Boiler & Heater Business (B&H)
Thermax provides equipment and solutions for generating steam for process and power through combustion of various solid, liquid and gaseous fuels, as well as through heat recovery from turbine/engine exhaust and (waste) heat recovery from industrial processes. B&H also offers heaters for various applications in the chemical, petrochemical and refinery segments.

Its services arm offers renovation and modernization solutions for old boilers and heaters.

The major industry segments served in India and across the world are steel, refinery, petrochemical, power, cement, sugar, distillery, fertilizer, paper, chemical, non-ferrous metal and textile.

Sustainable Solutions in Energy & Environment
Thermax is an engineering company that helps business enterprises perform competitively and sustainably in global markets. In over 75 countries, clients make use of Thermax’s products and solutions for energy efficient and eco-friendly operations: heating equipment and power plants that use a wide variety of fuels including solar energy; absorption chillers that use heat in place of electricity; waste heat recovery units; water & waste water management, air pollution control systems; performance improving chemicals.

The company provides its customers value added services – audits of energy and water, system modifications for optimal use of resources, annual maintenance contracts, energy rentals and O&M of power and water installations.

Thermax operations are supported by innovative R&D and partnerships with global technology majors. It has an international sales & service network spread over 24 countries and state-of-the-art facilities (in India, Denmark and China) that manufacture to international standards.

THERMAX VISION
To be a globally respected high performance organisation offering sustainable solutions in energy and environment.
Thermax Today

Global operation with 33 International offices, 12 Sales & Service offices & 11 manufacturing facilities - 7 in India and 4 overseas
Our presence spans 75 countries across Asia Pacific, Africa and the Middle East, CIS countries, Europe, USA and South America
R&D centre with focus on Combustion & Heat Transfer, Biotechnology, Material Science and Solar Thermal
Thermax's energy efficient and eco-friendly portfolio of technologies includes:

- ISO 9001 : 2008 accredited
- ISO 14001: 2004 certified plant
- OHSAS 18001 : 2007 certified plants
- Manufacturing facility spread over 27 acres at Chinchwad near Pune in Western India
- Manufacturing facility spread over 100 acres at Savli near Vadodara on Western Coast of India
- Assembly facility near Mundra Port on Western Coast of India
- Manufactures to international standards–ASME, EN, GOST, BS, DIN, UDT, IBR, PED etc.

B&H Installations in over 75 countries
Core Competencies and Strengths

- Leaders in Thermal and Combustion Engineering
- Versatile technologies for converting waste to energy
- Fully computerized design in-house and proprietary software packages
- Experienced project management and in-house construction teams
- High thermal efficiency heating solutions
- Modular construction and logistics management
- World-class, state-of-the-art manufacturing facilities with port assembly facility
- Multi fuel fired heating solutions for process and cogeneration
- Versatile technologies for converting waste to energy
- Modular construction and logistics management
- Experienced project management and in-house construction teams
- High thermal efficiency heating solutions
- World-class, state-of-the-art manufacturing facilities with port assembly facility
- Multi fuel fired heating solutions for process and cogeneration

Snapshot of Modularisation

- Package boiler being loaded on ship
- HRSG module is ready for shipment
- WHRU module is ready for shipment
- Superheater module is ready for shipment
- WHRB module is under shipment
- WHRB module is ready for shipment
- Fully modularized WHRB is ready for shipment
- Fully modularized fired heater is ready for shipment
- Fuel skid is ready for shipment
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Atmospheric Fluidized Bed Combustion Boiler (AFBC)

Product Features
- Multifuel firing
- Optimum combustion with staged secondary air system
- Machine welded membrane panel
- Better steam purity
- Bed evaporator design for higher reliability
- Pin studs welded on inbed surfaces
- Overbed as well as underbed feed system offered

Operating Range
- Capacity: Upto 300 TPH
- Pressure: Upto 160 kg/cm²(g)
- Temperature: Upto 540°C
- Fuels: Coal, lignite, rice husk, pet coke, spent coffee ground, washery rejects, low ash coal, paper sludge, roasted chaffs, DOB, bagasse, pith woodchips, biomass etc.

Boiler-Turbine-Generator (BTG) package can be offered on case-to-case basis.

Major Clients
Chemical
- DCW
- Chemplast

Cement
- Gujarat Ambuja
- JK Cement
- Shree Cement
- Madras Cement

Paper
- Orient Paper Mills
- West Coast Paper Mills Ltd.
- Bataan 2020, Philippines
- Khanna Papers Mills Ltd.
- TNPL
- Naini Tissues

Steel
- Bhushan Ltd.
- Nav Bharat Ferro Alloys Ltd.
- JSW Energy Ltd.
- Usha Martin, Jamshedpur
- KJS Steel Ltd.

Others
- Nestle
- Birla Tyres
- Eco Oils Sdn Bhd, Malaysia
- Ruchi Soya Oil Industries Ltd.

1 unit of 25 TPH, 45 kg/cm²(g), 480°C coal fired boiler
Circulating Fluidised Bed Combustion Boiler (CFBC)

Product Features
- Multifuel firing capability
- Compact, economical design and construction
- Impact separation with ‘U-beam’ particle separators
- Best-in-class compliance with environmental norms
- Low auxiliary consumption
- Minimum refractory
- No sootblowers required
- Air cooled bottom-ash cooler
- High turndown
- No interface erosion at panel to refractory interface

Operating Range
- Capacity: Upto 1000 TPH
- Pressure: Upto 200 kg/cm²(g)
- Temperature: Upto 560°C
- Fuels: High ash/low ash, petroleum coke, sludge, oil pitches, biomass, high-sulphur coal, petcoke, washery rejects, mill rejects, agro waste, refuse derived fuel, char, fly ash etc.

