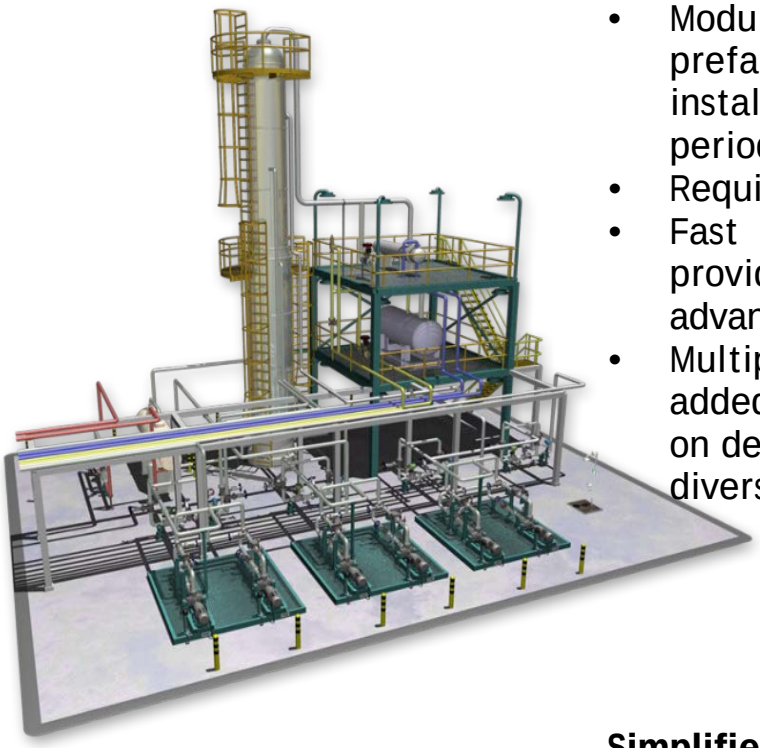
APEX

Modular Refinery of 10,000 BPD



- Modular Plant is prefabricated and will be installed onsite in a short period of time.
- Requires only concrete slab.
- Fast commissioning provides economical advantage.
- Multiple plants can be added to increase capacity on demand easily or to diversify products

Simplified Process Description;

1. Desalted and Water Separated Crude Oil will be Pumped to Direct Fired Crude Heater
2. Crude is heated up to 400 ºC and injected to Atmospheric Distillation Tower Unit
3. Tail Gases (C_1-C_4) are separated from the head and used for electrical generator
4. Naphtha and Diesel is separated and condensed to their liquid form
5. Residue is sent to Catalytic Cracking and Vacuum Distillation Unit by Vacuum Trap Suction
6. Additionally, Naphtha and Diesel is produced by catalytic cracking of Residue and Petcoke is separated from bottom of the system

