

DESIGN AND FABRICATION OF PRESSING STEAM BOILER

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Abstract— A boiler is a device used to create steam by applying heat energy to water. Changes in investment costs, increases in scale, demands placed on energy efficiency and environmental requirements are the main factors directing Development of the recovery boiler. This has resulted in use of higher steam Parameters of ironing and food production .Wood fired boiler equipment is common in the lumber processing industry. Many facilities will use wood waste boilers as an integral part of the production process. Steam or hot water is generated for lumber drying and process requirements. Wood burning boilers however, normally create considerable ash and soot build-up in the fire tubes, resulting in inefficient heat transfer and a loss of steam pressure. Most wood fired boilers require manual tube brushing. This means shutting down the boiler for hours while mill personnel brush the ash build-up from the fire tubes. The trade-off for not continually cleaning the fire tubes is excessive fuel usage, loss of energy and boiler inefficiency. The fluid does not necessarily boil. (The term "furnace" is normally used if the purpose is not actually to boil the fluid.) Boiler is an apparatus use to produce steam.

Keywords— Pressure gauge, Safety valve, Steam outlet valve, Exhaust valve, Multipurpose iron box, Drain valve, Teflon tube

I. INTRODUCTION

1.1 INTRODUCTION OF PRESSING STEAM BOILER:

A boiler is an enclosed vessel in which water is heated and circulated, either as hot water or steam, to produce a source for either heat or power. A central heating plant may have one or more boilers that use gas, oil, or coal as fuel. The steam generated is used to heat buildings, provide hot water, and provide steam for cleaning, sterilizing, cooking, and laundering operations. Small package boilers also provide steam and hot water for small buildings. A careful study of this course can help you acquire useful knowledge of steam generation, types of boilers pertinent to boiler operations, various fittings commonly found on boilers, and so on. The primary objective of this chapter is to lay the foundation for you to develop skill in the operation, maintenance, and repair of boilers.

A boiler is an enclosed vessel that provides a means for combustion and transfers heat to water until it becomes hot water or steam. The hot water or steam under pressure is then usable for transferring the heat to a process. Water is useful and cheap medium for transferring heat to a process. When water is boiled into steam its volume increases about 1,600 times, producing a force that is almost as explosive as gunpowder. This causes the boiler to be extremely dangerous equipment and should be treated carefully. Liquid when heated up to the gaseous state this process.

The heating surface is any part of the boiler; hot gases of combustion are on one side and water on the other. Any part of the boiler metal that actually contributes to making steam is heating

surface. The amount of heating surface of a boiler is expressed in square meters. The larger the heating surface a boiler has, the more efficient it becomes.

The boiler system is made up of:

1. Feed water system
2. Steam system
3. Fuel system

The feed water system provides water to the boiler and regulates it automatically to meet the steam demand. The water supplied to boiler that is converted to steam is called feed water. The sources of feed water are:

1. Condensate or condensed steam returned from the processes
2. Make up water which is the raw water which must come from outside.

The steam system collects and controls the steam produced in the boiler. Steam is directed through a piping system to the point of use. Throughout the system, steam pressure is regulated using valves and checked with steam pressure gauges. The fuel system includes all equipment used to provide fuel to generate the necessary heat. The equipments required in the fuel system depend on the type of fuel used in the system.

Boilers are pressure vessels designed to heat water or produce steam, which can then be used to provide space heating and or service water heating to a building. In most commercial building heating applications, the heating source in the boiler is a natural gas fired burner. Oil fired burners and electric resistance heaters can be used as well. Steam is preferred over hot water in some applications, including absorption cooling, kitchens, laundries, sterilizers, and steam driven equipment. Boilers have several strengths that have made them a common feature of buildings. They have a long life, can achieve efficiencies up to 95% or greater, provide an effective method of heating a building, and in the case of steam systems, require little or no pumping energy. However, fuel costs can be considerable, regular maintenance is required, and if maintenance is delayed repair can be costly. Guidance for the construction, operation, and maintenance of boilers is provided primarily by the ASME (American Society of Mechanical Engineers), which produces the following resources, Rules for construction of heating boilers, Boiler and Pressure Vessel Code, Section IV-2007 Recommended rules for the care and operation of heating boilers, Boiler and Pressure Vessel Code, Section VII-2007 Boilers are often one of the largest energy users in a building. For every year a boiler system goes unattended, boiler costs can increase approximately 10%. Boiler operation and maintenance is therefore a good place to start when looking for ways to reduce energy use and save money.

