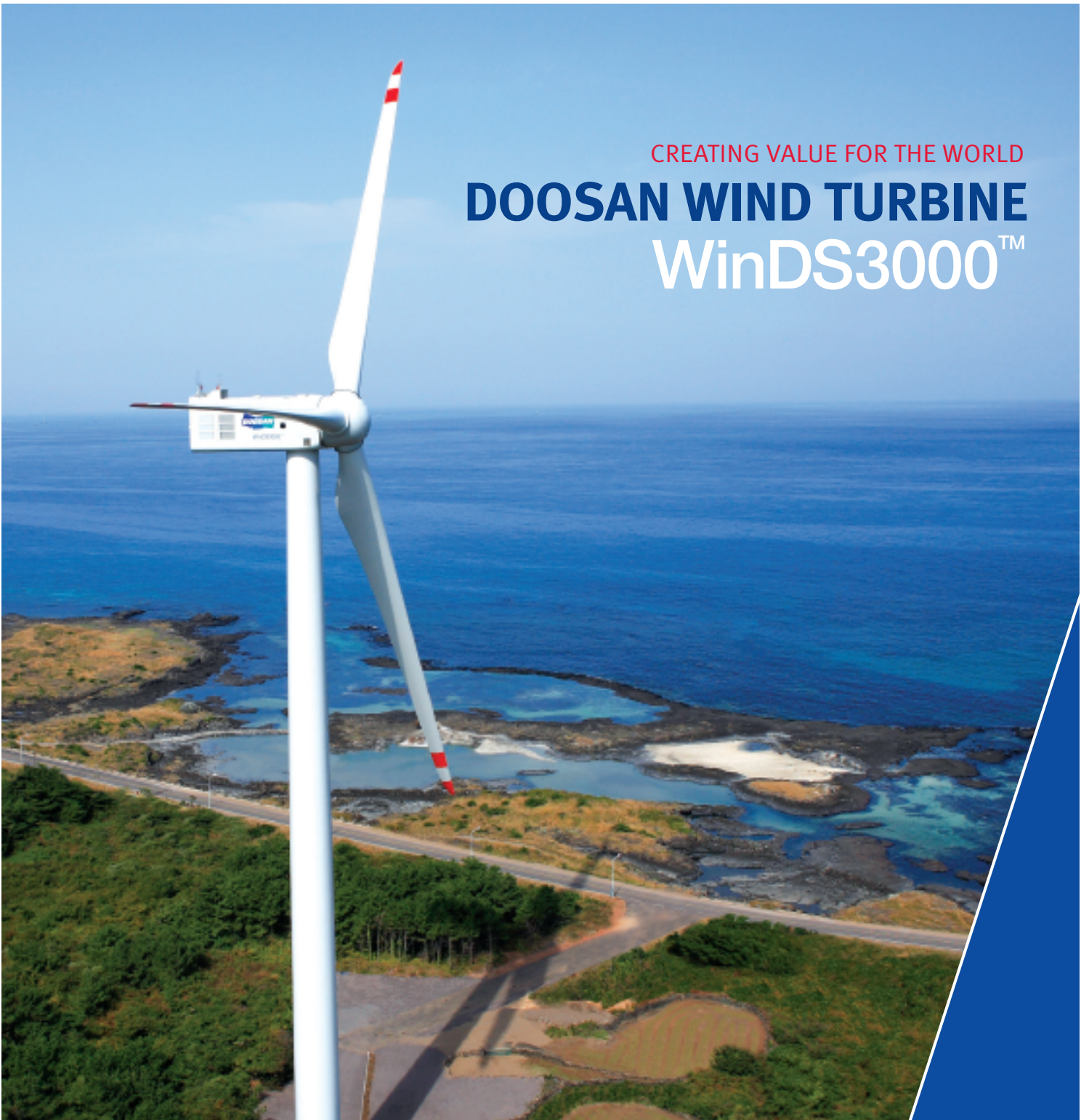


CREATING VALUE FOR THE WORLD

DOOSAN WIND TURBINE

WinDS3000™



Doosan Heavy Industries
& Construction

CREATING VALUE FOR THE WORLD

There are several types of winds; we face them and feel everyday on Earth.
The wind is infinitely blowing and Doosan create value for the world
converting this wind into electrical energy.



