Improving boiler efficiency pdf

Across the US, industrial boilers account for about 37% of the total energy consumed in the industrial sector. Fortunately, there are several ways you can increase boiler efficiency, ranging from no-cost options, cheap options, up to big capital improvements, such as a new boiler installation. Some of the most effective ways to increase boiler efficiency are discussed below. Increase Boiler Efficiency with Regular Boiler Maintenance One of the best and most cost effective ways to keep your equipment working efficiently is with a standard boiler maintenance program. A good maintenance program will increase efficiency, slow boiler deterioration, reduce operating costs, and ultimately maintain reliability. In addition to having standard maintenance regimen performed by a factory trained boiler technician, there are several inspections you can perform by following a simple boiler checklistOpera with proper Excess AirThe proper operation of a boiler requires a certain level of excess air to ensure complete combustion. If the system works with too much excess air, it can reduce the efficiency of the boiler by heating and throwing away this pillow of air. Operation of the boiler without excess air can cause: Air pollutionStande on the fireIncreased efficiencyPotential explosive flue gases By monitoring the oxygen content, flue gas temperature, and carbon dioxide content, you will be able to optimize this cushion of air and fine-tune the boiler for maximum efficiency. Fixed or portable combustion efficiency tests are available and can be used to adjust the quality of combustion air. Installing Turbulators If you have a firetube boiler, installing a turbulator can be an effective way to strengthen efficiency. A turbulator is a device inserted inside by the pipes in the boiler, pipes heat exchangers, and other equipment responsible for the transfer of heat. This device increases heat transfer efficiency by maintaining a turbulent flow through the boiler passes. In most cases, turbulators are installed in the final boiler pass. Turbulators are one of the most cost effective efficiency upgrades for firetube boilers that are older. Upgrade Boiler BurnerOver time, the burners on the boiler will begin to lose efficiency and deteriorate. When this happens, burners should either be replaced or retrofitted. No matter what type of fuel you burn or the type of industrial boiler you have, there are several burner options you can consider for a replacement. Even if you are not in a position to consider new boiler burners, retrofitting the burner can offer significant savings for a fraction of the cost. Improving Boiler Insulation Large commercial and industrial boilers have expansive surface areas exceptionally vulnerable to loss of heat, especially when improperly insulated. You may be able to strengthen the efficiency of your forehead through the use of insulation. The primary type of insulation used for industrial boilers is refract material, which is used to line the boiler. If you decide to replace this refractory material, be sure to conduct a full structural analysis to determine the amount of weight the boiler can effectively support. Contact Applied Technologies of New YorkIn many instances it is more cost effective and fast to upgrade to a new boiler system. At ATI of New York, we are the manufacturers' representatives for the leading and most efficient new boiler systems. We offer a wide range of equipment for a variety of industries including: Education Medical Pharmaceutical Residential Hotels & Lodging Whatever your needs, applied technologies of New York can help. Contact Applied Technologies in New York today to schedule a consultation. This website requires certain cookies to work and uses other cookies to help you have the best experience. By visiting this website, some cookies have already been set, which you can delete and block. By closing this notice or continuing to use our site, you agree to the use of cookies. Visit

 With rising costs of fuel prices, industries that use boilers for heating or power generation are hard-pressed to work at peak efficiency. While steam consumption, leakage, and other heat transfer losses can contribute to the overall energy bill, this article focuses on the heart of the steam generator – the boiler. Controlling the boiler is of utmost importance in any steam generation energy saving program. Below are some ways to improve boiler efficiency: Reduce excess air Install economizer Reduce scale and deposits Reduce blow down Recover waste heat from blowing down Stop dynamic operation Reduce boiler pressure Operation at peak efficiency Preheating combustion air Switching from steam to air refinement Switching to lower cost fuel Reduce Excess air Of far the most common cause of energy inefficiency in a boiler can be attributed to the use of