The steam generator or boiler is an integral component of a steam engine when considered as a prime mover. However it needs to be treated separately, as to some extent a variety of generator types can be combined with a variety of engine units. A boiler incorporates a firebox or furnace in order to burn the fuel and generate heat. The generated heat is transferred to water to make steam, the process of boiling. This produces saturated steam at a rate which can vary according to the pressure above the boiling water. The higher the furnace temperature,

The faster the steam production. The saturated steam thus produced can then either be used immediately to produce power via a turbine and alternator, or else may be further superheated to a higher temperature, this notably reduces suspended water content making a given volume of steam produce more work and creates a greater temperature gradient, which helps reduce the potential to form condensation. Any remaining heat in the combustion gases can then either be evacuated or made to pass through an economizer, the role of which is to warm

the feed water before it reaches the boiler. Boilers have several strengths that have made them a common feature of buildings. They have a long life, can achieve efficiencies up to 95% or greater, provide an effective method of heating a building, and in the case of steam systems, require little or no pumping energy. However, fuel costs can be considerable, regular maintenance is required, and if maintenance is delayed, repair can be costly. Guidance for the construction, operation, and maintenance of boilers is provided primarily by the ASME (American Society of Mechanical Engineers), which produces the following resources:

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1.2 TYPES OF PRESSING

1. Under Pressing:

Pressing from the wrong side of the garment.

2. Top Pressing:

Pressing from the face side of the garment In-Process Pressing, Pressing during the garment manufacturing process

3. Finish Pressing:

Adds the final shape to seams and garments

4. Buck Presses:

Used by manufacturers of slacks, skirts, and jackets and most of the dry cleaning plants A lower buck and a complementary moveable head with a linkage system, buck padding, steam and vacuum systems, frame and table, gauges and manual/automatic controls for steams, vacuum, heat and pressure May be used for in-process pressing and finish pressing.

5. Iron Pressing:

Manual molding operation with pressure and heat application with a flat contact surface Consists of an iron, power line, bed buck, and an iron support system Irons vary in weight and plate dimensions and characteristics depending on the type of pressing operation, fabric, area to be pressed and quality specifications of the operation Mostly used for under-pressing and are more versatile and mobile and are most common in our daily life.

6. Block or Die Pressing:

To establish a product's conformance to a form May change the surface characteristics and dimensions of a product An operator positions the component over a die and engages the machine, and folding blades fold and hold the edges to the underside for creases to be set May also be used to mould collars, collar stands and cuffs.

7. Form Pressing:

Used for final pressing or for renovating garments in dry cleaning plants Formed in approximate shapes as the finished garment Designed to reduce the positioning and repositioning time Just smooth garment fabric but does not set creases.

1.3 Boiler classification:

1. Tube content: (i) Fire tube boiler and (ii) water tube boiler
2. Axis of shell: (i) Horizontal, (ii) vertical, (iii) inclined
3. Location of furnace: (i) Externally fired, (ii) internally fired
4. Method of circulation: (i) Natural, (ii) forced
5. Mobility: (i) Stationary, (ii) portable
6. Usage: (i) Packaged, (ii) unpackaged
7. Pressure: (i) High, (ii) low
8. Tubes: (i) Single-tube, (ii) Multi-tube

Fire Tube Boiler:

As it indicated from the name, the fire tube boiler consists of numbers of tubes through which hot gasses are passed. These hot gas tubes are immersed into water, in a closed vessel. Actually in fire tube boiler one closed vessel or shell contains water, through which hot tubes are passed. These fire tubes or hot gas tubes heated up the water and convert the water into steam and the steam remains in same vessel. As the water and steam both are in same vessel a fire tube boiler cannot produce steam at very high pressure. Generally it can produce maximum 17.5 kg/cm^2 and with a capacity of 9 Metric Ton of steam per hour.

