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Solutions For Lean Fuels Firing

BLAST FURNACE GAS FIRED SOLUTION
M / s Jindal Steel & Power Angul, Orissa

SUBMERGED ARC FIRING LEAN FUELS
M / s SAIL Chandrapur

FERRO ALLOY GAS SOLUTION
M / s Chattisgarh Electricity Ltd.

PRODUCER GAS FIRED SOLUTION WITH HYDROGEN GAS
M / s DCW Ltd, T.N.

BIO GAS FIRED SOLUTION FOR CO-GENERATION BOILER
M / s Kaset Thai Sugar, Thailand
Dual Fuel LDO & Blast Furnace Lean Gas Firing

Plant: 4x460 TPH Boiler
Application: Fuel Conversion from LDO to DUAL FUEL LDO & BFG
Customer: Jindal Steel & Power Ltd. - Orissa

Project Detail:
- M/s JSPL has Blast Furnace Gas as byproduct
- JEPL Solution for Co-firing of BF Gas along with Coal for CFBC Boiler (4 x 460 TPH)
- BF Gas as low calorific value of 575 Kcal/kg

Scope:
- BF gas solution for existing boiler
- BF Gas Valve Train
- Fuel control Station
- Combustion Control system for Dual fuel operation

Advantages:
- Over bed inclined firing system
- BF Gas firing for part load operation
- Reduced coal consumption saving INR 75 lakhs /month
- No support fuel required when furnace temp goes above 500 Deg C
Submerged Arc Furnace Lean Gas firing

Industry: Metal – Steel
Application: SAF Gas
Customer: SAIL Chandrapur
Plant: 20 TPH Waste Heat Recovery Boiler
Low Cv Fuel: Submerged Arc Furnace Gas (SAF) – 1250 Kcal/Nm3

Project Synopsis
- Submerged Arc Furnace Gas firing Solution for Power generation
- Multi fuel firing option (SAF + HFO)
- PLC based fuel firing control system with instrumentation and automation

Advantages:
- Dual Fuel firing Solution for 20 TPH WHRB boiler
- 100% heat duty with SAF gas firing
- SAF gas firing without any support fuel after initial start up
- Steam boiler application for power generation
Ferro Alloy Gas (CO Gas) firing

**Industry:** Metal – Steel

**Application:** SAF Gas

**Customer:** SAIL Chandrapur

**Plant:** 20 TPH Waste Heat Recovery Boiler

Low Cv Fuel: Submerged Arc Furnace Gas (SAF) – 1250 Kcal/Nm3

**Project Synopsis**
- Lean fuel CO gas to be used for power generation
- Multi fuel firing solution (Oil + CO)
- PLC based control system with instrumentation and automation

**JEPL Solution Scope:**
- Vertical top down firing combustor for CO gas
- Gas pressure booster blower for lean fuel firing
- CO Gas at 400º C to be fired
- Option for alternate fuel firing

**Advantages:**
- Process by product CO Gas as fuel
- Substitute for fossil fuel
- Fuel cost saving – OPEX advantage
- Low payback period
DCW Ltd., T.N

Industry: Chemical
Application: Various Process Plants
Plant: OPP Dryer – 4 Plants
UGI Calciner – 2 Plants
UTOX Calciner – 2 Plants
Roaster – 4 Plants
Low Cv Fuel fired: PG – 1200kcal/kg

Project Synopsis
- Lean Fuel Firing and Modernization for saving on fuel cost with producer gas
- Multi fuel firing solution
- PLC based control system with instrumentation and automation

Scope:
- To convert FO fired system of various plants to Dual Fuel / Tri fuel fired system
- To use excess H2 Gas available with in the plant
- Producer Gas from coal Gasification plant as low cost of fuel
Producer & Hydrogen Gas Soln For Salt Bath Heater

End User: M / s DCW Ltd.
Application: Salt Bath Heater
Plant – Fusion Plant

Scope:
- Modernization & Retrofit for Optimum Utilization of By – Product
- Tri Fuel Solution – (H₂ + PG + FO)
- Producer & H₂ Gas Valve Train
- Oil Valve Train
- BMS – PLC Based – Redundant. & SCADA
- Combustion Controls Instruments

Advantages:
- Using low cost fuel – Producer Gas
- Option for H₂ gas firing to prevent flaring of excess quantity
- Automation & loop control for combination firing for energy efficiency
Bio Gas Fired solution for Co generation Boiler

Industry: Sugar
Customer: Kaset Thai Sugars, Thailand
Application: Bio Gas Fired solution for Co generation
Boiler: 240 TPH
Biogas CV: 4200 kcal/kg. Qty: 2000 Nm3/hr per burner

Scope
- Biogas fired solution for 240 TPH Bagasse fired Boiler
- Stand alone PLC based automation and Instrumentation system
- Biogas control station for safe operation

Advantages:
- Co firing of Biogas along with Bagasse
- Biogas generated from molasses by product of sugar industry
- Substitution for Bagasse fuel
- Effluent is used as fuel
- Increasing boiler per heater temperature
- Proven technology – many installation
Solutions For Hot Gas Generators

Case Studies
Kilburn Chemicals Ltd., Dahej, Gujarat

Industry: Dye & Pigment
Application: Rotary Dryer for Pigment

Advantages:
- No contamination of suspended particulate matter
- Provision for HFO firing for Low fuel cost
- Ceramic Fiber blanket insulation
- Insulation installed at works
- Design for 1200° C.
- Refractory curing not required
- Less weight
- Reduced life cycle cost

Description | Solution for HGG System
--- | ---
Fuel | HFO / NG
Heat Duty | $10 \times 10^6$ Mkcal/hr
Hot Gas Temperature | 1050 – 1100 ° C
Petrovietnam - Vietnam