CONTENTS

COMPANY OVERVIEW	04
WinDS3000™	
PRODUCT INTRODUCTION	06
I. BLADE	08
II. INTEGRATED DRIVE TRAIN	09
III. GEARBOX	09
IV. GENERATOR	10
V. SERVICE	10
OFFSHORE APPLICATION	11
TECHNICAL INFORMATION	12
CUSTOMER SATISFACTION	13
GLOBAL NETWORK	14

Cover photo : WinDS3000™ in Jeju Island, Korea

COMPANY OVERVIEW

Doosan Heavy Industries & Construction was founded in 1962 and has grown into a power generation facilities specialist, capable of building all types of power plants, to include nuclear, thermal, combined cycle and hydroelectric. We have completed more than 300 of these projects worldwide to date and are widely recognized for outstanding technological expertise in this field. Doosan is dedicated to improving people's lives around the world. Today we are applying our world-renowned technology in power generation facilities to step up development of next-generation green energy sources for a better tomorrow. Our topnotch engineers, armed with long experience in power system fabrication, have created the breakthrough WinDS3000™ wind power generation system, setting a new standard in the industry.



Doosan Heavy Industries & Construction "Changwon Plant"



1



2



3



4



5

1. Power Plants

Doosan is an EPC service provider who can perform all processes in-house, from design and material fabrication to installation, commissioning and construction.

2. Nuclear Power Plants

We are the only manufacturer in Korea during last 3 decades with nuclear power plant specialist, serving both domestic and overseas clients. Our expertise in this field is recognized worldwide.

3. Water Plants

The world's foremost supplier of seawater desalination systems (multi-effect desalination, multistage flash distillation and reverse osmosis) and have recently expanded into water treatment.

4. Castings & Forgings

Based on in-house technology for large scale of castings and forgings, we bolstered our global market position by acquiring Kvaerner IMGB in Romania.

5. Construction

We boast world-class competitiveness in constructing infrastructure (high-speed railways, roads, and ports), power plants, commercial buildings and residential buildings including SOC Businesses.

WinDS3000™

PRODUCT INTRODUCTION



New Paradigm of Wind Power System for Offshore & Onshore

As a specialist in power generation facilities, Doosan has accumulated know-how and experiences over the past 30 years. These competencies were leveraged to develop the WinDS3000™. The achievement of our design is high reliability, availability, maintainability and serviceability (RAMS), while producing electricity at low cost. Through system optimization, we managed to achieve outstanding reliability as well as high operational and maintenance efficiencies.