Types of Fire Tube Boiler:

There are different types of fire tube boiler likewise, external furnace and internal furnace fire tube boiler. External furnace boiler can be again categorized into three different types- 1) Horizontal Return Tubular Boiler. 2) Short Fire Box Boiler. 3) Compact Boiler. Again, internal furnace fire tube boiler has also two main categories such as horizontal tubular and vertical tubular fire tube boiler. Normally horizontal return fire tube boiler is used in thermal power plant of low capacity. It consists of a horizontal drum into which there are numbers of horizontal tubes. These tubes are submerged in water. The fuel (normally coal) burnt below these horizontal drum and the combustible gasses move to the rear from where they enter into fire tubes and travel towards the front into the smoke box. During this travel of gasses in tubes, they transfer their heat into the water and steam bubbles come up. As steam is produced, the pressure of the boiler developed, in that closed vessel.

Water Tube Boiler:

A water tube boiler is such kind of boiler where the water is heated inside tubes and the hot. This is the basic definition of water tube boiler. Actually this boiler is just opposite of fire tube boiler where hot gasses are passed through tubes which are surrounded by water.

Types of Water Tube Boiler

There are many types of water tube boilers, such as

- 1) Horizontal Straight Tube Boiler.
- 2) Bent Tube Boiler.
- 3) Cyclone Fired Boiler.

Horizontal Straight Tube Boiler again can be sub - divided into two different types,

- i) Longitudinal Drum Water Tube Boiler.
- ii) Cross Drum Water Tube Boiler.

Bent Tube Boiler also can be sub divided into four different types,

- i) Two Drum Bent Tube Boiler.
- ii) Three Drum Bent Tube Boiler.
- iii) Low Head Three Drum Bent Tube Boiler.
- iv) Four Drum Bent Tube Boiler.

II. PROBLEM DEFINITION

All combustion equipment must be operated properly to prevent dangerous conditions or disasters from occurring, causing personal injury and property loss. The basic cause of boiler explosions is ignition of a combustible gas that has accumulated within the boiler. This situation could arise in a number of ways, for example fuel, air, or ignition is interrupted for some reason, the flame extinguishes, and combustible gas accumulates and is reignited. Another example is when a number of unsuccessful attempts at ignition occur without the appropriate purging of accumulated combustible gas. There is a tremendous amount of stored energy within a boiler. The state change of superheated water from a hot liquid to a vapour (steam) releases an enormous amount of energy. For example, 1 ft³ of water will expand to 1600 ft³ when it turns to steam. Therefore, "if you could capture all the energy released when a 30 gallon home hot water tank flashes into explosive failure at 332°F, you would have enough force to send the average car (weighing 2,500 lbs) to a height of nearly 125 feet. This is equivalent to more than the height of a 14 story apartment building, starting with a lift off velocity of 85 miles per hour. Boiler safety is a key objective of the National Board of Boiler and Pressure Vessel Inspectors. This organization reports and tracks boiler safety and the number of incidents related to boilers and pressure vessels each year. Their work has found that the number one incident category resulting in injury was poor maintenance and operator error. This stresses the importance of proper maintenance and operator training. Boilers must be inspected regularly based on manufacturer's recommendations. Pressure vessel integrity, checking of safety relief valves, water cut off devices and proper float operation, gauges and water level indicators should all be inspected. The boiler's fuel and burner system requires proper inspection and maintenance to ensure efficient operation, heat transfer and correct flame detection. The Federal Energy Management Project (FEMP) O&M Best Practices Guide to Achieving Operation Efficiency

is a good resource describing a preventive maintenance plan and also explaining the importance of such a plan.

III. METHODOLOGY

Steam boiler or simply a **boiler** is basically a closed vessel into which water is heated until the water is converted into steam at required pressure. This is most basic **definition of boiler**.

