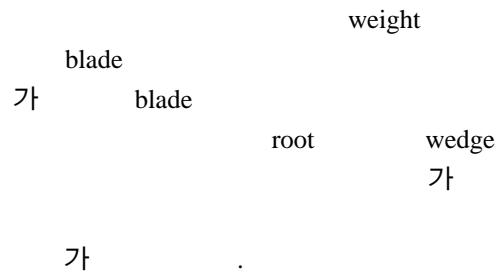


Fig. 8 New distribution of blade moment

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