HIGH RAMS

RELIABILITY



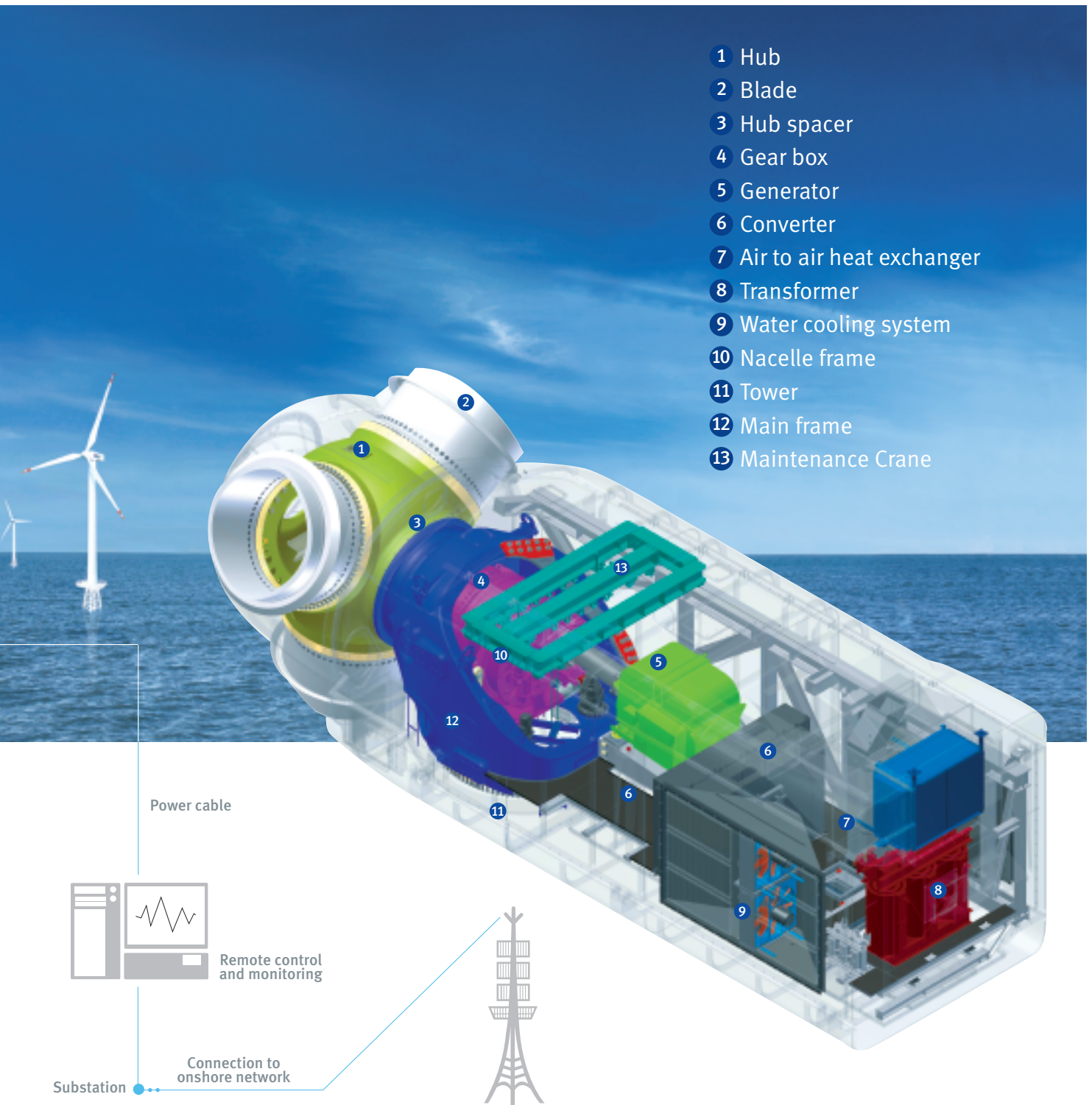
AVAILABILITY



MAINTAINABILITY



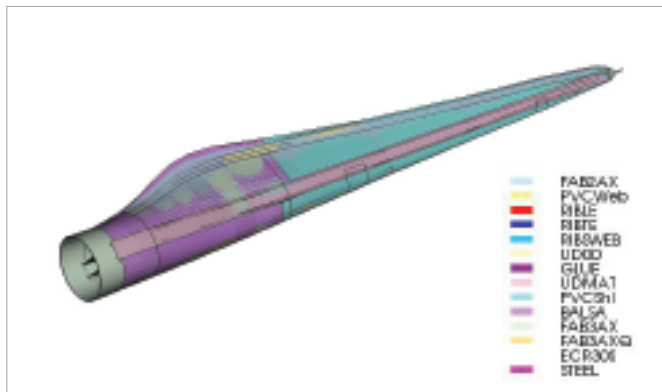
SERVICEABILITY



I. BLADE

Blade Design : Upgraded Technology for Optimal Aerodynamics and Minimal Weight

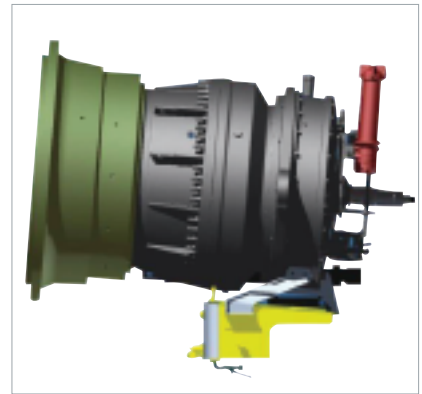
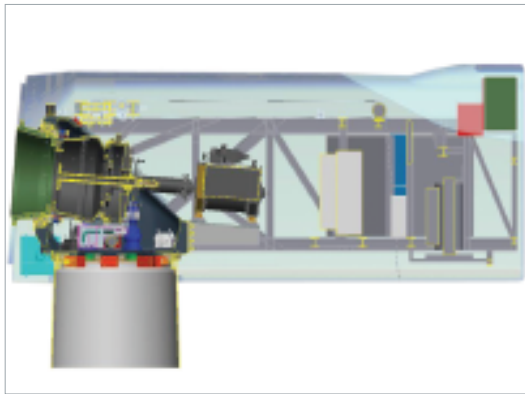
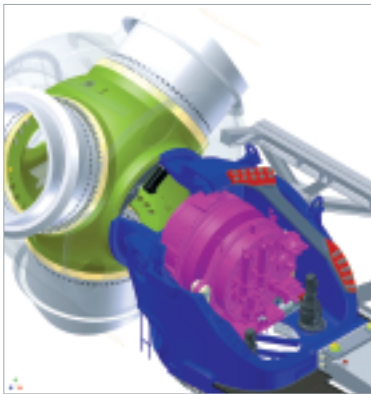
The blade converts the wind energy into mechanical energy. The innovative design optimizes the blade's aerodynamics, increasing efficiency and reducing the dynamic load. The improvements the structural design and fabrication technologies enabled to develop a blade with 44 meters long and weighing 10 tons. The Blade has a robust structure yet is lighter than conventional models.



II. INTEGRATED DRIVE TRAIN