Direct method:

Direct method of boiler efficiency test is more usable or more common boiler efficiency $= \frac{Q(H_g - H_f)}{q \cdot \text{GCV}} \cdot 100$ Q = Total steam flow, H_g = Enthalpy of saturated steam in kcal/kg, H_f = Enthalpy of feed water in kcal/kg, q = quantity of fuel use in kg/hr, GCV = gross calorific value in Kcal/kg, like pet coke (8200 Kcal/kg).

Indirect method:

To measure the boiler efficiency in indirect method we need a following parameter like

- 1) Ultimate analysis of fuel (H_2 , S_2 , S, C moisture constraint, ash constraint)
- 2) Percentage of O_2 or CO_2 at flue gas
- 3) Flue gas temperature at outlet
- 4) Ambient temperature in deg c and humidity of air in kg/kg
- 5) GCV of flue in Kcal/kg
- 6) Ash percentage in combustible fuel
- 7) GCV of ash in Kcal/kg

TANK CONNECTIONS

The heater is supplied with separate cold water and hot water connections. A connection is provided for mounting a combination safety temperature and pressure relief valve. An overflow line should be utilized from the relief valve outlet to a floor drain. See drawing for locations and sizes.

OUTER SHELL, INSULATION, AND SUPPORTS

The tank is encapsulated in 2-inches of high-density fiberglass insulation. The protective shell is constructed of galvanized and is coated with a durable silver hammer tone finish. The entire vessel is supported on heavy-duty integrally welded steel supports for sturdy floor mounting.

HEATING COIL

The water heater is supplied with a high quality factory installed 2, 4, or 6-pass U-tube heating coil constructed from 20-gauge $\frac{3}{4}$ -inch O.D. single wall copper tubing designed for a maximum working pressure of 150 psi. The tubing is installed in a heavy-duty fabricated steel head with threaded NPT connections. Each assembly is fastened to a corresponding tank flange using a gasket and hex head steel bolts and nuts. Specialized heating coil construction may be included. These options include, Double wall tubing with a leak detection port, or special materials (stainless steel, 90/10 copper-nickel, other) for the tubes and/or head. See drawing for complete details.

CONTROL VALVE

A fully modulating temperature regulator (also referred to as a control valve) should be installed to regulate the flow of boiler water through the heating coil. No quick opening or snap-acting valve should be used as these can cause surges in pressure or thermal shock to the coil. If the unit is furnished with a pilot operated or self contained control valve, no external source of power is required for the valve. The operating controls are factory selected sized, piped, and tested to ensure reliable operation, but can be shipped loose for in the field installation by others up on request. The following is an overview of the various boiler water control systems available.



FIG-1 CUT SECTION OF SHELL

IV. IRONING AND PRESSING EQUIPMENTS

In the garment industry, equipment for handling fabrics with damp heat to iron surfaces, fold edges, iron out seams, shape flat parts, and raise the pile during the manufacture of clothing. Ironing and pressing equipment shapes the semi finished garment by bringing the fabric fibers into a highly elastic state and then deforming and setting them. This is done by the simultaneous action of moisture, heat, and pressure on the fabric. Different types of fabric require specific combinations of moisture, pressure per surface unit, temperature, and duration of the process.

Ironing and pressing equipment includes irons, presses, steamers, steam-air dummies, assembling and shaping equipment, and auxiliary equipment. There is equipment that operates in sequence (irons, steamers), in sequence and in parallel fashion (presses, assembling and shaping equipment), and in parallel fashion (steam-air dummies). Ironing and pressing equipment can be operated manually or by a pedal; it can also be powered by pneumatic, hydraulic, or belt drive from electric motors. Presses with capacities up to 50 MN (500 kilogram-force) are considered light, up to 250 MN (2,500 kilogram-force) as medium, and above 250 MN as heavy. Presses are manufactured with electric, steam, and oil heating equipment. Auxiliary equipment includes various attachments, forms, and moisteners.

