



Fuel cell and Compressor range
Bumhan Industries Co., Ltd.

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Overview

History

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Achievement

Company overview

BUMHAN Industries Co., Ltd., established in 1990 and having its aim to create its own brand value and secure its competitiveness in the global market, is a research and development based company specialized in designing and manufacturing high pressure compressors and fuel cells for naval ships.

| | | | |
|----------------|---|----------------|-----------------------|
| Company | Bumhan Industries Co., Ltd. | Assets | 84,123 Million Won |
| President | Mr. Jung, Young-sik | Owner's equity | 26,153 Million Won |
| Establish date | 1990.06.20. | Plottage | 15,244 m ² |
| Business Field | <ul style="list-style-type: none"> • High pressure air compressor for Navy, Marine, Powerplant, Aerospace • Fuel cell for Submarine • Cable & system for Marine & Industry • Hydrogen Refueling Station | Floorage | 10,521 m ² |
| | | Employee | 107 |
| Location | 61,Jayumuyeok 4-gil, Masanhoewon-gu,Changwon-si, Gyeongsangnam-do, 51343, Korea | Total Assets | 109,920 Million Won |
| Subsidiaries | Bumhan Co., Ltd. / Bumhan Motors Co., Ltd. / Bumhan Cable & System Factory Co., Ltd. | | |

Company overview - Location

■ Bumhan Industries, Co., Ltd.

Fuel Cell and Compressor Business in Changwon(15,244 m²)

Fuel Cell Business in Daejeon(1,200 m²)

R&D Center will be moved to Seoul(5,000 m²)

Seoul



Headquarter



Plant 1

Daejeon



Plant 2



Company overview - Subsidiaries

■ Bumhan Co., Ltd.

Real Estate Rental Service



■ Bumhan Cable & System Factory Co., Ltd. (Da Nang city, Viet Nam.)



■ Bumhan Motors Co., Ltd.

Dealer of Nissan Motor Corporation



Company History (90'~)

- 90' Establish Bumhan Industries co., Ltd.
- 92' Certificated KR Classification
- 93' Develop High pressure Air Compressor (pressure 250bar, Military Defense Lab.)
Certificated GL Classification
- 94' Certificated BV, RS Classifications
- 95' Certificated DNV, LR, NK Classification
Certificated CCS Classification
- 96' Selected as a promising medium enterprise
- 98' Selected as a Venture Cooperation
Certificated ABS Classification
- 99' Register ISO 9001 (BVQI)
- 00' Awarded the Industries & material Ministry Prize
Awarded the KT Mark
Selected as an Enterprise of Outstanding Technology
Supply agreement with DENO Compressor Holland
- 01' Awarded the EM Mark
- 02' Awarded CE Mark
- 03' Awarded the industrial medal by president of Korea
Certificated the world's top product (Complex cycle-type high pressure compressor)
- 06' Establish Bumhan R&D Center
- 07' Approved Inno-Biz enterprise
Awarded Korean World Class product (Complex cycle-type high pressure air compressor)

Company History (~19')

- 09' Move the head office to Masan Free-trade zone
Registered as an enterprise of maintenance and repair (R Class)
- 10' Obtain QA Certification (KR)
Renewed ISO 9001 : 2008 ABS
- 11' Signed the supply agreement (Bumhan-Atlas Copco, ODM)
- 12' Establish a second factory
- 13' Takeover the main building (Bumhan Building)
- 14' Develop air compressor for submarine (160m³/h×250bar)
Establish a Third factory
- 15' Renewed OHAS 18001 : 2007 ABS
Renewed ISO 14001 : 2004 ABS
Renewed ISO 9001:2008 ABS Quality Evaluations
- 16' Contract with GS Caltex for Fuel-cell business right
- 17' Awarded “Hidden Champions” by Small and Medium Business Administration
- 18' Establish Bumhan Cable & System Factory Co., in Vietnam
- 19' Acquisition the business for Buildings of Fuel Cell from Hyundai Steel
Signed an agreement with PowerCell as distributor and Service provider for PowerCell
Obtained PEMFC manufacturing license from KGS

Certification & Quality Assurance



BUREAU
VERITAS



Bumhan machines are designed, manufactured and tested under full load in accordance with the valid standards (such as KS, JIS, DIN, ISO, etc) and or quality assurance system, which has been certified by **ABS (ISO9001, 14001, 18001)**.

In addition, all units can be tested according to **ABS, BV, CCS, DNV-GL, LRS, KR, NK, RS, RINA**, etc., and relevant certificates submitted if required.