Innovative Integrated Drive Train

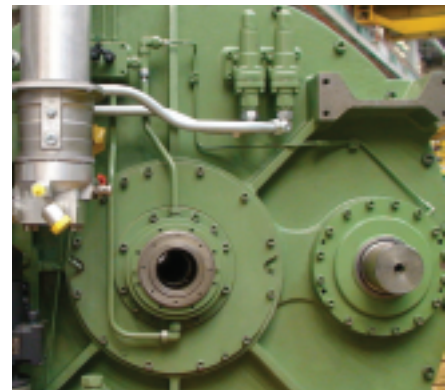
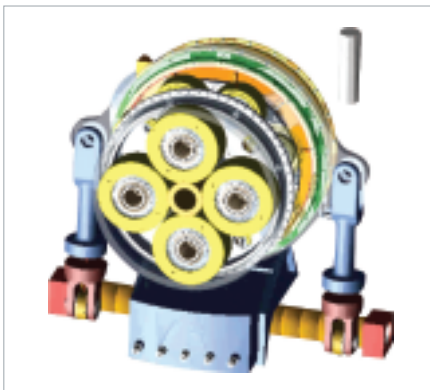
The WinDS3000™ features an integrated drive train without main shaft, lightening the nacelle, reducing the system load and vibration.



III. GEARBOX

Gearbox : Compact Design & High Reliability

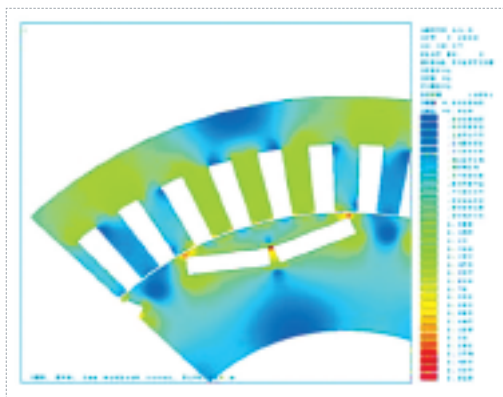
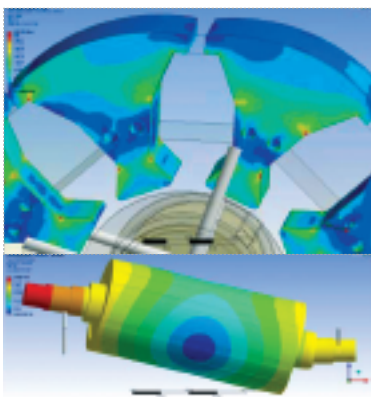
WinDS3000™ uses differential gears, flexible pins and a rotating housing to achieve high efficiency and reliability while reducing the gearbox size and lightening by 30% compared with conventional models. The gearbox durability has been improved, an advantage considering the high cost and time required to replace broken parts, especially when the turbine is located in an hardly-accessible place such as offshore.



