

GAS TURBINE ELECTRIC PROPULSION LNG 선 소개

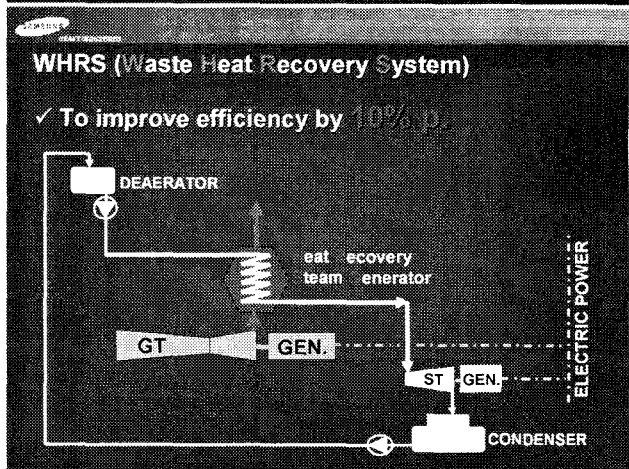
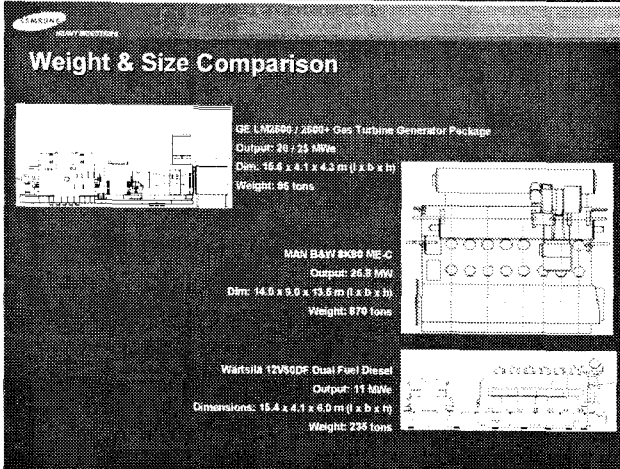
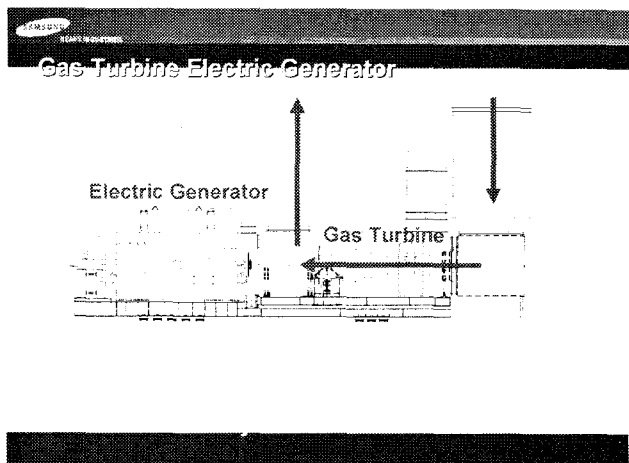
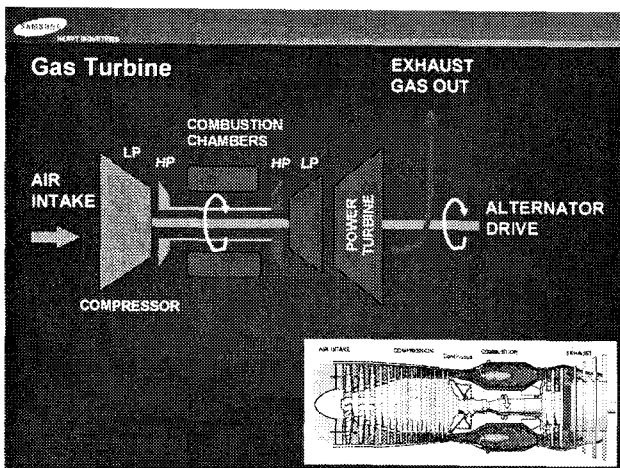
여 동 일*

