LS Marine Solution

We Can, We Change, We Challenge

Global No.1

Contents

LS Marine Solution

Overview

Established in 1995, LS Marine Solution has become one of the most comprehensive offshore service provider to copy with demanding requirements of customers around the World, specialized in Submarine Cable & Flexible Pipeline Installation and maintenance with DP Vessels, ROVs and other suitable equipment.

We have secured and upgraded our spreads through the continuous development and acquisition of technologies to include high-end technology into our services, and we have laid the foundations to advance forward as a “Total Marine Solution Provider”.

We believe all our efforts are on the basis of our know-how, know-where and know-what to take the satisfaction of our friends, partners and customers to the next level in the days and years that lie ahead.

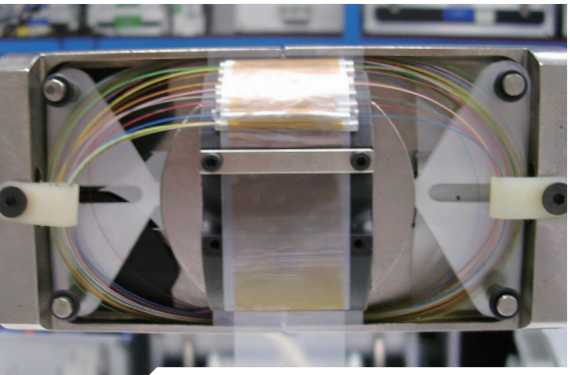
We hope you will continue to share in mutual prosperity and success.

