

DUAL-FUEL ELECTRIC PROPULSION LNG 선 소개

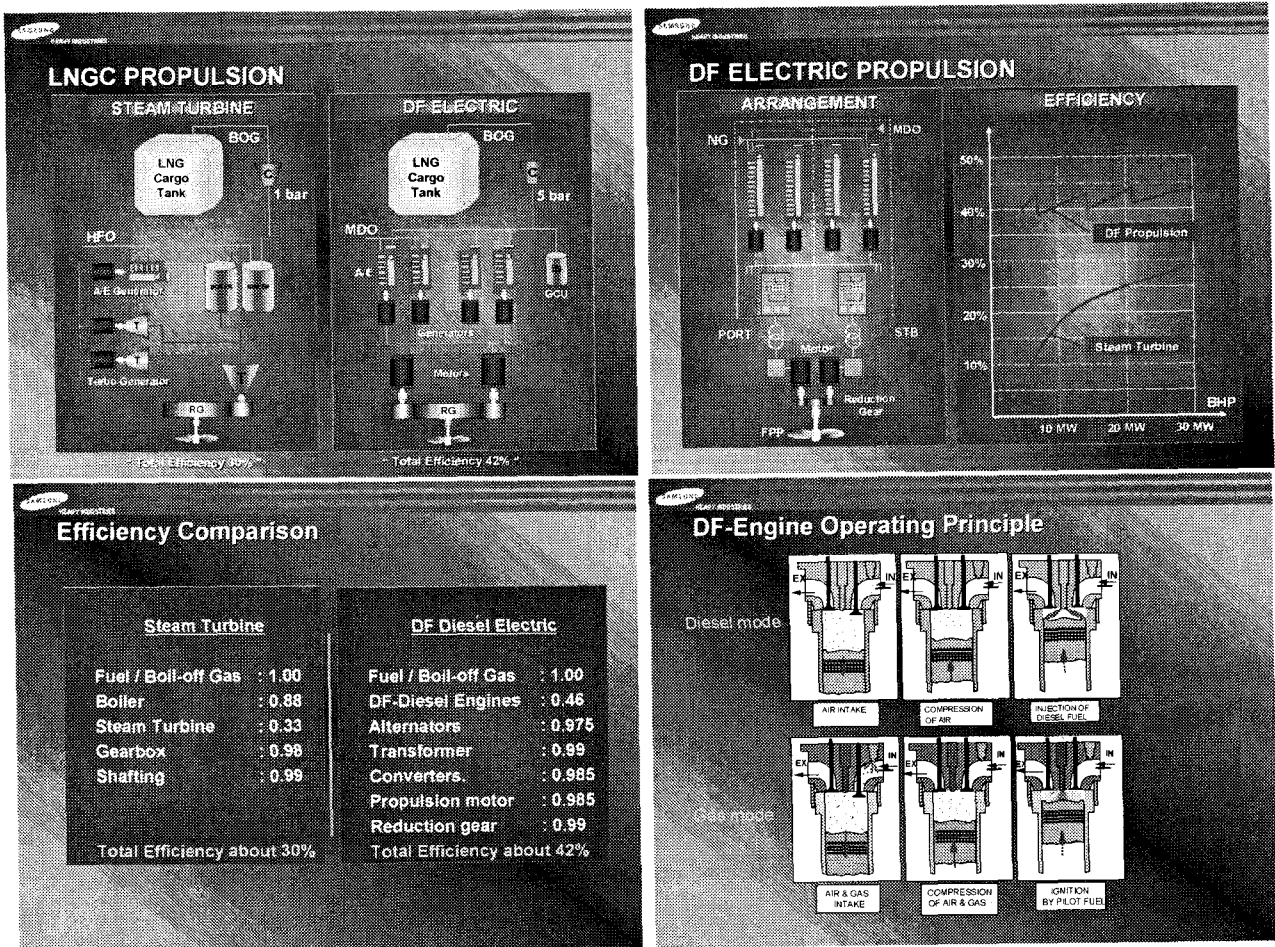
김진모*

Introduction For Dual Fuel Electric Propulsion LNGC

Jin-mo Kim*

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 기관으로 각광받고 있다. 이에 따라 Dual fuel electric propulsion LNGC 의 기본 개념, 작동 원리, 주요 보조 기기, 타 추진 시스템과의 비교 등에 대해 고찰하였다.