Introduction For Gas Turbine Electric Propulsion LNGC

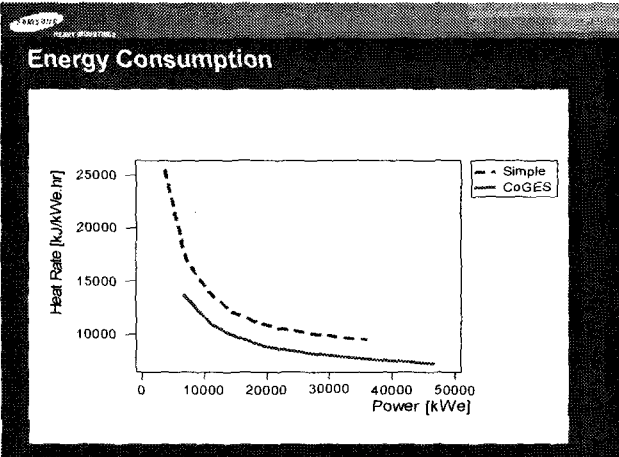
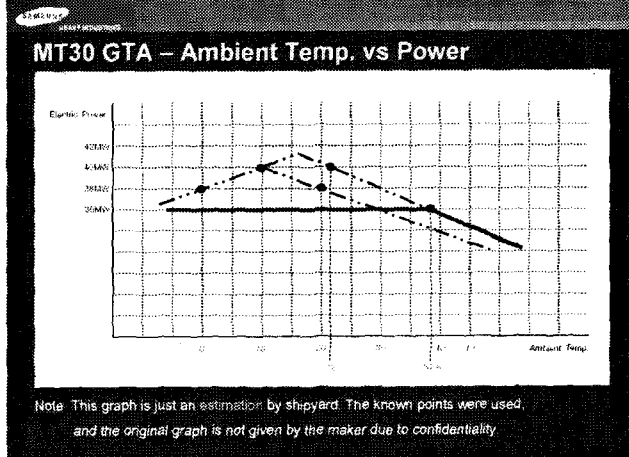
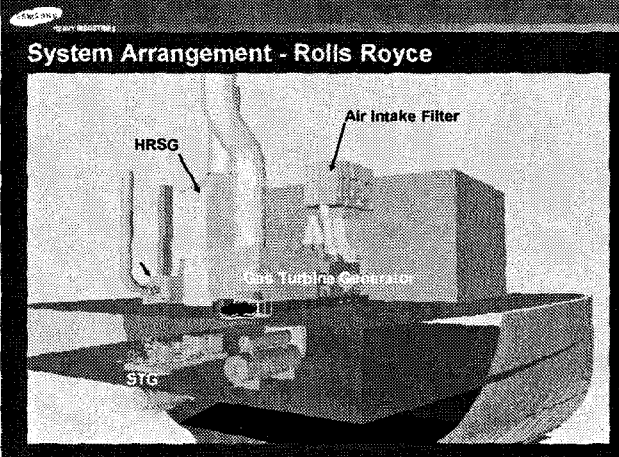
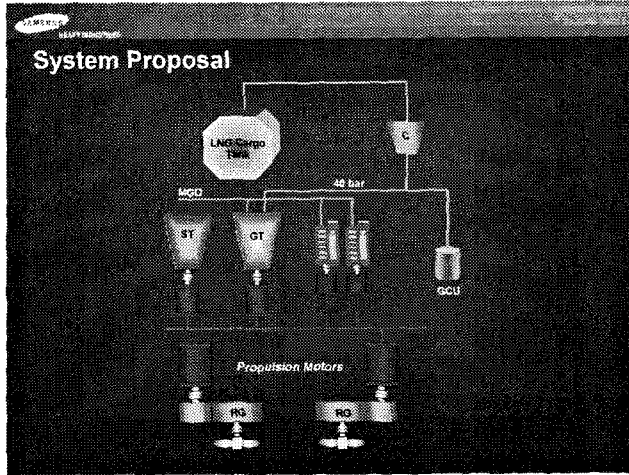
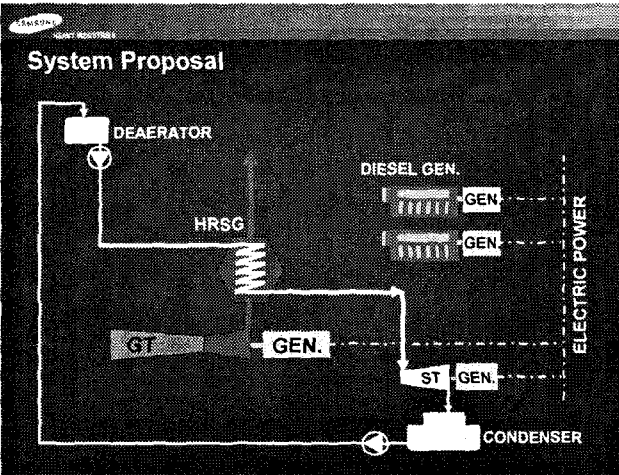
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Abstract : 최근 LNG 연료 시장의 호황에 힘입어 LNG 선들이 점차 대형화 추세에 있고, LNG 선의 추진 기관 또한 경제성, 환경 영향 등의 주어진 요구 환경에 따라 다양화 되고 있다. 기존의 Steam Turbine Propulsion 외에 Conventional 2-stroke Diesel Engine 및 Dual-fuel 4-stroke Diesel Engine 이 LNG 선의 주 기관으로서 이미 상용화 되었고, 기술적/경제적인 이유로 일반 상선의 주기관으로서는 논외에 있었던 Gas Turbine 또한 일부 Oil Major 와 Gas Turbine Maker 에 의해 그 적용 가능성이 논의되고 있다. 이에 따라 LNG 선에 Gas Turbine 적용 타당성, 고려 사항 및 적용에 따른 이점과 단점 등을 고찰하였다.

