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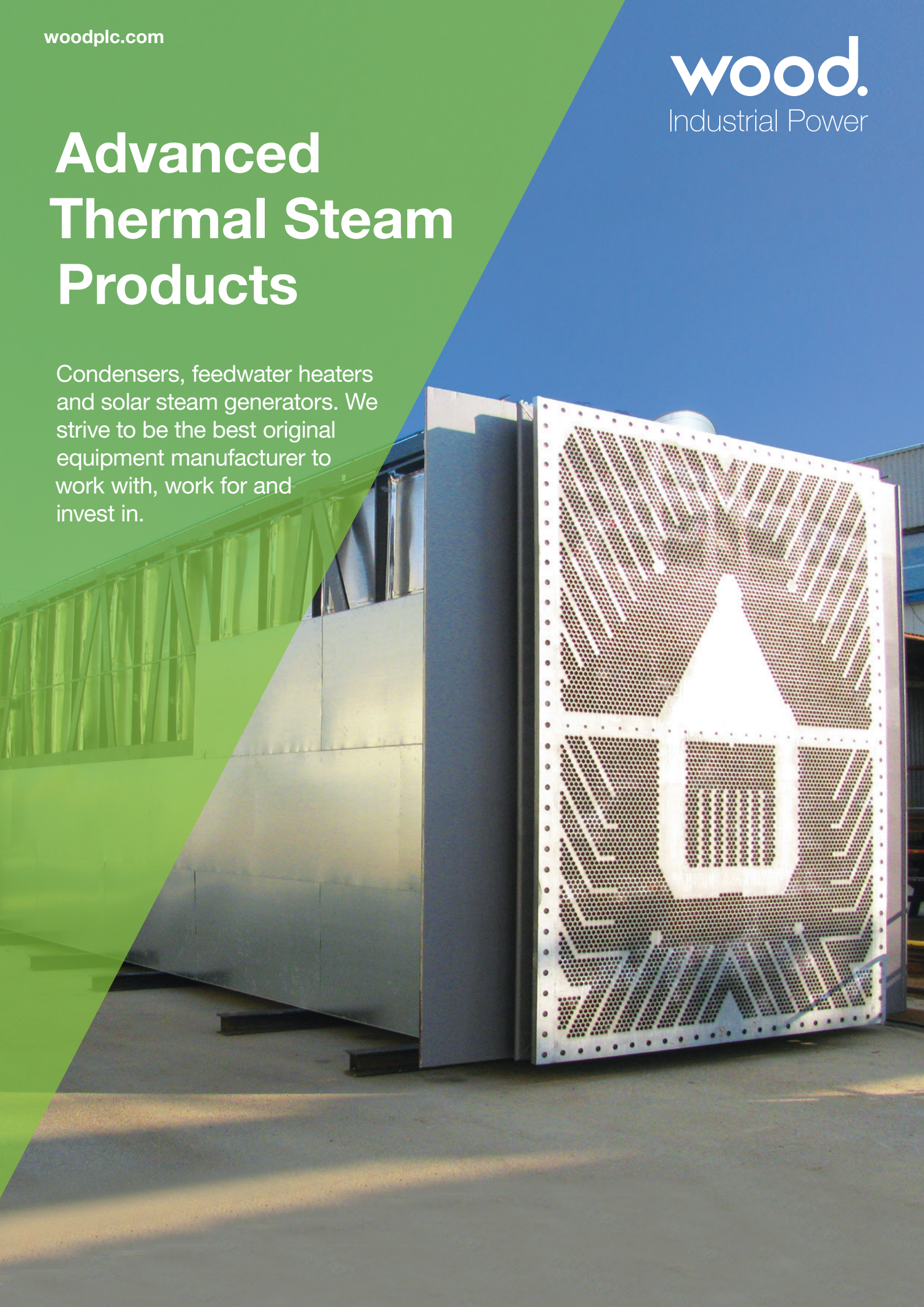
wood.
Industrial Power

Advanced Thermal Steam Products

Condensers, feedwater heaters and solar steam generators. We strive to be the best original equipment manufacturer to work with, work for and invest in.



Highly reliable and technically advanced thermal products

Wood Industrial Power has been designing and manufacturing feedwater heaters and steam condensers for over 125 years. In fact, feedwater heaters and steam condensers were the very first products offered by our company when it was founded in 1884 in New York, USA, as the “Wheeler Condenser & Engineering Company. Today, you can find our steam condensers and feedwater heaters in nuclear, combined cycle, and fossil steam power plants, as well as, industrial plants all over the world.

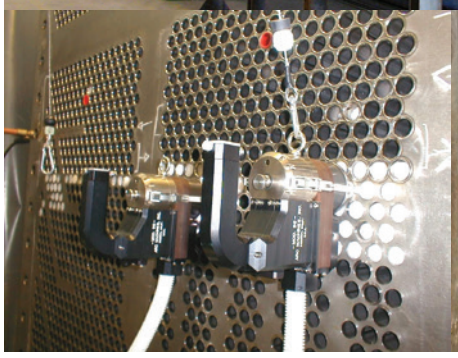
In the early 70’s, well before solar power became mainstream, we worked with the US Department of Energy to design and develop the very first concentrated thermal solar power plants. Since then we have supplied solar steam generating equipment for most of the utility-scale thermal solar projects in the world, totally over 50 projects. Today, in addition to offering individual steam cycle thermal components like: feedwater heaters, preheaters, evaporators, superheaters, reheaters and condensers, we also offer the entire steam generating island on a turn-key basis for both parabolic trough and tower solar thermal power plants.

