SEHO MARINE MAGAZINE

VOLUME 7

SEHO MARINE SOLUTIONS

CONTENTS

VOLUME 7 | 2020.5.4

You may find Seho Marine Magazine at Homepage of Seho Marine Solutions, http://www.sehomarine.com.
In any information or proposal on this magazine, please contact to Sales team at sales@sehomarine.com

CEO MESSAGE

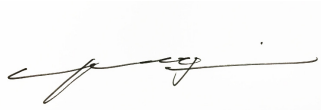
Spring Sprouts in the Pandemic
Everyone, Hope You Are Well

Now the spring comes again to us. Outside the window, you can witness the sun shining. All flowers blossom, trees sprout their leaves and prepare themselves to make new growth amid the cruelty of the COVID 19 pandemic. At this wonderful spring, we have to isolate ourselves from each other to avoid the coronavirus. We and our neighbors closed borders, schools, bars and businesses as the coronavirus pandemic swept through the world.

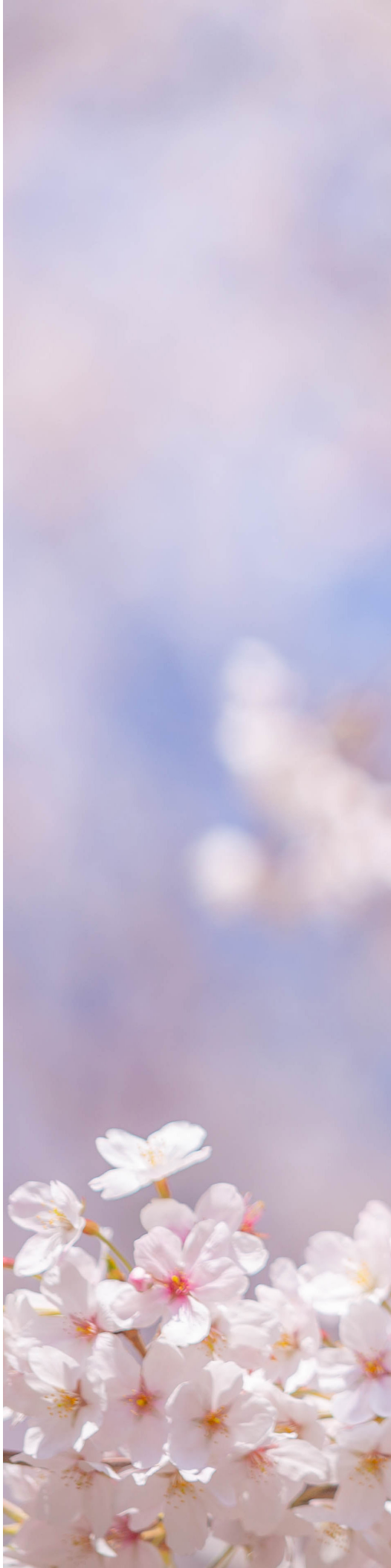
We don't really know how soon or how well we overcome this ubiquitous experience that all of us are going through. We are not certain if or when the economy will recover or what will happen to our society later. We know so little. Maybe we will have to live with the coronavirus a little longer than we expect.

However, we are seeing even a glimmer of light at the end of this dark tunnel. Here in Korea, the number of confirmed patients is reduced to the single digit. The Koreans get ready to enjoy the spring with the COVID outbreak diminishing. Surrounded by isolation, lockdown, despair and fear, all of us believe that the spring will bring solace to our exhausted body and mind. Look out of the window and step out cautiously. There is the spring.

Hope you and your family are healthy and safe during these uncertain and unprecedented times.



Youngwon KIM/CEO
Seho Marine Solutions



Example of Hull Structure for the Installation of Scrubber According to IMO SOx Regulations

W. N. Joo/Director - Hull

Introduction

Starting January 1, 2020, all ships on the international routes are regulated by the International Maritime Organization (IMO)'s new initiatives that the amount of SOx emissions in maritime fuel oil shall be reduced to 0.50 %. According to the regulation, ship owners should adopt one of the following options: 1) use of low sulphur fuel oil (LSFL); 2) installation of SOx Scrubber; and 3) LNG-fueled propulsion system. Here I introduce Seho Marine Solutions' application experiences of SOx Scrubber System.