Achievement

- Selected as a targeting parts-materials developer of the high pressure air compressor for vessels.
- Selected as a promising medium enterprise by Small & Medium Business Administration (No.96048)
- Selected as a venture cooperation by Small & Medium Business Administration (No.98212412-6)
- Selected as an Enterprise of Outstanding Technology (Korea Technology Finance Corporation)
- Awarded the KT Mark (High Pressure Air-compressed Technology for the type of Complex cycle, Ministry of Science and Technology)
- Awarded the EM Mark for high voltage current isolator compressor (Korean Agency for Technology and Standards)
- Awarded Korean World-Class Product (Complex cycle-type high pressure air compressor, Ministry of Commerce, Industry and Energy)
- Awarded the Industries & Material Ministry Prize in the category of technology innovation (for Commercialization of new technology)
- Received a commendation by the Minister of Commerce, Industry and Energy
- Awarded the industrial medal by President of Korea



Business scope

Product scope

Industrial Property

Business scope



◆ COMPRESSOR

■ NAVAL

- Used for starting of the diesel propulsion engines and gas turbines, torpedo and missile ejection, deballasting, breathing, air control and ship service air.

■ MARINE

- Designed for engine room duties including main engine starting, topping up, control air and general air service.
- Have advantage of high efficiency contrast with their required power as air compressor of engine starting.

■ POWER PLANT & INDUSTRIAL

- Have long been engaged in designing engineering and manufacturing special-purpose gas insulated switch gear compressor suitable for power plants and power station.
- Installed on a large number of nation-wide power stations and sub-stations.