IV. GENERATOR

Permanent Magnet Generator

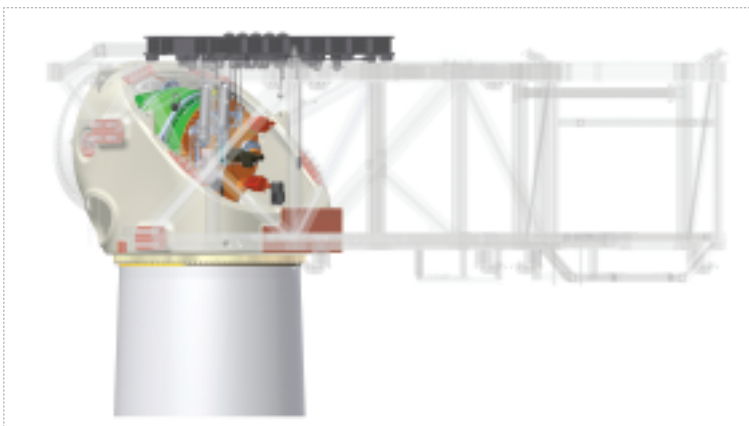
WinDS3000™ is equipped with a permanent magnet generator that delivers a high yield even under partial loads. Furthermore, the full-power converter system provides better grid-friendly characteristics.