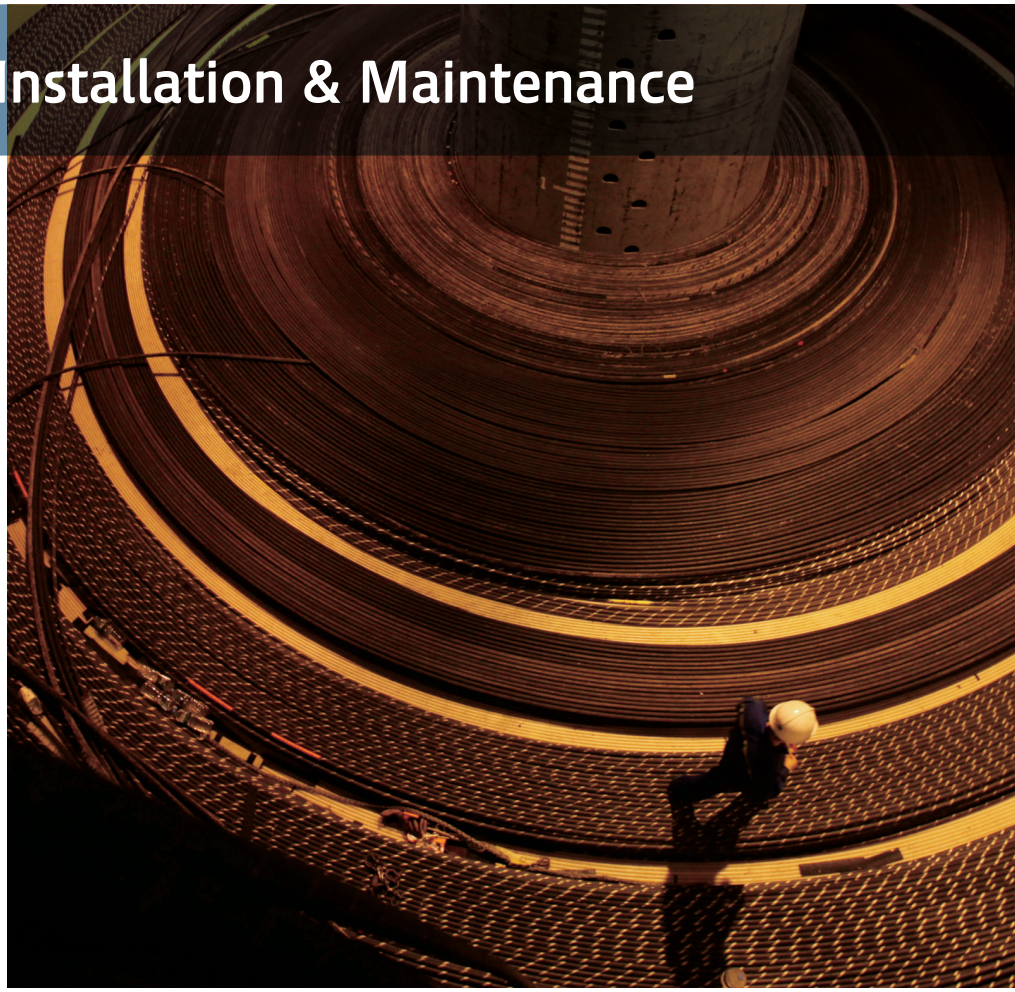
Certificate

- Acquisition of ISO 14001 (February 28, 2013)
- Acquisition of OHSAS 18001 (February 28, 2013)
- Registered in IMCA Marine Division (March, 2012)
- Registered in Renewable Energy Business (August 17, 2009)
- Certificate Patent (November 08, 2007)
- Registered in Construction Business (December 12, 2006)
- Registered in Overseas Construction Business (January 13, 2005)
- Certificate of R&D Department (May, 21, 2003)
- PO & Registered in KOSDAQ (February 15, 2002)
- Registered in Electricity Installation & Construction Business (November 7, 2001)
- Acquisition of ISO 9001 (November 14, 1998)
- Registered in Telecommunication Installation & Construction Business (April 12, 1996)

Business Area

Submarine Cable Installation & Maintenance





Fiber Optic Cable

Since in 1995, LS Marine Solution has played a key role in providing submarine fiber optic cable installation services in the Asia-Pacific region, and has expanded its services to other regions.

Further to the Construction & Installation, LS Marine Solution has successfully provided repair and maintenance services for Submarine Fiber Optic Cable in the Asia Pacific

region called the Yokohama Zone since the company was chosen as one of the service provider in 1997.

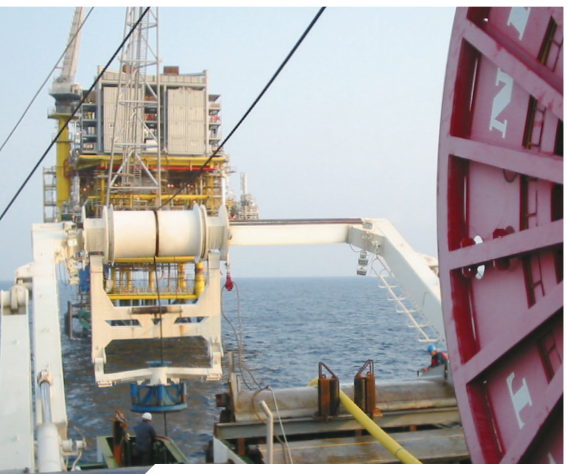
Power Cable

With extensive experience gained through Submarine Fiber Optic Cable Installation and Maintenance Work, LS Marine Solution has expanded its business area to Submarine Power & Optical Composite Cable Installation Work from 22.9kV Distribution Power Cable Work as an EPIC Provider since 2001.
LS Marine Solution has performed numerous 22.9kV Distribution Power Cable Installation Works and won the order for High Voltage Direct Current (HVDC, 180kV) Cable Repair Work in April 2006 and completed challenging the HVDC#2 (250kV) Installation Work between Jeju and Mainland (2 Systems of 105km) in February 2012.

Renewable Energy

In line with its strategy of business diversification toward the offshore renewable energy development area, LS Marine Solution launched the Wave Power Development Business in 2007 and took part in the Current Power Development Project in 2009. By introducing the submarine cable installation barge GL2030 in 2023, LS Marine Solution is preparing for various renewable energy projects such as Bigeum solar power project, Jeonnam offshore windfarm project, and Anma offshore windfarm Project, etc.

Offshore Construction & Others



Offshore Construction

LS Marine Solution has provided its Customers with various services those including, Submarine Oil & Gas flexible pipeline installation, survey services, submarine fiber optic/umbilical and power cable installation services for communication, control of its facilities and electricity between land and platform to platform.
Based on the Know-How acquired from Submarine Oil & Gas pipeline Installation, LS Marine Solution also has played a key role as a “Total Marine Solution Provider” for the Deep Sea Water Development Business in Korea.