EPC: Thyssenkrupp Ind. Soln.
Industry: Fertilizer
Application: Rotary Dryer

Scope:
- NG fired HGG
- NG fuel control station
- PLC Based BMS Panel
- CA / DA Fan
- Control Dampers for CA / DA

Advantages:
- Low power consumption
- Maintaining skin temperature < 65º C
- Hazardous for zone II
- Pre-installed ceramic insulation
- Furnace insulation design for 1200º C
- Insulation cladded with SS 310 to prevent wear

<table>
<thead>
<tr>
<th>Description</th>
<th>Solution for Hot Gas Generator System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>Heat Duty</td>
<td>7 x 10⁶ Mkcal/ hr</td>
</tr>
<tr>
<td>Hot Gas Temperature</td>
<td>150 – 600 º C</td>
</tr>
</tbody>
</table>
Industry: Power CFBC Boiler

Application: Hot Gas Generator for start up of 180 TPH CFBC Boiler

Description:
- For CFBC Boiler the bed material needs to be heated to 600–700 °C prior to coal induction
- Hot gas generated is introduced from the bottom of furnace heat up bed material being continuously fluidized
- Crushed coal (8–10 mm) is introduced in the furnace

Advantages:
- High temperature hot gas at 850 °C is generated
- Design for back pressure of 1800 mmWC
- Hot gas bypass arrangement during coal firing
- Arrangement of HGG hanging with sling support from main structure
- High efficiency due to high pressure atomizing

<table>
<thead>
<tr>
<th>Description</th>
<th>Solution for Hot Gas Generator System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel</td>
<td>HSD</td>
</tr>
<tr>
<td>Heat Duty</td>
<td>$12 \times 10^6$ Mkcal/ hr</td>
</tr>
<tr>
<td>Hot Gas Temperature</td>
<td>850 – 900 °C</td>
</tr>
</tbody>
</table>
Case Study for Thermal Oxidizers & Incinerators

**STYRENE INCINERATION SYSTEM**
M / s IOCL – Panipat, India

**PHENOL WASTE INCINERATION**
M / s Mai Liao, Taiwan

**ACID GAS INCINERATION SYSTEM FOR WSA PLANT**
M / s Conoco Phillips – Ireland

**AMINE OFF GAS INCINERATION SOLUTION**
M/ s Evonik Industries, China

**HALOGENATED WASTE THERMAL OXIDIZER**
M/ s Maktheshim Chemical Works, Israel

**OFF GAS INCINERATION & SNCR**
M/ s Novartis Pharma Technology Co. Ltd. China

**AMMUNITION OFF GAS THERMAL OXIDIZER**
M/ s CETC, China
Styrene Incineration Solution

Industry: Refinery / Petrochemical
Application: Styrene Incineration system
EPC: Toyo India
Customer: IOCL, Panipat

Description:
- Styrene - a by-product of the crude oil refining process, used for Rubber Production
- Off spec styrene has shelf life, hence is a waste generated on a large scale and needs disposal
- Industry needs to find safe and economic method of disposing this waste styrene which is a critical application

JEPL Solution:
- Natural Gas as start up fuel
- Self sustaining styrene combustion solutions
- Flue gas emission control
- Steam generation by incineration of waste styrene
Solution For Phenol & Tar Incineration

Industry: Petrochemical (Plastic)
Application: Phenol Waste Incineration
EPC: Durr System GmbH
Customer: Mai Liao, Taiwan

Description:
- Liquid waste incineration system
- Incineration of combined phenolic waste from plastic industry & Heat recovery
- Vertical top down firing construction

<table>
<thead>
<tr>
<th>WASTE A</th>
<th>75 kg/hr.</th>
<th>200cP @ 213 ° C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenol</td>
<td>0.42 wt.%</td>
<td></td>
</tr>
<tr>
<td>IPP</td>
<td>2.84 wt. %</td>
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</tr>
<tr>
<td>Tar</td>
<td>96.19 wt.%</td>
<td></td>
</tr>
<tr>
<td>NaOH</td>
<td>0.54 wt. %</td>
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</tr>
</tbody>
</table>

<table>
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<tr>
<th>WASTE B</th>
<th>300 kg/hr.</th>
<th>182cP @ 182 ° C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone</td>
<td>0.03 wt. %</td>
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<td>Phenol</td>
<td>49.85 wt. %</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>35.16 wt.%</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>7.98 wt. %</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>6.97 wt.%</td>
<td></td>
</tr>
</tbody>
</table>
**Acid Gas Incineration System for WSA Plant**

**Industry:** Oil Refinery  
**Application:** SRU Tail Gas Incinerator  
**EPC:** Jacobs Nederland B.V.  
**Customer:** Conoco Phillips - Ireland

**Description:**
- Conoco Phillips WSA plant a combustions chamber for firing H2S gases (SWS and H2S gas).
- Downstream equipment waste heat boiler for steam generation.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td>8 MW</td>
</tr>
<tr>
<td><strong>Operating Temp.</strong></td>
<td>975°C</td>
</tr>
<tr>
<td><strong>Combustion Chamber Dim.</strong></td>
<td>Ø 1.5 x 6.0m</td>
</tr>
<tr>
<td><strong>Fuel Consumption</strong></td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>300 Nm3/hr.</td>
</tr>
<tr>
<td>SWS Gas</td>
<td>115 Nm3/hr.</td>
</tr>
<tr>
<td>Acid Gas</td>
<td>300 Nm</td>
</tr>
</tbody>
</table>
Amine Off Gas Incineration Solution

