TECHNIP ENERGIES

Where energies make tomorrow

Low-Emission Cracking Furnace

A novel cracking furnace design to significantly increase fuel efficiency and reduce CO_2 emissions

Governments are struggling to find cost-effective ways to meet the 2020 emission targets. In light of these developments, Technip Energies presents a revolutionary change in the design of ethylene furnaces:Our Low-Emission Cracking Furnace (patent filed).

This new cracking furnace design brings a major decrease in CO_2 emissions and is a substantial step towards meeting the future targets of the European Committee. By modifying the heat recovery scheme, fuel consumption and the associated CO_2 emissions can be reduced by 30 percent. This is a suitable solution for green field plants, furnace revamps or addition of furnace units in existing assets.

Innovative breakthroughs

To reduce the CO_2 emissions fuel efficiency must be improved. Our research showed that the heat recovery scheme of the conventional furnace configuration was limiting the extent to which the fuel efficiency can be improved. Technip Energies has developed a new heat recovery scheme to overcome this limitation and has filed a patent for this new configuration.

In our design, the duty of the convection section of a low-emission cracking furnace with air preheat accomplishes the following purposes:

- Preheating, evaporation of hydrocarbons
- Superheating of dilution steam
- Initial superheating of naphtha/dilution steam mixture
- Partial generation saturated vhp steam in “boiler coil”
- Superheating of saturated vhp steam generated in the transfer line exchanger
- Preheating of combustion air

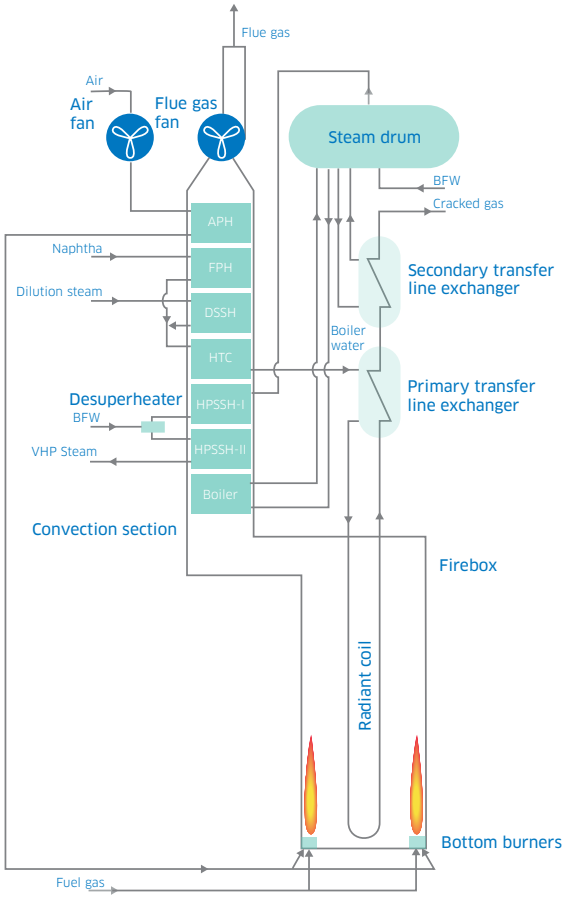

Fig. 1. Low-emission cracking furnace with air preheat.

> The most attractive configuration is one with an air preheater.”

The cracked gas is used for:

- Final superheating of naphtha/dilution steam mixture in primary transfer line exchanger (tle)
- Partial generation saturated vhp steam in secondary tle

Technip Energies reviewed various high efficiency furnace configurations to evaluate fuel consumption including:

- Air preheat
- Full oxyfuel combustion
- Partial oxyfuel combustion

All these furnace configurations reduce the fuel consumption by approximately 30 percent by raising the furnace firebox efficiency with roughly 30 percent. A 30 percent fuel reduction results in a 30 percent reduction of CO_2 emissions at the ethylene furnace stack as firing is reduced.

Cost-effective design

Any plant’s operating margins are defined by the emerging prices of feedstock, fuel and products. Pay-back times depend on each plant’s individual market situation and the selected furnace configuration.

When evaluating the OPEX and the CAPEX of ethylene plants, it becomes clear that the plant’s economics are dominated by the operating costs. The most attractive configuration is one with an air preheater. Even though this scheme requires the highest investment from a furnaces standpoint, it shows a pay-back time of roughly one year operating under normal market conditions because of the more favourable operating costs. Therefore this configuration can increase the operating margins, especially under difficult market conditions.

To determine if your company can reduce operating costs or improve the pay-back time at your facility, please contact us about performing an economic survey specifically focused on your assets and specific economic environment.

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