- Offshore Pipeline Laying & Burial
- Multipurpose Vessel Operation for Offshore Project
- Subsea Riser Umbilical Flowline Installation

Offshore Structure Assembly Business

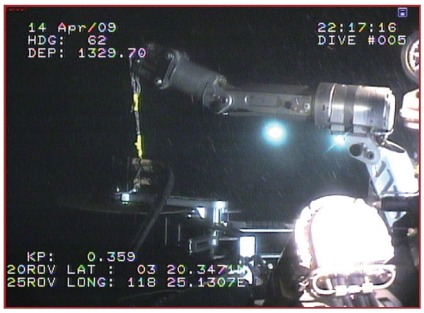
For drill ships, LS Marine Solution has expanded its business for manufacturing Offshore Structures, that is, Derrick for drilling vessels in Geoje Depot of LS Marine Solution with collaboration of major offshore business players.

The main activities for this business are as follows;

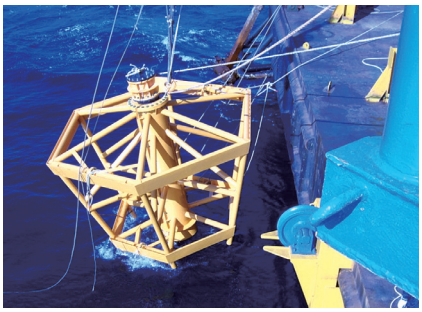
- Installation of Vessel Crane on Board
- Installation of Drilling Rig Package

Other Services

1 Offshore IRM Services



2 Offshore Deep Sea Water Pipeline Installation



3 Offshore Inspection & Salvage Services with ROV

4 Salvage of Plane & Ship Wreck

Vessel

DP2 CABLE LAYING BARGE

GL2030

Specification	
FLAG	KOREA
Length Overall (LOA)	111.5m
Breadth Moulded	36m
Draft	4.2m
Deadweight	9,813ton
Gross Tonage	9,003ton
Classifications	BV
Accommodation	60persons
Economical Speed	N/A

Cable Laying Vessel

New CLV

Specification	
FLAG	TBA
Length Overall (LOA)	149.25m
Breadth Moulded	31.00m
Draft	7.80m
Deadweight	16,500ton
Gross Tonage	18,800ton
Classifications	BV/KR
Accommodation	100persons
Economical Speed	11knots

Cable Ship

SEGERO

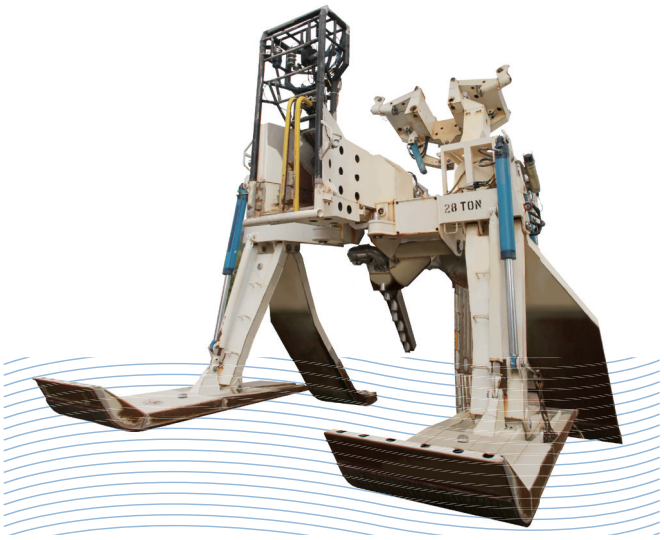
Specification	
FLAG	KOREA
Length Overall (LOA)	115.4m
Breadth Moulded	20.0m
Draft	7.8m
Deadweight	6,409ton
Gross Tonage	8,323ton
Classifications	KR
Accommodation	62persons
Economical Speed	13.5knots

Multi-purpose Vessel

MIRAERO

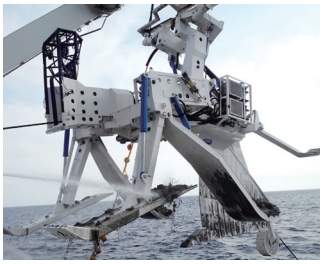
Specification	
FLAG	KOREA
Length Overall (LOA)	70.05m
Breadth Moulded	14.95m
Draft	5.02m
Deadweight	1,597ton
Gross Tonage	2,017ton
Classifications	KR
Accommodation	52persons
Economical Speed	11.0knots