Our thermal products have a track record and reputation of being well designed, highly reliable and competitively priced.

FOSTER WHEELER

High quality
Wood Industrial Power Condensers

A time-tested, proven product



Experience highlights

- Proven more than 300 condensers
- Operating at combined cycle, Biomass, oil/gas, nuclear and fossil steam power plants worldwide
- Water and air cooled
- Ranging from 10-1600MWe
- Rectangular single, double or triple shell designs
- One or two passes
- Single, double, or triple pressure zones
- Down flow, axial flow or side inlet design
- 10-12 months D&S delivery
- Available for all types of steam turbine

REFERENCE PROJECTS

Pagbilao Power Plant

Start-up Year:	2018
Customer:	Daelim Engineering & Construction
Location:	Quezon, Philippines
Plant Capacity:	420 MWe
Plant Type:	Tandem Compound
Condenser Type:	Downflow

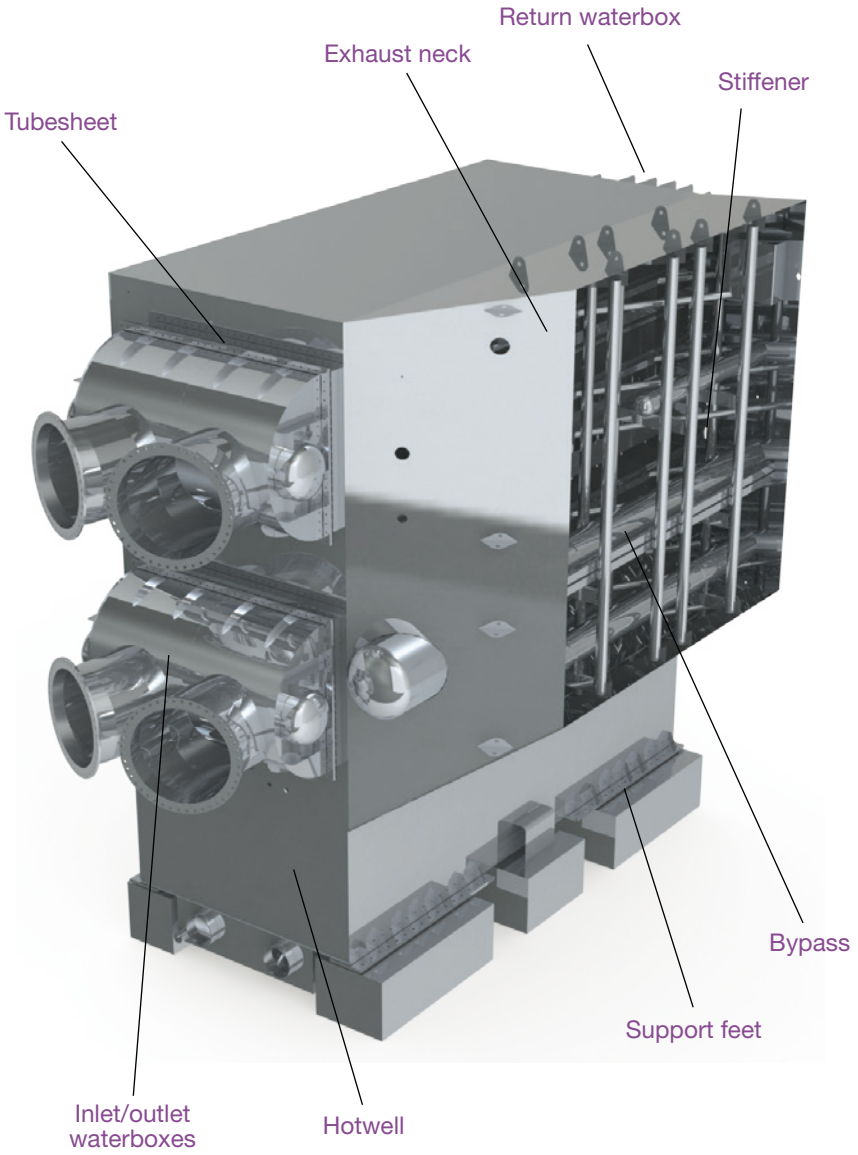
Mae Moh Power Plant

Start-up Year:	2017
Customer:	Alstom Power Systems SA
Location:	Mae Moh, Thailand
Plant Capacity:	600 MWe
Plant Type:	Cogen
Condenser Type:	Downflow

Soyo

Start-up Year:	2017
Customer:	GE Energy Product France
Location:	Angola
Plant Capacity:	2 x 100 MWe
Plant Type:	Combined cycle
Condenser Type:	Axial flow

