

How To

Recover Waste Heat from Flue Gas

Save Energy – Save Money

The widespread use of recuperative burners to preheat combustion air has boosted efficiency throughout most of the heat processing industry. The savings in gas consumption pays for the equipment and the “carbon footprint” is reduced. However, for most industrial users, opportunities still exist for recuperating and putting to use much of the waste heat currently being exhausted from their facilities.

Tax incentives and various energy programs can help fund a project and potential upcoming legislation may put pressure on industry to reduce greenhouse gas emissions. Here are some practical approaches to this timely topic.

Heat your Wash or Rinse Tank

Measure the flow and temperature of your exhaust streams. A source of heat that is adequate to fully supply or at least substantially augment an existing demand should be identified.

The vented exhaust from combustion can be ducted to a heat recovery unit with a gas-to-liquid heat exchanger to pre-heat boiler feed water or another nearby process (see figure 1). Many heat related processes are preceded or followed by a heated wash or rinse tank which are also good candidates for recovered heat.

Rinse tanks, boiler feed water and other applications may be heated directly in the heat recovery unit. Other fluids may have to be indirectly heated (using an intermediate heat exchanger) due to chemistry or lack of cleanliness.

Process Control Methods

One challenge is to match the demand for recuperated heat with the available supply of heat. One way to accomplish this is to pull only as much heat as needed from the exhaust stream by utilizing a simple modulating damper to bypass excess heat around the heat transfer coil, controlling the amount of heat reclaimed. An alternate method is the utilization of variable speed exhaust blowers.

A temperature probe in the tank can be used to signal the heat recovery unit to operate and a temperature probe in the outlet of the heated fluid stream can be used to proportionately control the bypass damper or variable speed blower. This will prevent any over-heating of the heat transfer fluid.

If there is not enough heat to fully satisfy the demand, consider pre-heating or assisting the current system. For large exhaust streams consider a modular approach using several units for different users (see figure 2).

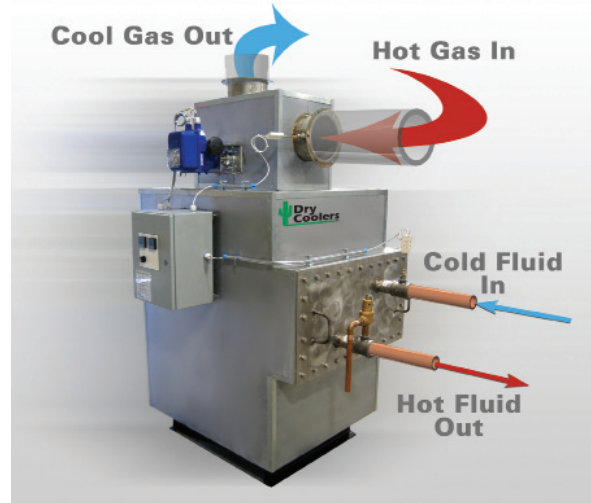


Figure 1. Gas-to-Liquid Heat Recovery Unit

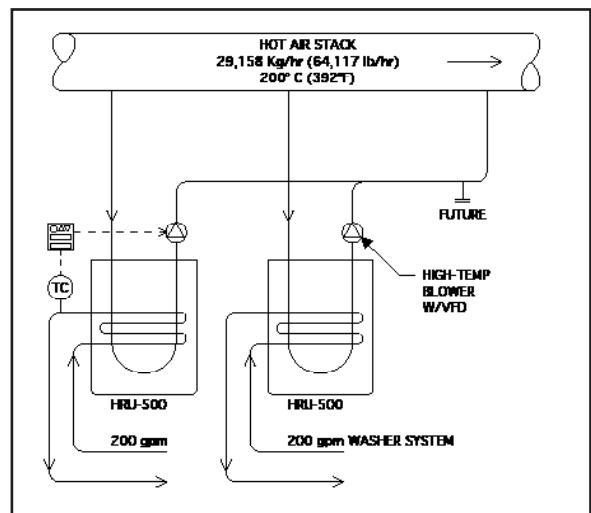


Figure 2. Modular application for washer and boiler pre-heat

Heat Recovery Tips

- Match the materials of construction to the temperature of the exhaust stream
- Consider Variable Frequency Drives for blowers as a means of temperature control
- A backup heating system may be advisable
- Allow for thermal expansion in equipment, ducts and piping.
- Look for close proximity heat users to minimize installation costs
- Insulate ductwork and fluid piping for maximum efficiency