Boiler-Turbine-Generator (BTG) package can be offered on case-to-case basis.

Major Clients

Chemical
- Kanoria Chemical
- GHCL Ltd.
- Vinachem DAP-2 Project
- RSPL

Cement
- Ultra tech Cement Ltd.
- Saurashtra Cement
- ACC Ltd.
- Jaiprakash Associates Ltd.
- Sagar Cement
- Sharjah Cement, Dubai

Refinery & Petrochemical
- Reliance Utilities & Power Pvt. Ltd.

Paper
- Ballarpur Industries Ltd.
- ITC Ltd.

Steel
- Suryadev Alloys & Power Pvt. Ltd.
- IMFA Ltd.
- Kamachi Sponge & Power Corpn. Ltd.

Textile
- Grasim Industries Ltd.
- Indian Rayon & Inds. Ltd.
- Welspun Captive Power Generation Ltd.

Sugar
- Bajaj Infrastructure Development Company Ltd.

5 units of 500 TPH, 125 kg/cm²(g), 535°C Indonesian coal, Indian coal, petcoke fired boilers
Bagasse & Biomass Fired Boiler

Product Features
- Continues ash discharge
- Grate driven by hydraulic / planetary gear with VFD
- Caternary design
- Fine control on grate speed variation
- Overlapping grate design prevents air leakages
- Overfire air system provides turbulence and thorough mixing of volatile gases, thus assuring complete combustion
- Online maintenance of grate
- Three / two stage superheater with inter stage feed water spray attemperator
- Tall furnace for complete combustion
- Pinhote grate or pusher grate is offered for specific applications

Operating Range
- Capacity: Upto 300 TPH
- Pressure: Upto 150 kg/cm²(g)
- Temperature: Upto 550°C
- Fuels: Biomass, bagasse, wood chips, coconut shell, saw dust, rice husk, corn cob, cane leaves, king grass, napier grass, paper sludge, coal, roasted chaffs, DOB, palm waste, red gram stems, ground nut shell, rice straws, tapioca stem, mustard husk, cotton stalk, julia flora, coco husk, maize stalk, EFB, palm kernel shell, palm fibre etc

Boiler-Turbine-Generator (BTG) package can be offered on case-to-case basis.

Major Clients
Sugar
- Mitr Phol Bio-Power, Thailand
- Korach Industry Company Ltd., Thailand
- Kamuna Sugar Ltd. UP
- Victorias Milling Company Inc., Philippines
- Zuker SA DE CV, Mexico
- Ambalika Sugar Pvt Ltd.
- India Cane Sugar Ltd.
- Bannari Amman Sugars Ltd.
- Dhampur Sugars Ltd.
- Sri Chamundeshwari Sugars
- URC Sonedco Sugar Corporation, Philippines
- Thip Kamphaengphet Bio Energy Co. Ltd., Thailand
- San Pedro Bio-Energy, Dominican Republic
- PT Rejoso Manis Indo, Indonesia

1 unit of 140 TPH, 82 kg/cm²(g), 520°C bagasse, coal, king grass fired travelling grate boiler
Bi-Drum Packaged / Site Erected Boiler

Product Features
- Package boiler completely pre-engineered with packaged design
- Special design of drum internals for high steam purity
- Membrane / studded wall water-cooled furnace construction
- Fully drainable convective superheater
- Fine combustion control and high turndown ratios

Operating Range
- Capacity: Up to 500 TPH
- Pressure: Up to 110 kg/cm²(g)
- Temperature: Up to 538°C
- Fuels: All liquid and gaseous fuels, waste fuels, tar, hydrogen, refinery gases etc.

Major Clients

Chemical & Fertiliser
- Qatar Vinyl Company Ltd., Qatar
- Trust Chemicals Industries LLC, Egypt
- TCI Sanmar Chemicals, Egypt
- Egyptian Propylene & Polypropylene Company, Egypt
- Saudi Basic Industries Corporation (SABIC)
- Galaxy Project FZCO for Burrup Fertilizers Pty. Ltd., Australia
- Indorama Eleme Fert & Chem Ltd. Nigeria
- Gujarat Narmada Valley Fertilizers Co Ltd.

Mining
- Saudi Arabian Mining Company (Ma’aden)

Refinery & Petrochemical
- Buzzychelli Maroc - Sonara Limbe Refinery Project, Cameroon, Africa
- Sabic Petrokemya, Saudi Arabia
- Lurgi Aktiengesellschaft Ein Unternehmen der for PDH AlfaseL, Saudi Arabia
- KBR for Chevron Energy, Nigeria
- Dangote Oil Refining Company, Nigeria
- Cairn Energy India Pvt. Ltd. for Northern Area Development Mangala And Rageshwari Fields, Rajasthan
- Hindustan Petroleum Corporation Ltd.
- National Petrochemical Industrial Co. (NatPet)
- ONGC Mangalore Petrochemicals Ltd.

1 unit of 273 TPH, 65 kg/cm²(g), 500°C Arabian light crude oil & natural gas fired PFM boiler
Single-Drum High Capacity Boiler

Product Features

- Fully drainable, horizontal and convective superheater for longer life and high reliability
- Front wall firing for a variety of liquid and gaseous fuels (independently or in combination)
- Steam drum outside the flue gas path permits quick startup and load
- Large furnace size and volume ramp up
- Leak proof membrane wall design
- Steam cooled superheater supports for increased reliability
- Low refractory and thus reduced maintenance

Operating Range

- Capacity: Upto 500 TPH
- Pressure: Upto 160 kg/cm²(g)
- Temperature: Upto 560°C
- Fuels: Liquid fuels such as natural gas, purge gas, coke oven gas, #2 oil, #6 oil, heavy fuel oil, residue oil, HSD, naphtha, hydrogen gas, bio gas, waste gas etc.