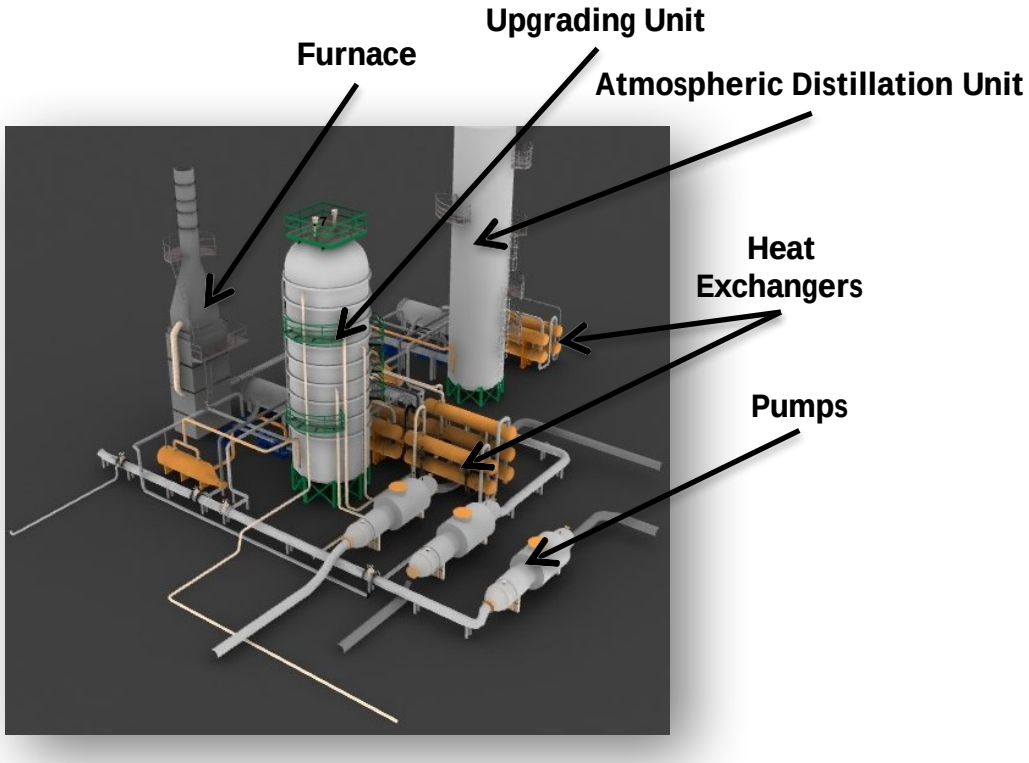
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List of Major Equipment		
No	**Item**	**Description**
1	Crude Heater Unit	Direct Fired
2	Atmospheric Distillation Tower Unit (ADU)	Trayed Tower with Bubble Caps
3	Heat Exchanger Unit	Shell and Tube Type Heat Exchangers, Feed/Product and Product Cooling Exchanger Sets
4	Cooling Unit	Cooling Tower Set
5	Pumping Unit	Product and Crude Transfer Horizontal Centrifugal Pumps
6	Catalytic Cracking & Vacuum Distillation Unit (CVU)	
7	CVU Heater Unit	Hot Oil Boiler
8	Resid Transfer Vacuum Trap	
9	Product Reboilers	
10	Product Strippers	
11	Steam Generator	
12	Reflux Drums	Horizontal 3 Phase Separators
13	Fire Water Pumps	Horizontal Centrifugal Pumps
14	Fire Jokey Pumps	Vertical Centrifugal Pumps
15	Wet Scrubbers	Outlet for Vacuum Pump, Tail Gas and Flue Gas
16	Vacuum Pump	

Emissions

There will be minimal flaring during operation.
Tail Gases and Chimney Flue Gases will be washed by wet scrubber with Catalytic Absorber Solution to reduce acid gas emissions then send to generator and boilers.
Because we are not using hydrotreater, there will be high sulfur levels in the produced fuels. We need emission analysis to decide and calculate ideal absorbent material and quantities necessary to reduce the acid gas emission and cost of recycling of the absorbent.

Catalytic cracking will be applied, Slurry liquid cracking catalyst cost will be $50/kg and 1 kg catalyst is required to treat 1 MT Residue.



Fabrication and assembly of this plant:

- ASME Code Section VIII, Division 1, Pressure Vessels and Heat Exchangers
- ANSI B31.3 Petroleum Refinery Piping
- FM Requirements for Burner Control
- API-RP520, Parts I and II, Design and Installation of Pressure Relieving Systems in Refineries
- API-500A Classification of Areas for Electrical Equipment in Petroleum Refineries (Class 1, Group D, Division 2) on the process end of the skid.

A firewall separates the process end of the skid from the control room and heater end of the skid. A seal is placed in all conduits that pass through the firewall. The heater end of the skid is unclassified.

All process vessels are designed and fabricated in accordance with the ASME Code, Section VIII, Division 1.