Axial Flow Condensers

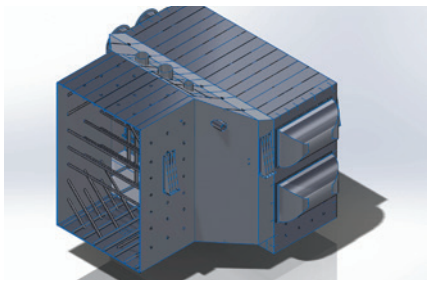


Design features

- State-of-the-art axial flow condensers with optimized inlet steam distribution
- Reliable stainless steel expansion joints for flexible steam turbine connection
- Compact design for easy installation
- Common turbine/condenser support system for flanged transition piece
- Staggered tubebundle design for efficient heat transfer
- Advanced deaeration system minimizes outlet condensate oxygen level
- Fog spray protects the turbine from reverse steam

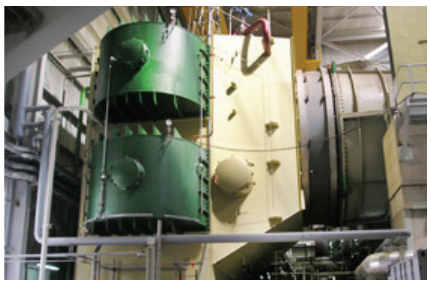
Our axial flow condenser designs minimize foundation size and installation costs.

REFERENCE PROJECTS



Bouchain

Start up Year:	2016
Customer:	GE Energy Product France
Location:	France
Plant Capacity:	510 MWe
Plant Type:	Combined cycle
Condenser Type:	Axial flow



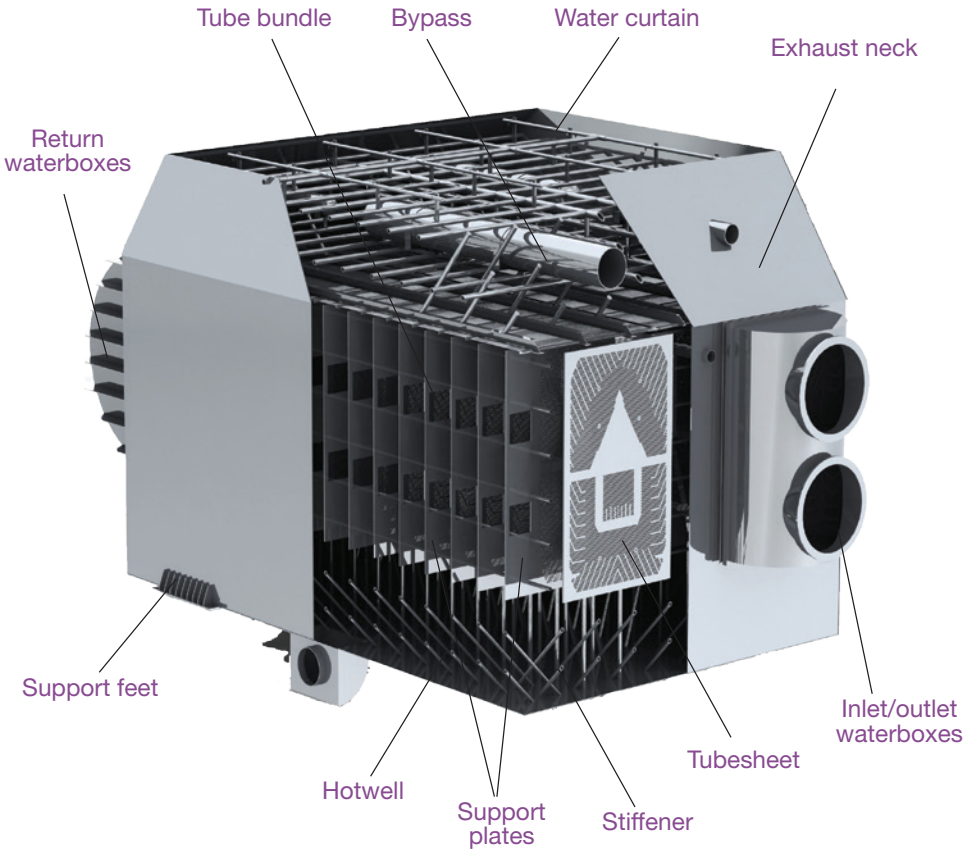
Bremen

Start up Year:	2015
Customer:	Cobra
Location:	Germany
Plant Capacity:	400 MWe
Plant Type:	Combined cycle
Condenser Type:	Axial flow

Siddhirganj

Start up Year:	2015
Customer:	Isolux Corsan
Location:	Bangladesh
Plant Capacity:	340 MWe
Plant Type:	Combined cycle
Condenser Type:	Axial flow

Downflow Condensers

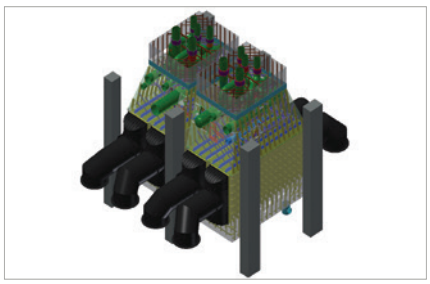


Design features

- Simple design results in competitive pricing and high availability over a long and predictable service life
- Mechanically designed for flexible thermal expansion and minimum obstruction in steam path
- Turbine and condenser centerline maintained to prevent turbine damage
- Full size tube support plates prevent destructive tube vibration
- Staggered tubebundle pattern minimizes pressure drop, while maximizing heat transfer
- Stainless steel, rubber or spring-supported expansion joints offered for design flexibility
- Hydraulic or conventional tube expansion assures leak-proof tube joints

Wood Industrial Power has the most experience in steam surface condensers for all applications. For nuclear plants we have installations in boiling water and pressurized reactors, as well as Candu designs. For thermal plants we have applications in subcritical and supercritical steam plants, and combined cycle plants.

