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Study on the damage of Bearings due to failure of Oil Supply System at turbine

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Key Words: Bearing(), Oil supply system(), Emergency oil pump(),

Abstract

Oil supply system is one of the most important part of Turbine. Lubricating oil of bearings supplied by oil pump. Failure of Oil supply pump critical damaged parts of Turbine, especially bearings. In this paper we have discussed the serious damage of turbine bearings due to failure of Oil supply pump.

(rotor)

1.

(babbitt)

가

(pump)

(journal bearings)

(oil film)

(centrifugal type)

*

가

가

2.

2.1
Fig.1
(Tank)
2.0kg/cm²

1.8 ~

(header)

40mmHg

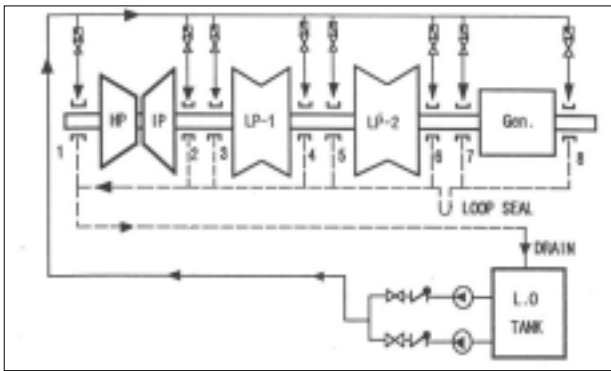


Fig. 1 Lubricating oil supply system

2.2 (Emergency)

가

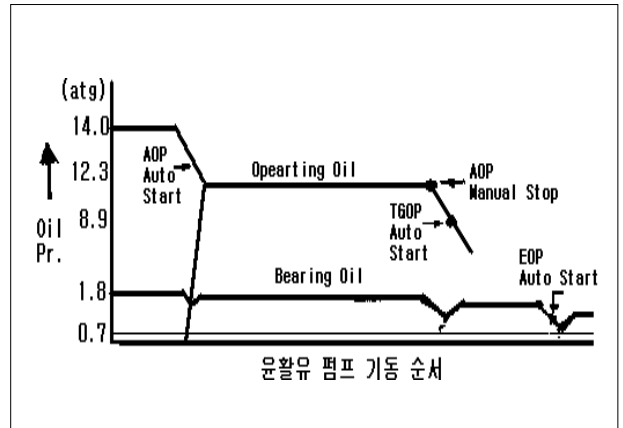


Fig. 2 Starting Sequence at Lubricating Oil Pump (Babbit Metal)

2

(Clearance)

(Packing)

가

가 2000rpm

1inch 0.0254mm, 4500rpm 0.033mm

Fig. 3

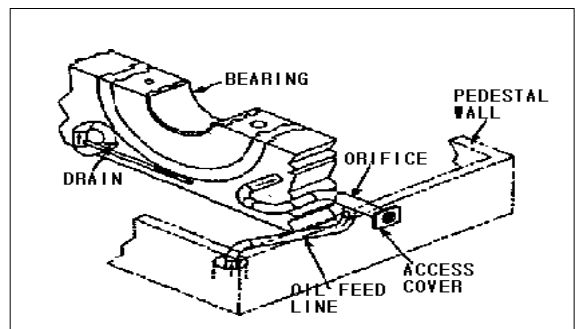


Fig. 3 Lubricating Oil pipe arrangement

Fig.2

2.3

(Journal)
(Shell)

(sn)

3.

3.1

(PLC: Programmable Logic Control)

(PLC: Programmable Logic Control)

가 , PLC 420rpm 가 Turning 가

3.2

780rpm 2 가
#6 650μmpp 가
420rpm 가
#10 400μmpp

Table 1.

Table 1. Vibration of Bearings at Shut-Down

베어링 번호	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
터빈 정격속도시	25	35	50	50	80	90	55	60	50	40
터빈감속시 780 rpm	180	160	290	310	410	650	490	460	140	150
터빈감속시 420 rpm	250	35	190	240	210	300	320	250	120	400

3.3

95 가 , 420rpm
#4 가 190
780rpm 가

Table 2.