The tower and stripper, with associated trays, are 316 stainless steel. Fabrication shops for the vessels are tested and certified by ASME, insurance companies and other regulatory agencies to perform fabrication in accordance with the ASME Code, Section VIII, Division 1. These shops are provided with a certificate having a certificate number and they are audited and re-certified every three years. Copies of the shop`s certificate are available after a purchase order has been issued for the coded vessels.

The fabrication shops must use certified welders who are tested and certified in accordance with the ASME Code, Section IX. Pressure gauges are calibrated annually in accordance with a dead weight tester.

Certified mill test reports on materials used on ASME Code vessels are provided and shipped with each vessel for the buyer`s and customs use.

Sufficient surge capacity is provided in all vessels to assure stable control and allow corrective action to be taken in the event of a process upset or equipment failure. Sufficient elevation is provided for all vessels to assure adequate suction head at low liquid level for pumps.

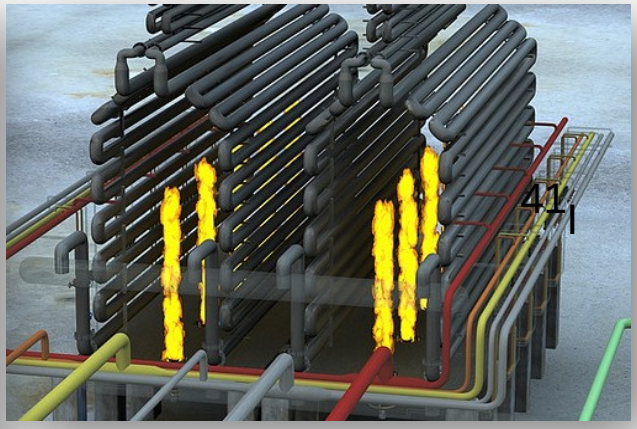
The heater is a horizontal cabin-type with a convection section. Certified mill test reports on materials used to build the heater are provided and shipped with the heater for the buyer`s and customs use. The heater is built in accordance with the following codes:

Coil: ASME Section I
Tubes: ASTM SA 335 P9 (9 chrome)
Fittings: ASTM & ASME SA 234 WP9
Flanges: SA 182 F9
Burner: FM Requirements

All piping and valves required within the process battery limits are provided, fabricated and installed to the maximum practical extent. Piping design is according to ANSI B31.3. All process piping (2" and smaller) is 316 stainless steel tubing using tube bends, Swagelok fittings and a minimum of welds. Piping larger than 2" is A-106, Grade B seamless.

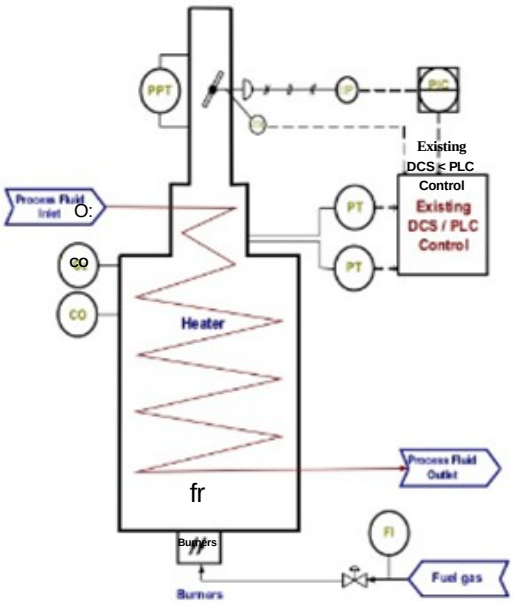
10,000 bpd Modular Refinery
Direct Fired Heater Unit