REFERENCE PROJECTS



Shuqaiq

Start-up Year:	2017
Customer:	Hyundai Heavy Industries Co. Ltd.
Location:	Shuqaia, Saudi Arabia
Plant Capacity:	4 x 660 MWe
Plant Type:	Combined Cycle
Condenser Type:	Downflow

Yanbu Power Plant

Start-up Year:	2015
Customer:	Althouki & Acwa
Location:	Yanbu, Saudi Arabia
Plant Capacity:	5 x 620 MWe
Plant Type:	Supercritical
Condenser Type:	Downflow

Vung Ang

Start-up Year:	2012
Customer:	Lilama Corporation
Location:	Vun Ang, Vietnam
Plant Capacity:	2 x 600 MWe
Plant Type:	Subcritical PC Power Plant
Condenser Type:	Downflow

Circular Condensers

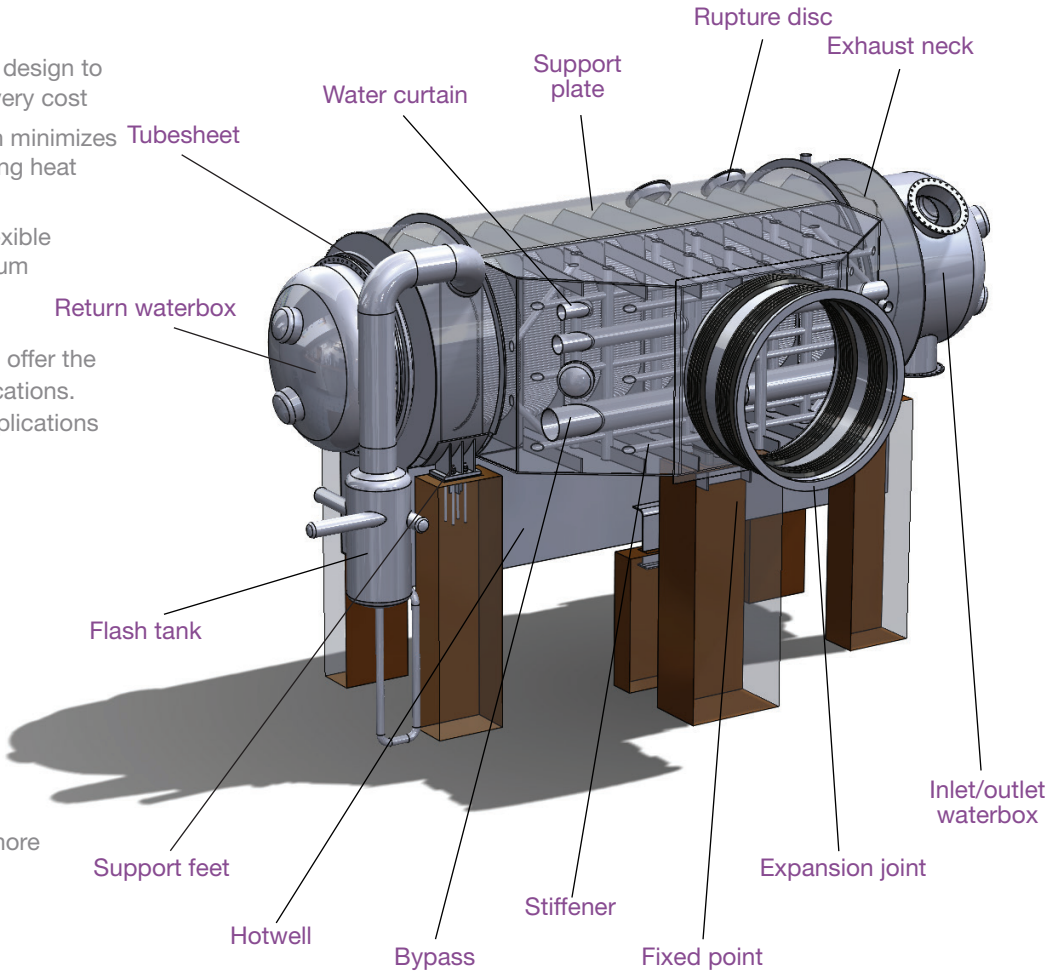
For thermal power, solar, industrial and cogeneration plant applications

Design features

- Fully assembled and modular design to reduce erection time and delivery cost
- Staggered tubebundle pattern minimizes pressure drop, while maximizing heat transfer
- Mechanically designed for flexible thermal expansion and minimum obstruction in steam path