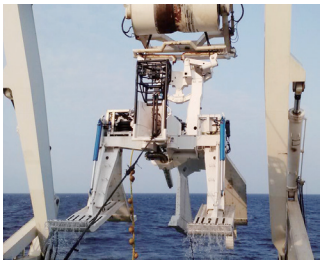
Equipment & Facility



MD3XT Plough

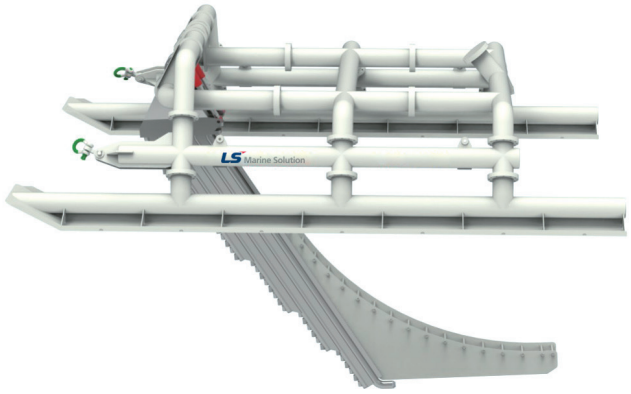
Specification	
Size	9.49 X 5.50 X 5.08m
Weight	27.5ton
Operation Depth (Umbilical : 2types)	Up to 1,500m
	Up to 700m(Jetting)
Burial Depth	Max. 3.3m
Repeaters	Up to 380mm
Cable Bending Radius	1.5m(Min.)
Ploughing Speed	Up to 1.94knots





QT1500 ROV

Specification	
Size	5.50 X 5.50 X 3.35m
Weight	22Ton(with skids) 24Ton(with tracks)
Operation Depth	Up to 2,000m
Burial Depth	Max. 3.0m
Vehicle Power	1,500HP
Target Size	Up to 650mm
Cohesive Soil	Up to 100kPa



DJS35 Jetting Sled

Technical specifications	
Max Depth	100m Water Depth
Dimension	11.50m(L) x 7.3m(W) x 2.7m(H)
Weight in Air	14Te
Trenching Depth	3.0m Nominal(Max. 3.3m)
Cable Path Width	250mm
Cable Path MBR	4,000mm
Typical Operating Parameters	12~14bar/800~1600m³/hr
Anticipated Typical Tow Force	7~10Te

Vertical Injector

Characteristics	
Max Water Depth	40m
Trench Depth	Up to 10m below seabed
Soil condition	Sand, Soft to Medium Clay, Overburden
Depressor MBR	4m
Product OD	10~220mm
Working pressure	12 bar(Max 18bar)
Max Flowrate	3000m³/hr
Principle	High Pressure Water Jetting
Tow Force	Up to 100kPa

T800 ROV

Specification	
Size	2.98 X 4.18 X 5.32m
Weight	18ton
Operation Depth	Up to 2,500m
Burial Depth	Max. 3.0m
Vehicle Power	800HP
Target Size	Up to 600mm
Cohesive Soil	Up to 100kPa

15ton Cable Tensioner

Overall Dimensions			
Length	5580mm	Width	2024mm
Height	3235mm	Weight	Approx.20ton

Performance	
Capacity	Max. 15ton
Speed	40m/min

Cable Capacity	
Min. Cable Dia	2"
Max. Cable Dia	10"
Max. Track Opening	410mm
Bottom of Cable	1670mm

Tracks	
No. of Tracks	2ea
Chain Pitch	215.9mm
Tensioner Sensor	Loadcell

RDB(Reel Drive Base)

This equipment was designed for spooling of submarine cables.

Specification	
Drum Size	Flange Dia. Max. 6000mm
	Overall Width Max. 3410mm
	Max Weight 50ton
Load	Rope 10ton
Rope Size	100mm
STBD Arm Assembly Weight	12ton
PORT Arm Assembly Weight	7.5ton
Center Arm Assembly Weight	3.5ton

Electrical Requirement	
Drum Motor	22kW DC Motor
Driving Unit	11kW Induction Motor
Power	220V, 3Phase, 60Hz

Geoje Depot

The depot of LS Marine Solution was built in Geoje, Korea. This depot is consists of a berth facility which is capable of berthing 2 vessels, cable stowage, and office building. And the storage capacity of the depot for submersible plant provides approximately 2,000km length of spare cables storage as well as submersible spares including Repeaters, BU and jointing consumables.