Table 2. Bearing Metal Temperature at Shut-Down

단위:℃

베어링 번호	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
터빈 정격속도시	62	64	75	82	78	95	88	80	80	80
터빈 감속시 최고치	79	145	160	190	155	165	165	148	80	160

Fig. 4 #4

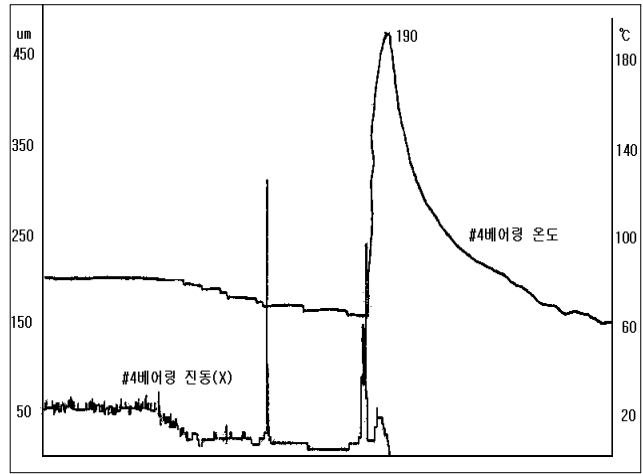


Fig. 4 Vibration and Metal Temperature of #4 Bearing at Shut-Down

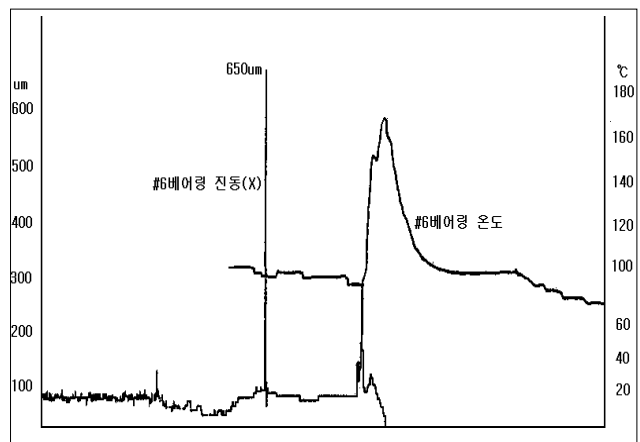


Fig. 5 Vibration and Metal Temperature of #6 Bearing at Shut-Down

Fig. 5 #6

#4, 6

3.4

#1, #3, #4

3.4.1 #1

Fig. 6

Babbitt가

가

Babbitt가

Babbitt

가

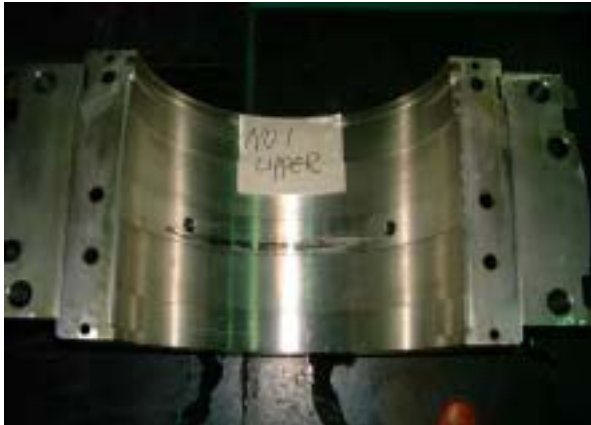


Fig. 6 Disassemble of No. #1 Upper Bearing

3.4.2 #3

Fig. 7

Babbitt

Babbitt가



Fig. 7 Disassemble of No. #3 Lower Bearing

3.4.3 #4

가 가

Fig.8

Babbitt가



Fig. 8 Journal of No. #4 Bearing

4.

PLC(Programmable Logic Control)

가

, 780rpm

2

1bar

(1) Koo, woo sik, Lee, woo kwang, Koo, jae rayng, 2003, Technical report of maintenance at turbine/generator

(2) Korea Electric power company , 1996, Steam Turbine Maintenance