Our compact circular condensers offer the best economics for smaller applications. They bring high value in many applications and sectors:

- Combined cycle
- Cogeneration
- Solar
- Waste-to-energy biomass
- District heating
- Desalination
- Chemical
- Petrochemical
- Refineries
- Cargo ships and vessels
- Floating production and off-shore platforms
- Sugar mills and steel mills
- Mining and metallurgy



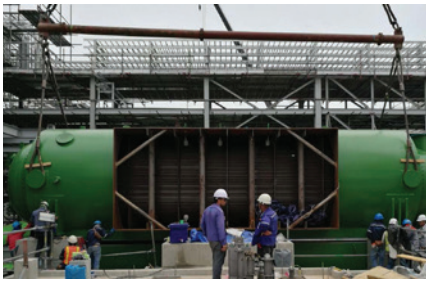
REFERENCE PROJECTS

SPP Gulf

Start-up Year:	2017-2019
Customer:	GE Oil & Gas
Location:	Rayong, Thailand
Plant Capacity:	95 MWe
Plant Type:	Cogeneration Combined Cyc
Condenser Type:	Circular flow

Cleco

Start-up Year:	2018
Customer:	Cleco Corporation
Location:	Louisisana, USA
Plant Capacity:	46 MWe
Plant Type:	Industrial plant
Condenser Type:	Circular flow



Klongluang

Start-up Year:	2017-2019
Customer:	GE OIL&GAS
Location:	Klongluang, Thailand
Capacity:	95 MWe
Plant Type:	Cogeneration Combined Cycle
Condenser Type:	Circular flow

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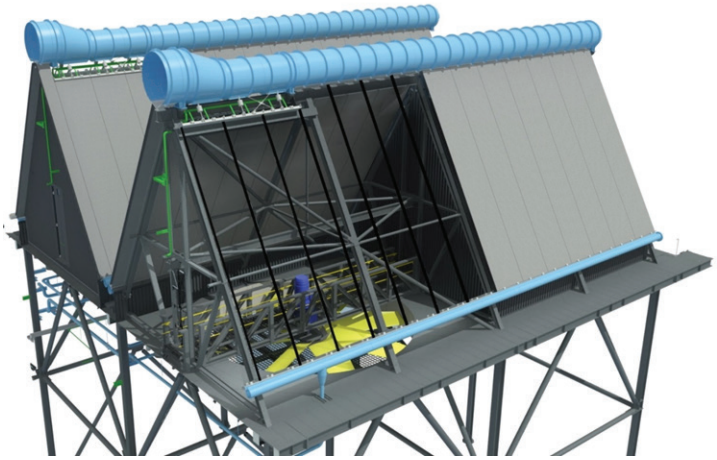
Air Cooled Condensers

Design features

- Project-specific design to satisfy thermodynamic objectives
- Special plant integration (limiting dimensions)
- Optimized for a plant performance and integration
- Diffusor for optimal re-gain of static pressure
- In-line pressure balanced expansion joint for short main ducts
- Integral platform for multiple units in parallel
- Minimal condensate sub-cooling
- Integral thermal make-up water deaerator
- Correction measures against high cross-wind conditions
- Easy and fully automatic operation
- Efficient, reliable and safety operation
- Ranging from 10-1000MWe



Our product is unique regarding smart design, careful system integration, rate of non-conformances and system performance.

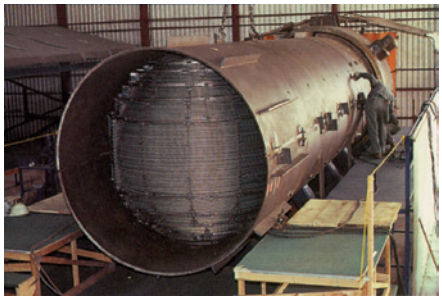
Heat Exchangers

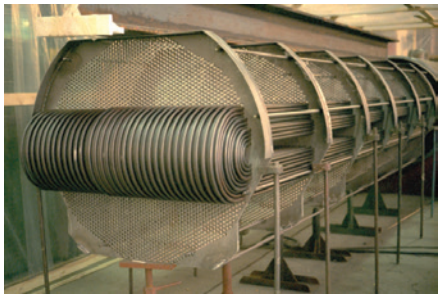
For all plants applications

Wood engineering expertise in design and manufacture of Heat Exchangers. Heat Exchangers. Detailed flow stream analysis (including process chemical elements) with finite element stress and vibration analysis are supported by the applicable codes.

