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# Heat Exchanger Solution Partner for Industries

New Energy, Environment, Engineering & Technology



- MAIN(SURFACE) CONDENSER
- DEAERATOR(Tray & Scrubber Type)
- STEAM CONVERTOR WITH DEAERATOR
- H.P & L.P FEED WATER HEATER
- SHELL & TUBE HEAT EXCHANGER
- PLATE HEAT EXCHANGER
- VACUUM SYSTEM
- H<sub>2</sub> COOLER/AIR COOLER
- GAS & OIL COOLER(Fan & Motor Type)
- ECONOMIZER, STEAM AIR HEATER
- FUEL GAS PREHEATER
- CLOSED COOLING WATER HEAT EXCHANGER
- STATOR WINDING WATER COOLER
- PRESSURE VESSEL

**DongHwa Entec**  
Heat Exchanger Solutions

Plant Division has done thermal & mechanical design, fabrication, transportation and technical service after delivery with best technique & quality and continuous development of technology. And our products have satisfied our customers and have been our pride.

PLANT사업부는 기본설계, 제작, 납품, 사후관리까지를 첨단기술과 품질향상, 기술력개발로써 고객을 만족시키는 것이 동화엔텍의 자존심입니다.

We, Plant Division, has produced all kinds of compact and efficient heat exchangers for Refinery, Petrochemistry, Power Plant, Textile Industry and Food Industry.

Especially we have a lot of experience in Thermal Power Plant, Co-Generation Plant, Nuclear Power Plant and all steam application system.

Worldfamous engineering company and heavy industry have been our customer and they are satisfied with our quality.

석유화학공업, 발전설비, 방직공장 그리고 식품산업등의 열회수와 효율적인 설비로 사용되는 모든 종류의 열교환기를 자체 생산하고 있으며, 특히 화력, 열병합, 원자력발전과 STEAM을 사용하는 열교환기에 많은 실적을 가지고 있으며, 유수 엔지니어링사와 중공업으로 부터 견적을 제출하고 주문품을 제작 납품하고 있습니다.

**DongHwa Entec**

Heat Exchanger Solutions

**Plant Division**

## MAIN PRODUCT

1 <b>MAIN(SURFACE) CONDENSER</b>		<ul style="list-style-type: none"> <li>• Main Condenser</li> <li>• Pump Turbine Condenser</li> <li>• Surface Condenser</li> <li>• Gland Steam Condenser</li> </ul>
2 <b>DEAERATOR</b>		<ul style="list-style-type: none"> <li>• Deaerator(Tray &amp; Scrubber Type)</li> <li>• Steam Converter with Deaerator</li> </ul>
3 <b>FEED WATER HEATER</b>		<ul style="list-style-type: none"> <li>• H.P. Feed Water Heater</li> <li>• L.P. Feed Water Heater</li> </ul>
4 <b>HEATER</b>		<ul style="list-style-type: none"> <li>• Hot Water Heater for district heating</li> <li>• Fuel Oil Heater</li> <li>• Lub. Oil Heater</li> <li>• Oil Suction Heater for Storage Tank</li> <li>• Jacket Water Preheater</li> </ul>
4 <b>COOLER</b>		<ul style="list-style-type: none"> <li>• Lub. Oil Cooler</li> <li>• Transformer Oil Cooler</li> <li>• Fresh Water Cooler</li> <li>• Low Pressure Steam Generator</li> <li>• Teg Cooler</li> </ul>
4 <b>PLATE HEAT EXCHANGER</b>		<ul style="list-style-type: none"> <li>• Feed Water Heater for district heating</li> <li>• Cooling Water Cooler for ice thermal storage system</li> <li>• Process Liquid Cooler</li> <li>• Cooler for turbine engine</li> </ul>
5 <b>VACUUM UNIT</b>		<ul style="list-style-type: none"> <li>• Inter &amp; After Condenser</li> </ul>
6 <b>H<sub>2</sub> COOLER</b>		<ul style="list-style-type: none"> <li>• Hydrogen Cooler</li> <li>• Air Cooler for Compress</li> </ul>
7 <b>GAS/OIL COOLER</b>		<ul style="list-style-type: none"> <li>• Air Steam-Heater for Boiler</li> <li>• Air Heater for drying process</li> <li>• Economizer</li> <li>• Gas/Oil Cooler with Fan &amp; Motor</li> </ul>
8 <b>STEAM PACKING EXHAUSTER</b>		<ul style="list-style-type: none"> <li>• Steam Packing Exhauster Unit</li> <li>• Closed Cooling Water Cooler</li> <li>• Fuel Gas Preheater</li> </ul>
9 <b>PRESSURE VESSEL</b>		<ul style="list-style-type: none"> <li>• Air Receiver</li> <li>• Oil Storage Tank</li> <li>• Ice Thermal Storage Tank</li> <li>• L.P. &amp; H.P. Steam Drum</li> </ul>
9 <b>VESSEL</b>		<ul style="list-style-type: none"> <li>• Jacket type Vessel</li> <li>• Half Coil Vessel</li> <li>• Snubber &amp; Separator</li> <li>• Mixed Bed Polisher</li> </ul>

The function of Surface Condenser is to maintain back pressure while exhausted steam from turbine is condensed.