◆ HYDROGEN & FUEL CELL

■ SUBMARINE

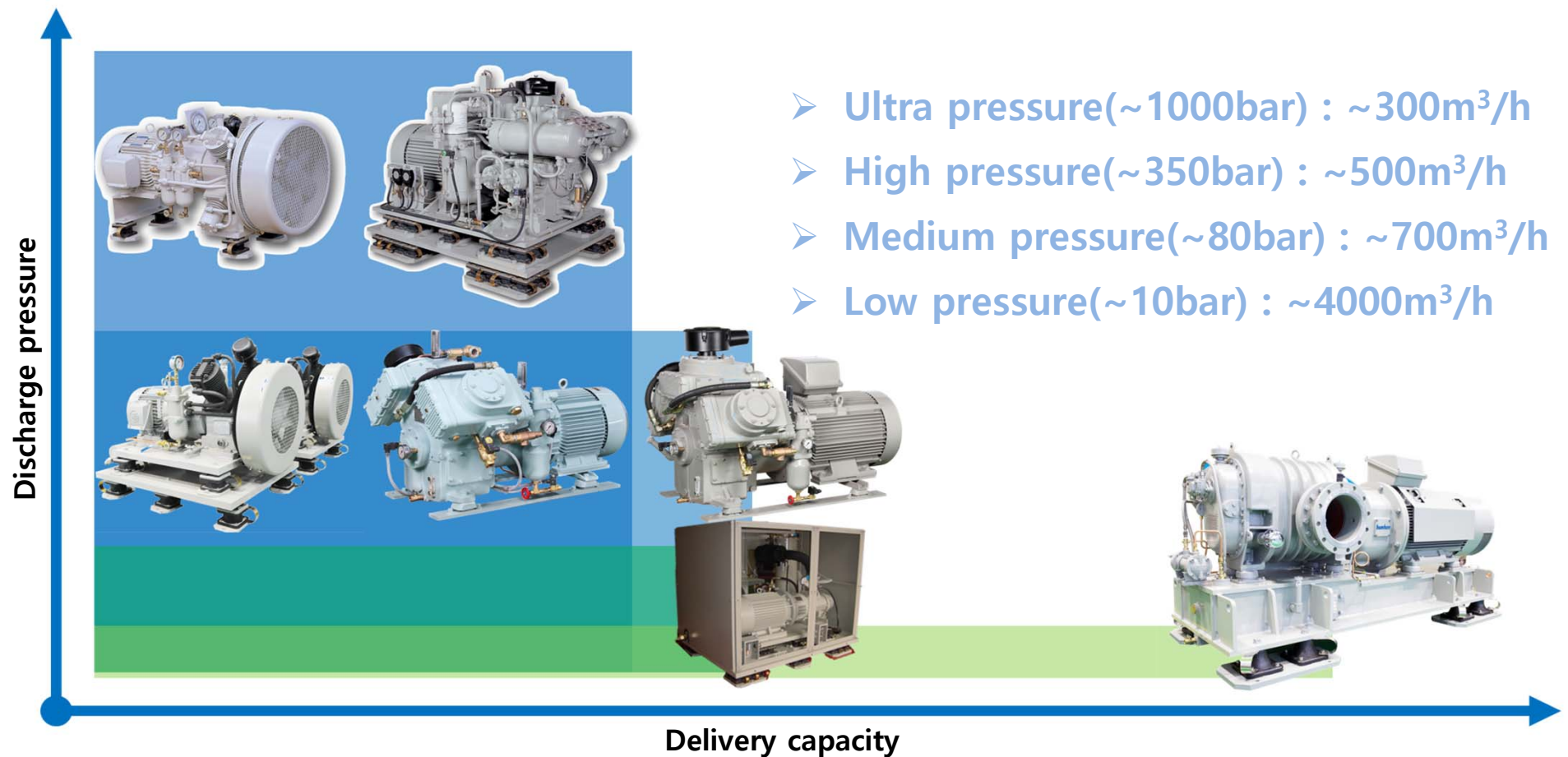
■ BUILDING

■ FUEL CELL POWER PLANT

■ H₂ REFUELING STATION

Product scope

BUMHAN, your trustable partner in Compressor, Fuel cell,
Hydrogen refueling station and Assembly systems.



Product scope

❑ Water-cooled type, Air-cooled type (2,3,4 stage)



2-stage, water-cooled
280 m³/h × 30bar



3-stage, water-cooled
190 m³/h × 80bar



4-stage, water-cooled
160 m³/h × 350bar



3-stage, Air-cooled
190 m³/h × 40bar



3-stage, Air-cooled
38 m³/h × 80bar



4-stage, Air-cooled
35 m³/h × 400bar

Product scope

❑ Fuel Cell System for Building

BNH050



BHH050



| | BNH050 | BHH050 |
|-----------------|---------------------------|-------------------------|
| Rating Power | 5kW | 5kW |
| Voltage | AC 220V, 1Phase | AC 220V, 1Phase |
| Size | W1,000 X D650 X H1,430 | W500 X D650 X H1,430 |
| Fuel | Natural Gas | Hydrogen |
| Efficiency | Elec. 35%, Heat 50% | Elec. 48%, Heat 37% |
| Operating Temp. | -20 ~ 45 °C | -20 ~ 45 °C |
| Starting time | < 60 min | < 10 min |

Product scope



Bumhan Products Inside

- Launched on Sept. 14, 2018
- #1 Fuel Cell Submarine of Changbogo-III Project, Dosan AhnChnagho
- Fuel Cells and Compressors of Bumhan

Hydrogen Refueling Station

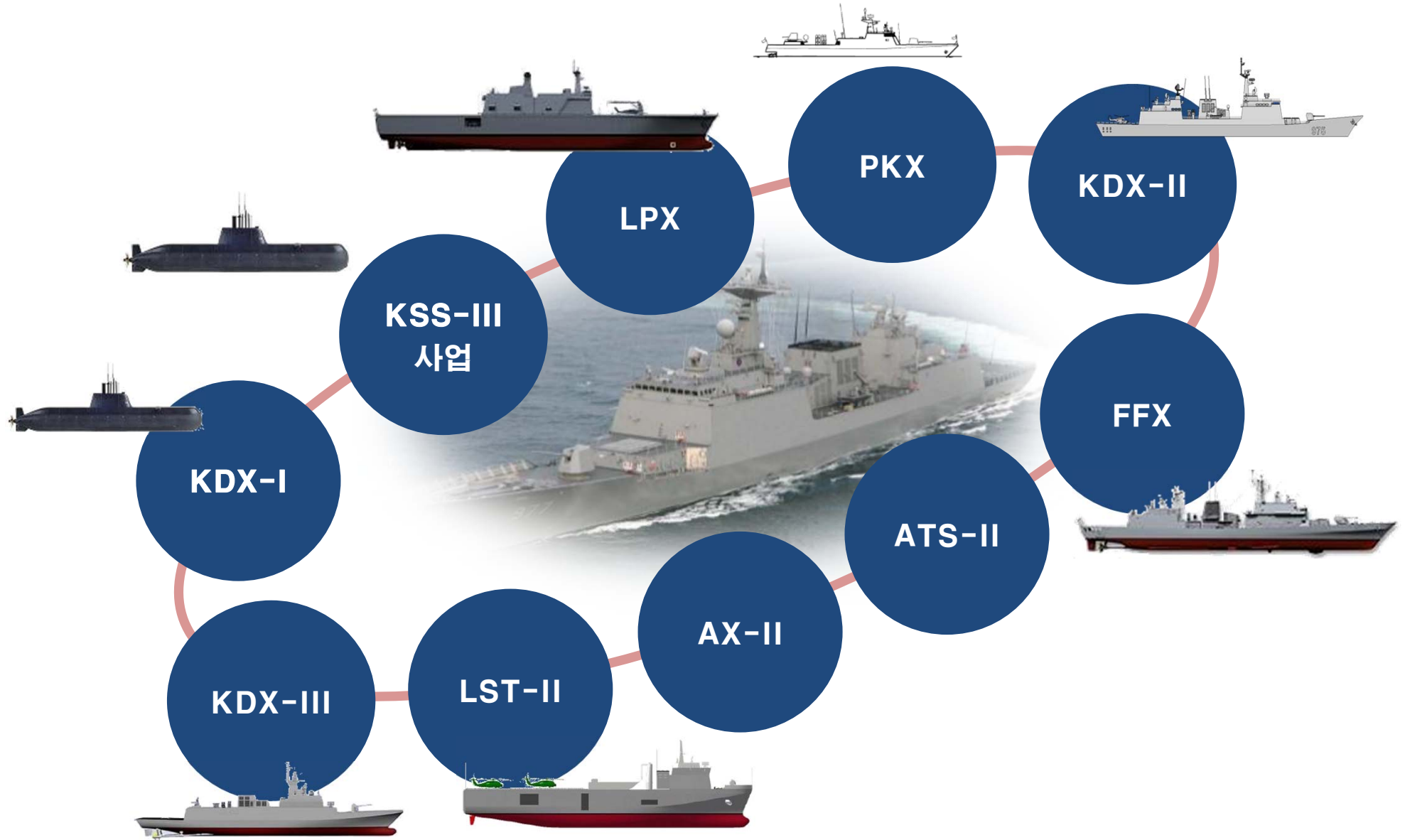
- ❑ Movable Hydrogen Station - Under Development
- ❑ Active Participation of National Hydrogen Station Program



