Global Power Synergy Public Co., Ltd.

Cooling fan blade improvement project

Cooling Tower

1.) Energy Saving.

2.) Reduce Maintenance Investment Cost.

3.) Maximize Reliability of Cooling Fan.

1.) Energy Saving.

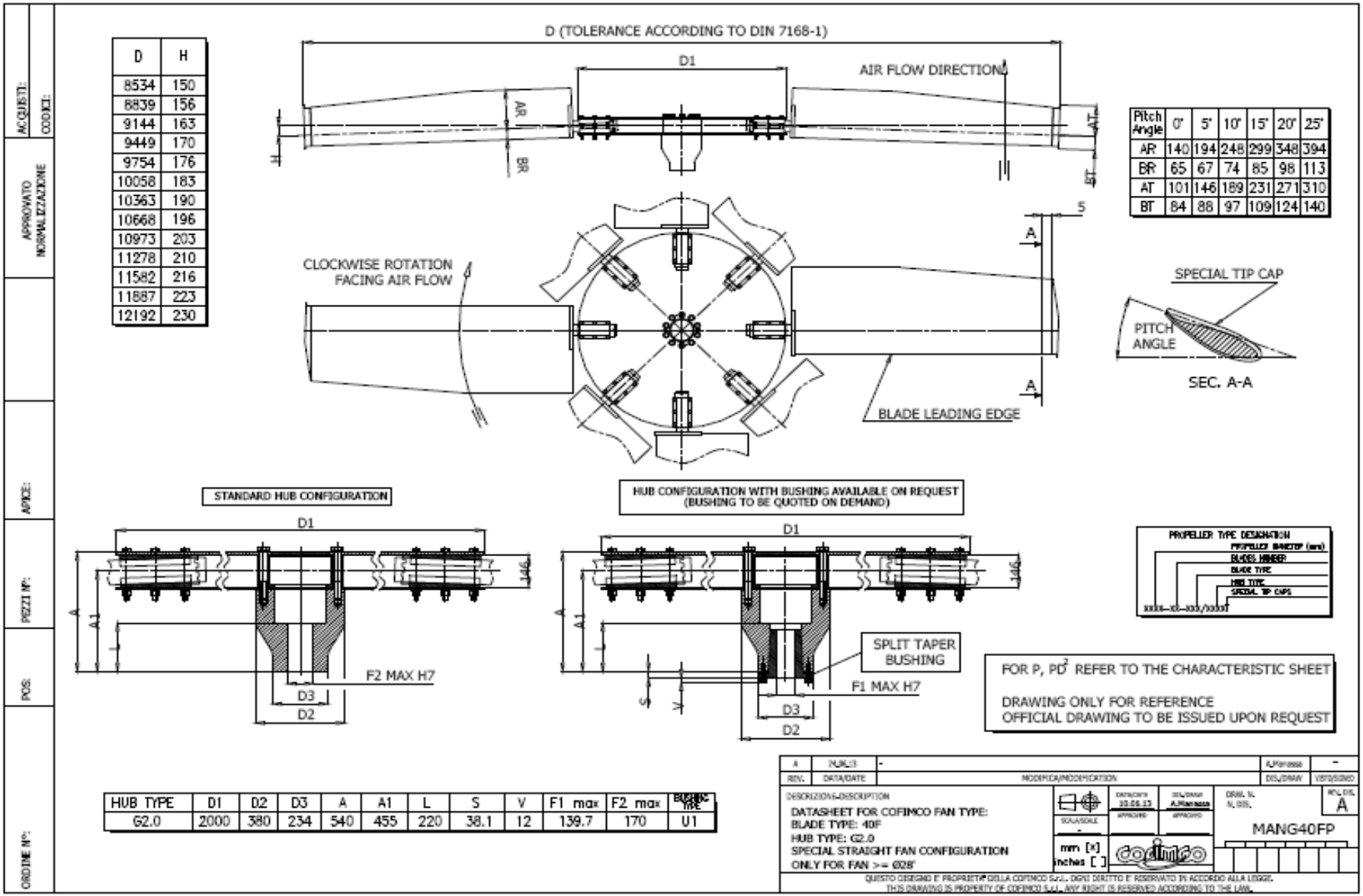
- Reduce Electrical Use 13.78%
- Save electric cost 500,000 Baht/year/cell.

2.) Reduce Maintenance Cost.

- Reduce = 380,000 Baht/cell.

3.) Reduce Risk from Class II to Class III

Drawing of Fan Blade



D	H
8534	150
8839	156
9144	163
9449	170
9754	176
10058	183
10363	190
10668	196
10973	203
11278	210
11582	216
11887	223
12192	230

Pitch Angle	0°	5°	10°	15°	20°	25°
AR	140	194	248	299	348	394
BR	65	67	74	85	98	113
AT	101	146	189	231	271	310
BT	84	88	97	109	124	140

HUB TYPE	D1	D2	D3	A	A1	L	S	V	F1 max	F2 max	BUSHING TYPE
G2.0	2000	380	234	540	455	220	38.1	12	139.7	170	U1

Cofimco Fan Blade

Model : 10975-6-40F/G2.0T

Material : FRP Pultrusion

FRP Fan 40F UV protection Coated

Fan Blade : 7 Blades

1 Set Hub fasteners in carbon steel electro zinc plated

Compare Old and New Fan

FAN	MODEL	DIA.	No. of BLADE	WEIGHT
		(FT)		(KG)
Hudson	Tuf-Lite II	36	9	2,203
Cofimco	10975-6-40F/G2.0T	36	7	1,950

Work Benefits : Calculation Sheet.