General information

Location	(N34°58.79, E128°39.45) 887, Geojebuk-ro, Hacheong-myeon, Geoje-si, Gyungsangnam-do, Korea
Area	28,037.42㎡
Structure	Pier, Storage house, Equipment Building, Office Building
Main Dimension	Length Over All : 181 meters | Breadth : 7.5 meters | Height : 8 meters
Main Berthing	120m(L) x 8.5m(B) Water Depth : 8.5 meters | Length : 150m Connecting Bridge : 28m(L) x 6.41m(B)
Submersible Storage	540.00㎡
Number of Cable Tanks	Total 66 EA (Large Tank : 4 EA | Medium Tank : 32 EA | Small Tank : 30 EA)
Dimension of Cable Tanks	Large Tank : Inner-3m / Outer-10m / Height-2.3m Medium Tank : Inner-3m / Outer-6m / Height-2.3m Small Tank : Inner-3m / Outer-6m / Height-1.8m Hand Cart for Repeater / BU : 20 off Repeater : 9 off | Branching Unit : 4 off | Gain Equalizer Unit : 3 off
Loading & Unloading Facilities	Cable Through | Turn Sheave | Cable Tower | 3 off Cable Engine | Fork-Lift for 8 ton

Track Record

1. Submarine Power Cable Project

No.	Project Title	Client	Performance Period	Power Capa.	Distance (km)	Burial Depth (m)	Water Depth (m)
1	#3 HVDC PLIB Project	LS Cable & System	2023.03 ~ 2025.10	DC150kV	78.734	1.0~2.5	130
2	Jeonnam 1 Offshore Wind Farm Project, Korea	JOWP (SK E&S/CIP)	2022.06 ~ 2025.02	AC 66.0kV	30.537	2.0~9.6	21
3	Bigeum-Anjwa Submarine Cable Project, Korea	LS Cable & System	2023.10 ~ 2023.12	AC154kV	7.170	1.0~1.5	36
4	Tamra Offshore Wind Power (Reinforcement work)	Doosan Heavy Industries & Construction	2021.08 ~ 2021.10		0.150		3~5
5	Anjwa-Okdo-Jangbyeongdo Project, Korea	KEPCO	2016.05 ~ 2016.12	AC 22.9kV	3.973	1.0~2.0	27
6	Yubudo Project, Chungnam Prov., Korea	KEPCO	2012.02 ~ 2013.02	AC 22.9kV	3.500	3.0~4.0	12
7	Daemodo Project, Cheonla Prov., Korea	KEPCO	2010.06 ~ 2012.05	AC 22.9kV	8.5	1.5~2.0	35
8	HVDC Link Construction Project between Jindo and Jeju	KEPCO (LS Cable)	2009.11 ~ 2012.02	DC 250kV	102x4	3.0	162
9	Yeonpyeong-do Project, Incheon, Korea	KEPCO	2007.06 ~ 2007.12	AC 22.9kV	0.98	1.0~2.0	1
10	Masan Project, Kyeongsang Prov., Korea	Masan Cityhall	2006.12 ~ 2007.11	AC 22.9kV	0.85	0.7~1.0	12
11	Wonchangdong Project, Incheon, Korea	KEPCO	2006.06 ~ 2007.02	AC 22.9kV	1.8	1.5~2.0	21
12	Geomundo Project, Cheonla Prov., Korea	KEPCO	2006.07 ~ 2006.12	AC 22.9kV	1.428	1.5~2.0	25
13	HVDC #2 Repair	KEPCO	2006.05 ~ 2006.07	AC 22.9kV	0.200	PLI	30
14	Pyeongtaek Port, Choongcheong Prov., Korea	Daelim Industries Ltd.	2005.09 ~ 2006.05	AC 22.9kV	2.953	2.0	25
15	Udo Project, Jeju Island, Korea	KEPCO	2005.06 ~ 2006.10	AC 22.9kV	2.931	1.0~1.5	20
16	Norokdo Project, Cheonla Prov., Korea	KEPCO	2004.06 ~ 2005.09	AC 22.9kV	2.56	1.5~2.0	15
17	Kukhwado Project, Choongcheong Prov., Korea	KEPCO	2003.08 ~ 2004.06	AC 22.9kV	2.631	1.0~2.0	20
18	Korean Navy Project	Korean Navy	2002.12 ~ 2003.06	AC 22.9kV	1.812	1.5~2.0	20
19	Choyakdo Project, Cheonla Prov., Korea	KEPCO	2001. 04 ~ 2001.12	AC 22.9kV	5.576	1.0~2.0	30