excess air during combustion at the burners. When there is more air than is required for combustion, the extra air becomes heated and finally discharged into the atmosphere. However, there are reasons for inserting some extra air for combustion - to compensate for imperfect burner fuel-air mixing conditions, air density changes, slush control system, burner fuel composition and viscosity variation, and imperfect atomizing steam or air controls for burners. Adjustment of the fuel-to-air ratio for can be quite tricky. If the fuel is too much compared to the air, incomplete combustion occurs. This will give rise to carbon soot deposits inside the combustion chamber or even over the boiler pipes. The consequences of having soot deposits over the heat transfer surfaces and the potential to have explosive flue gases inside the boiler are much worst than losing a small amount of energy through the exhaust stack. Therefore, many boiler operators choose to adjust their burners to be slightly on excess air. Installing The Economizer This is only suitable if there are insufficient heat transfer surfaces in the boiler. Household vessels may contain either circulating boiler water or circulating feed water. Since the temperature of the exhaust gases can be quite high, the economizer tubes can be equipped with safety valves to avoid overpressure damage. Also temperature control of feed water is required to prevent pump airlock. To avoid corrosion, careful design is needed to ensure that the exhaust gas temperature does not drop below the dew point. Reduce Scale and Deposits For all boiler operation, this is a must. The safety of the boiler is at stake. Each scale or deposit will lead to reduced heat transfer that will eventually lead to overheating, reduction of mechanical strength of the steel and ultimately to blasting. This should already be in the normal daily procedure of boiler operation. Reduce Blowing down Blowing down of boiler water is discharging hot water into drains. But blowing down is necessary to maintain boiler water concentration of dissolved solids necessary for conditioning of boiler water. The dissolved solids are necessary to prevent boiler corrosion and scaling. As steam is generated from the evaporation of water, the remaining water in the boiler becomes more and more concentrated. This must be drained away during the blow down. The challenge is to check the drainage to a minimum. Recovering Waste Heat from Blow Down Because it is necessary to blow down to control the total dissolved solids in boiler water, methods can be assumed to recover back some of the heat from the drained hot water. Blowing down tanks, heat exchanger pipes and pump arrangements can be made to recover some of the heat back in the boiler. Stop dynamic operation When a boiler starts or stops, a few minutes are spent running the forced draft fan for cleaning the combustion chamber of unburned gases. This is a necessary step for safe operation of a boiler. During this time the heat from the boiler water in the shell or pipe will be lost to the cleansing air. To avoid this type of loss, it is better to maintain a steady burning condition in the boilers. Reduce boiler pressure By reducing boiler pressure, some of the heat losses through leakage or transmission can be slightly reduced. However there can be problems with the boiler with reduced pressure. Boiler circulation may be agitated steam- steam may have insufficient capacity and flow to transport the low pressure sing. Peak Efficiency operation When operating two or more boilers, improved efficiency can sometimes be obtained by unequal splitting of the load so that the combined load works at peak efficiency. Preheating Combustion air Any heat loss from the boiler's skin to the boiler room can be used back for combustion. By preheating the intake air combustion in the furnace becomes more efficient. Switching from Steam to Air Atomization For burners with steam atomization, switching to air atomization will of course result in less steam consumption overall and better boiler efficiency gains. This is only applicable for heavy fuel oil burners. Switching to lower cost fuel When comparing natural gas and heating oil, if the cost is the same or more per BTU delivered, switch to heating oil. The reason for this is that in the combustion process, hydrogen combines with oxygen to form water. The latent heat of evaporation is lost when water vapor leaves the boiler stack. Fuels like natural gas with higher hydrogen to carbon ratio will lose this heat more than those with lower hydrogen-carbon ratios like heating oil. However, it must also be seen that there will be increased maintenance, operating costs and greater need for more excess air to achieve complete combustion for heating oil. In addition, soot deposits and incomplete combustion can also affect the total costs. Costs.