Industry: Gas Processing
Application: Amine Off Gas Incinerator
EPC: Envirotec GmbH.
Customer: Evonik Industries, China

Description:
- Off gases with NH₃ and HCN
- Liquid waste with nitrogenous hydrocarbons
- Heat duty capacity 13.5 MW
- Liquid and gaseous waste incineration system

<table>
<thead>
<tr>
<th>Capacity</th>
<th>13.5 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temp.</td>
<td>1,100 ºC</td>
</tr>
<tr>
<td>Combustion Air</td>
<td>38,500 Nm³/hr</td>
</tr>
<tr>
<td>Fuel Consumption Line A (Liquid)</td>
<td>80 – 420 Kg/hr.</td>
</tr>
<tr>
<td>Line B (Liquid)</td>
<td>40 – 270 Kg/hr.</td>
</tr>
<tr>
<td>Line C (Liquid)</td>
<td>1,200 Kg/hr.</td>
</tr>
<tr>
<td>Line D (Gas)</td>
<td>200 – 810 Nm³/hr</td>
</tr>
<tr>
<td>Line E (Gas)</td>
<td>1,000 – 4,000 Nm³/hr</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>125 – 1,350 Nm³/hr</td>
</tr>
</tbody>
</table>

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Halogenated Waste Thermal Oxidizer

**Industry:** Chemical  
**Application:** Halogenated Waste Thermal Oxidizer  
**EPC:** CTU – Conzepte Technik Umwelt AG  
**Customer:** Maktheshim Chemical Works, Israel

**Description:**
- Chemical industry process waste
- Hazardous Waste comprising of chlorinated hydrocarbons, organics and solvents
- Vertical top down firing incinerator with a central multi fuel burner and additional liquid waste lances.
- Control systems

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>14.0 MW</td>
</tr>
<tr>
<td>Operating Temp.</td>
<td>Max 1,200 °CCTU – Conzepte Technik Umwelt AG</td>
</tr>
<tr>
<td>Combustion Chamber Dim.</td>
<td>Ø 3.4 x 13.5 m</td>
</tr>
</tbody>
</table>
| Combustion Air             | Case 2  
  Case 1                  | 8,500 – 15,000 Nm³/hr.  
  0 – 10,000 Nm³/hr.       |
| Fuel Consumption           | LPG                    |
|                           | 40 – 400 Nm³/hr.       |
|                           | Natural Gas            |
|                           | 110 – 1,100 Nm³/hr.    |
|                           | Heavy Fuel Oil No. 6   |
|                           | 350 – 1300 kg/hr.      |
|                           | Off Gas                |
|                           | 10 – 60 kg/hr.         |
|                           | Waste Liq. No. A1      |
|                           | 100 – 500 kg/hr.       |
|                           | Waste Liq. No. B1      |
|                           | 20 – 80 kg/hr.         |
|                           | 20-105 kg/hr.          |
Off Gas Incineration & SNCR

**Industry:** Pharmaceutical  
**Application:** Off Gas Incineration & SNCR

**Customer:** Novartis Pharma Technology Co. Ltd. China

**Description:**
- Thermal Oxidizer Plant for pharmaceutical process waste
- Process Off gas Incineration
- Selective non catalytic reduction (SNCR) with ammonia injection
- NOx control and emission monitoring

**Capacity** 6.0 MW

**Operating Temp.** 750 – 1,200 ºC

**Combustion Chamber Dim.** Ø 1.7 x L₁ = 4.3m. L₂ = 7.16 m

**Ammonia Water** 1 l/h / 20% for SNCR

**Fuel Consumption**
- Off Gas 1 1,000 – 7,500 Nm³/hr. without H₂
- Off Gas 2 0 -100 Nm³/hr. with H₂
- Natural Gas 90 – 600 Nm³/hr.
- Quench air 18,000 Nm³/hr.
Refinery Waste Gas Incineration

Industry: Refinery
Application: Waste Gas Incineration
EPC: Selas Linde AG
Customer: Shell Pernis, Netherlands

Description:
- Off Gases from gasification of heavy residue from thermal cracking process for hydrogen gas generation
- Sour gas from recti sol treating of Syngas for Sulphur and CO2 removal
- Sulphur and CO2 removal from downstream of CO – Shift
- Off gases from the first stage contains absorbed hydrogen gas
- Hydrogen rich off gases from catalytic reformer

<table>
<thead>
<tr>
<th>Capacity</th>
<th>7 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Air</td>
<td>9,000 Nm³/hr.</td>
</tr>
<tr>
<td>Control Range</td>
<td>1:10 for Natural Gas</td>
</tr>
<tr>
<td>Fuel Consumption</td>
<td>Gaseous Fuels 600 Kg/hr.</td>
</tr>
<tr>
<td></td>
<td>Waste Gas 1,650 kg/hr.</td>
</tr>
</tbody>
</table>
Ammunition Off Gas Thermal Oxidizer

Industry: Ammunition
Application: Ammunition Destruction Off Gas THO
EPC: Dynasafe Germany GmbH
Customer: CETC, China

Description:
- Off gas resulting from the pyrolysis process in the SDC (Static Detonation Chamber)
- The THO accepts off gases resulting from one feed cycle in a period of max. 180 sec.
- The oxidizer is designed to be oversized to handle peak flow and is able to take twice the anticipated flow.
- The THO has a residence time of three seconds or more at 1,100 °C.
- Off gas is fed tangentially using a four lance system to ensure complete treatment of the contaminated gases.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>400kW</th>
</tr>
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<tbody>
<tr>
<td>Operating Temp.</td>
<td>1,100 °C</td>
</tr>
<tr>
<td>Combustion Air</td>
<td>850 Nm³/hr.</td>
</tr>
<tr>
<td>Control Range</td>
<td>1:10 for Natural Gas</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>40 Nm³/hr.</td>
</tr>
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</table>
Solution For Phenol & Tar Incineration