2. Submarine FO Cable Project

No.	Project Title	Client	Performance Period	Distance (km)	Water Depth (m)
1	SJC2 S5 Repair	NEC	2025.03 ~ 2025.04	-	250
2	ECHO Repair	NEC	2024.08 ~ 2024.11	-	400
3	Topaz Repair	NEC	2024.07 ~ 2024.08	-	1,500
4	ADC & SJC2 PLIB	NEC	2024.01 ~ 2024.04	60	75
5	Jeju-Udo	SKT	2023.07 ~ 2023.11	3	20
6	ECHO V4	NEC	2023.06 ~ 2023.11	660	60
7	DSCPA2-Palawan Reciliency PLIB	FiberHome	2022.10 ~ 2022.12	63	80
8	TPKM2 Replacement	NEC	2022.04 ~ 2022.05	46	58
9	SJC2 S5	NEC	2022.03 ~ 2022.04	426	3,700
10	DSCPA2 PLIB	FiberHome	2022.05 ~ 2022.08	650	1,497
11	CDSCN PLIB	OMS	2022.02 ~ 2022.05	20	1,817
12	ECHO V1	NEC	2022.07 ~ 2022.10	3,389	5,600
13	SCIP PLIB Ph#1	SBSS	2021.02 ~ 2021.04	74	1,515
14	NorthWestern Russia	HMN	2020.06 ~ 2021.01	1,430	5,460
15	SJC2 S7	NEC	2020.05 ~ 2020.09	55	2,735
16	PLCN PLGR & PLIB	SubCom	2019.12 ~ 2020.01	281/15	3,600
17	CANI	NEC	2019.11 ~ 2020.05	2,289	3,400
18	Jupiter	SubCom	2019.06 ~ 2019.11	5,586	9,000
19	Megacable & IGW	HMN	2019.02 ~ 2019.08	1,430	5,460
20	Taiwan - Penghu PLIB Phase #3	NTT WEM	2018.06 ~ 2018.07	26	126
21	Okhotsk & SUSP	HMN	2018.05 ~ 2018.08	900	3,200

Track Record

No.	Project Title	Client	Performance Period	Distance (km)	Water Depth (m)
22	IGG Load #3	HMN	2018.05 ~ 2018.08	900	3,200
23	SEAX-1	BNP	2018.02 ~ 2018.06	765	4,100
24	Taiwan - Penghu PLIB Phase #2	HMN	2017.12 ~ 2018.02	234	80
25	Taiwan - PengHu PLIB Phase #1	NTT WEM	2017.10 ~ 2017.11	26	126
26	NCP	NTT WEM	2017.04 ~ 2017.06	44	126
27	MCT PLIB	TE SubCom	2017.06 ~ 2017.09	773	910
28	SKR1M PLIB	HMN	2016.12 ~ 2017.02	25	80
29	SEA-US Load #1 & ATISA	NEC	2016.11 ~ 2017.04	70	500
30	S-NET	NEC	2016.10 ~ 2017.06	4,733	5,000
31	MACHO2	NEC	2016.08 ~ 2016.11	1,458	9,000
32	AAE-1 Hong Kong Extension	NEC	2016.07 ~ 2017.01	63	3,500
33	Uleung~Main Land #2	NEC	2016.03 ~ 2017.01	1,189	2,000
34	USAKA	KT	2016.03 ~ 2016.11	152	2,200
35	SMPCS PLIB	Sealift	2015.10 ~ 2015.12	-	-
36	DONET2	NEC	2015.01 ~ 2015.07	38	500
37	APG	NEC	2014.08 ~ 2014.10	389	3,498
38	TPKM3	NEC	2013.07 ~ 2016.03	4,596	4,890
39	SJC	NEC	2013.04 ~ 2013.11	467	136
40	ASE PLIB	NEC	2012.08 ~ 2013.03	2,194	4,600
41	DDSCN	NEC	2012.03 ~ 2012.06	60	80
42	AAG PLIB	NEC	2011.11 ~ 2011.12	1,011	2,900
42	Ullengdo Project	NEC	2011.04 ~ 2011.04	10	100
43	Ullengdo Project	KT	2009.10 ~ 2010.02	9	1,000