Key words : LNGC, Dual-fuel, Gas turbine, 2-stroke diesel engine, Steam turbine



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Emissions

	NOx (g/kWh)	SOx (g/kWh)	CO ₂ (g/kWh × 100)	Particulates (g/kWh)
2 Stroke Diesel (Low Speed)	17.0	12.9	5.8	0.5
4 Stroke Diesel (Medium Speed)	12.0	13.6	6.12	0.4
Dual Fuel Diesel Electric	1.3	0.05	4.2	0.05
Steam Turbine	1.0	11.0	8.5	2.5
Gas Turbine	2.5	0	4.8	0.01

Sensitivity to Ambient Air Temp.

Ambient Temp. (°C)	Plant Output (MW)	GTG (MW)	STG (MW)	Gas Fuel Consumption		Remark
				Gas Turbine	Total Plant	
0	45.3	36	9.3	1.9 % ↓	5.0%	
7.5	45.9	36	9.8	1.4 % ↓	2.0%	
15	46.8	36	10.8	0.8 % ↓	2.8 %	
22.5	47.3	36	11.3	0.2 % ↓	0.2 %	
25	47.5	36	11.5			Base Condition
30	48.0	36	12.0	0.6 % ↓	0.4 % ↓	
37.5	46.7	38	12.7	1.5 % ↓	1.0 % ↓	MT30 power output reduced at higher temp. T _{BO} is not repaired at lower temperature.
45	46.7	34	12.7	3.5 % ↓	1.5 % ↓	

Comparison between Alternatives

	Steam Turbine	Dual Fuel Diesel	Slow Diesel	Gas Turbine
효율 (Efficiency)	기준 (Baseline)	+38%	+44%	+31%
Maintenance	우수 (Excellent)	보통 (Average)	불리 (Disadvantage)	우수 (Excellent)
Cargo space	기준 (Baseline)	+7K	+7K	+9K or more
대형선 적용 (Large ship application)	불가 (Not possible)	적합 (Suitable)	적합 (Suitable)	적합 (Suitable)
경제성 (Economy)	불리 (Disadvantage)	우수 (Excellent)	우수 (Excellent)	양호 (Good)
평가 (Evaluation)	대형선 적용 불가 (Not possible for large ship application)	한 용량의 (One capacity)	경제적 (Economic)	Cargo 운항 용가시 경제성 확보 (Economy secured when cargo operation is possible)