1. In case of the application of SOx Scrubber System

To reduce the emissions of SOx from sea-going ships, the ways to retrofit a SOx Scrubber System includes Open Loop System, Close Loop System and Hybrid Scrubber System. According to whether there is a room to protect SOx Scrubber Body, there are two types of Protection Type and Exposure Type.

2. Hull Structure Review for the Retrofit of SOx Scrubber

1) Installation Positioning: The scrubber is easily connected to exiting equipment by positioning 5 meters on the upper deck on the left, right or behind the funnel.

2) Optimum Design: Structural design is conducted to meet hull rules and regulations.

3) Light Weight: Additional weight of hull caused by retrofit is minimized.

4) Structural Stability: The stability of existing structures is reviewed due to adding structures to them.

5) Identification of Vibration Occurrence: Vibration should be check as it is installed near the cabin.

6) Wind Load Area should be minimized.

7) The installation should avoid interference with interference of mooring and outfitting equipment on the upper deck.

8) Cargo loss should be minimized.

9) It should be checked if the installation interfere with existing pipes, cableways, and provision cranes.

10) The installation should me maintenance and repair of the equipment easy.

11) Materials should be arranged, given block but, seam line and block lifting to manufacture and install.

3. Installation Type of SOx Scrubber

1) Protection Type: SOx scrubber body is installed in the cuboid space on the lfet, right or back side of the engine casing top.

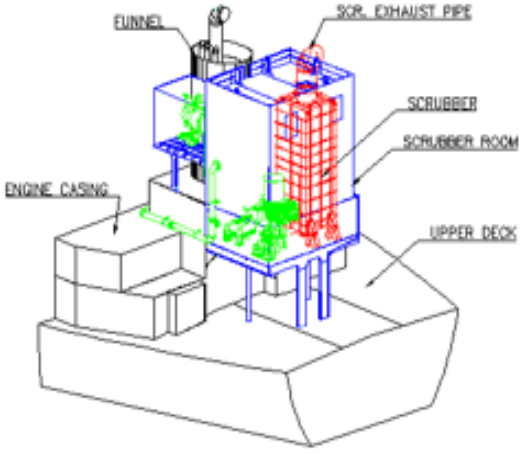


Figure 1 Protection Type

Figure 2 Example of Protection Type

The installation makes a separate hull structure scrubber room where SOx scrubber and its outfitting equipment can be protected.

2) Exposure Type: SOx scrubber body is exposed outside.

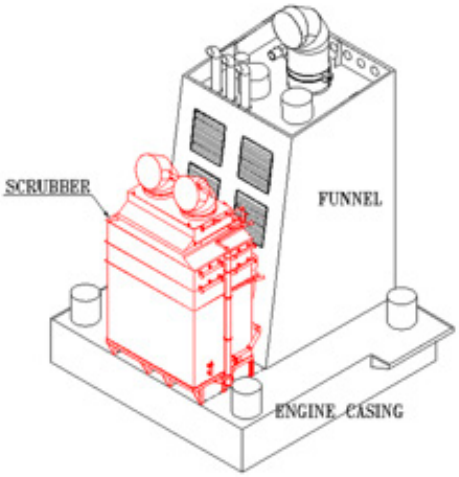


Figure 3 Exposure Type

Figure 4 Example of Exposure Type

3) Comparison of Installation Types

	Protection Type	Exposure Type
Advantages	• Structurally stable • Resistant to corrosion from seat water • Preventive to damage caused by external force • Easy operating, maintenance and repair	• Installable in narrow space • Low material costs • Simple structure • Short period for design and installation • Fewer corrections of existing outfittings
Disadvantages	• Large installation space • Higher cargo loss • Higher possibility of vibration due to height • Higher material costs • Possible interference with mooring equipment and cable ways • More relocations of existing equipment • More under wind load	• Weak to corrosion • Demanding maintenance of damages caused by external forces (waves and wind) • Increase numbers of supports to distribute loads for installation of heavy structure due to weak strength of super structure • Possible deck deformation • Very hard to install for container carriers and car carriers