Industry: Petrochemical (Plastic)
Application: Phenol Waste Incineration
EPC: Durr System GmbH
Customer: Mai Liao, Taiwan

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- Conoco Phillips WSA plant a combustions chamber for firing H2S gases (SWS and H2S gas).
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<tbody>
<tr>
<td>BURNER CAPACITY</td>
<td>8 MW</td>
</tr>
<tr>
<td>OPERATING TEMPERATURE</td>
<td>975°C</td>
</tr>
<tr>
<td>COMBUSTION CHAMBER DIM.</td>
<td>1.5 x 6.0 m</td>
</tr>
<tr>
<td>COMBUSTION AIR</td>
<td>6,200 Nm³/h</td>
</tr>
<tr>
<td>FUEL CONSUMPTION</td>
<td></td>
</tr>
<tr>
<td>Natural gas</td>
<td>100 Nm³/h</td>
</tr>
<tr>
<td>SWS gas</td>
<td>115 Nm³/h</td>
</tr>
<tr>
<td>Acid gas</td>
<td>300 Nm³/h</td>
</tr>
</tbody>
</table>
Case Study for Sulphur Combustion

VISCOSE - SULPHURIC ACID PLANT – WSA
M/s Lenzing – PT. South Pacific Viscose, Indonesia

MANGANESE SULPHATE - SULPHURIC ACID PLANT – WSA
M/s Rio Seco, Peru

PULP & PAPER – SO2 PRODUCTION PLANT
M/s M Real Hallein, AG, Austria

VISCOSE - SULPHURIC ACID PLANT
M/s South Pacific Viscose Ltd., Indonesia

SPENT ACID REGENERATION
M/s BASF AG, Ludwigshafen, Germany

SPENT ACID
M/s Dead Sea Bromine, Israel

SULPHURIC ACID RECOVERY – WSA
M/s Ningbo Haiyue New Materials, China

SPENT ACID RECOVERY
M/s Evonic, Germany

SPENT ACID RECOVERY
M/s Petrochemia Blachownia S.A., Poland
Viscose Staple Fiber - SAP

Industry: Viscose Staple Fiber
Application: Sulphuric Acid Plant - WSA
EPC: Lenzing-PT, South Pacific Viscose
Customer: Lenzing-PT, South Pacific Viscose, Indonesia

Description:
- For a new WSA plant combined system for different media with 27.8 MW
- Natural gas or Diesel as start up fuel
- Adjustable lances for Sulphur injection
- High excess air for optimum SO2 generation

<table>
<thead>
<tr>
<th>Capacity</th>
<th>27.8 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temp.</td>
<td>850ºC</td>
</tr>
<tr>
<td>Combustion Air</td>
<td>88000 Nm3/hr. (Pri. + Sec.)</td>
</tr>
<tr>
<td>Combustion Chamber Dim.</td>
<td>Ø 3.3 m x 12.5 m</td>
</tr>
<tr>
<td>Fuel Consumption</td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>300 – 2970 Nm3/hr.</td>
</tr>
<tr>
<td>Rich Gas</td>
<td>175 – 600 Nm3/hr.</td>
</tr>
<tr>
<td>Sulfur</td>
<td>870 – 2970 Kg/hr.</td>
</tr>
<tr>
<td>Diesel Oil</td>
<td>230 – 1753 Kg/hr.</td>
</tr>
</tbody>
</table>

Fuel Consumption:
- Natural Gas: 300 – 2970 Nm3/hr.
- Rich Gas: 175 – 600 Nm3/hr.
- Sulfur: 870 – 2970 Kg/hr.
- Diesel Oil: 230 – 1753 Kg/hr.
Industry: Manganese Sulphate Leaching process
Application: Sulphuric Acid Plant - WSA
Customer: Rio Seco, Peru

Description:
- Co-firing of H2S Gas and liquid sulphur
- WSA Process for Sulphuric Acid plant in Rio Seco Peru
- Acid gas is injected by a gas ring with four separate adjustable gas lances
- Liquid Sulfur is added through a centrally mounted ultrasonic
- Low Pressure steam atomization
- Natural gas fired through a gas sleeve tube around Sulfur lance
- The combustion air stream divided into two air layers
- First layer directly to the burner housing and the secondary stream is tangentially fed to the combustion chamber
- Operation of the system with high air excess

<table>
<thead>
<tr>
<th>Capacity</th>
<th>3 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temp.</td>
<td>1,000°C</td>
</tr>
<tr>
<td>Combustion Chamber Dim.</td>
<td>Ø 2.1 x 6.9 m</td>
</tr>
<tr>
<td>Combustion Air</td>
<td>10,800 kg/hr.</td>
</tr>
<tr>
<td>Fuel Consumption</td>
<td></td>
</tr>
<tr>
<td>Fuel Gas</td>
<td>140 Kg/hr.</td>
</tr>
<tr>
<td>H2S Gas</td>
<td>340 – 1,400 kg/hr.</td>
</tr>
<tr>
<td>Liq. Sulfur</td>
<td>150 – 850 kg/hr.</td>
</tr>
<tr>
<td>Capacity</td>
<td>3 MW</td>
</tr>
<tr>
<td>Operating Temp.</td>
<td>1,000°C</td>
</tr>
<tr>
<td>Combustion Chamber Dim.</td>
<td>Ø 2.1 x 6.9 m</td>
</tr>
<tr>
<td>Combustion Air</td>
<td>10,800 kg/hr.</td>
</tr>
</tbody>
</table>
**Pulp & Paper - SO2 Gas**