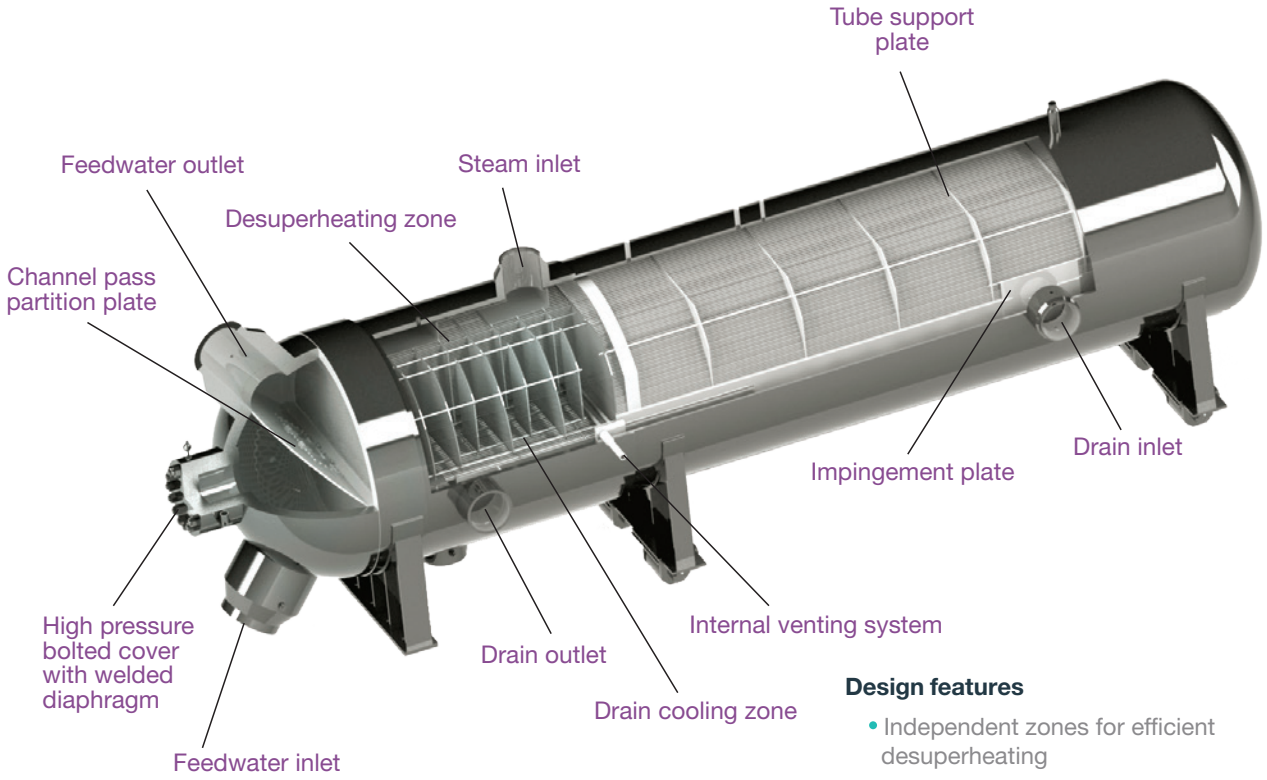
Design features

- Full rage of equipment such as: Moisture Separator reheater, Shutdown cooler for nuclear generating station, economizer for solar power plant...





Horizontal Feedwater Heaters



Design features

- Independent zones for efficient desuperheating
- Conservative tube spacing and baffle configuration for peak performance
- Liberal sub-cooling zone entrance areas to prevent flashing of saturated water
- Internal, centrally located venting arrangement provides postive venting in condensing zone
- Hydraulic or conventional tube expansion ensures leak-proof tube joints

REFERENCE PROJECTS

Mae Moh Power Plant

Start-up Year:	2017
Customer:	Alstom Power Systems SA
Location:	Mae Moh, Thailand
Plant Capacity:	600 MWe
Plant Type:	Cogen
FWH Type:	Horizontal
Scope:	Design and supply of 3 HP feedwater heaters

Yanbu Power Plant

Start-up Year:	2015
Customer:	Althouki & Acwa
Location:	Yanbu, Saudi Arabia
Plant Capacity:	5 x 620 MWe
Plant Type:	Supercritical
FWH Type:	Horizontal
Scope:	Design and supply of 15 LP and 15 HP feedwater heaters

Hassyan

Start-up Year:	2018
Customer:	Alstom Power Systems SA
Location:	United Arab Emirates
Capacity:	4 x 600 MWe
Plant Type:	Supercritical plan
FWH Type:	Horizontal
Scope:	Design and supply of 16 HP feedwater heaters