Major Clients

**Chemical & Fertiliser**
- L&T for Tata Fertilizer
- KRBHCO - Oswal Chemicals and Fertilizers Ltd.
- Madras Fertilizers Ltd.
- Chambal Chemicals & Fertilizers Ltd.
- Hindustan Fertilizer Corporation Ltd., Dibrugarh
- Egypt Fertilizer Co. Egypt
- Southern Petrochemicals Ind. Corp.
- Matix Fertilizers & Chemicals Ltd.
- Gujarat Narmada Valley Fertilizer Co.

**Refractory & Petrochemical**
- Arabian Petrochemical Co.
- Reliance Petroleum Ltd.
- Gas Authority of India Ltd.

1 unit of 175 TPH, 115 kg/cm²(g), 510°C natural gas, diesel fired boiler
Heat Recovery Steam Generator (HRSG)

Product Features
- Proven design with more than 90 installations
- Natural circulation design for higher reliability
- Single drum construction
- Fully welded construction for quicker start-ups and shutdowns
- Special drum internals which ensure high steam purity
- Gas tight internally insulated ducting and casing
- Fully drainable superheater for higher reliability
- Strategic soot blowing for oil firing
- Firing gases and #2 oil in the duct burner
- Modular construction
- Highest reliability in spite of slow burning

Operating Range
- Capacity: Gas turbine size of 320 MW
- Pressure: Up to 160 kg/cm²(g)
- Temperature: Up to 566°C
- Fuels: Natural gas/ naphtha / HSD / kerosene / refinery fuel gas etc.

Boiler-Turbine-Generator (BTG) package can be offered on case-to-case basis.

Major Clients

Chemical & Fertiliser
- BASF PETRONAS Chemicals Sdn Bhd, Malaysia
- Rashtriya Chemicals and Fertilizers Ltd., (RCF)
- KRBHCO - Oswal Chemicals and Fertilizers Ltd.
- Chambal Fertilisers and Chemicals Ltd.

Power
- Aban Power Ltd.
- Internusa A/c Bekasi Power, Indonesia
- Essar Power A/c Vadinar Power Co. Ltd.
- Lanco Infratech Ltd.

Refinery & Petrochemical
- Daelim for Numaligarh Refinery
- Reliance Petrochemicals Ltd.
- Petroleum Development Oman (PDO), Oman
- Emirates National Oil Company (ENOC), Dubai
- Dangote Oil Refining Company, Nigeria
- Abener for Hassi R’mel project, Algeria
- Jacobs Netherlands BV For Schoonebeek Oilfield Redevelopment Project, Netherlands
- Bharat Petroleum Corporation Ltd.
- ONGC Mangalore Petrochemicals Ltd.

1 unit of 405 TPH, 83 kg/cm²(g), 310°C natural gas, associated gas + FAF fired boiler
Blast Furnace Gas / Lean Gas Fired Boilers

Product Features
- Reliable design for combustion of low calorific value
- Auto switch over to oil firing in case of interruption in BFG supply
- Safe operation of boiler under varying load conditions
- Low volumetric heat release rate with larger boiler furnace
- Scroll burner for high mixing energy of air and BFG for efficient combustion
- Safety interlocks to ensure proper burning of BFG without support fuel

Operating Range
- Capacity: Upto 500 TPH
- Pressure: Upto 100 kg/cm²(g)
- Temperature: Upto 560°C
- Fuels: Blast furnace gas, coke oven gas, corex gas, LD gas, other lean gases etc.

Boiler-Turbine-Generator (BTG) package can be offered on case-to-case basis.

Major Clients
Steel
- Tata Iron & Steel Co. Ltd.
- Jindal Vijaynagar Steels Ltd., Bellary
- Kalyani Steels Ltd., Hospet
- Nagpur Alloys and Castings Ltd., Raipur
- Kirloskar Ferrous Industries Ltd., Hospet
- Steel Authority of India Ltd., Rourkela
- National Mineral Dev. Corp. Ltd.
- Bhushan Power & Steel Ltd.
- Rashtriya Ispat Nigam Ltd.

3 units of 220 TPH, 109 kg/cm²(g), 540°C syngas, natural gas fired BFG, COG, LDG, LDO fired blast furnace gas boilers
Waste Gas Fired Boiler (CO/H₂)

Waste gas fired boilers are designed to burn waste gas / tail gases to generate steam for process or power. Typical systems include:
- Carbon Black Plants (CO Gas)
- Ferro Alloy Plants (CO Gas)
- Caustic Soda Plants (H₂ Gas)

### Salient Features
- Natural circulation design
- Fire tube or water tube boilers
- Special refractory lined combustor for burning lean gas
- Adequately sized combustor for proper residence time to ensure complete burning of gas
- Membrane wall water tube construction to minimize refractory and increase radiant heat transfer
- Control systems to ensure complete combustion of lean gas

### Operating Range
- Capacity: Upto 250 TPH
- Pressure: Upto 100 kg/cm²(g)
- Temperature: Upto 540°C

### Major Clients
#### Chemical
- Hi-Tech Carbon Ltd.
- Philips Carbon Black Ltd.
- Continental Carbon
- Cabot Corporation
- Thai Carbon Black
- Birla Carbon
- BA Energy, Canada
- Himadri Chemicals & Industries Ltd.
- Goodluck Carbon Pvt. Ltd.