**Industry:** Pulp & Paper  
**Application:** SO2 Production Plant  
**Customer:** M Real Hallein, AG, Austria

**Description:**
- Revamping of SO2 Production Plant
- Horizontal combustion chamber placed in existing building
- Natural gas and sulfur firing solution
- Combustion chamber temperature of 1,500 °C
- SO2 - content in the flue gas is higher than 19%

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td>2.9 MW</td>
</tr>
<tr>
<td><strong>Operating Temp.</strong></td>
<td>1500 – 1600 °C</td>
</tr>
<tr>
<td><strong>Combustion Chamber Dim.</strong></td>
<td>Ø 1.86 m x 6.4 m</td>
</tr>
<tr>
<td><strong>Fuel Consumption</strong></td>
<td>Natural Gas</td>
</tr>
<tr>
<td></td>
<td>Sulfur</td>
</tr>
</tbody>
</table>
Viscose Staple Fibre - SAP

**Industry:** Viscose Staple Fibre

**Application:** Sulphuric Acid Plant

**Customer:** South Pacific Viscose Ltd., Indonesia

**Description:**
- Sulfuric acid production plant for South Pacific Viscose Ltd.
- Horizontal combustion sulfur and H2S gas firing
- For heating up procedure diesel fuel / HFO
- In the downstream installed WSA process equipments
- The sulfur dioxide, from the combustion of sulfur and H2S gas, is converted into sulfuric acid

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
</tr>
<tr>
<td>Operating Temp.</td>
</tr>
<tr>
<td>Combustion Air.</td>
</tr>
<tr>
<td>Fuel Consumption</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Industry: Petro-Chemical (Polyurethane)  
Application: Spent Acid Regeneration  
EPC: CTU – Concepte Technik Umwelt, AG Customer: BASF AG, Ludwigshafen, Germany

Description:
- For MDI and TDI Production
- In a vertical combustion chamber spent acid is combusted
- For start-up operation and additional heating the burner is equipped with a natural gas lance and is also possible to operate the burner with waste liquid fuels as visbreaker tar and EDA residue
- The spent acid is fed via four lances into the combustor
- In the centre of the lances is a multi fuel burner – top down mounted
- For enrichment the SO2, additional liquid sulfur is fired

<table>
<thead>
<tr>
<th>Capacity</th>
<th>33 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temp.</td>
<td>1050ºC</td>
</tr>
<tr>
<td>Comb. Chamber Dim.</td>
<td>Ø 3.1 m</td>
</tr>
<tr>
<td>Combustion Air</td>
<td>Pre Heated @ 250 ºC</td>
</tr>
<tr>
<td>Fuel Consumption</td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>80 – 1000 Nm³/hr.</td>
</tr>
<tr>
<td>Spent Acid</td>
<td>15950 Kg/hr</td>
</tr>
<tr>
<td>Sulphur</td>
<td>4460 Kg/hr</td>
</tr>
<tr>
<td>Visbreaker Tar</td>
<td>200 – 1600 Kg/hr</td>
</tr>
<tr>
<td>EDA Residue</td>
<td>200 – 1300 Kg/hr</td>
</tr>
<tr>
<td>High Boiling residues</td>
<td>200 – 1600 Kg/hr</td>
</tr>
</tbody>
</table>
Chemical (Elemental Bromine)-
Spent Acid Recovery

Industry: Chemical (Elemental Bromine)
Application: Spent Acid
EPC: CTU – Concep te Technik Umwelt AG
Customer: Dead Sea Bromine, Israel

Description:
- Hazardous Waste Heat recovery Plant for liquid and gaseous waste fuels (with Bromine, Sulfuric Acid, halogenated Hydrocarbons and Waste Water)
- The waste fluids fired in a vertical incinerator with a central multifuel burner mounted in a top down orientation
- Solution for Spent acid recovery along with Incineration of Halogenated waste & other process waste

<table>
<thead>
<tr>
<th>Capacity</th>
<th>6 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temp.</td>
<td>1200 – 1300 °C</td>
</tr>
<tr>
<td>Combustion Chamber Dim.</td>
<td>ø 2.6 x 9.4 m</td>
</tr>
<tr>
<td>Combustion Air</td>
<td>Vent Gas 6000 – 10000 kg/hr. (Halogenated CnHy &amp; Organics)</td>
</tr>
<tr>
<td>Fuel Consumption Natural Gas</td>
<td>66 – 330 Kg/hr.</td>
</tr>
<tr>
<td></td>
<td>Melt Residues 470 – 1400 kg/hr. (50wt % Bromine)</td>
</tr>
<tr>
<td></td>
<td>Spent Acid 900 Kg/hr.</td>
</tr>
<tr>
<td></td>
<td>Liquid Waste 50 – 300 kg/hr.</td>
</tr>
<tr>
<td>Capacity</td>
<td>6 MW</td>
</tr>
<tr>
<td>Operating Temp.</td>
<td>1200 – 1300 °C</td>
</tr>
<tr>
<td>Combustion Chamber Dim.</td>
<td>ø 2.6 x 9.4 m</td>
</tr>
</tbody>
</table>
Refinery - Spent Acid Recovery

Industry: Refinery (Propylene)
Application: Sulphuric Acid Recovery - WSA
EPC: Haldor Topsoe AS
Customer: Ningbo Haiyue New Materials, China

Description:
- MTBE phase out needs alkylation of propylene
- Strong sulphuric acid is used as catalyst for reaction of propylene/butylene & amylene with Isobutane to get branched paraffin alkylate.
- Alkylates used as oxylate instead of MTBE.
- These alkylate have high Octane & very low sulphur.
- Alkylates are used as blendstock for clean burning fuel.
- MTBE is water soluble & difficult to detect contamination in ground water & also is toxic