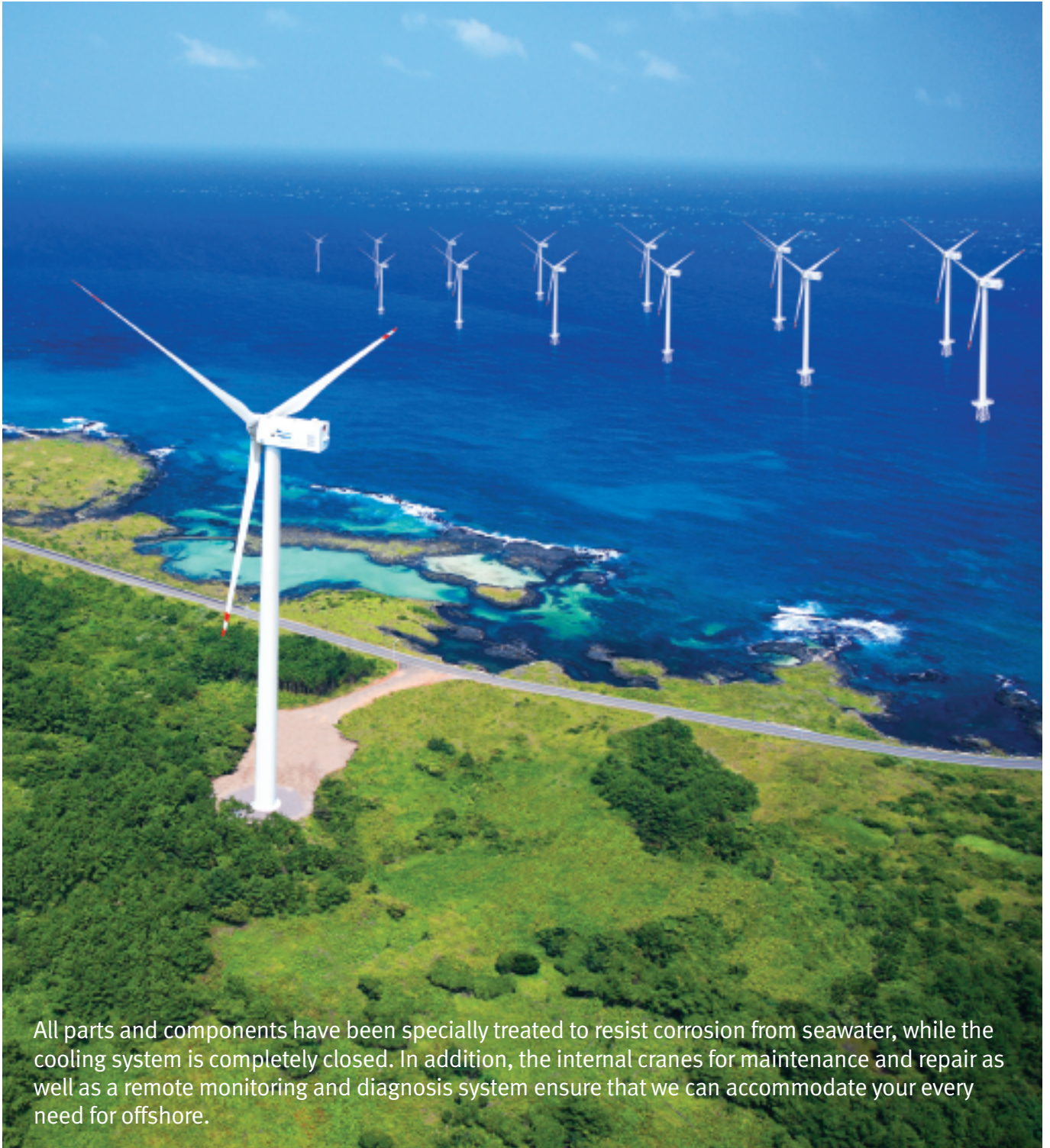
V. SERVICE

Service

WinDS3000™ is supported by highly responsive and precise service system to ensure your satisfaction. The internal maintenance crane promises elevating the efficiency of operation, maintenance and repair services.



OFFSHORE APPLICATION



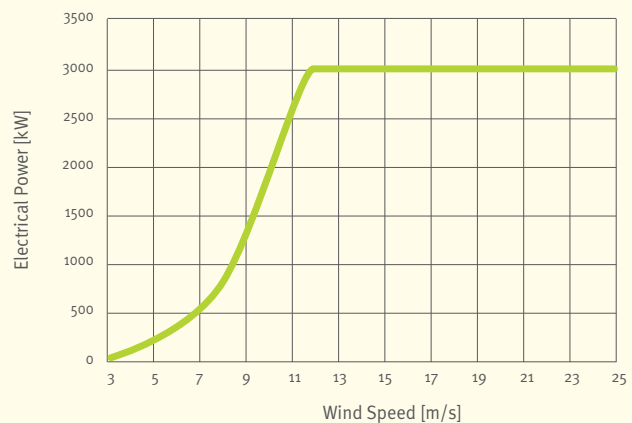
All parts and components have been specially treated to resist corrosion from seawater, while the cooling system is completely closed. In addition, the internal cranes for maintenance and repair as well as a remote monitoring and diagnosis system ensure that we can accommodate your every need for offshore.

TECHNICAL INFORMATION

System Specification

Model	WinDS3000™	
Operational data	Rated Power	3,000 kW
	Power Regulation	Pitch regulated
	IEC Class	IA
	Cut-in Wind Speed	3 m/s
	Rated Wind Speed	13 m/s
	Cut-out Wind Speed	25 m/s
	Ambient Survival Temperature	-20°C to 50°C
	Ambient Operating Temperature	-15°C to 40°C
	Rotor Diameter	91.3 m
	Rated Rotor Speed	15.7 rpm
Blade	Length	44 m
	Maximum Chord Length	4.15 m
	Swept Area	6,539 m ²
Drive-train	Gearbox	2 Planetary + 1 Parallel
	Generator	PMSG
	Converter Type	Full power converter
	Grid Frequency	50/60 Hz
Tower	Tower Type	Tubular steel tower
	Hub Height	80 m
Additional data	Extreme Survival Wind Speed	70 m/s
	System Design Life	20 years
	Certification Guideline	Germanischer Lloyd

Power Curve



CUSTOMER SATISFACTION



Doosan strictly comply with the quality requirements of both customers and regulatory bodies. At the same time our rigorous in-house quality assurance system ensures the reliability of every product we sell. Moreover, our aggressive R&D investment, thorough quality control and well-trained human resources enable us to keep improving product quality. At the same time, we apply the latest technologies and construction techniques as well as our extensive know-how to find new ways to cut costs. Our commitment to customer satisfaction is also manifested in our trustworthy after-sales service and a corporate philosophy that stresses social responsibility.