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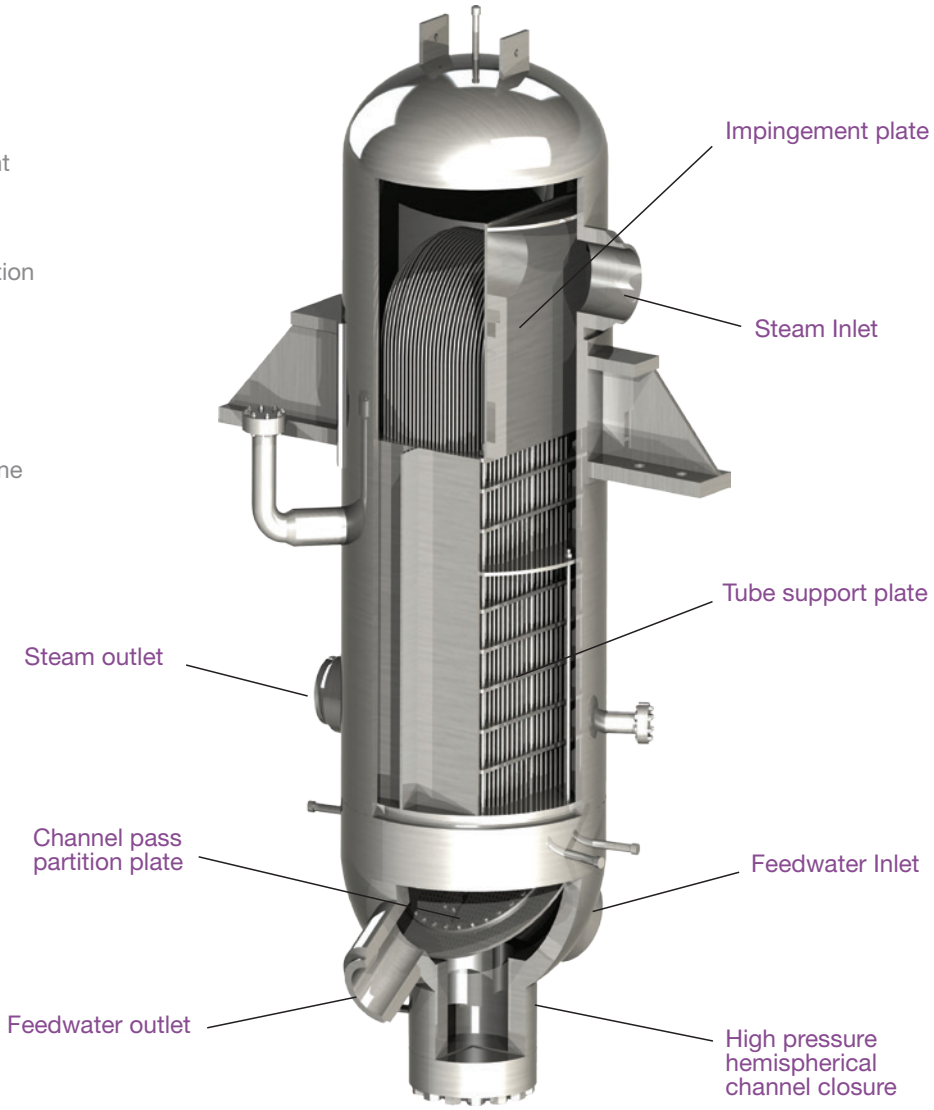
Vertical Feedwater Heaters

Design features

- Vertical design minimizes foot print
- Generous manways allow easy maintenance
- Three zone design provides isolation between desuperheating and subcooling zones
- Desuperheater design can be customized to meet application requirements
- Self venting gravity subcooling zone



REFERENCE PROJECTS

C.T. Mejillones

Start-up Year:	2010
Customer:	Central Térmica Mejillones S.A.
Location:	Mejillones, Chile
Plant Capacity:	2 x 165 MWe
Plant Type:	CFB power plant
FWH Type:	Vertical
Scope:	Design and supply of 8 LP and 6 HP feedwater heaters

C.T. Alcudia

Start up year:	2010
Customer:	Endesa
Location:	Alcudia, Spain
Plant Capacity:	2 x 260 MWe
Plant Type:	Coal power plant
FWH Type:	Vertical
Scope:	Design and supply of 2 HP feedwater heaters

C.T. Costa Sur

Start up year:	2008
Customer:	Passco
Location:	Puerto Rico
Plant Capacity:	2 x 85 MWe
Plant Type:	Coal power plant
FWH Type:	Vertical
Scope:	Design and supply of 2 LP feedwater heaters

Advanced steam generating technology for concentrated solar thermal power

We offer a fully integrated steam generating island for concentrated solar thermal power plants encompassing all of the steam generating equipment (feedwater heaters, preheaters, evaporators, superheaters, reheaters, condensers and deaerators), piping, instrumentation and control. This approach provides an integrated and optimized design and supply model - eliminating scope gaps while ensuring successful project control and single supplier accountability.

Design features

- Conservative design following Wood Industrial Power standards, TEMA and ASME VIII Div. 1 y 2
- Mechanically flexible designs to endure repeated start-ups, shutdowns and load changes
- Integrated chevron dryers in evaporators produce high quality saturated steam
- We offer different steam generators (Kettle or evaporator + Steam drum with natural or assisted circulation)

REFERENCE PROJECTS

Duba Green

Start-up Year:	2018
Customer:	Consortium (Initec Energia-SSEM)
Location:	Kingdom of Saudi Arabia
Capacity:	50 MWe
Plant Type:	Integrated solar combined cycle plant
Scope:	Design & supply of one steam generator system consisting of preheater, steam generator (kettle type) and superheater

La Africana

Start-up Year:	2012
Customer:	UTE Africasolar
Location:	Córdoba, Spain
Capacity:	50 MWe
Plant Type:	Trough with thermal oil
Scope:	Design & supply of steam generator system consisting of preheater, steam generator (steam drum + evaporator bundle), superheater and reheater, as well as 4 LP & 6 HP feedwater heaters