#### Refinery & Petrochemical
- Abu Dhabi Oil Refining Company (Takreer)
- Saudi Elastomers Project, Saudi Arabia

1 unit of 100 TPH, 46 kg/cm²(g), 375°C CO fired waste gas boiler
Exhaust Gas Boiler (EGB)

Salient Features
An exhaust gas boiler recovers heat from the flue gases of genset to produce steam, hot water or thermic fluid for various heating / cooling applications.

Key features of our offering:
- Enhance system efficiency in genset based power plants upto 10%
- Available in configurations of water tube and smoke tube type
- Expertise to integrate with all makes of engines

Applications
- Auxiliary oil heating, tank farm heating, line tracing
- Process heating
- Combined cycle
- Steam / hot water for industrial chilling
- Power generation

Operating Range
- EGB installed on 0.5 MW to 50 MW genset installations
- 2 stroke and 4 stroke engines
- Light oil, heavy oil and gas fired engines

Major Clients
Steel
- Abul Khair Steel & Power, Bangladesh
- Ispat Metallics Ltd.
- Jindal Alloy & Steel Company Ltd.
- Bhushan Steel Ltd.

Textile
- Alok Industries Ltd.
- Garden Silk Mills Ltd.
- Jindal Polyester Ltd.
- Indian Rayon Corp. Ltd.
- National Rayon Corporation Ltd.
- Rajasthan Spinning & Weaving Mills Ltd.
- Rajshree Polifils Ltd.
- Recron Synthetics Ltd.
- Indorama Synthetics Ltd.
- SRF Ltd.

6 units of 3.4 TPH (6 mw Wartsila Engine) at 10.5 kg/cm²(g)
Waste Heat Recovery Units (WHRU)

WHRUs are engineered to recover waste heat from the exhaust of gas turbines or reciprocating engines, heating media could be water glycol mixture or thermal oil or water depending on the application. These units are installed on:

- Offshore platforms
- Floating Production Storage and Offloading Vessels (FPSOs)
- LNG tanker
- Onshore terminals and gas processing plants

This offers special features such as:

- Compact space saving design
- Integral by pass facility
- On line isolation of WHRU
- Single stack option
- Removable tube bundle
- Optimum gas side pressure loss
- Supplementary fired units - with FAF
  - without FAF

There are over 100 installations for the upstream oil & gas segment. These units are working in very diverse locations such as Sakhalin island, Asian offshore waters, North Sea, Africa offshore & the Americas.

Major Clients

**FPSO**
- Bumi Armada, Malaysia A/c ENI, Italy- Block 15/6 FPSO, Angola
- Nigerian National Petroleum Corporation (NNPC)- Chevron, Agbami FPSO, Nigeria
- Petrobras America Inc., P43, P48, P51 & P52, Brazil
- MODEC Inc., Singapore A/c Petrobras America Inc, MV 27 Caroica, Brazil
- BP Exploration, BP / KBR Block
- Maersk-- Husky Oil Co.
- Shell Bonga
- BW Offshore, Norway A/c Petrobras America Inc, Chinook & Cascade, Brazil offshore

**Offshore**
- Unocal Thailand Ltd. Pailin Offshore Thailand
- PTT Thailand, Offshore.Bongot, Thailand
- Essar Offshore A/c ONGC, Neelam Heera Platform, India
- B.P Exploration, Offshore UK North Sea
- Samsung A/c CTOC Cakerawala Project Offshore Thailand/Malaysia
- NPCC Technip A/c ADMA OPCO- Umm Al Lulu Offshore Abu Dhabi

**Onshore**
- Siemens, UK A/c Buurillus Gas Co. Egypt
- Petrofac A/c Hayan Petroleum Company, Jihar Onshore Syria
- Hyundai A/c Abu Dhabi Marine Operating Company (ADMA-OPCO) Satah Al Razboot (SARB), UAE

5 units of 36.19 mw waste heat recovery unit
WHRB in Sponge Iron Plant

Thermax is pioneer in supplying waste heat recovery boilers for sponge iron plants and has around 471 installations. The boilers are designed to handle large amounts of dust from the flue gas generated in the rotary kilns. The steam generated from these boilers is typically used for power generation.

- Pioneer in waste heat recovery in sponge iron plant
- More than 150 installations
- Design takes into account high dust in gases
- Horizontal design on 100 TPD DRI kiln for greater operational comfort
- Vertical design for 100 TPD, 200 TPD, 350 TPD, 500 TPD and 650 TPD

Salient Features

- Natural circulation water tube design
- Gas tight side wall of water wall construction

Operating Range

WHRB on 100 TPD, 200 TPD, 350 TPD, 500 TPD, 650 TPD

- Pressure: From 44 kg/cm²(g) up to 115 kg/cm²(g)
- Temperature: Upto 540°C

Boiler-Turbine-Generator (BTG) package can be offered on case-to-case basis.

Major Clients

Steel

- Jindal Steel & Power Ltd.
- Bhushan Power & Steel Ltd.
- Bhushan Steel & Strips Ltd.
- Tata Sponge Iron Ltd.
- BMM Ispat
- Ispat Godavari Ltd.
- Shree Metallics Ltd.
- Singhal Enterprises
- Janaki Corporation Ltd.
- Tata Metalliks
- Super Smelters
- Gallant Ispat
- Rungta Mines Ltd.
- Bisetoon Steel Company, Iran
- Shakambhari Ispat & Power Ltd.

5 units x 32 TPH at 35 kg/cm²(g), 380°C WHRB in Sponge Iron Plant
WHRB in Non-Ferrous Industry

- Waste heat boiler on **zinc pyrite roasters**
- Waste heat boiler on **copper smelters**
- Waste heat boiler on the **copper convertors**

In non-ferrous industry it is common practice to have a boiler operating at high pressure but without superheat. This facilitates the operation of the boiler well above the dew point of the gases.