The most common but least productive ironing and pressing device is the iron, which is suitable for performing a large number of operations in processing with heat and moisture. More refined and more productive but less widespread are ironing presses, which permit a considerable degree of mechanization and some automation of processing with heat and moisture. Fabrics are steamed in order to eliminate sheen (luster), which develops when ironing and pressing equipment is used. Steaming is done either on specially designed ironing presses that combine pressing and steaming or on steaming equipment. In steam presses the steam is delivered to the article through an upper ironing cushion. The working part of steaming equipment is a brush with a nozzle mounted on a flexible, steam-resistant sleeve joined to a steam line or individual steam generator.

Work on steam-air dummies is highly efficient. A steam-air dummy consists of a metal frame on a firm rotating base, with padding in the shape of the finished product placed on the frame. Special equipment employing steam and hot air under

Pressure is used to shape the product placed on the dummy. Steam-air dummies are used to form dresses, suits, coats, underwear, and certain other products. Sequential and parallel ironing and pressing equipment includes highly productive machinery and equipment for unit processing and the assembly of parts with thermoplastic glues to ensure high quality and stable production.

Extensive use is made of control and measuring equipment such as mechanical, oil, and electronic time relays; bimetallic, fluid, and semiconductor thermo regulators; pressure gauges; and moisture gauges. This equipment maintains the regimens of moisture and heat treatment within the limits recommended for a particular type of fabric. Presses with electrically heated ironing surfaces (cushions) are wide-spread, but the use of steam or of fluids that create a more even heat when mixed with hot air offers better long-range prospects as heat conductors.

Further development of ironing and pressing equipment envisages automation of the supervision and operation of press work, mechanization of auxiliary and laborious processes, intensification and improvement in the quality of processing (the use of a vacuum to remove moisture and steam permeation instead of moistening), increased productivity (multi operational and multi positional presses), and improved working conditions.



型号 MODEL	ES-200	ES-200L	ES-300	ES-300L	ES-94A	ES-94AL	ES-85AF	BSP-600	BSS-600	BS-6PC	BS-6SC	HS-B8TN
重量(KG) WEIGHT	2.4	2.64	2.1	2.64	2.1	2.64	2.3	1.8	1.8	1.8	1.8	2.7
类型 STEAM VALVE TYPE	knob dial	knob dial	knob dial	knob dial	knob dial	knob dial	knob dial	press	dial	press	dial	dial
功率(W) POWER	1000W	1350W	1000W	1350W	1000W	1350W	1000W	1000W	1000W	1000W	1000W	1000W
用途 IRONING PURPOSE	middle ironing	large ironing	middle ironing	large ironing	middle ironing	large ironing	middle ironing	large ironing	large ironing	large ironing	large ironing	large ironing

V. DESIGN AND CALCULATION

5.1 DESIGN OF BOILER

Steam boilers for textile:

Textile industry is suffering from energy crisis specially Gas, Low pressure and high demand among residence in winter causes complete breakdown. So, it's high requirement to shift on alternate energy resources e.g. Coal. Country is very rich with its coal reserves and it can serve for quite long. In this post we will discuss possible energy alternates for textile industry, Economical aspect (Costing), Merits and demerits involved. Major focus is on costing to evaluate efficiency of different

energy resources. Industry utilizes different kind of boilers with varying pressure and of different capacities as per unit requirement.

Let's assume a boiler working at pressure 5Bar and producing steam of Two Tons per hour. Efficiency of this boiler is approx. 80%.

What would be cost of producing 2Tons of steam per hour on Natural Gas, Coal and Furnace Oil?

Our solution to this scenario is a simple formula which says:

$$\text{Efficiency (n)} = \frac{\text{Output Quantity of Steam (Qs)} \times \text{Energy in Steam (hf)}}{\text{Input Qt of Fuel (Qf)} \times \text{Gross Cal. Val. (GCV)} \times \text{Sp. Gravity of fuel}}$$

Omitting Specific Gravity of fuels to simplify and Shifting variables of formula from here to there and vice versa. So, that Final shape becomes.

$$Q_f = \frac{Q_s \times h_f}{\text{GCV} \times n}$$

So, Here what these are

Qf = Quantity of fuel needed to produce 2Tons steam per hour at 5 Bar

Qs = Quantity of steam. This is fixed value 2000Kg per hour

Hf = Enthalpy of evaporation which is Fix Value taken from Steam table, 2757KJ/Kg of Steam. (Means One Kilogram of steam has this much energy at Pressure 5 Bar)

GCV = Gross caloric value, Different for each combustible material.