Olivenza

Start-up Year:	2012
Customer:	UTE Olivenza
Location:	Badajoz, Spain
Capacity:	50 MWe
Plant Type:	Trough with thermal oil
Scope:	Design & supply of the steam generation systems: preheater, steam generator (kettle), superheater, as well as LP and HP feedwater heaters

Gemasolar

Start-up Year:	2011
Customer:	UTE Solar 3
Location:	Sevilla, Spain
Capacity:	17 MWe
Plant Type:	Tower with molten salt and storage
Scope:	Design & supply of one 17MWe steam generating train consisting of preheater, steam generator (kettle type), superheater and reheater, as well as 2 LP & 3 HP feedwater heaters

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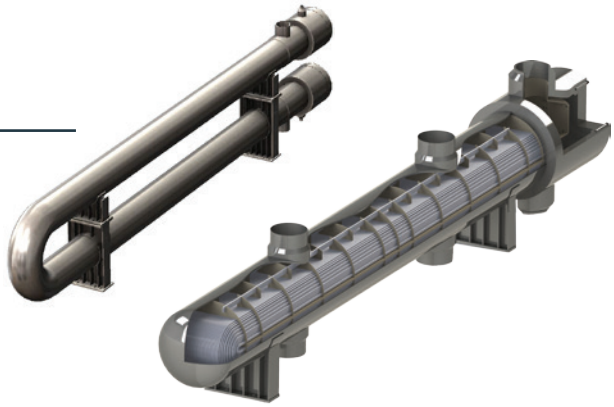
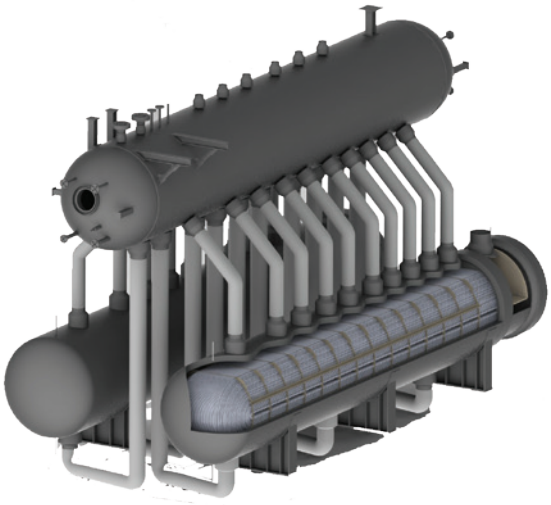
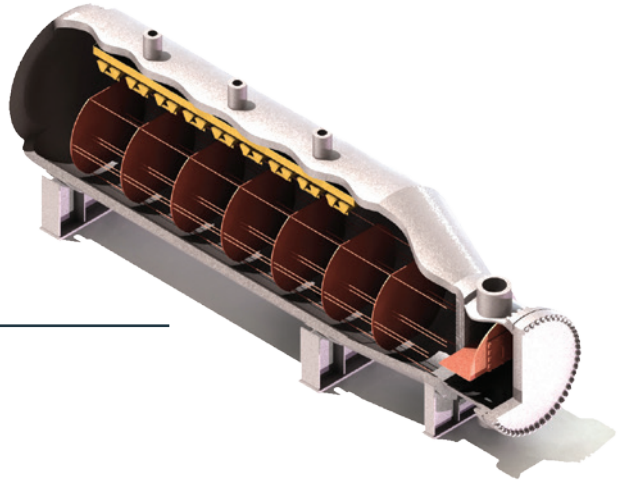
Preheaters, superheaters and reheaters





Steam drum and evaporators



Kettle steam generator

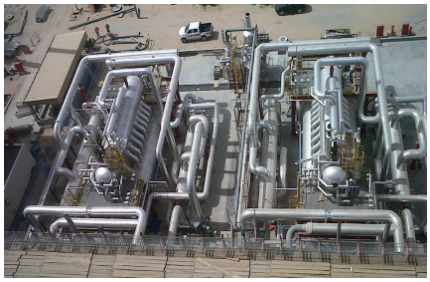
REFERENCE PROJECTS

Thermo Solar Plant in California

Start-up Year:	2014
Customer:	Abener Teyma Mojave
Location:	California, USA
Capacity:	2 x 140 MWe
Plant Type:	Trough with thermal oil
Scope:	Complete boiler island: steam generator systems consisting of preheater, steam generator (steam drum + evaporators), superheater and reheaters, as well as 12 LP & 8 HP feedwater heater

Thermo Solar Plant in Arizona

Start-up Year:	2013
Customer:	Teyma USA -Abener
Location:	Arizona, USA
Capacity:	2 x 140 MWe
Plant Type:	Trough with thermal oil
Scope:	Complete boiler island: steam generator systems consisting of preheater, steam generator (steam drum + evaporators), superheater and reheaters



Thermo Solar Plant in Abu Dhabi

Start-up Year:	2012
Customer:	UTE Abener Teyma Emirates 1
Location:	Abu Dhabi, UAE
Capacity:	2 x 50 MWe
Plant Type:	Trough with thermal oil
Scope:	Complete boiler island: steam generator systems consisting of preheater, steam generator (steam drum + evaporators) and superheater