4. Structure Analysis

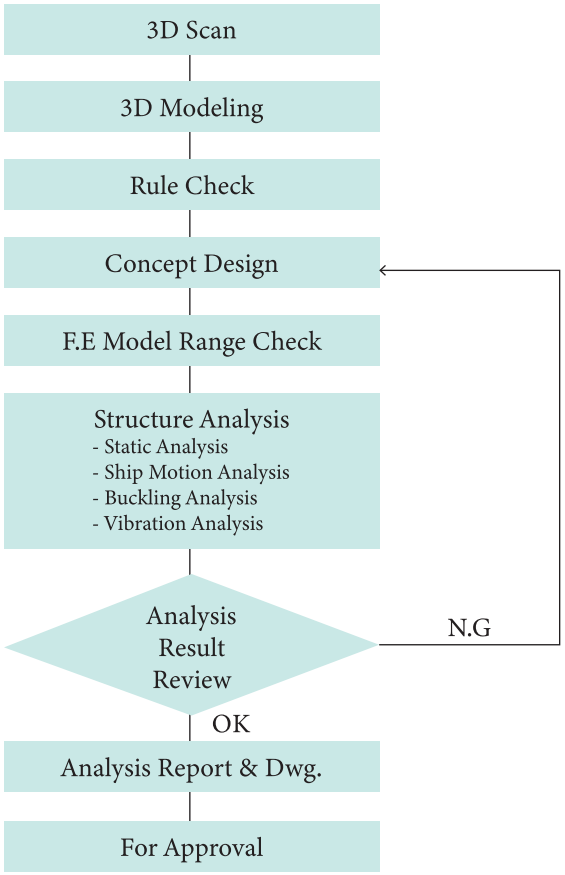
1) When SOx scrubbers is installed on currently operating ships, following checklist should be reviewed for structure analysis:

a. Static Analysis : EGCU, EGCU Room, Etc.
b. Ship Motion Analysis
c. Buckling Analysis
d. Vibration Analysis
e. hermal Structural Analysis

2) Design Software

a. MSC Patran / Nastran : Static & Dynamic Analysis
b. ANSYS : Static & Dynamic Analysis
c. MOSES : Dynamic Ship Motion Analysis
d. HELYX : Computational Fluid Dynamics

3) Analysis flow chart



4) Loading Condition & Combination

For structure analysis, structure should be reviewed by applying loads presented by each classification society.

a. EGCU Dead Weight (DL)
b. Live Load (LL)
c. Ship Motion Acceleration Load (ACX, ACY, ACZ)
d. Wind Load (WDX, WDY) ©Load Combination

