



KIRCHNER

FIRED HEATERS FOR REFINERIES AND PETROCHEMICAL PLANTS

Revamping Presentation

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Revamping

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Revamping

WHAT IS REVAMPING?

Revamping is the update of an existing Fired Heater to improve efficiency and/or capacity, etc through the modification or replacement of some of its parts.



Revamping

WHAT DO WE REVAMP?

**Revamping is applicable to existing fired heaters, done by us
or by others, as:**

- Refinery Fired Heaters
- Steam Reforming Heaters for Hydrogen, Methanol or Ammonia Plant
- Ethylene Cracking Heaters
- Others

Revamping

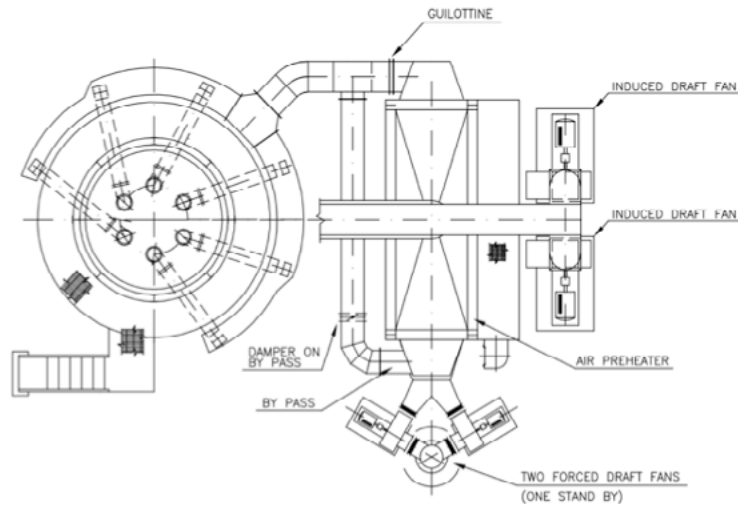
THE RESULT OF THE REVAMPING



- Efficiency increased up to 90% and more. This means less fuel consumption.
- Quick Payback. Raising efficiency from 75% to 90% normally has a payback < 2 years.
- Reduction of pollution. Thanks to a better combustion obtained with Forced Draft Low Nox burners that use lower excess air.
- Reduction of Stack Temperature: Higher efficiency means colder flue gas exiting the stack.
- Increasing of Heater Life.

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REVAMPING PROPOSAL



KIRCHNER ITALIA makes available to Client more than 60 years of expertise on fired heaters with a huge experience on troubleshoots and solutions.

Revampings must be tailor made, these are the phases:

- 1) Study with client of the existing heater considering also available resources to be recovered.
- 2) Pre Engineering
- 3) Economical Proposal with cost of revamping and relevant payout.
- 4) Analysis with client about possible different solutions with different results and costs.
- 5) Revamping execution consisting of Engineering, Project Management, Procurement, Construction, Supervision and training of personnel.

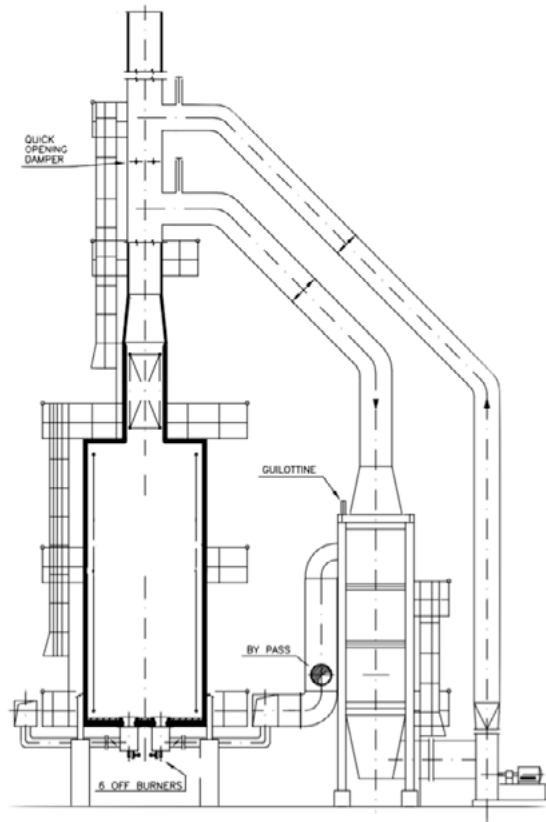
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PROCESS CHECK

In most of the cases, the existing heater is old. This means that the technical conditions might have changed since its initial design, for example:

- Is the process fluid the same of the initial design?
- Is the fuel the same as the initial design?
- Is the metallurgy of the coils correct?
- Is the needed heat exchange (the duty of the heater) the same as the initial design? Is it raised or decreased?
- Are the inlet/outlet temperatures and pressures still the same?
- Is the available pressure drop still the same?