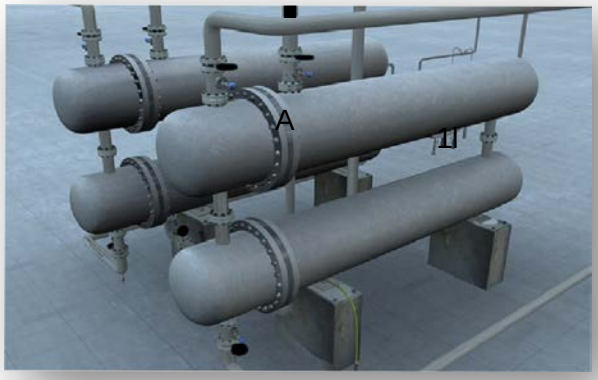
Draft Control System

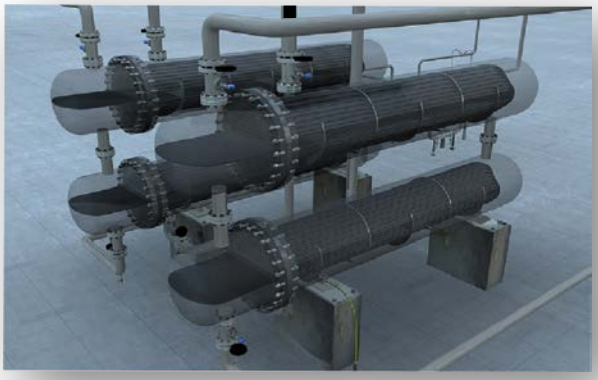
-
- Improved Heater Efficiency
- Decreased NO_x Emissions
- Optimized Combustion
- Reduced Fuel Consumption
- Payback less than a year



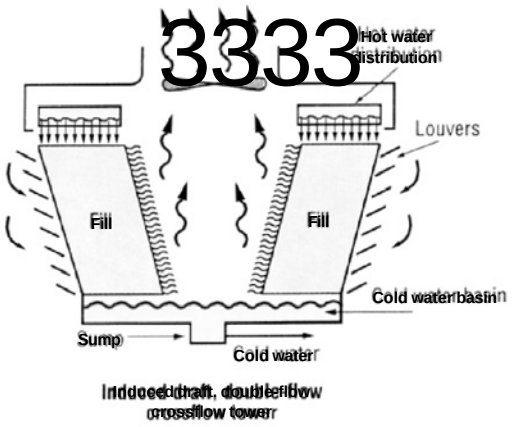
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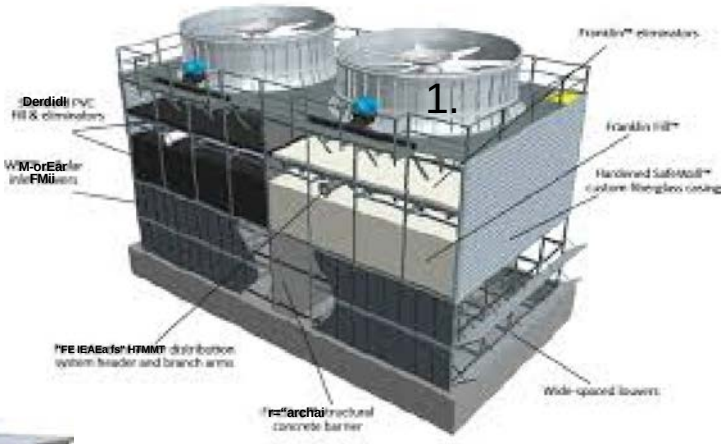
Heat Exchanger Unit





Cooling Unit







Packaged Heat Exchangers Unit and Cooling Unit provide efficient condensing for the process.

Tel: +1 312 256 6533 Fax: +1 XXX XXX XXXX e-mail: apexmali13@gmial.com

Standard Accessories









Solar, RF Sensor Network for 7/24 Real-Time Monitoring ;

1. Solar Powered Wireless Sensors are economic and easy to install
2. Levels at reactor and storage tanks
3. Flowmeters for pumps
4. Pressure Measurement
5. Temperature Measurement
6. Emission Measurement at Chimney and critical points at refinery
7. Fire Safety Detectors
8. Automatic Fire Extinguishing System
9. Computer based Real Time SCADA Control at Secure Room
10. Web Based Real Time Data Logging and Monitor