N = Efficiency of Boiler, Fixed quantity taken as 80%, we will put 0.8 in formula.

5.2 DESIGN OF PRESSING SOURCE

Steaming is one of the most important processes in textile processing such as well as being widely used in pre-treatment, dyeing, finishing and printing processes has come a long way from its traditional associations with locomotives and the industrial revolution.

Steam today is an integral and essential part of modern technology. Without it, our food, textile, chemical medical, power, heating and transport industries could not exist or perform as they do.

Steam provides a means of transporting controllable amounts of energy from a central, automated boiler house, where it can be efficiently.

This is an obvious example of what steam is used for. It is just easier to get rid of spots and dirt when the washing water is heated. Our washing machine at home does the same, however with electrical heating. In large laundries this would be inefficient as electrical energy is too expensive. Steam can also be perfectly used for downstream processes like pressing, using the mangle, ironing or finishing. We know this process from steam-ironing at home; steam simply removes all creases.

Industrial boiler systems can cope with much higher pressures than pressure cookers. These boilers are welded from thick steel plates that are up to 20 mm thick, making pressures of 20 bar and more possible. A stable, robust design is also essential – if a boiler of this type were to collapse, explosive forces comparable to the explosive power of a ton of gelignite would be released (milk

boiling over in a pressure cooker is nothing in comparison to this). A thermal output of up to 10 MW is possible from a single boiler.