5. Analysis Result

1) EGCU Room Analysis Result

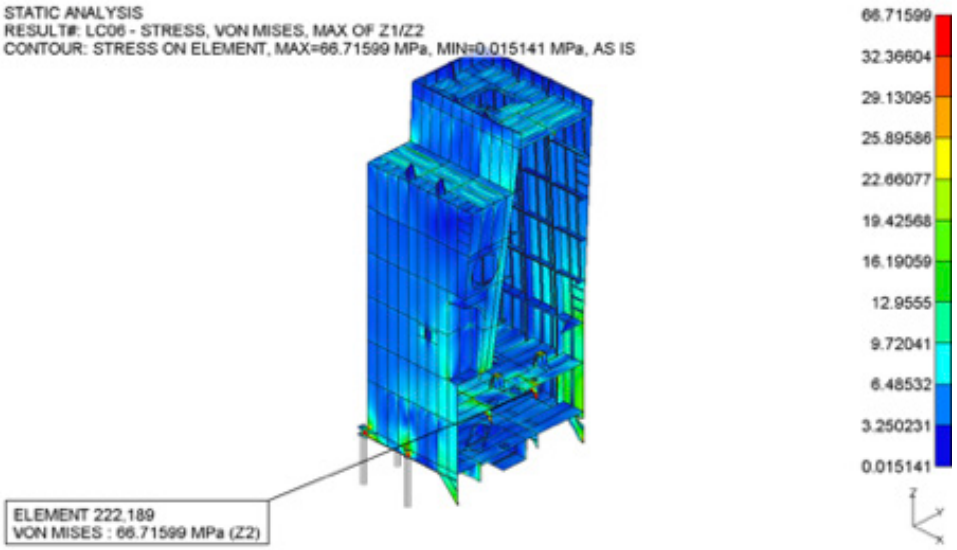


Figure 5 Analysis of EGCU Room

2) EGCU Thermal Structural Analysis

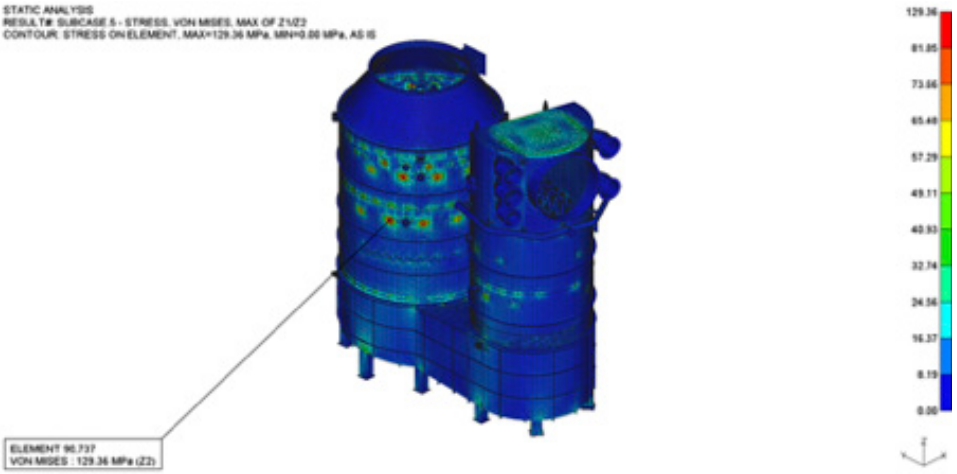


Figure 6 Analysis Result of SOx Scrubber Unit

3) EGCU Vibration Analysis Result

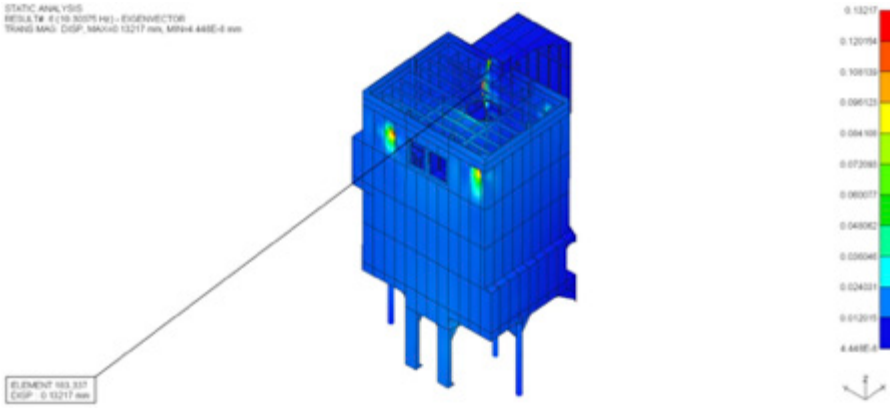


Figure 7 6th Mode Masthead Region Max.Displacement: 0.13217m

4) EGCU Room Buckling Analysis Result

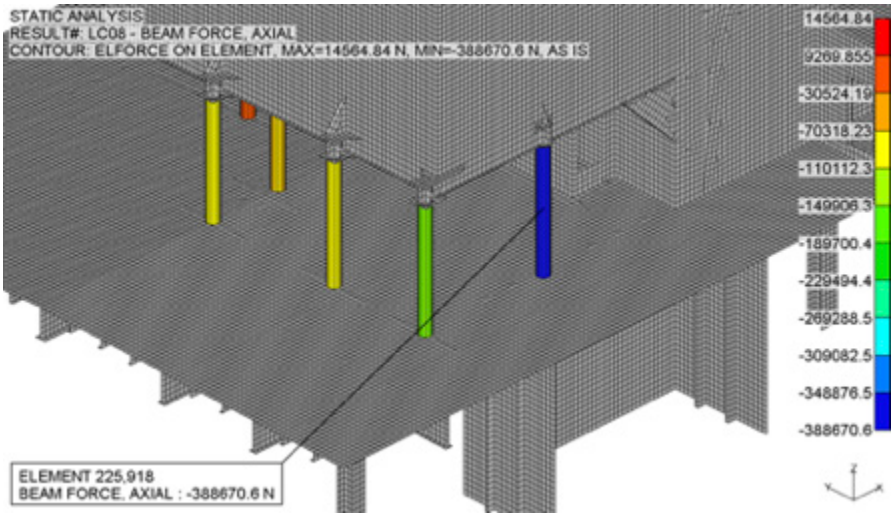


Figure 8 Analysis Result of Buckling Analysis

6. Installation Performance

- Protection Type

No	Ship Type	Ship Name	Builder/Year	No. of Vessel	Remark
1	300k VLCC	Amorgos	IHIMU/2004	1	
2	82k LPG	Leo Green	MHI/2016	1	
3	319k VLCC	Kassos I	HSHI/2007	1	
4	320k VLCC	Miltiadis	SWD (Shanghai) / 2014	1	
5	5,000 TEU	Hyundai Prestige	HHI/2013	5	
6	297.5k VLCC	Karbala	Universal Shipbuilding Corp./2015	2	
7	298k VLCC	Syfnos	Universal Shipbuild'g Corp./2006	1	
8	82k LPG	Gas Symphony	MHI/2011	1	
9	84k LPG	Gas Summit	HHI/2014	1	
10	180k B/C	Cape Agamemnon	Sungdong/2012	1	
11	84k LPG	Gas Wisdom	HHI/2017	1	
12	84k LPG	Gas Power	HHI/2012	1	
13	7,400 PCTC	Glovis Sun	HSHI/2015	3	

- Exposure Type

No	Ship Type	Ship Name	Builder/Year	No. of Vessel	Remark
1	115k COT	Elandra Angel	SHI/2009	1	
2	158k COT	Elandra Falcon	SungDong/2017	1	
3	298k ORE	Wukang Haoyun	STX/2011	1	
4	158k COT	Elandra Osprey	HSHI/2018	1	
5	180k B/C	Feg Success	Kawasaki Shipbuilding Corp./2011	1	
6	320k VLCC	New Giant	JHI/2016	1	
7	177 B/C	SJ Asia	MHI/2005	1	
8	176 B/C	Sea Coen	Universal Ship-building Corp./2014	1	

Big 3 Shipbuilders, Focus on Development of Eco-Friendly and Smart Ship Technology

Korean Big 3 shipbuilders are spurring the technological development to build eco-friendly and smart ships amid order drought.

Shipbuilders judges IMO 2020 Initiative is the key elements to drive paradigm shift in the shipping and shipbuilding industries. Big 3 shipbuilders are on firm track to draw up proactive future growth engine including smart and eco-friendly ships equipped with new technologies from the 4th industrial revolution to stay afloat in the market.