**Salient Features**

- Forced circulation water tube design
- Gas tight side wall of water wall design
- Wide pitched in-line geometry to prevent choking
- On-line hammering system
- Baffles to prevent channeling of gases
- Provision of cavity followed by variable pitch convection coils

**Operating Range**

- **Capacity**: 10 TPH to 100 TPH
- **Pressure**: 45 - 60 kg/cm²(g)
- **Temperature**: Upto 400°C

**WHRB for 300 TPD Copper Convertor Unit to produce 21 TPH of steam at 45 kg/cm²(g) at saturation temperature**

**Major Clients**

**Non Ferrous**

- Birla Copper
- Cominco Binani Zinc Ltd.
- Hindustan Copper Ltd.
- Pyrites Phosphates & Chemicals Ltd.
WHRB in Coke Oven / Coke Dry Quenching Plant

- Pioneer in waste heat recovery in coke oven plant
- Water wall panel construction in 1st / 2nd pass
- Site / port assembly with modularized construction
- Horizontal / vertical design
- Optional blast furnace firing capability
- Natural / forced circulation design for coke dry quenching plant

Application
- Non recovery coke oven plant
- Recovery type coke dry quenching plant

Operating Range
- Capacity : Upto 150 TPH
- Pressure : Upto 120 kg/cm²(g)
- Temperature : Upto 540°C

Boiler-Turbine-Generator (BTG) package can be offered on case-to-case basis.

Major Clients

Steel
- Hoogly Met coke & Iron Ltd. (Tata Power)
- Jindal Steel & Power Ltd.
- Bhushan Power & Steel Ltd.
- Konark Met coke Ltd. (Neeanchal Ispat Ltd.)
- Electrosteel Casting Ltd.
- Global Coke Ltd.
- Lanco Industries Ltd.
- Tata Steel Ltd.
- Steel Authority of India Ltd.
- National Mineral Dev. Corp. Ltd.
- Sesa Goa Ltd.
- Global Coke Ltd.
- Electrosteel Casting

Refinery & Petrochem
- Petroleum Development Oman (PDO)

12 units of 24.5 TPH, 96 kg/cm²(g), 540°C WHRB in coke oven plant
3 units of 25TPH, 66 kg/cm²(g), 500°C WHRB in coke dry quenching plant
WHRB for Coal Gasification

Thermax is a leading manufacturer in the field of waste heat recovery boilers for coal gasification. The steam generated from these boilers is typically used either for power generation or process.

Product Features
- Pioneer in waste heat recovery in coal gasification plant
- Hammering arrangement for effective cleaning of heat transfer surface
- Water wall panel construction
- Site / port assembly with modularized constructions
- Horizontal design
- Natural circulation design

Operating Range
- Capacity : Upto 200 TPH
- Pressure : Upto 130 Kg/cm²(g)
- Temperature : Saturated to 540°C

Major Clients
- Jindal Steel & Power Ltd, Barbil

2 units of 15 TPH, 60 kg /cm²(g) 500°C WHRB in coal gasification
WHRB for Coke Calcination

Thermax is a leading manufacturer in the field of waste heat recovery boilers for coke calcination plants. The steam generated from these boilers is typically used either for power generation or process.

Product Features

- Pioneer in waste heat recovery in coke calcination plant
- Soot blowing arrangement for proper operation
- Water wall panel construction in 1<sup>st</sup> / 2<sup>nd</sup> pass
- Site / port assembly with modularized constructions
- Horizontal / vertical design

Operating Range

- Capacity: Upto 200 TPH
- Pressure: Upto 130 Kg/cm²(g)
- Temperature: Saturated to 540°C

Major Clients

- One of the esteemed installation in UAE

2 units of 94.12 TPH, 42.1 kg/cm²(g), 381°C WHRB in coke calcination
WHRB in Refinery & Petrochemical Plant

Fluid Catalytic Cracking Unit (FCCU)
- Waste heat recovery boiler downstream of FCCU
- One of the world’s largest WHRB designed and supplied to Reliance Industries Ltd. India
- Experience in handling very large volume of flue gases e.g. normal operating conditions of 515,000 Nm³/hr at 731°C containing catalytic dust
- Two different technologies are available
  - Directly downstream of FCCU
  - ‘CO’ gas boiler downstream of FCCU

Salient Features
- Designed to take care of carry-over catalytic dust
- Complete membrane panel construction to take care of sulphur dew point
- Soot blowers at suitable locations to take care of dust laden gases
- Vibration arrestors provided to prevent tube vibration and consequent failures
- Natural circulation design
- Fully drainable design of superheater
- Co-current and drainable economizer

Operating Range
- Capacity: Up to 400 TPH
- Pressure: Up to 100 kg/cm²(g)
- Temperature: Up to 540°C

Major Clients
- Reliance Industries Ltd.
- Indian Oil Corporation Ltd.
- Hindustan Petroleum Corporation Ltd.
- Mangalore Refinery & Petrochemicals Ltd.
- HPCL - Mittal Energy Ltd. (HMEL)
- Algiers Refinery, Algeria
- Saudi Aramco Mobil Refinery Limited (SAMREF), Saudi Arabia
- Bharat Petroleum Corporation Ltd.
- Dangote Oil Refining Company, Nigeria

1 unit of 103 TPH, 43 kg/cm²(g), 400°C WHRB in Refinery & Petrochemical Plant
WAST HEAT RECOVERY BOILER