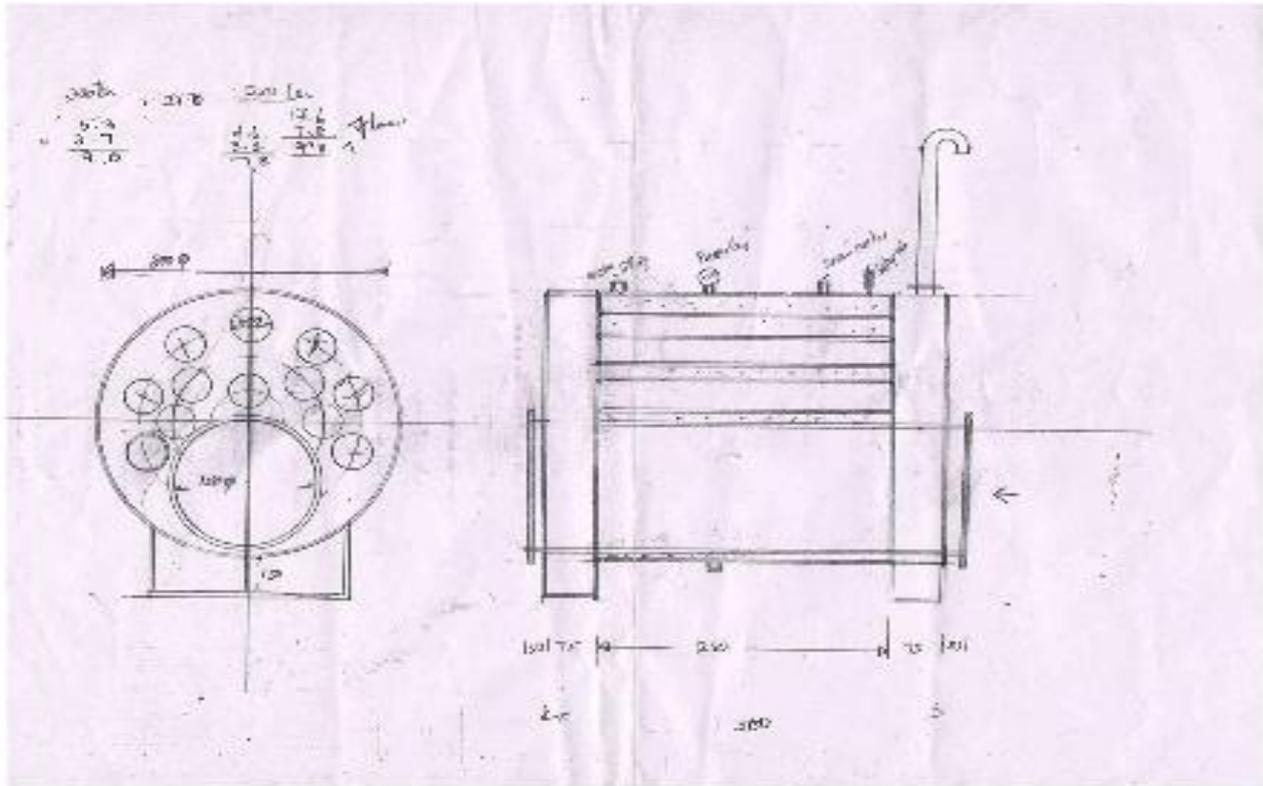


FIG 2 DESIGN OF BOILER

VI. WORKING PRINCIPLE

Both gas and oil fired boilers use controlled combustion of the fuel to heat water. The key boiler components involved in this process are the burner, combustion chamber, heat exchanger, and controls. The burner mixes the fuel and oxygen together and, with the assistance of an ignition device, provides a platform for combustion. This combustion takes place in the combustion chamber, and the heat that it generates is transferred to the water through the heat exchanger. Controls regulate the ignition, burner firing rate, fuel supply, air supply, exhaust draft, water temperature, steam pressure, and boiler pressure. Hot water produced by a boiler is pumped through pipes and delivered to equipment throughout the building, which can include hot water coils in air handling units, service hot water heating equipment, and terminal units. Steam boilers produce steam that flows through pipes from areas of high pressure to areas of low pressure, unaided by an external energy source such as a pump. Steam utilized for heating can be directly utilized by steam using equipment or can provide heat through a heat exchanger that supplies hot water to the equipment. The discussion of different types of boilers, below, provides more detail on the designs of specific boiler systems.

The basic working principle of boiler is very simple and easy to understand. The boiler is essentially a closed vessel inside which water is stored. Fuel (generally coal) is burnt in a furnace and hot gasses are produced. These hot gasses come in contact with water vessel where the heat of these hot gases transfer to the water and consequently steam is produced in the boiler. Then this steam is piped to the turbine of thermal power plant. There are many different types of boiler utilized for different purposes like running a production unit, sanitizing some area, sterilizing equipment, to warm up the surroundings etc.

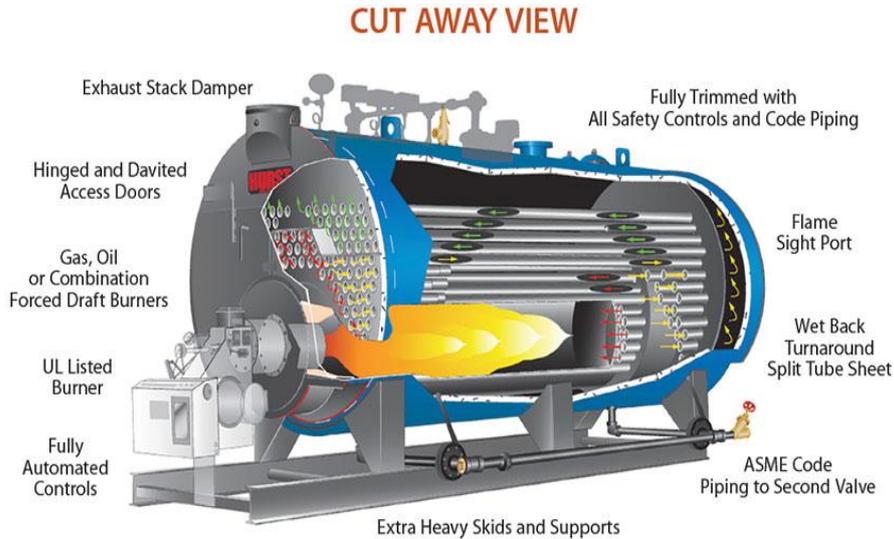


FIG 3 CUT AWAY VIEW OF A SYSTEM

VII. EXPERIMENTAL ANALYSIS

7.1 EVAPORATION METHOD:

The percentage of total heat exported by outlet steam in the total heat supplied by the fuel (coal) is called steam boiler efficiency.