Samsung Heavy Industries

Samsung Heavy Industries (SHI) developed an eco-friendly water-soluble paint without volatile organic compounds in cooperation with Chugoku Marine Paints (CMP) of Japan. The new water-soluble paint maintained green features while showing high rust-proof performance and adhesion as well as a significant reduction in drying time by improving the shortcomings of existing paints.

SHI applied the new paint to a 180,000 m3 LNG carrier under construction. SHI's research institute head Shim Yong-rae said the ship-builder would increase the use of eco-friendly paints by 60 percent of its total paint use in 2024. "Through this, we will comply with environmental regulations and enhance product competitiveness."

SHI has successfully completed the test of 5G-based remote control navigation platform in partnership SK Telecom.

Leveraging the power of the Internet of Things (IoT), 5G and artificial intelligence (AI) tech-nologies, the navigation platform will guide vessels to autonomously sail towards their fixed destinations.

SHI also initiated the drawing-free hull design project to replace existing 2D drawings with 3D-based simulation in order to increase productivity of design works. This technology enables virtual assembly to significant save cost and time.

SHI's LNG Carrier
First Applied to Eco-Friendly Paint

Hyundai Heavy Industries

Hyundai Heavy Industries (HHI) has developed a smart ship management system that efficiently manages the fuel consumption of ships installed with its HiMSEN diesel engine, using new technologies such as

artificial intelligence, big data and internet of things. The system can save the cost of fuel by more than 10 percent by allowing human managers to remotely monitor the operation of ships and engines in real-time and find the optimized routes to save fuel.