No.	Project Title	Client	Performance Period	Distance (km)	Water Depth (m)
43	TPE PLIB	SBSS	2009.07 ~ 2009.10	31	500
44	AAG	NEC	2008.03 ~ 2009.01	1,273	1,000
45	TPE	Tyco/SBSS	2007.10 ~ 2008.12	1,259	1,724
46	DSCN	NEC	2006.10 ~ 2006.12	1,058	3,635
47	JASUKA	NEC	2005.11 ~ 2005.12	372	62
48	TIISCS	Tyco	2004.03 ~ 2004.07	593	1,403
49	Thailand~Indonesia~Singapore PLIB	ACPL	2003.06 ~ 2003.08	945	-
50	PGN II	HHI	2003.02 ~ 2003.04	215	-
51	FOBN PLIB	Fujitsu/ACPL	2002.10 ~ 2002.12	-	60
52	FNAL	ASN	2001.10 ~ 2001.10	-	-
53	KJCN	Fujitsu	2001.11 ~ 2001.12	501	180
54	C2C	Tyco	2001.07 ~ 2001.10	1,007	2,141
55	EAC	GMSL	2000.11 ~ 2001.01	420	-
56	SAM-1	Tyco	2000.09 ~ 2000.11	3,610	-
57	APCN2 S4E, S4W	NEC	2000.08 ~ 2000.08	3,800	-
58	Japan-US	ASN	1999.11 ~ 2000.01	3,865	6018
59	3rd Korean Domestic	KT	1999.09 ~ 1999.11	204	-
60	APCN Seg. B1 Reroute	APCN Consortium	1999.07 ~ 1999.08	45	-
61	SMW3	NTT WEM	1998	3	-
62	FLAG Seg. P2, Q1	FLAG	1998	-	-
63	CUCN	KDDI-SCS	1998	1,226	802
64	2nd Korean Domestic	KT	1996	153	-
65	Ullengdo Project	KT	2009.10 ~ 2010.02	9	1,000

Track Record

3. Offshore Project

No.	Project Title	Client	Performance Period	Distance (km)	Water Depth (m)
1	Dong Hae-1 Subsea Facility Control System ROV Survey Project	KNOC	2020.10		142
2	Dong Hae-2 Subsea Facility ROV Survey Project	KNOC	2019.10		140
3	T800 Trenching Work (Ausrtalia Ichthys Field Pipeline)	ENI Sonsub	2015.06 ~ 2015.08		
4	Free-Span Correction (Donghae-1 Gas Field)	KNOC	2014.05	2.0	150
5	Earthquake Monitoring System Maintenance	KMA	2014.06		
6	SCM Replacement (Donghae-1 Gas Field)	KNOC	2013.06		
7	Bawal Project	Kreuz Subsea	2012.01 ~ 2012.08	42.0	82
8	Earthquake Monitoring System Maintenance	KMA	2010.12	30.0	1,000
9	KOGA Buoy Installation Project	KHOA/Oceantech	2010.11		
10	KOGA Ocean Observation Buoy System Installation	KHOA/Oceantech	2010.09 ~ 2010.11		
11	Sea –Turtle Project (Main Lay)	RENETEC	2009.12	1.0	30
12	ENI Project (Drilling Assistant)	Amarco Service	2009.03 ~ 2009.05		1,350
13	KOC Project (Cable Installation)	HHI	2007.07 ~ 2008.01	56.7	50
14	Gangwon Deep Sea Water Project(35cm, 37cm, 12cm)	GWDW	2008.07 ~ 2008.12	6.2	
15	F15K Salvage Service	ROK Air Force	2006.05		
16	PTT Post Trenching Project (42")	PTT/HHI	2005.10 ~ 2006.03	72.0	
17	Deep Sea Water Project	KORDI	2005.06 ~ 2005.10	8.0	
18	Chunxiao Post Trenching Porject(8", 12", 16")	CNOOC/HHI	2005.06 ~ 2005.08	125.9	
19	MUT Post Trenching Project (12", 14", 16")	ONGC/HHI	2005.04 ~ 2005.05	56.8	

No.	Project Title	Client	Performance Period	Distance (km)	Water Depth (m)
20	Special Cable Installation (Navy Project)	Korean Navy/ Nex1 Future	2003.10 ~ 2003.11	44.0	
21	Dong Hae-1 Gas Flow line & Umbilical Lay & Burial Project	HHI	2003.08	9.1	

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