WHRB in Cement Plant

Cement manufacturing is a highly energy-intensive process. Given the fragile and dynamic nature of the fuel and power situation faced by cement plants today, it makes sense for them to adopt waste heat recovery based solution for the following reasons:

- Greater energy security (helps meet up to 35% of power requirement)
- Improved competitive positioning
- Regulatory push (Policies mandating use of minimum 5-10% renewable/WHR energy are already in place in several states)
- Thermax along with technical assistance from M/s Taiheiyo Engineering Corp. (Japan) offers this world-class solution for cement industry

Operating Range

- Capacity: 1,800 TPD to 10,000 TPD of clinker production

Salient Features

a. Waste heat recovery boiler for pre-heater and calciner
   - Vertical/horizontal boiler with natural / forced circulation
   - Inline/Staggered heat transfer area
   - Fully field proven de-dusting hammering mechanism

b. Waste heat recovery boiler for clinker cooler (with and without center tap off)
   - Vertical boiler with horizontal tubes
   - Proven design for highly abrasive AQC gases
   - Natural circulation boilers

Generating 72 TPH at 17 kg/cm² (g), 325°C WHRB in Cement Plant

Major Clients

- Cement
  - Dhar Cement Ltd.
  - JK Cement Ltd.
  - JK Laksmi Cement Ltd.
  - Wonder Cement Ltd.
  - Rain Cement Ltd. (Priya Cement)
  - Gujarat Sidhee Cement Ltd.
  - Ultra Tech Cement Ltd.
  - Reliance Cement Company Pvt Ltd.
  - Nuvoco Vistas Corp. Ltd.

Boiler-Turbine-Generator (BTG) package can be offered on case-to-case basis.
WHRB in Chemical Plant

Sulphuric Acid Plant
- Can be offered as fire tube / water tube construction
- Experience in offering flexible / fixed tube sheet design for fire tube boilers
- Experience in handling high gas side operating pressures up to 6000 mmWC (special construction of economizer and superheater is provided)
- Cast iron gilled ring economiser to prevent sulphur corrosion
- Equipment - boiler, superheater, economiser
- Gas outlet temperature control at every equipment is required for efficient conversion of acid gas

Operating Range
- Capacity: 20 TPD to 5000 TPD sulfuric acid production

Nitric Acid / Caprolactum Plants
- Nitric Acid Plants are either low pressure or high-pressure systems
- The type of boiler used is either
  - Natural circulation fire tube
  - Forced circulation water tube
- The NH3 burner is normally included as a part of the unit
- Gas tight construction with stainless steel material
- Heating coils to prevent dew point corrosion
- Wall cooling coils to protect the shell
- Lamont nozzles for uniform distribution of water in the coils

Major Clients

Chemical & Fertiliser
- Hitachi Zosen
- Mitsui Engg. & Shipbuilding Co.
- Sterlite Industries Ltd.
- Hindustan Heavy Chemicals
- Birla Copper
- Indian Explosives Ltd.
- PT. South Pacific Viscose, Indonesia
- Shree Sulphuric Acid Ltd.
- Southern Petrochemical Industries Corp. Ltd.
- Gujarat State Fertiliser
- Bagfas Fertilizer Co., Turkey
- Shivalik Fertilisers Chemicals Ltd.
- Bharat Fertilisers Ltd.
- FACT
- Gujarat State Fertiliser Corp.

Others
- Saudi Arabian Mining Company (Ma'aden)
- Andhra Sugars Ltd.
- Anil Starch Products Ltd.
- Metazinc Ltd.

3 units of 261 TPH, 68 kg/cm²(g), 500° C WHRB in Sulphuric Acid Plant

Ammonia burner with waste heat boiler in Nitric Acid / Caprolactum Plants
WHRB in Sulphur Recovery Plant

Main Reaction Furnace
- WHB downstream of main reaction furnace
- Fire tube boiler
- Experience in designing and supply of boiler where gas inlet temperature is around 1300°C - 1400°C
- Multipass arrangement in same shell of boiler or separate shell with common steam drum
- Steam heated sulphur drains at outlet / intermediate gas chambers
- Experience in design and supply of flexible / fixed tube sheet

Tail Gas Incinerator
- WHB downstream of tail gas incinerator
- Water tube / fire tube design
- Modularised construction
- Experience in supplying superheater made of T22, T91, Incoloy material

Major Clients
Refinery & Petrochem
- Reliance Petroleum Ltd.
- Cochin Refineries Ltd.
- Indian Oil Corporation Ltd.
- Hindustan Petroleum Ltd.
- Bharat Petroleum Corp. Ltd.
- Bahrain Petroleum Co., Bahrain
- Dolphin Energy Ltd., Qatar
- HMEL - HPCL Mittal Energy Ltd.
- Mangalore Refinery & Petrochemicals Ltd.
WHRB in Hydrogen Plant

Reformed Gas / Process Gas Boiler

- Fire tube boiler configuration
- Flexible tube sheet design
- Alloy steel tubes to overcome metal dusting (such as T11, T22, etc.)
- Internal bypass provided with liner to control the gas outlet temperature
- Incoloy ferrules anchored in the inlet tube sheet refractory
- Separate steam drum connected by risers and downcomers
- Heat sensitive paint on the inlet box
- High gas side operating pressures (around 30 Kg/cm²g)

- Gas rich in H₂ / CO / CH₄
- Common steam drum for reformed gas boiler and flue gas boiler

Flue Gas Boiler / Convection Section of Hydrogen Reformer

- Water tube / fire tube type design
- Designed to handle heating of different liquids
- Capacity to design and manufacture high capacity boilers

Operating Range

- Capacity : 30 TPD to 5000 TPD Hydrogen Production

Major Clients

Chemical
- Gujarat Godrej Innovative Chemicals Ltd.
- National Peroxide Ltd.
- Hindustan Petroleum Corporation Ltd.