Smart Ship Management System
Applied to HiMSEN Engine

HHI is also stepping up the development of advanced smart factory solutions based on the 5G network to improve efficiency, productivity and safety with collaboration with Korea's top telecom operator KT Corp.

HHI Group has also joined an industry-academy alliance dubbed 'AI One Team' to nurture talent and develop new business opportunities in the areas of artificial intelligence.

Daewoo Shipbuilding and Marine Engineering

Daewoo Shipbuilding and Marine Engineering (DSME) teams with Hyundai Merchant Marine (HMM) to drive joint forces on the research, development and innovation in the field of smart ship technologies.

Two companies is conducting research on real-time service system for optimized fleet operation, automated warehousing systems for ship materials and economic navigation

HMM Containership

solutions. The smart ship solution is applied to 23,000 TEU containerships which will be delivered to HMM by DSME.

DSME joined hands with Hanwha Defense for the development of a lithium-ion battery-based energy storage system (ESS) that can reduce fuel use and emissions of pollutants generated by ships. Lithium battery-based energy storage devices are seen as a next-generation ship energy source along with fuel cells.

Meanwhile, according to Clarksons Research, global orders for ships by February plummeted to 1.17 million CGT from 7.72 CGT in 2018 and 4.89 million CGT in 2019.

"Global shipbuilding industry is directly hit by COVID-19 pandemic, seeing more uncertainty in the market. The only way to survive in order crisis is to drive consistent innovation and secure unrivaled technology." said an industrial source.

Flying Vessel, WIG, Ready to Service on New Route

The flying vessel, WIG, was accredited by a classification society for the first time in the world, expecting first official service and the industrialization ahead.

MARINE & OFFSHORE NEWS

Aron Flying Ship based in Sacheon, South Gyeongsang Province was issued the accreditation certificate on its own developed M80 model from the Korean Register of Shipping, or KR on March 31, 2020. This will open the way for domestic passenger transport and export.

Assembly in the Plant in Aron's Sacheon Plant

Aron Fly Ship has successfully developed the M80 WIG model by investing 50 billion won over 13 years. The first M80 model is equipped with dual aviation piloting system to train pilots, flight recorder, automatic fire sprinkler equipment, radars, VDR and satellite communications.

As early as next year, Aron Fly Ship is expected to introduce what's called a wing-in-ground craft or WIG vehicle for military purpose, sea rescue for Maritime Policy Agency, transportation of crew for offshore wells, and service for emergency medical ship as well as for passenger transport between Pohang and Ulleung Island.

According to the Oceans and Fisheries Ministry, Aron Flying Ship will service an eight-seat capacity M80 WIG craft beginning with the Pohang-Ulleung route from next year.

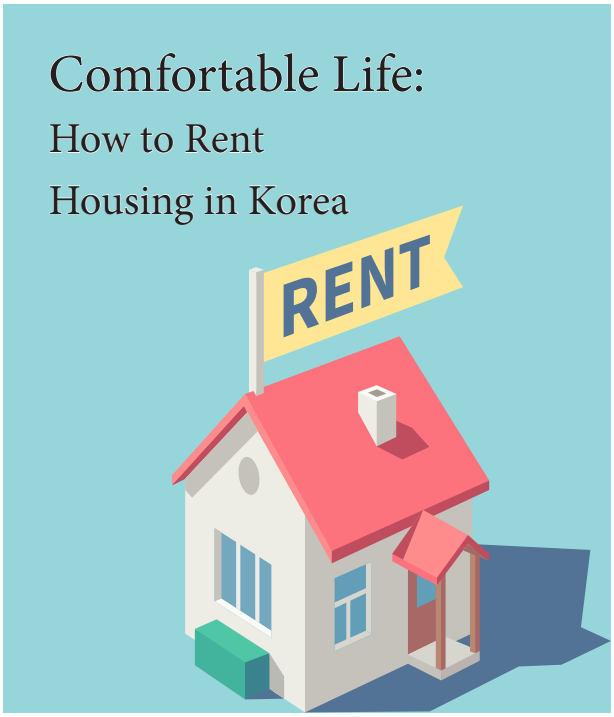
The WIG, also called a ground-effect vehicle and dubbed a "flying vessel," is a next generation mode of transportation. It floats over water using the pressure created between the water's surface and the vehicle's wings.