GLOBAL NETWORK





Doosan Heavy Industries
& Construction

- Doosan Heavy Industries & Construction Subsidiaries
- Doosan Heavy Industries & Construction Branch Offices



GLOBAL NETWORK

Overseas Branches

DOOSAN HEAVY INDUSTRIES AMERICA CORP.

Parker Plaza, 10th Floor
400 Kelby Street
Fort Lee, NJ 07024, U.S.A.
Tel 1-201-944-4554
Fax 1-201-944-5022, 5053

NEW JERSEY OFFICE

Parker Plaza, 10th Floor
400 Kelby Street
Fort Lee, NJ 07024, U.S.A.
Tel 1-201-944-4554
Fax 1-201-944-5022, 5053

PITTSBURGH OFFICE

C/O Westinghouse Electric
Company, Suite E361B, 4350
Northern Pike, Monroeville,
PA 15146 U.S.A.
Tel 1-412-374-6048
Fax 1-412-374-6168

SCHENECTADY OFFICE

General Electric Building 33, Room
202A One River Road
Schenectady, NY 12345, U.S.A.
Tel 1-518-385-5218, 2629
Fax 1-518-385-4984

WINDSOR OFFICE

20 International Drive
Windsor, CT 06095, U.S.A.
Tel 1-860-731-6479, 6482
Fax 1-860-731-6478

DOOSAN HEAVY INDUSTRIES JAPAN CORP.

Mita Kokusai Building, Room 2410
1-4-28, Mita, Minato-gu,
Tokyo 108-0073, Japan
Tel 81-3-3452-5451~3
Fax 81-3-3452-5624

BANGKOK OFFICE

M-Thai Tower, 10th Floor
All Seasons Place,
87 Wireless Road
Phatumwan, Bangkok 10330,
Thailand
Tel 66-2-654-0690, 2
Fax 66-2-654-0693

BEIJING OFFICE

Gateway Plaza, Tower B, 19th Floor
No. 18 Xiaguangli, North Road,
East Third Ring, Chaoyang District,
Beijing 100027, China
Tel 86-10-8454-7131, 7133
Fax 86-10-8484-7139

HANOI OFFICE

Daeha Business Center, #1101
360 Kim Ma Street
Ba Dinh District, Hanoi, Vietnam
Tel 84-4-823-2501, 5
Fax 84-4-843-2302

HYDERABAD OFFICE

White House, #119, Block 3
6-3-1192/1/1, Kundan Bagh
Begumpet
Hyderabad 500 016, India
Tel 91-40-6613-2444/5
Fax 91-40-6613-2447

KOLKATA OFFICE

Trinity Building, 3G
226/1 AJC Bose Road
Kolkata 700 020, India
Tel 91-33-4003-3018
Fax 91-33-2289-0576

MUMBAI OFFICE

Maker Chambers-V, 1109~1110
Nariman Point, Mumbai 400 021,
India
Tel 91-22-2202-6504
Fax 91-22-2202-6557

NEW DELHI OFFICE

Lotus Towers 2A, Community Centre
New Friends Colony
New Delhi 110 065, India
Tel 91-11-5132-8031
Fax 91-11-5132-8039

SHANGHAI OFFICE

City Center of Shanghai,
Room 2802, 100 Zunyi Road,
Changning District
Shanghai 200051, China
Tel 86-21-6237-2485~6
Fax 86-21-6237-2487

TAIPEI OFFICE

51 Keelung Road, Room 704
Section 2, Taipei, Taiwan, R.O.C.
Tel 886-2-2739-2255(ARS)
Fax 886-2-2739-2266

FRANKFURT OFFICE

Arabella Center, 9th Floor
Lyoner Strasse 44-48 Frankfurt am
Main 60528, Germany
Tel 49-69-69-5004-0
Fax 49-69-69-5004-10

