

Energy Saving for Air Conditioning System (China Motor Corporation)

Etern

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Case information

Location: Taoyuan, Taiwan (Yangmei factory)

Industry: Motor manufacturer

Employees: About 1900 employees (Yangmei factory)

Requirement: Energy saving for chiller, ice & cooling water pumps

Implementation: Inverter control system is designed for chiller and water pump to reduce power consumption

◆ Equipment



80RT chiller ↑
15HP ice water pump ↗
15HP cooling water pump →

◆ Analysis

Item		Current	Estimate	Guarantee
Chiller	Capability (RT)	80	80	80
	Consumed (KW)	80.0	80.0	80.0
	Loading avg.	60%	60%	60%
Pump	Capability (RT)	30	30	30
	Consumed (KW)	22.5	22.5	22.5
Energy saving (%)		-	30%	20%
Consumption (KWH/hr)		70.5	49.4	56.4
Operating (hr/day)		8	8	8
Operating (day/month)		22	22	22
Consumption (KWH/month)		12,408	8,694	9,926
Electricity (NT\$/month)		37,224	26,082	29,778
Saving (KWH/month)		-	3,714	2,482
Saving (NT\$/month)		-	11,142	7,446
Implement cost (NT\$)		-		
Return of I.C. (year)		-		

NT\$3.0 /KWH

◆ Energy saving system



Energy saving for chiller

ES for I.W.P.

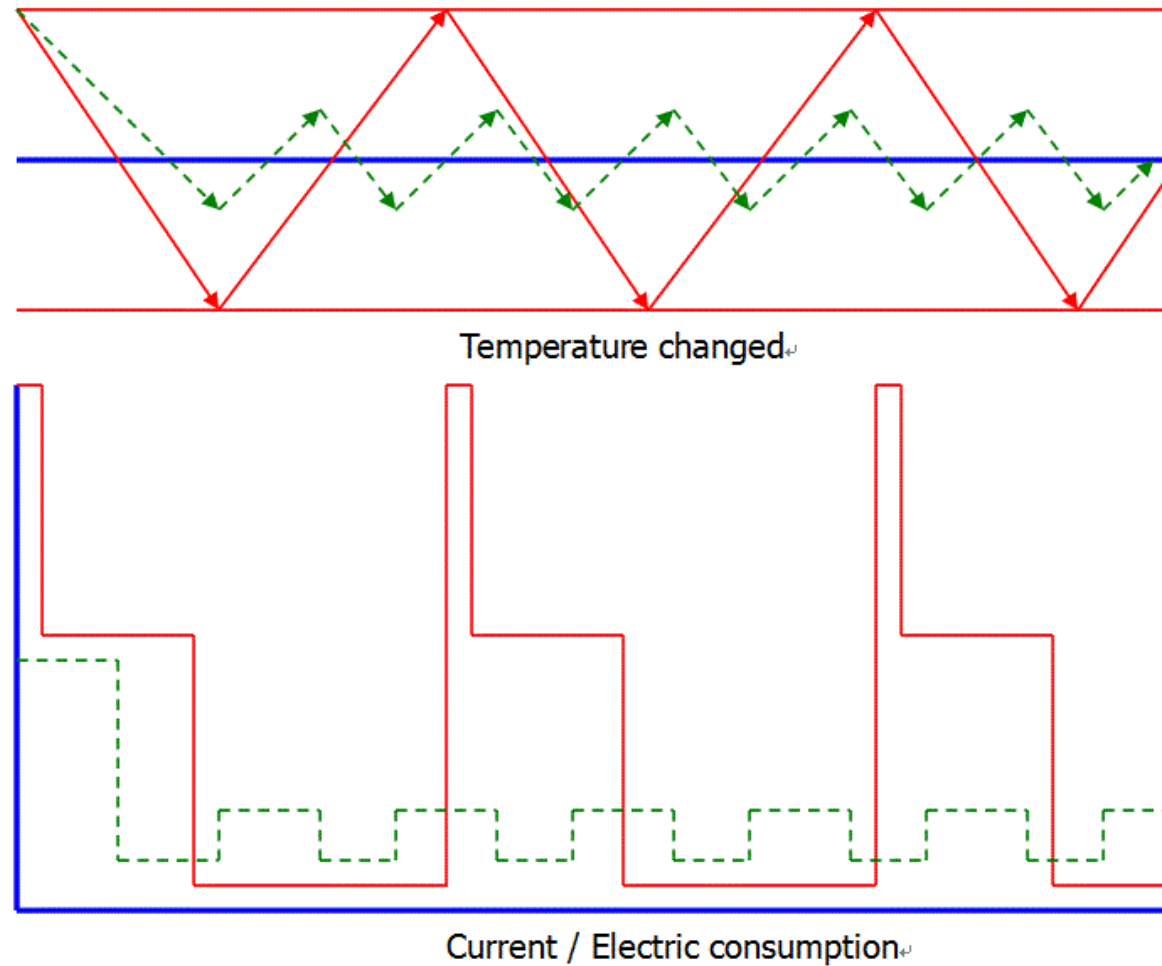


ES for C.W.P.