Wing-in-ground (WIG) craft are supported in their main operational mode solely by aerodynamic forces which enable them to o perate under low altitude of 150 meters above the sea surface but out of direct contact with that surface. Accordingly, IMO classifies WIG craft as a ship.

It's been built for military purposes in countries such as China, Finland, Russia, the U.S. and Germany, but has never been commercialized.

The Ministry of Oceans and Fisheries estimate that the global demand of WIG craft will reach 15,000 units and 34 trillion Korean won in added value.

Concept Design of Various Types of WIG



Everyone who visits Korea tries to find accommodations fitted to his/her visiting purpose. Tourists surely find a hotel or a guesthouse. However, most of the longer-term foreign residents wishito rent their accommodations. Every foreign residents pay a monthly rental fee and a one-time deposit that usually amounts to one or two months' rent. In Korea, however, there are completely different rental systems in Korea: jeonse or wolse system.

Jeonse

The *jeonse* system, a unique housing rental system, is very unusual for most foreigners. The system allows you to stay in your apartment without paying rent. However, it is not free occupation of the house. Tenants must put down an large amount of deposit (also known as 'key money') before moving in. This deposit is typically 40 to 90 percent of the market value of the house. To put that into perspective, if you want to rent a studio with a 100-million Won market value, you can expect to pay a deposit of 40 to 90 million Won. The full amount of deposit is returned to the tenant at the end of the lease term – generally one to two years – if the agreed obligations are met. This system has been popular when the high bank rate was guaranteed the homeowner its interest earrings equivalent to monthly rent, without worrying about the delayed payments by tenants. Nowadays, houseowners puts the deposit money into a bank account to earn interest, invest in stocks, or do whatever he or she wants. An increasing number of people, however, are turning to monthly rent these days due to falling interest rates.

In the contract, the rental period and the amount of deposit money must be specified. You must also discuss with the owner about how to pay for monthly fees and maintenance costs. Your real estate agent can arrange this on your behalf. Deals are made quickly in Korea, so expect negotiations to be completed within a month of your move-in date.

In case of *Jeonse*, housing contract is usually renewed every two years and, at the time of renewal, you should notify the intention to give up tenancy before the expiry date stated on the contract, which should be given to the property owner at least one to two months in advance, so they may have enough time to prepare the money that is to be returned to you.

Wolse

This rental system is accustomed to international residents. To avoid putting up such a large sum of cash, most international residents opt for the wolse system, which requires a significantly smaller deposit, in addition to a monthly rent. With wolse, it's

possible to negotiate with the owner, and higher deposits often equate to lower monthly rent amounts. It is possible to find housing with deposits lower than 5 million won, but these are few and far between, and normally require a higher monthly rental fee.

Opt for Rental System

It's important to understand the different kinds of housing, so you can have a better idea of what to look for. When you rent a house in Korea, first you will have to consider your period of residence and budget. Types of properties include: villas, Korean traditional house hanok, apartments, officetels and short-term rentals. The first three use both the *jeonse* and *wolse* systems and are classified by style, size and value, while the latter two are better short-term, low-deposit options.

Villas, low-rise apartment buildings, or hanok offer the greatest value, but also vary greatly in terms of quality, size and furnishings. Officetels, a combination of office and apartment complex, are slightly more expensive but usually feel more modern, and are furnished with newer appliances. Apartments are large residential complexes appropriate for families.

Short-term rentals are often fully furnished and are a good option for those who plan on staying in Korea for a short amount of time.

Living in South Korea isn't always easy, but if you don't mind a small living space and doing things a little differently, you can have comfortable and amazing experience, living like the Koreans.

Ondol, Essence of Korean Heating System in House

he Ondol is a Korean traditional heating system in which the room floor is heated by hot air circulating underneath it. This unique heating system dating back to the Goguryeo Kingdom (37 B.C-A.D. 668) made Koreans adopt a "sitting culture." They would take their shoes off and sit on the floor and sleep on the floor, instead of using chairs or beds.

Wood or holed briquettes were used to heat the room. The modern version of Ondol uses pipes embedded in the floor of the room, through which heated water circulates and warms the floor. Korean construction companies now export the system to other Asian countries.