ABU DHABI OFFICE

P.O. Box 27767
Al Ghaith Tower, Suite 508
Hamdan Street, Abu Dhabi, U.A.E.
Tel 971-2-627-6273
Fax 971-2-627-6274

DUBAI OFFICE

P.O. Box 11859
Al Serkal Building, Office No. 308
Airport Road, Dubai, U.A.E.
Tel 971-4-294-4699
Fax 971-4-294-9930

KUWAIT OFFICE

Villa 15, Street 24, Block 4
Sabah Al-Salem Area, Kuwait
Tel 965-551-8436
Fax 965-551-8453

RIYADH OFFICE

P.O. Box 9656
Riyadh 11423, Saudi Arabia
Tel 966-1-419-1920, 1696
Fax 966-1-419-1995

DOOSAN WATER R&D CENTER

Gold & Diamond Park
Building No. 6, Office 112
Sheikh Zayed Road
P.O. Box 282350, Dubai, U.A.E.
Tel 971-4-347-7051
Fax 971-4-347-7142

DOHA OFFICE *

CAIRO OFFICE *

ALGIERS OFFICE *

JAKARTA OFFICE *

SYDNEY OFFICE *

MIAMI OFFICE *

SANTIAGO OFFICE *

Overseas Subsidiaries

DOOSAN BABCOCK ENERGY LTD.

11 The Boulevard, Crawley
West Sussex, RH10 1UX, U.K.
Tel 44-1293-612-888
Fax 44-1293-584-816

SKODA POWER

Tylova 1/57, Plzen 301 28, Czech
Tel 420-378-185-000
Fax 420-378-185-341

DOOSAN HYDRO TECHNOLOGY, INC.

912 Chad Lane Tampa, FL 33619,
U.S.A.
Tel 1-813-549-0182
Fax 1-813-549-0183

DOOSAN HF CONTROLS CORP.

1624 West Crosby Road, Suite 124
Carrollton, Texas 75006, U.S.A.
Tel 1-469-568-6526, 6557
Fax 1-469-568-6589

DOOSAN IMGB

104 Berceni Road Bucharest 4, Romania
Tel 40-21-301-2602
Fax 40-21-301-2701

DOOSAN ENGINEERING & SERVICES, LLC

5 Paragon Drive, Montvale,
NJ 07645, USA
Tel # 201-746-8200
Fax # 201-746-8210

DOOSAN BABCOCK ENGINEERING & SERVICES INDIA PVT. LTD.

DLF Building No. 8, 3rd Floor
DLF Cyber City Phase II
Gurgaon 122 002, Haryana, India
Tel 91-124-439-8200
Fax 91-124-414-7006

DOOSAN PROJECTS INDIA PVT. LTD.

322 Solitaire Corporate Park, Chakala
Andheri Kurla Road, Andheri (East)
Mumbai 400 093, India
Tel 91-22-4097-0500
Fax 91-22-4097-0599

DOOSAN HEAVY INDUSTRIES VIETNAM CO., LTD. [DOOSAN VINA]

No. 1 An Duong Vuong Street
Quangngai City, Quangngai Province
Vietnam
Tel 84-55-713-001~7
Fax 84-55-713-008

HAN-VIET HEAVY INDUSTRY & CONSTRUCTION CORP. [HANVICO]

933 Ton Duc Thang Street
Hong Bang District, Hai Phong,
Vietnam
Tel 84-31-371-2720
Fax 84-31-712-714~5

HANJUNG POWER LTD.

P.O. Box 2803, Boroko, NCD
Port Moresby, Papua New Guinea
Tel 675-320-0529
Fax 675-321-2984

* The above branches will be newly opened



**Doosan Heavy Industries
& Construction**

www.doosanheavy.com

HEAD OFFICE AND CHANGWON PLANT

555, Guigok-dong, Changwon,
Gyeongsangnam-do, 641-792, Korea
Tel. 82-55-278-6114, 7114 Fax. 82-55-264-5551, 5552

SEOUL OFFICE

1303-22, Seocho-Dong, Seocho-Gu. Seoul 137-920,
Korea (C.P.O Box 1826, Seoul Korea)
Tel. 82-2-513-6114 Fax. 82-2-513-6200