EnergyBay

INFINITENERGY SOLUTIONS

STM PowerUnit™
Power Generation from Refinery and Petrochemical Flare Gases

by

STM POWER
The Future of Energy

Distributor of Asia Pacific Region

Singapore Technologies Kinetics
A company of Singapore Technologies Engineering

EnergyBay is a one-stop destination offering wide range of products and services be it power, heat or chilling. The technologies offered include green refrigeration, energy efficient lighting, output enhancement of refineries, petrochem and power plants, and renewable energy.

EnergyBay is committed to promoting clean energy technologies through a variety of products and services. The products portfolio is rendered through representation / distribution rights of leading manufacturers from Europe, United States and Far East. The Services portfolio is comprised of Business Advisory, Performance Contracting, and Technical Consulting.

EnergyBay is founded by highly qualified professionals with long years of experience in power generation and distribution projects, distributed generation, co-generation, process plants, industrial marketing, banking and finance.

Official India Distributor

EnergyBay

508 Chiranjiv Tower, 43 Nehru Place, New Delhi 110 019, India
Voice: 91 11 51608900, 51608901
Facsimile: 91 11 51608902
Email: info@energybay.com
Website: www.energybay.com

STM PowerUnit™
Power Generation from Refinery and Petrochemical Flare gases
STM Power Inc, USA

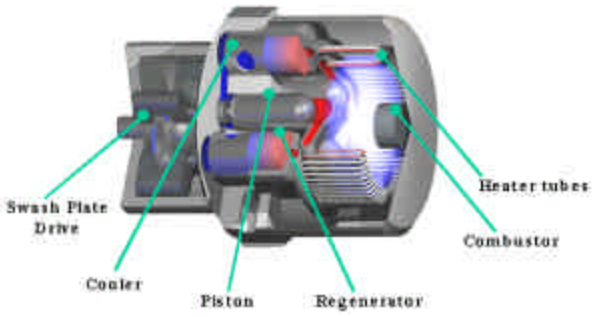
The PowerUnit is a marvelous combination of advanced technology and simplicity. The most important component is the STM external combustion engine, which operates on the Stirling cycle principle. In contrast to traditional gasoline and diesel internal combustion engines that take in fuel and air inside the cylinder, the STM engine works differently. Instead, the STM engine contains a sealed-in amount of working gas that is used over and over. Rather than burning fuel inside the cylinder, the STM engine uses external heat to expand its contained gas inside the cylinder and push against its pistons. The STM engine then recycles the same captive working gas by cooling and compressing it, then reheating it again to expand and work the pistons, which in turn drive a generator.

As a result, the STM engine provides benefits that are advantageous to many power applications, including smooth, clean, quiet engine performance without the need for a fuel compressor, muffler or emissions control. In addition, the STM engine is highly efficient and durable, and requires very little maintenance, because none of the products of combustion come into contact with any moving parts or lubricants.

Power generation from any combustible gases, 30 percent efficiency
Completely stand alone to the flow of the industrial process
A self contained unit
Can be easily connected to a tap off near the flare stack
Core components have no moving parts reducing the need for regular maintenance
Custom designed to meet local conditions and capacity requirements
Running costs are low – there is no additional fuel costs
Manpower is minimal
Co-generation potential, 80 percent CHP efficiency
Fully automated through on-board computer
Multifunctional – can be utilized for many processes within an industry
Modular, units can be added to the plant to increase capacity at a later date
Long life span – depending on local conditions can be up to 25 years

Stirling cycle technology - How it works

The STM engine is a four-cylinder, double-acting Stirling engine with a swash plate drive. At the heart of the engine are four independent gas enclosures each comprised of the volume under a piston (compression volume), the volume above the adjacent piston (expansion volume), a series of three heat exchangers connecting these two volumes, a cooler adjacent to the compression volume, a heater adjacent to the expansion volume and a regenerator between the heater and the cooler.



The four pistons are arranged symmetrically around a swash plate that forces the reciprocating motion of any two neighbouring pistons to be 90º out of phase. The gas

enclosures are charged with high-pressure hydrogen that serves as a working fluid. The reciprocating motion of the pistons causes the volume of hydrogen to increase and decrease alternately. The expansion spaces are maintained at a high temperature by continuous combustion of fuel or some other source of heat (waste heat) outside the tubes of the heaters.

1 MW Solution

The compression spaces are maintained at a low temperature by liquid cooling of the coolers. Therefore, the temperature and the pressure of the hydrogen during expansion is higher than during compression. The hydrogen absorbs heat from the combustion process, converts a portion of it to mechanical power, which it delivers to the pistons, and rejects the balance to the liquid coolant. The mechanical power delivered by the hydrogen to the pistons is aggregated and converted to rotating shaft power by means of the swash plate drive. The regenerator, which is the third heat exchanger, does not exchange heat with the outside. It alternately absorbs heat from and releases heat back to the hydrogen in order to improve the engine efficiency. The engine's output shaft is connected to a generator to make three-phase electrical power.

Specifications

Electrical output

55 kWe continuous duty
220/380 VAC, 3-Phase, 50 Hz
Grid parallel or grid independent modes

Heat output at 55kWe

91 kWth / 312000Btu
2000 LPM / 10 GPM of hot water @ 20°C / 72°F temperature rise

Fuel requirements

0.25-2.0 psig inlet gas pressure
11,375 BTU/kWh

Efficiency

30% net electric efficiency
80% CHP efficiency

Noise level

58 dBA at 7 meters

Dimensions

Length 102" (259 cm), Width 34" (86 cm)
Without Radiator: Height 43" (110 cm)
Weight 3200 lbs (1455 kg)
With Radiator: Height 68" (173 cm)
Weight 3500 lbs (1591 kg)

Codes and Standards

Compliant with UL 2200, CE, CSA, UL 1741, IEEE 1547, CARB

Warranty

One year, parts and labor, no limitation on operating hours or starts.
Extended service agreements available.