Key words : LNGC, Dual-fuel, Gas turbine, 2-stroke diesel engine, Boil-off gas



* 김진모, 삼성중공업 기본설계1팀, E-mail : jin.mo.kim@samsung.com, Tel: 055) 630-3340

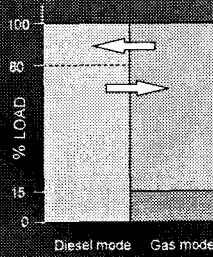
DF-Engine Operating Principle - Operating Modes

Gas mode

- High efficiency and low emissions
- Automatic and instant transfer to diesel operation in alarm situations
- Transfer to diesel operation at any load
- Minimum 15% load limit for continuous operation
- Pilot fuel injection in operation

Diesel mode

- As an ordinary diesel engine
- Transfer to gas operation preferably at part load (< 80%)

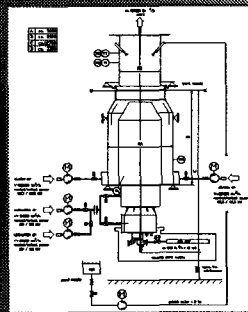


Boil-off gas dumping system

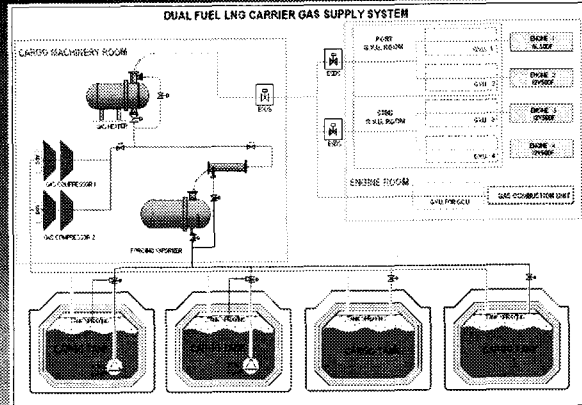
Operating mode	Boil-off gas	Facility
LNG loading	Send to shore (To DF engine as fuel)	LNG terminal (DF engine)
LNG unloading	Send to shore (To DF engine as fuel)	LNG terminal (DF engine)
Laden voyage	To DF engine as fuel	DF engine
Ballast voyage	To DF engine as fuel	DF engine
Maneuvering Port waiting	Dumping	BOG dumping facility required

Boil-off gas dumping system

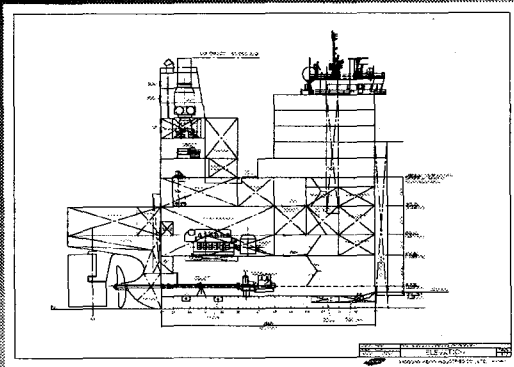
	BOG Incinerator
Space	4.5 m(D) x 9.9 m(H)
Auxiliary system	Nitrogen purging
Safety	Safety system for flame failure
Maintenance	Annual inspection
Capacity	4.6 ton/h
Weight	36 ton



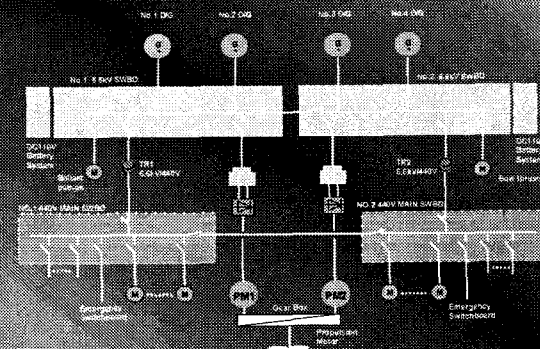
DUAL FUEL LNG CARRIER GAS SUPPLY SYSTEM



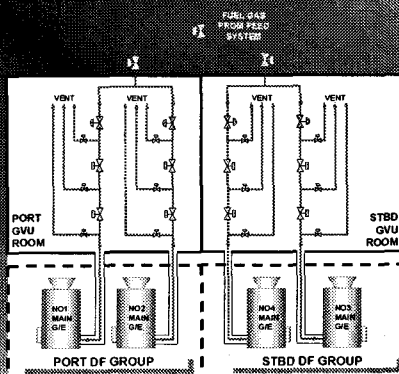
Elevation



Electric Single Line Diagram



Main G/E Fuel Gas Service System



Conclusion

Maintenance cost	Slightly higher cost against steam ship
Cargo capacity	More cargo: about 5 Km ³
Environment	Reduce COx emission
Operation safety	Redundant system in engine room
Constant speed	Constant speed in tropic condition (approx. 3% reduction for steam turbine)
Crew	No need specialized crew for steam vessel

Electric propulsion is much more economic and reliable solution