WHRB in Hydrogen Reformer at HPCL Mumbai
Spent Wash Fired Boiler

“Distillery Waste to Energy”

- Effective solution for power and process steam requirements of distillery
- To meet the zero liquid discharge statutory norm
- Continuous operation of boilers as much as you want without cleaning
- Can fire spentwash with less than 48% solid concentration
- First to introduce concept of 3 pass boiler design
- Potash rich fly ash generates good revenue and also eliminates disposal problem
- Cost optimised design to cater to micro distillery capacity of less than 30 klpd
- Highest number of operating boilers

Boiler-Turbine-Generator (BTG) package can be offered on case-to-case basis.

Major Clients

Sugar
- Bannari Amman Sugars Ltd.
- Nirani Sugars Ltd.
- Indian Sugar Manufacturing Co. Ltd.
- Nandi Sahakari Sakkare Karkhane
- EID Parry Ltd.
- Shivshakti Sugars Ltd.
- Sar Senapati Santaji Ghorpade Sugar Factory Pvt. Ltd.
- Daund Sugar Ltd.
- Shri Ambalika Sugar Pvt. Ltd.
- Godavari Biorefineries Ltd.
- Satish Sugars Ltd.
- Athani Sugars Ltd.
- Krantiagrani Dr. G.D. Bapu Lad SSK
- Kunjir Bioenergy India LLP
- Jaywant Sugars Ltd.
- Venkateshwar Power Project Ltd.
- Karmaveer Shankarrao Kale SSK Ltd.

1 unit of 33 TPH, 44 Kg/cm²(g), 400°C spent wash fired boiler
Municipal Solid Waste / Refuse Derived Fuel Fired Boiler

Designed and Engineered for Excellence
- Successful in-house trials conducted while firing 100% MSW/RDF
- Based on Thermax’s rich experience in firing various biomass, spent wash, paper sludge, RDF, MSW and other industrial wastes
- Specially designed furnace to ensure complete combustion
- Hydraulic ram feeder provided considering fuel size variation
- Our R&D and Innovation team is geared up to continuously improvise the products to high industry standards and deliver ultimate solution to customers

Thermax can offer indigenised sustainable solution as equipment supplier or complete EPC for:
- Combustion systems suitable for RDF or segregated MSW
- Waste to energy boiler confirming to latest SWM firing rules
- Gas cleaning plant in accordance with latest emission norms
- Balance of plant with boiler and steam turbine generator island

Salient Features
- Dedicated resources in design & development of waste to energy solutions based on physical & chemical characteristics of waste
- Single line capacity: 50 – 600 TPD
- Professional design teams use special integrated programs for core equipment design of waste to energy boilers
- Engineering capability for designing gas cleaning plants to meet the stringent local norms
- Capability to handle various types of fuels from agricultural waste to RDF

Major Clients
- Shalivahana (MSW) Green Energy Ltd.
Fired Heater in Chemical & Petrochemical Plant

The Fired Heaters in the Chemical and Petrochemical plants are for

- Heating process fluids
- Thermal cracking

Two types of designs can be offered depending on the application

- Vertical cylindrical
- Box type furnace

Thermax offers high efficiency heaters by incorporating outboard or on board steam generators or air preheaters

Application

Liquid phase heaters for

- Mineral oils / synthetic oils
- Molten salt heaters

Vapour phase heaters for

- Synthetic oil / mineral oil vaporisers
- Hydrocarbon vaporisers

Process industry heaters

- Steam superheaters
- Charge heaters
- Start up heaters

Crackers

- Ethylene di chloride cracker
- Acetic acid cracker
- Gas cracker

Operating Range

- Capacity: Upto 100 MMKcal/hr (Single unit)

Major Clients

**Refinery & Petrochem**
- Chennai Petroleum Corporation Ltd.
- Haldia Petrochemicals Ltd.
- Reliance Industries Ltd.
- Indian Petroleum Corporaton Ltd.
- Southern Petrochemicals Industries Corp.
- Farabi Petrochemicals Ltd, Saudi Arabia

**Chemical**
- Mangalore Chemicals & Fertilisers Ltd.
- Egyptian Propylene & Polypropylene Company (EPPC), Egypt
- Chemplast Sanmar Ltd.
- Finolex Industries Ltd.
- National Peroxide Ltd.
- Pyrites Phosphates & Chemicals Ltd.
- Sudarshan Chemicals Industries
- Tamilnadu Petroproducts Ltd.

**Others**
- Cominco Binani Zinc Ltd.
- Nirma Ltd.

**Textile**
- India Polyfibres Ltd.
- Orissa Synthetics

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2 units of 6.34 MMKcal/hr hot oil heaters

1 unit of 13.5 TPH, 30.5 kg/cm²g, 280°C, out board steam generator on cracking furnace
Fired Heater in an Oil Refining for Refinery Plant

The Fired Heaters in the Chemical and Petrochemical plants are for

- Heating process fluids
- Thermal cracking

Two types of designs can be offered depending on the application

- Vertical cylindrical
- Box type furnace

Application

- Crude distillation unit
- Vacuum distillation unit
- Delayed coker unit
- Fluid catalytic cracker unit (FCCU)
- Diesel hydro desulfurization treatment (DHDT) plants
- Naphtha vaporizers in hydrogen
- Motor spirits quality (MSQ) heaters
- Naphtha splitter unit (NSU)

Operating Range

- Capacity: Upto 100 MMKcal/hr (Single unit)