EXAMPLES OF HEAT RECOVERY SYSTEMS



1) Preheating of Combustion Air

AIRPREHEATER: exchanges the heat from the flue gas exiting the stack of the heater to the combustion air entering the burners.

2) Heat recovery from hot fluids available in refinery

HEAT EXCHANGER: the heat is transferred to the combustion Air going to the burners.

3) Steam Production

Heat is recovered from the flue gas exiting the heater and transferred to a typical steam production unit composed by convection section coils (Steam Generator, Steam Superheater, Economizer) and steam drum.

SAFETY: INSTRUMENTATION AND CONTROL SYSTEMS

Today Safety is one of the first points to be checked. A correct Instrumentation helps the user to check all the process values in real time.

To control in a safe way the burners and the heater's operation, it's suggested to install:

- Burner Management Systems (BMS),
- Fuel SKID,
- Emergency Shutdown System (ESD) and
- Distributed Control System (DCS)

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ETHYLENE CRACKING HEATERS

Kirchner is specialized in the revamping / Refurbishing of Ethylene Cracking Heaters. This particular heater has 2 different kind of efficiency to consider:

- Thermal Efficiency.
- Ethylene Production Efficiency (YELD Efficiency)

Normally YELD Efficiency is around 27/29% ethylene of the effluent.

With our revamping the YELD effluent efficiency can be raised by 2 % that means 7% more Ethylene production.

This is done without any variation on fuel consumption.

Revamping

ETHYLENE CRACKING HEATERS

THE REVAMPING CONSISTS OF:

- Radiant Coil replacement with new generation type. This substitution is more economic if done at the end of old coil life.
- Optimization of Combustion. Installation of a fewer number of new bottom flat flame burners. This brings to a better heat distribution, less Excess Air and lower emissions.
- Thanks to a better charge and a heat distribution, hot spots and temperature picks are avoided, this helps raising distance between decoking activities.
- New Venturi System helps to balance different coils in order to obtain the same flowrate in every single coil.
- Upgrading the Quench System. (Transfer Line Exchanger & Quench Fitting)
- Update and Improvement of Instrumentation. (Advanced Heater Control System)

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EX 1: REVAMPING OF REBOILER HEATER WITH INSERTION OF AIRPREHEATER

CR 23 Isomerization Plant - Priolo, Italy for Polimeri Europa S.p.A. (ENI)

	BEFORE	AFTER
Absorberd Duty (MW)	62,4	62,4
Fired Heat (MW)	76,1	68,6
Efficiency (%)	82%	91%
Fuel Saving (Kg/h)	-	616,43
Fuel Cost (€/Kg)	-	0,4
Annual Saving (€)	-	€ 2.159.971

EX 2: REVAMPING OF TOPPING HEATER - SUBSTITUTION OF CONVECTION TUBES

Topping 4 - Milazzo, Italy for Raffineria di Milazzo S.p.A. (ENI & Q8)

	BEFORE	AFTER
Absorberd Duty (MW)	81,71	81,71
Fired Heat (MW)	97,3	90,8
Efficiency (%)	84%	90%
Fuel Saving (Kg/h)	-	581,36
Fuel Cost (€/Kg)	-	0,4
Annual Saving (€)	-	€ 2.037.085

EX 3: REVAMPING OF TOPPING HEATER - AIR PREHEATER INSTALLATION

Topping - Pantano del Grano, Rome, Italy for Raffineria di Roma S.p.A. (TOTAL & ERG).

	BEFORE	AFTER
Absorberd Duty (MW)	56,91	56,91
Fired Heat (MW)	66,7	62,5
Efficiency (%)	85,3%	91%
Fuel Saving (Kg/h)	-	370,51
Fuel Cost (€/Kg)	-	0,4
Annual Saving (€)	-	€ 1.298.267



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Thank You!

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