The condensate generated in Surface Condenser is recirculated to boiler through Feed Water Heater and Deaerator.

SURFACE CONDENSER는 증기원동기(TURBINE)의 후단에서 폐증기를 응축시키며 배압을 만드는 역할을 한다. 일반적으로 여기서 응축된 물은 Feed Water Heater, Deaerator등을 거쳐 보일러로 재순환된다.

## MAIN(SURFACE) CONDENSER

1. HHI LNGC(H1429) MAIN CONDENSER
2. MHI/MCEC, KPI PROJECT(2,124M<sup>2</sup>)
3. MHI/APP SUZHOU PAPER MILL 80MW(2,390M<sup>2</sup>)
4. EBARA/PEMEX MADERO(668M<sup>2</sup>)
5. MHI/IKPP, PETRAWANG 55MW(1,776M<sup>2</sup>)
6. MHI/FUJI SEKIYU SODEGAURA CHIBA(508M<sup>2</sup>)
7. MHI/LINDE, ADNOC BOROUGE PETROCHEMICAL(3,506M<sup>2</sup>)
8. MHI/APP SUZHOU PAPER MILL 50MW(1,120M<sup>2</sup>)
9. MHI/JIANGSU GOLDEAST PAPER, DAGANG(1,380M<sup>2</sup>)
10. MES/KIMITSU 3CDQ POWER PLANT(3,850M<sup>2</sup>)
11. TUBE & T/SHEET SEAL WELDING(Titanium)



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**D**eaerator is defined as a mechanical device for removal of dissolved gases, primarily oxygen and carbon dioxide from water, regular maintenance of suction pressure of feed water pump and rising the temperature of feed water.

Deaerator는 공정수속의 용존산소, 가스 그리고 이산화탄소를 제거하고 급수펌프 흡입압력을 일정하게 유지하고 동시에 급수온도를 가열하는 장치이다.

## DEAERATOR(Tray & Scrubber Type)

### STEAM CONVERTOR

1. LNGC FOR DW2205(SCRUBBER TYPE)
2. DAEJUN INDUSTRIAL COMPLEX #3,4(STEAM CONVERTOR)
3. LG CALTAX COGENERATION #3
4. ICHON TOTAL ENERGY NO. 2
5. MHI/CHYODA PROJECT
6. SAMSUNG ENG./DAINONG PJT



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Feed Water Heaters are utilized to heat the feed water prior to steam generator. This is served to improve the cycle efficiency and to minimize the thermal effect arising from the difference of temperature between steam generator and feed water.

Feed Water Heater 는 급수를 steam generator로 공급되기 전에 가열하는 장치이며 steam generator와 급수와의 온도차로 야기되는 영향을 최소화 하는데 사용된다.

이러한 역할을 하는 급수설비에 적용되는 열교환기는 네 부류가 있으며 하기와 같다.

## H.P & LP FEED WATER HEATER

1. LG CALTAX COGENERATION #3
2. HANBO CDQ GAS POWER PLANT
3. MHI/CURACAO PJT
4. HHI/LNGC FOR H1295 H.P. HEATER
5. HHI/LNGC FOR H1295 L.P. HEATER
6. MHI/ARAMCO PROJECT
7. KWANG-YANG STEEL IRON CO., LTD.  
(165m<sup>2</sup> HP F.W HEATER)



- High Pressure Feed Water Heaters
- Deaerator Heaters
- Low Pressure Feed Water Tubed Heaters
- Low Pressure Feed Water Direct Contact Heater



● **Shell & Tube (Plate Type)Heat Exchanger**

The Shell & Tube (High efficient Plate Type)Heat Exchanger for Power Plant, District Heating, Petro-chemical Plant and Offshore Plant and so on.