SAVING ENERGY

Cell No.	OLD FAN		COFIMCO FAN		ENERGY SAVING
	FLOW	ROTOR SHAFT POWER	FLOW	ROTOR SHAFT POWER	
	M3/S	KW	(KW)	(KW)	%
I	600.9	155.65	600.9	134.2	13.78

ROI

Cell No.	INVEST COST			UNIT RATE PER KWh	COMPARE POWER .		ENERGY SAVING	ENERGY SAVING PER YEAR	SAVING PER YEAR	ROI
	NEW FANS	LABOUR	TOTAL		EXISTING	NEW				
	(BAHT)	(BAHT)	(BAHT)	(BAHT)	(KW)	(KW)	(KW)	(KWh)	(BAHT)	(YEARS)
I	920,000		920,000	2.8	155.65	134.20	21.45	187,902	526,126	1.7
		TOTOL	920,000					TOTOL	526,126	

Guarantee Energy Saving

- Reduce power minimum 12%
- Discount 2% from 1% reduction in energy saving guarantee.

-Reject if energy saving less than 6%

Guarantee material 12 months.

Guarantee service 12 months.

Guarantee vibration not over zone B.

Do : Modification work

Do : Modification work

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Description	Cooling fan cell I blades improvement		
	Before	After	Saving
Power consumption (kW)	156.6	114.29	42.31
Energy consumption (kWh/day)	3,758	2,743	1,015
Energy cost (Baht per day)	10,524	7,680	2,843
Energy cost (Baht per year)	3,683,232	2,688,101	995,131

1.) Energy Saving.

Target: Reduce Electrical use = 13.78%

Actual: Reduce Electrical use = 27.0%

Target: Save electric cost 500,000 Baht/year/cell.

Actual : Save electric cost 995,131 Baht/year/cell.

2.) Reduce Maintenance Cost.

Target: Reduce = 380,000 Baht/cell.

Actual : Reduce = 3.80 Mil.Baht/10 cells

Addition : Vibration less than previous.

Remark :
Old type of fan price about 1,300,000 Baht/ cell.
New type of fan price 920,000 Baht/cell.

3.) Maximize: Reduce Risk from Class II to Class III.

Class II: Exceed the risk acceptance threshold and require pro-active management.
Class III: On the risk acceptance threshold and require active monitoring.

Risk Assessment Matrix

Risk Assessment Matrix

Consequences						Likelihood of occurrence				
Severity	**People**	**Assets**	**Environment**	**Reputation**	**Product quality**	**A**			**D**	**E**
Catastrophic (5)	Multiple fatalities	Extensive damage > 100 MTHB	Massive effect, persistent severe damage	International impact	Massive effect (BI > 100 MTHB)	II	II	I	I	I
Major (4)	Permanent Total Disability or 1 to 3 fatalities	Major damage 10-100 MTHB	Major effect, extended breach or widespread nuisance	Nation impact	Major effect (BI 10-100 MTHB)	III	II	II	I	I
Serious (3)	Single LWDC or Multiple RWDC	Localized damage 1-10 MTHB	Localized effect, repeated breached or many complaints	Considerable impact, Regional Media	Considerable effect (BI 1-10 MTHB)	III	III	II	II	I
Moderate (2)	Single RWDC	Localized damage 0.1-1 MTHB	Localized effect or few complaints	Regional Media	Moderate effect (BI 0.1-1 MTHB)	IV	III	III	II	II
Minor (1)	Minor injury with First Aid	Localized damage < 0.1 MTHB	Localized effect or minor effect	No effect	Minor effect (BI < 0.1 MTHB)	IV	IV	III	III	II

Abbreviation

LWDC	Loss Work Day Case	RWDC	Restricted Work Day Case
		BI	Business Interuption

Likelihood			**Possibility**
A	Improbable	Never heard of in Power Generation Industry	< 20%
B	Unlikely	Heard of in Power Generation Industry (> 5 years)	20 - 40
C	Possible	Incident has occurred or may be occur in our group or company (3-5 years)	40 - 60
D	Likely	Incident has occurred or may be occur in our group or company (1-2 years)	60 - 80
E	High	Incident has occurred or may be occur in our group or company (within 1 years)	> 80%

Risk Acceptance Classes

Class I	Significantly exceed the risk acceptance threshold and require urgent and immediate attention
Class II	Exceed the risk acceptance threshold and require pro-active management
Class III	On the risk acceptance threshold and require active monitoring
Class IV	Below the threshold and do not require active management

Remark

Initial Risk — Risk after existing action — Risk after long action plan

Existing Action to reduce Risk

Next Action Plan to reduce Risk

4.) Maximize: Increase efficiency.

- Air flow increase 4.7% than previous.

- ลดการใช้พลังงานไฟฟ้า 995,131 Baht/year/cell = 9,951,310 Baht/10 cells
- ประหยัดค่าใช้จ่ายในการเปลี่ยน = 13 – 9.2 = 3.8 ล้านบาท
- หัก Investment cost = 1.84 ล้านบาทต่อปี
- **Benefit Value = (9.95 + 3.8) - 1.84 = 11.91 Mil.Baht / year**

THANK YOU