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>3.7 MW</td>
</tr>
<tr>
<td>Operating Temp.</td>
<td>975°C</td>
</tr>
<tr>
<td>Combustion Chamber Dim.</td>
<td>Ø 2.65 x 9.0m</td>
</tr>
<tr>
<td>Combustion Air</td>
<td>11000 kg/hr</td>
</tr>
<tr>
<td>Fuel Consumption</td>
<td>Natural Gas</td>
</tr>
<tr>
<td></td>
<td>45 – 400 kg/hr.</td>
</tr>
<tr>
<td>Spent Acid</td>
<td>400 – 4610 kg/hr.</td>
</tr>
</tbody>
</table>
Specialty Chemical – Spent Acid Recovery

**Industry: Specialty Chemical**

**Application: Spent Acid Recovery**

**Customer: Evonic, Marl, Germany**

**Description:**

- The spent acid decomposition plant was revamped
- The combustion plant consists of a horizontal combustion chamber with a front side located multi fuel burner for heating gas, sulfur and Oxo oil
- 3 separate lances are provided for 6.1 t/h spent acid firing
- Gas sleeve tubes provided for firing H2S gas
- In the combustion chamber the spent acid and the sulfur are thermally converted into SO2 gas
- In the downstream sulfuric acid is recovered

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>11.2 MW</td>
</tr>
<tr>
<td>Operating Temp.</td>
<td>1050 ºC</td>
</tr>
<tr>
<td>Combustion Chamber Dim.</td>
<td>Ø 2.5 x 8.0m</td>
</tr>
<tr>
<td>Combustion Air Temp.</td>
<td>400 ºC</td>
</tr>
<tr>
<td>Fuel Consumption</td>
<td></td>
</tr>
<tr>
<td>Fuel Gas</td>
<td>970 Nm3/hr.</td>
</tr>
<tr>
<td>H2S Gas</td>
<td>1300 Nm3/hr.</td>
</tr>
</tbody>
</table>
### Petro-chemicals - Spent Acid Recovery

**Industry:** Specialty Chemical  
**Application:** Spent Acid Recovery  
**Customer:** Evonic, Marl, Germany

**Description:**
- Chemical Synthesis (Benzene / Toulene)  
- MDI & TDI production for polyurethane Industry  
- Toulene – di – isocyanite manufacturing process  
- Coke oven gas and natural gas as support fuel  
- Spent acid of varying composition and quantities.  
- Pump station for liquid sulphur and spent acid  
- Combustion chamber  
- Waste heat recovery boiler

<table>
<thead>
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<tr>
<td><strong>Capacity</strong></td>
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<td><strong>Combustion Chamber Dim.</strong></td>
<td>Ø 2.5 x 8.0m</td>
</tr>
<tr>
<td><strong>Combustion Air Temp.</strong></td>
<td>400 °C</td>
</tr>
<tr>
<td><strong>Fuel Consumption</strong></td>
<td></td>
</tr>
<tr>
<td>Fuel Gas</td>
<td>970 Nm³/hr</td>
</tr>
<tr>
<td>H₂S Gas</td>
<td>1300 Nm³/hr</td>
</tr>
</tbody>
</table>
Case Study for Fuel Conversion

**FUEL CONVERSION – TO TRI FUEL SYSTEM HFO + H2+ BUTANE**
*M/s Cetex Petrochemicals, Manali, Chennai*

**SULPHURIC ACID PLANT FROM HFO TO NG FIRED**
*M/s FACT, Cochin, Kerala*

**HYDROGEN GAS FIRED SOLUTION**
*M/s Atul Ltd. Gujarat*

**MULTI FUEL FIRED SYSTEM HSD + LPG**
*M/s IOCL, Kandla, Gujarat.*

**NG GAS FIRED SOLUTION FOR 58 TPH BOILER**
*M/s ONGC, Hazira, Gujarat*

**FUEL CONVERSION FROM HSD TO HFO**
*M/s BALCO, Chhattisgarh*

**FUEL CONVERSION FROM HSD TO HFO**
*M/s Rayalseema Alkalies & Allied Chemicals*
Fuel Conversion HFO + H2 Gas + Butane

Plant: 1 x 5 TPH Boiler

Application: Boiler For Steam Generation

Customer: M/s Cetex Petrochemicals, Manali, Chennai

Project Detail:
- To provide solution for Hydrogen gas fired
- Low cost fuel firing option
- Modernization and automation

Scope:
- Tri Fuel Fired Burner
- Oil Valve Train
- H2 Gas Valve Train
- Automation and Instrumentation
- PLC based Burner Management System

Advantages:
- Multi Fuel Firing Solution
- Utilizing excess H2 gas available
- Step less modulation
- Co-firing of different fuel with control
- Safety and reliability
Fuel Conversion From HFO To NG Firing

Plant: Sulphuric Acid Plant
Application: Start up system for Sulphur Combustor Furnace
Customer: FACT, Cochin & Udyogmandal, Kerala

Project Detail:
- Existing Pant: HFO as start up fuel
- The Sulphuric acid plant is based on the sulphur combustion process to generate SO2 Gas
- JEPL Provide the fuel conversion of the sulphur combustor from HFO to NG
- To meet the criterial of NG fuel as feed stock for availing subsidy

Scope:
- NG fuel firing system
- Redundant PLC Based BMS Panel
- Fuel control station fro safe start-up and shut down
- Instrumentation and automation for continuous modulation
- Suitable for Hazardous area Zone II