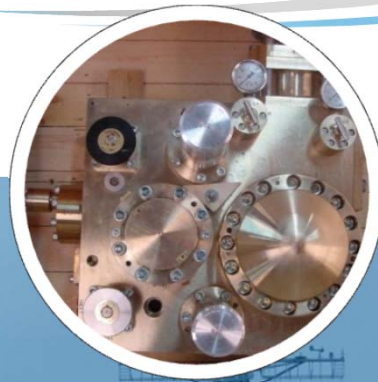
Industrial Property - Compressor

| TYPE | Title | Register date | Register No. |
|----------------|---|---------------|---------------|
| Patent | Complex Cycle-type High Pressure Air Compressor | 2002.10.29 | 0360671 |
| Patent | Anti-emulsion inner crankcase multi-stage reciprocating Air Compressor | 2013.10.18 | 10-1458614 |
| Utility Model | Air Valve for Air Compressors | 2000.03.17 | 0183778 |
| Utility Model | Dryer for Gas Insulated Switchgear Compressor | 2001.03.12 | 0233293 |
| Design | Air Valve for Air Compressors | 1998.07.24 | 224549 |
| Design | Air Valve for Air Compressors | 1998.07.24 | 224550 |
| Design | Body Block for Air Compressors | 1998.07.24 | 224553 |
| Design | Air Valve for Air Compressors | 1998.09.23 | 228009 |
| Design | Compressors for charging Compressed Air | 2001.11.06 | 0286425 |
| Design | Dryer for Air Compressors | 2002.04.17 | 0297133 |
| Design | Air Compressor | 2009.12.15 | 30-0548552 |
| Design | Air Compressor | 2009.12.15 | 30-0548553 |
| Design | Air Compressor | 2010.03.05 | 30-0555329 |
| Similar Design | Air Valve for Air Compressors | 1998.09.23 | 228009-01 |
| Similar Design | Air Compressor | 2010.01.18 | 30-0548552-01 |
| Similar Design | Air Compressor | 2010.01.17 | 30-0548553-01 |
| Trademark | 9 items incl. Air Compressor | 2006.08.04 | 40-0673021 |

Compressed Air System – All Korean Navy since 1990



Compressed Air System



- Starting Air System - D/E, D/G, G/T
- Bleed Air System
- Prairie / Mask Air System
- Control Air System



Containerized Air/Gas System - Navy

The gas mixer is a device that supplies the breathing air and gas to the cylinders for submarine. It consists of low pressure compressor, high pressure compressor, dryer, membrane gas generator, filtration, cylinders and gas boosters, distributor, pressure reducing valve, control system, fire protecting systems in a container.



Gas Mixer,
Ground support equipment
for Submarine

Containerized Air System - HYUNDAI



Compressed Air System - Starting Air System



Compressed Air System - Starting Air System





Fuel cell and Compressor range

Bumhan Industries Co., Ltd.

ver. 2020.09.25.