발전소, 지역난방, 석유화학, 해양 플랜트 등을 위한 각종 산업용(고효율 Plate타입) 열교환기

**SHELL & TUBE HEAT EXCHANGER**

**PLATE HEAT EXCHANGER**

1. MHI/EBARA G. CONDENSER
2. MHI/TECH. SAFAC(#2,3) LUBE OIL COOLER
3. PLATE HEAT EXCHANGER
4. AL-JUBAIL PJT FOR OIL COOLER
5. HHI/LNGC FOR H1295 MAIN OIL COOLER
6. MHI/TEC UZBEKISTAN PROJECT
7. LP.S.G/DAEWOO LNGC FOR DW2205
8. HHI/LNGC H1156 FOR G. CONDENSER PK'G
9. TAEHAN POWER PLANT(NO.5,6),LUBE OIL PK'G
10. HYUNDAI OIL REFINERY(DAESAN)
11. MHI/ABB-LUMMUS PROJECT



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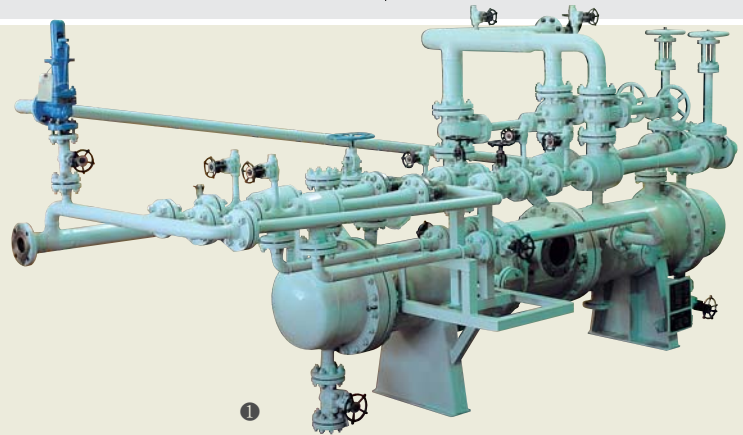
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The vacuum degree is decreased if the air is penetrated to Vacuum Surface Condenser for turbine. Therefore steam driving ejector is necessary in order to remove air in Vacuum Surface Condenser and Ejector Condenser is necessary in order to condense the driving steam. In case of high Vacuum surface condenser, especially two stage ejector and ejector and ejector condenser is required and this is called as ejector vacuum system. And maintenance is not needed because there is not rotation machinery using electricity

터빈용 진공 복수기의 경우 외부에서 공기가 안으로 유입되면 복수기의 진공도가 떨어지게 된다. 따라서 일정하게 공기 추출을 하기 위해 스팀으로 운전되는 이젝터와 사용된 스팀을 응축시켜 재사용하기 위한 응축기가 필요하다. 특히 고진공 복수기의 경우 2단 이젝터와 응축기가 복합적으로 운전되는데 이를 Ejector Vacuum System이라 한다. 그리고 동력이 필요한 회전기가 들어가지 않으므로 유지,보수가 필요없는 큰 장점이 있다.

## VACUUM SYSTEM

1. MHI/LINDE-ADNOC PROJECT
2. EBARA/PEMEX MADERO NO.2 PROJECT
3. EBARA/PEMEX TULA REFINERY PROJECT
4. MHI/JGC-TAKASAKO PJT
5. EBARA/PEMEX-SALMACA PJT
6. EBARA/PEMEX MADERO NO.1 PROJECT
7. HHI THERMONORTE PHASE II POWER PJT/BRAZIL



## H2 COOLER/AIR COOLER

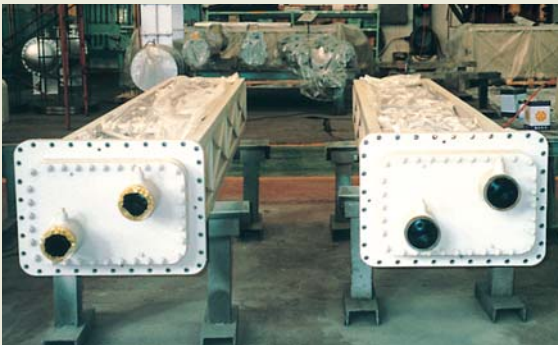
1. HITACHI PROJECT(NO.1) AIR COOLER
2. GE/7FH2 H2 COOLER
3. YOUNGKWANG/ULJIN NUCLEAR POWER PLANT
4. TAEAN, SAMCHEONPO, HADONG NO.1,2,3,4,5,6 POWER PLANT
5. HITACHI PROJECT(NO.2) AIR COOLER
6. HITACHI PROJECT(NO.3) AIR COOLER

In case of high capacity generator. H2 is generally used as cooling medium because the specific heat of H2 is high

대용량 발전기의 경우 수소가 비열이 크므로 냉각 매체로 주로 사용된다. 발전기를 냉각시키고 나온 수소를 냉각시키는 열교환기를 H<sub>2</sub> Cooler라고 한다.