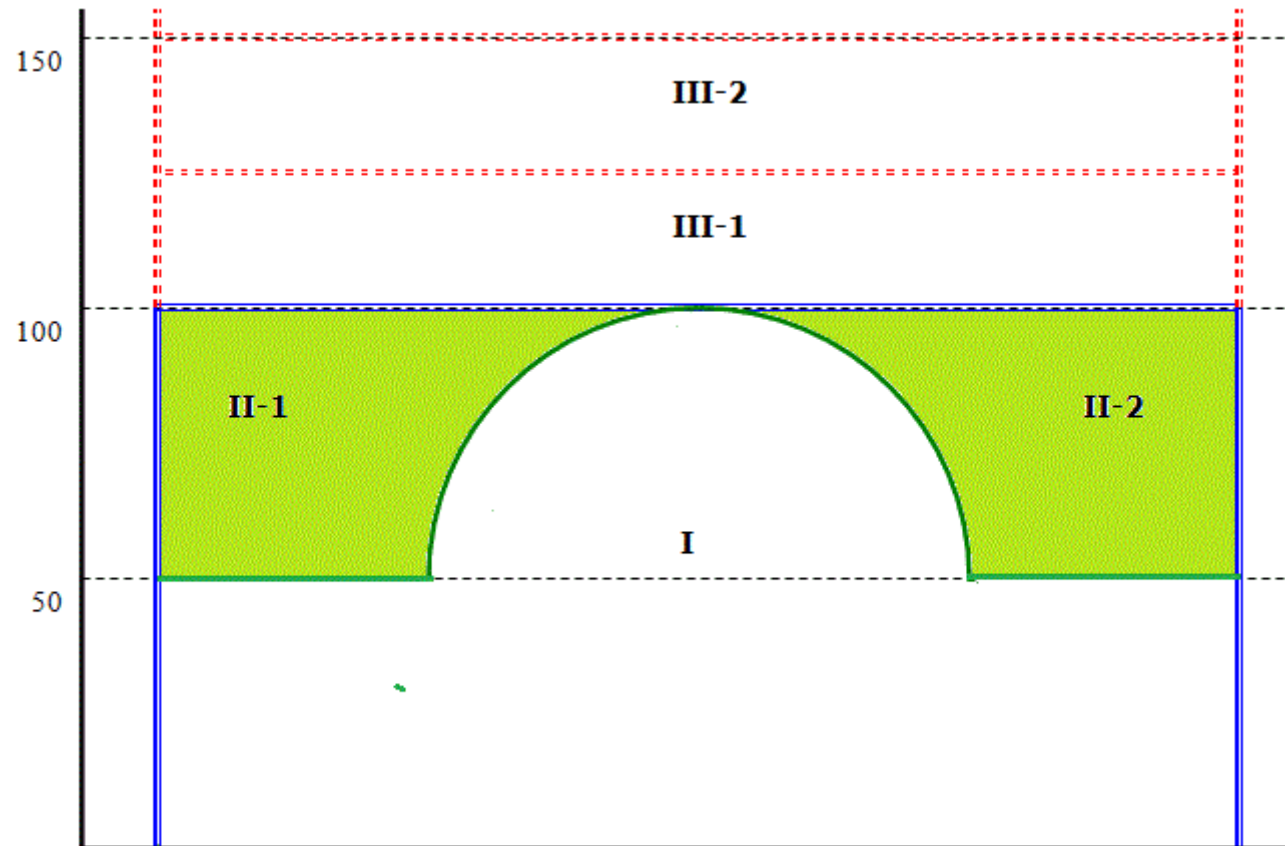


◆ Theorem (Chiller)

With FCM (green) vs. Without FCM (red)



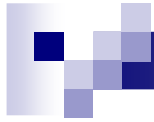
◆ Theorem



- Power consumption of water pump = I + II-1 + II-2 + III-1~2.
- Energy saving by VFD only = III-1~2 (over design).
- Energy saving by VFD with controller = II-1 + II-2 + III-1~2.

◆ Benefits

Place	Technology building (Yangmei factory)			
Equipment	Chiller(80RT) + C.W.P.(15HP) + I.W.P.(15HP)			
Op. mode	Fixed Hz (Without ES sys.)		Variable Hz (With ES sys.)	
KWH (Chiller)	1day	222	1day	165
KWH (C.W.P)	1day	70	1day	44
KWH (I.W.P)	1day	120	1day	77
KWH (Total)	1day	412	1day	286
Saving(%)	$(412 - 286) / 412 = 30.6\%$			
Saving (KWH/month)	$(412 \times 30 \times 30.6\%) = 3,782$			
Saving (NT\$/month)	$(3,782 \times 3.0) = \text{NT\$11,346}$			
Saving (NT\$/year)	$(11,346 \times 8) = \text{NT\$90,768}$			
Acceptance	Qualified			



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