Advantages:
- To avail Govt. Subsidy NG fuel to be used
- Natural Gas price is less compared to HFO less emissions due to clean gas fuel
- Reliable operation of plant with safety
Fuel Conversion for H2 Gas Co-Firing

Plant: 1 x 50 TPH AFBC Boiler
Application: Co Firing of excess H2 Gas
Customer: M/s Atul Ltd., Valsad, Gujarat

Project Detail:
• Existing Plant: HFO as start up fuel
• The Sulphuric acid plant is based on the sulphur combustion process to generate SO2 Gas
• JEPL Provide the fuel conversion of the sulphur combustor from HFO to NG
• To meet the criterial of NG fuel as feed stock for availing subsidy

Scope:
• Tri Fuel Fired Burner
• Oil Valve Train
• H2 Gas Valve Train
• Automation and Instrumentation
• PLC based Burner Management System

Advantages:
• Multi Fuel Firing Solution
• Utilizing excess H2 gas available
• Step less modulation
• Co-firing of different fuel with control
• Safety and reliability
LPG Gas Fired Solution For Fuel Conversion

Plant: 2 x 14 TPH Boiler

Application: Fuel Conversion from LDO to Dual Fuel LDO & LPG

Customer: M/s IOCL, Kandla, Gujarat

Project Detail:
- M/s IOCL operating LPG for only part load of boiler
- Complete plant damaged due to storm
- Customer planned to operate the boiler on full load of 14 TPH
- Complete reconditioning and modernization of fuel firing system

Scope:
- Modernization and retrofit for existing boiler
- Dual Fuel (LPG + LDO) Burner System
- LDO Pumping & Filtering Unit
- LPG Gas Valve Train
- PLC based Combustion Control system for Dual fuel operation with SIL 3

Advantages:
- Full load operation with LPG as main fuel
- External sourcing of fuel not required
- Establish plant for continuous operation
- Minimum modification of the existing plant
- Increase the capacity of the plant for regasification of liquefied gas
LPG Gas Fired Solution for Fuel Conversion

Project Detail:
- Complete turnkey solution for NG firing in 58 TPH boiler
- Air to fuel ratio trim from O2 for efficiency
- Continuous emission monitoring for SOx, NOx & SPM
- Damper and VFD control from BMS

Scope:
- NG fired burner heat duty – 2 x 18 Mkcal/hr
- NG fuel control station.
- Nitrogen purge panel.
- PLC based BMS panel – SIL 2
- Hazardous zone II
- VFD control drive
- Combustion air fan
- Emission monitoring system

Advantages:
- Meet stringent Environment Norms for NOx Emission
- Continuous monitoring of SOx, NOx & SPM
- SIL2 compliant Burner Management System
- Dual Point control of air to fuel for high efficiency
- Air Damper loop control along with VFD control for O2 trim
- Complete turnkey solution for 58 TPH boiler.

Plant: 1 x 58 TPH Boiler
Application: NG Fired Solution
Customer: M/s ONGC, Hazira, Gujarat
NG Fired Solution For Boiler

Scope:
- Retrofit and modernization of existing system supplied along with Boiler by Chinese OEM
- Conversion of fuel firing system from HFO fired to dual fuel fired (HFO + LDO)
- PC fired power boiler need support fuel firing during initial start-up and also for part load
- Replacing the existing HFO firing system by Dual fuel fired
- Indigenous availability of spares & support
- LDO fuel pumping & filtering system
- MCC Panel
- Fuel firing capacity of 6000 kg/hr.
- Interconnecting piping & instrumentation
- Power and instrument cables
- Implementation of logic in client DCS

Advantages:
- Option for firing HFO + LDO fuels
- Avoid change of oil gun for different fuel
- System can be directly started with HFO fuel
- Constant pressure atomizing media – 5-6 bar
- Air / Steam atomizing system
- Customizing with minimum modification of the existing unit
- No detachment of flexible hoses for oil gun lance removal from the burner

Plant: 4 x 63.5 MW (250 TPH) Boiler
Application: Captive Power Plant
Customer: M/s BALCO, Korba, Chattisgarh

Project Detail:
- Fuel Conversion to accommodate dual fuel firing for PC fired power boiler
- Refurbishing and automation of fuel firing system
- Custom design to suit on main burner installation
- Oil gun Lance can be removed during the boiler operation
Fuel Conversion from HSD to HFO

Project Detail:
- M/s JSPL has supplied HSD fired start up system for 80 MW pulverized coal fired boiler
- Addition of HFO firing with minimum modification
- Reduced fuel cost and OPEX saving

Scope
- Fuel Pumping and heating system for HFO
- Interconnecting piping with Heat tracing
- Fuel control station for HFO firing

Advantages:
- Fuel conversion from HSD to HFO
- Using the existing oil gun supplied for HSD firing
- Solution with HFO fuel conditioning system
- Saving on fuel cost of HSD with HFO
- HFO firing for up to 60% of Boiler load
- Boiler can be operated on HFO fuel even when the coal is not available due to Mill shut down and other reason

Plant: 1 x 80 MW (300 TPH) Boiler
Application: Fuel Conversion from HSD to HFO
Customer: Rayalseema Alkalies & Allied Chemicals, A.P.
Case Studies for Rotary Kiln Applications

**DUAL FUEL (HFO+PC) KILN BURNER FOR PELLET PLANT**
M/s Arya Iron & Steel Company, Odisha

**TRI-FUEL (HFO+PC+PG) KILN BURNER FOR PELLET PLANT**
M/s Shyam SEL & Power, Jamuria

**TRI-FUEL (HFO+PC+PG) KILN BURNER FOR PELLET PLANT**
M/s MSP Steel & Power Ltd, Raigarh
Dual Fuel Kiln Burner System

Application: Rotary Kiln – Iron Ore Pellet Plant
Customer: M/s. Arya Iron & Steel, Odisha
Plant Capacity: 0.6 MTPA
Fuel: HFO + Pulverised Coal