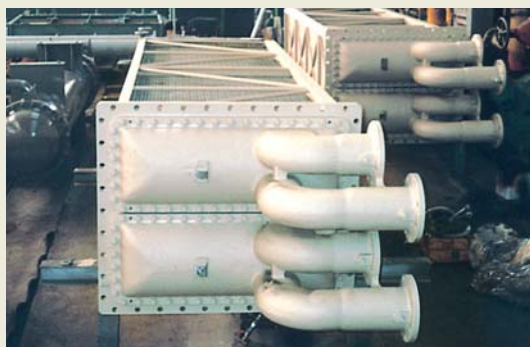
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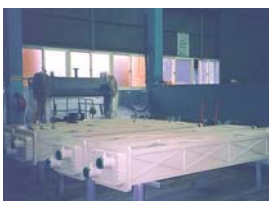
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● **Economizer**

Fin tube or bare tube type heat exchanger to preheat feed water with flue gas of boiler in order to save fuel and to increase the steam quantity of boiler.

연료소비를 감소시키고 보일러 증기 발생량을 증가시키기 위해 보일러의 연소가스로 보일러 급수를 예열하는 열교환기

● **Air Cooled Heat Exchanger(Fan and Motor Type)**

Heat exchanger to cool Lube oil, process fluid and so on with air by fan & motor.

팬과 모터로 공기를 이용하여 윤활유, 공정 유체 등을 냉각시키는 열교환기

**GAS & OIL COOLER(Fan & Motor Type)**

**ECONOMIZER, STEAM AIR HEATER**

1. POHANG IRON & STEEL CO., LTD.(VAPORIZER)
2. MHI/CURACAO PROJECT(ECONOMIZER)
3. DAEWOO/LNGC DW2205 FOR STEAM AIR HEATER
4. MHI/NANPU PROJECT GAS COOLER
5. MHI-KHUFF GAS PJT(OIL COOLER)



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## FUEL GAS PREHEATER

### CLOSED COOLING WATER HEAT EXCHANGER STATOR WINDING WATER COOLER

1. SAMCHEONPO POWER PLANT NO.5,6 STEAM PACKING EXHAUSTER
2. MHI/CURACAO PROJECT C.C.W. H/EX
3. SAMSUNG ENG./ECH PJT(SPRIAL COOLER 23ETS)
4. HADONG POWER PLANT NO.3(STATOR W.W.COOLER)
5. SUNKYOUNG ENG./GHANA STABILIZER REBOILER & CONDENSER
6. WEAT INCHON GAS TURBINE(C.C.W. H/EX)

#### ● Fuel gas Preheater

Heat exchanger to preheat fuel gas(LNG) of Combined Cycle Power Plant

복합발전용 연료가스(LNG)의 예열기

#### ● Closed Cooling Water Heat Exchanger

Heat exchanger to cool the closed cycle equipment cooling water

폐쇄 순환 냉각수를 냉각시키는 열교환기



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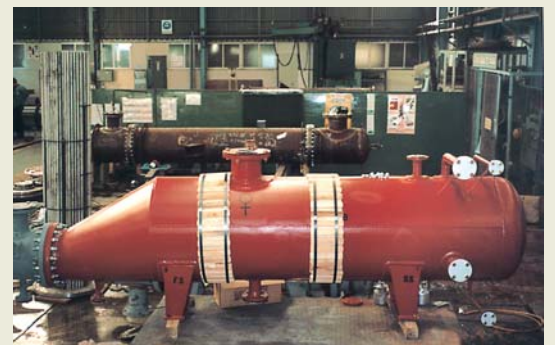
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All Pressure Vessels intended for marine and Land power station diesel engine starting air system, oil storage, chemical reactor system for refinery and chemical plant are covered by DongHwa Entec.

All the design and fabrication processes are supported by ASME "U", "PP" & "S" stamp, rules of the required classification societies and the concerned national standards.

선박이나 육상 디젤발전소에서 사용되는 시동공기용 탱크, 정유공장이나 화학공업에 사용되는 유류처리 탱크나 화학반응장치에 사용되는 거의 모든 압력 탱크는 당사에서 제작이 가능하며 모든 설계나 제작공정은 ASME, 선급 및 각국가 공인표준서를 기본으로 관리되고 있습니다.

## PRESSURE VESSEL

1. NKK/OLKARIA II GEOTHERMAL POWER PJT-CYCLONE SEPARATOR 13SETS
2. MES/NODOC QATOR PJR-SNUBBER 38SETS
3. SAMSUNG ENG./DAINONG CHEMICAL PJT(JACKET TYPE)
4. HHI/RIG RBS-8D PROJECT
5. DOOSAN/AL-TAEWEELLER & UMMAL-NAR PROJECT
6. DOOSAN/AL-ZOUR PROJECT



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Korea became a leading country as the best and  
the biggest shipbuilding industry in the world.  
DongHwa Entec, which is global maker of Heat Exchanger  
has always been with the shipbuilding industry in great history.



VISION

세계 최고의  
열교환기  
전문제조기업

MISSION

프로세스 혁신과  
프로세스의 조화를  
통한 최고의  
서비스 제공

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