Major Clients

**Refinery & Petrochem**

- Reliance Industries Ltd.
- Indian Oil Corporation Ltd.
- Bharat Petroleum Corporation Ltd.
- Qatar Petroleum
- Bharat Oman Refinery Ltd.
- Shell Inc., Gabon (West Africa)
- Mangalore Refinery & Petrochemicals Ltd.
- HPCL Mittal Energy Ltd.
- PDO, Lekhwair Project, Oman
- Hindustan Petroleum Corporation Ltd.
- Lekhwair Project, PDO Oman
- Kuwait Oil Corporation
- Gas Authority of India Ltd.
- Dangote Oil Refining Company, Nigeria

2 units of 17.22 MMKcal/hr box type heater for Delayed Coker Unit (DCU)
Services Business

Strategic Business unit exclusively addressing Services Business of Thermax Boiler & Heater group, has been successfully addressing plant renovation & modernization concerns since the early 1990s. The R&M approach, that tailors technology and experience based solutions for boiler users, have benefitted more than 200 customers around the world. Today, these solutions are at work boosting process efficiencies across a diverse spectrum of industries that include among others, power utilities, petrochemicals, refineries, fertilizers, steel, cement, sugar and paper.

- Provides one-stop solutions to all kinds and makes of boilers and fired heaters
- Undertake performance improvement and revamping projects, engineering & feasibility studies, energy audits, annual service and maintenance contracts, spares, condition assessment & remaining life assessment studies, O&M services, etc.
- Dedicated construction management team to provide total turnkey solutions
- Having staff strength of 90 including personnel from marketing, process and detail engineering, project management, procurement, QAC, field services, commissioning and post sales services
- Country wise local partners for Middle East, South East Asia, North Africa, selective markets in Latin America & Europe.

Plant Improvement Projects

- Engineering studies
- Efficiency improvement
- De-Bottlenecking of boiler operation / performance
- Fuel conversion / retrofits & firing system upgrades
- Upgrades emission control / reduction
- Technology upgrades
- Plant relocation
- Services for upgrades / conversions
- Replacement in Kind / refurbishment

Major Clients

Chemical & Fertiliser
- Columbia Carbon, Spain
- Alexandria Carbon Black, Egypt
- Thai Carbon, Thailand
- Egyptian Propylene & Polypropylene Co., Egypt
- Indorama Thailand
- EDFU, Egypt
- Matix Fertilizers, West Bengal
- Madras Fertilizer Ltd, Chennai
- Chambal Fertilisers Ltd, Kota
- Gujarat Narmada Valley Fertilizers, Gujarat
- IFFCO, Kalol, Phulpur
- National Fertilizer Ltd, Panipat, Bathinda, Nangal
- Zuari Agro, Goa
- Deepak Fertilizers & Petrochemicals Corporation
- Rashtriya Chemicals & Fertilizers (RCF)

Others
- Maruti Udyog Ltd, Haryana
- Nestle, Thailand, Philippines and Ivory Coast
- Airliquide, Thailand
- PT Gunanusa, Indonesia
- Foster Wheeler, U.K
- URC Philippines
- Ultratech Cement Ltd, Rajasthan
- Indian Navy
- National Thermal Power Corporation
Plant Services
- Annual inspection contracts
- Annual maintenance contracts
- Proactive expert visits
- Breakdown services - tube failure analysis
- Operation & Maintenance contract of boilers

Spares
- Pressure parts
- Air Pre heater – tubes & tube sheets
- Burners
- Branded / Patented fuel firing equipment like stoker, feeders, mechanical spreaders, pneumatic spreaders, bubble caps, air nozzles
- Spares for rotating equipment
- Electrical & Instrumentation items spares
- Miscellaneous spares for piping and IBR fittings, control valves, process valves, safety valves, motorized valves, dampers, bellows & supports

Condition Assessment and Remaining Life Analysis (CA&RLA) Studies
- RLA of boiler pressure parts is undertaken to verify their present condition and find out their remaining life. RLA tool is effectively employed not only to know condition of pressure parts but corroborate with boiler operation for reliability & improvement purposes.
- In RLA multiple non-destructive and metallurgical tests are done for accurate measurement of thickness, dimensions and finding any anomalies which includes erosion, corrosion, cracks, bulging etc.

Major Clients
**Refinery & Petrochem**
- Petronas Gas Berhard, Malaysia
- Petrokemya, Saudi Arabia
- Orpic - Sohar Refinery, Oman
- Gulf Petrochemicals Industries, Bahrain
- SAPREF, South Africa
- Reliance Industries Ltd, Jamnagar, Dahej, Hazira
- Reliance Industries Ltd, Vadodara, Nagothane
- Hindustan Petroleum Corporation Ltd, Mumbai
- Bharat Petroleum Corporation Ltd, Mumbai & Kochi
- Chennai Petroleum Corporation Ltd, Chennai
- Manglore Refinery & Petrochemicals Ltd, Manglore
- Indian Oil Corporation Ltd, Vadodara, Barauni & Bongaigaon
- Essar Oil, Vadinar
- Dolphin, Qatar
- Malaysia LNG Sdn Bhd
- Takreer Abu Dhabi Refinery

**Sugar**
- Mitrophol Thailand
- Cristalla Sugar Thailand

**Steel**
- Jindal Steel & Power Ltd.
- Vedanta Ltd, Goa
- Tata Steel Ltd, Jamshedpur
Thermax Business Portfolio

- Heating
- Cooling
- Power
- Air Pollution Control
- Chemicals
- Water and Wastewater Solutions
- Solar
- Specialised Services

This brochure presents only some of our products and we reserve the right to amend any product details without notice. The photographs used in the brochure are indicative and may not match the actual plant.

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