Project Synopsis:
- Higher fuel firing rate
- Combination firing
- Specially designed passage for coal firing

Advantages:
- 100% firing on pulverised coal eliminates the support fuel firing
- Reliable operation
- Minimum downtime for maintenance
Tri-Fuel Kiln Burner System

Application: Rotary Kiln – Iron Ore Pellet Plant
Customer: M/s. Arya Iron & Steel, Odisha
Plant Capacity: 0.6 MTPA
Fuel: HFO + Pulverised Coal

Project Synopsis:
- Lean fuel gas to be used for pellet production
- Multi fuel firing solution (Oil + PC + PG)
- Maximum coal/PG firing with minimum support firing provision

Scope:
- Tri-Fuel Kiln Burner
- HFO pumping, heating & filtering unit
- HFO Valve Train
- PLC based control system with instrumentation and automation

Advantages:
- 100% coal firing without support fuel
- More than 90% PG firing with min. support fuel
- Combination firing options
- Fully Automated operation ensures less manpower supervision and improve plant efficiency
**Tri-Fuel Kiln Burner System**

**Application:** Rotary Kiln – Iron Ore Pellet Plant  
**Customer:** M/s. MSP Steel & Power, Raigarh  
**Plant Capacity:** 0.6 MTPA & 0.3 MTPA  
**Fuel:** HFO + Pulverised Coal + Producer Gas

**Project Synopsis:**
- 100% Coal firing without support firing  
- Maximum PG firing with min. support fuel  
- Minimize plant/equipment downtime  
- OPEX savings

**Scope:**
- Tri-Fuel Kiln Burner (Retrofit)  
- Engineering support for coal feeding & handling system  
- Special design for 100% coal firing without support fuel

**Advantages:**
- 100% coal firing without support fuel  
- More than 90% PG firing with min. support fuel  
- Combination firing options  
- Ensuring equipment availability
Case Study for Biogas Application

**BIO-GAS BURNER PACKAGE FOR POWER BOILER**
M/s Kaset Thai Bio Power, Thailand

**BIO-GAS SYSTEM FOR UTILITY BOILER**
M/s Dhampur Sugar Mills, Bijnor (U.P)

**HOT GAS GENERATOR SYSTEM FOR DRYING**
M/s Gayathri Sugars, Andhra Pradesh

**CO-FIRING SYSTEM FOR COGEN POWER PLANT**
M/s United Spirits Ltd, Rosa (H.P)

**HOT GAS GENERATOR SYSTEM FOR DRYING**
Bio-Gas System for Process Boiler
Co-Firing System for Power Generation

Customer: Kaset Thai Bio Power Ltd, Thailand
Plant: 240 TPH Cogen Power Plant
Application: Co-Firing of Bio-Gas with Bagasse, Cane Chips & Coal

Project Synopsis:
- M/s KTBP has bio digester and bio-gas as by-product
- JEPL Solution for Co-firing of bio-gas along with solid fuels in same boiler
- Fuel savings project with bio-gas utilisation

Scope:
- Complete Burner Assembly with Auto Ignition & Flame Monitoring System
- Bio-Gas Fuel Handling & Control Station
- Combustion Control system for burner operation

Advantages:
- Utilisation of waste bio-gas for co-firing in the boiler
- Equivalent saving of main solid fuel firing
- Higher return of investments
- Trouble free operation and minimum supervision of man power
Bio-Gas System for Utility Boiler

Project Synopsis:
- Bio-Gas firing Solution for steam regeneration
- Fuel Valve Train & Controls
- PLC based fuel firing control system with instrumentation and automation

Advantages:
- Complete usage of available bio-gas for steam generation
- No additional fuel requirement
- Good ROI
- Complete Automation reduces man power supervision

Application: Bio-Gas firing in Utility Boiler
Customer: Dhampur Sugar Mills, Bijnor
Plant: 10 TPH Boiler
Bio-Gas fired Hot Gas Generator System

Customer: Gayathri Sugars Ltd
Application: Hot Air Drier
Fuel: Bio-Gas

Project Synopsis:
- Bio-Gas firing for hot gas generation
- Minimise OPEX
- Fully Automated system

Scope:
- Horizontal firing combustor for bio-gas
- Complete fuel handling & control station
- PLC based BMS system

Advantages:
- Process by product as fuel
- Substitute for fossil fuel
- Fuel cost saving – OPEX advantage
- Attractive payback period
Co-Firing Solution for Cogen Plant

Customer: United Spirits Ltd, Rosa (H.P)
Application: Power Generation
Plant: Cogen
Fuel: Bio-Gas (Co-fired with Bagasse, Slop Oil & Coal)

Project Synopsis:
- Co-Firing and Modernization for saving on fuel cost with Bio-Gas
- OPEX Savings
- Complete Automation

Scope:
- Utilisation of Bio-Gas for steam generation assistance
- Co-firing with solid fuels in same boiler
- Corresponding fuel handling & controls
- Fully automatic burner management system for process based operation control
Bio-Gas System for Process Boiler

Application: Bio-Gas firing in Process Boiler
Customer: M/s. Kothari Sugars, Trichy
Plant: 6 TPH Boiler

Project Synopsis:
- Bio-Gas firing Solution for steam generation
- Dual fuel firing option (Bio-Gas+HFO)
- Continuous Duty

Scope:
- 100% heat duty with bio-gas firing
- Dedicated fuel handling & control system
- Fully automatic control depends on steam demand