$$\text{Steam Boiler Efficiency}(\%) = \frac{\text{Heat exported by outlet steam}}{\text{Heat supplied by the fuel}} \times 100$$

It includes with thermal efficiency, combustion efficiency & fuel to steam efficiency. Steam boiler efficiency depends upon the size of boiler used. A typical efficiency of steam boiler is 80% to 88%. Actually there are some losses occur like incomplete combustion, radiating loss occurs from steam boiler surrounding wall, defective combustion gas etc. Hence, efficiency of steam boiler gives this result.

BOILER

A boiler is a closed vessel in which water or other fluid is heated. The fluid does not necessarily boil. The heated or vaporized fluid exits the boiler for use in various processes or heating applications including water heating, central heating, boiler-based power generation, cooking, and sanitation.

PRESSURE GAUGE

Many techniques have been developed for the measurement of pressure and vacuum. Instruments used to measure pressure are called pressure gauges or vacuum gauges. A manometer is an instrument that uses a column of liquid to measure pressure, although the term is often used nowadays to mean any pressure measuring instrument. A vacuum gauge is used to measure the pressure in a vacuum which is further divided into two subcategories, high and low vacuum and sometimes ultra-high vacuum. The applicable pressure range of many of the techniques used to

measure vacuums has an overlap. Hence, by combining several different types of gauge, it is possible to measure system pressure continuously from 10 m bar down to 10–11 mbar.

SAFETY VALVE

A safety valve is a valve mechanism which automatically releases a substance from a boiler, pressure vessel, or other system, when the pressure or temperature exceeds preset limits. It is one of a set of pressure safety valves (PSV) or pressure relief valves (PRV), which also includes relief valves, safety relief valves, pilot-operated relief valves, low pressure safety valves, and vacuum pressure safety valves. Safety valves were first used on steam boilers during the Industrial Revolution. Early boilers operating without them were prone to accidental explosion. A gate valve also known as a sluice valve, is a valve that opens by lifting a round or rectangular gate wedge out of the path of the fluid. The distinct feature of a gate valve is the sealing surfaces between the gate and seats are planar, so gate valves are often used when a straight-line flow of fluid and minimum restriction is desired. The gate faces can form a wedge shape or they can be parallel.

VIII. RESULT AND DISCUSSION

A boiler or steam generator is a device used to create steam by applying heat energy to water. Although the definitions are somewhat flexible, it can be said that older steam generators were commonly termed boilers and worked at low to medium pressure (1–300 psi or 6.895–2,068.427 kPa) at pressures above this, it is more usual to speak of a steam generator.

A boiler or steam generator is used wherever a source of steam is required. The form and size depends on the application: mobile steam engines such as steam locomotives, portable engines and steam-powered road vehicles typically use a smaller boiler that forms an integral part of the vehicle; stationary steam engines, industrial installations and power stations will usually have a larger separate steam generating facility connected to the point-of-use by piping. A notable exception is the steam-powered fireless locomotive, where separately-generated steam is transferred to a receiver (tank) on the locomotive.

Thus it will lead to many changes in the field of Thermal engineering and development of revolutionary heat exchangers. The integration of many collective applications of steam from the boiler is possible.

IX. CONCLUSION

A miniature steam power plant was presented. Construction and operation details were explained. The voltage generated by the power plant is enough to lighten two LEDs. Energy efficiency is very low. This is because the built miniature power plant is far from being optimized like a real world one is. From the description presented is the text although the working principle is the same there are profound differences between a real steam power plant and the model described in this paper that directly affect efficiency. The major difference is the steam temperature difference between steam going to and existing the turbine. In a real world plant steam enters the turbine at 550°C and exit at a relatively low temperature although higher than ambient temperature. In this model the steam enters the turbine at about 120°C and leaves the turbine still very hot, steam temperature was not measured but it is hot enough to burn the skin. Despite very poor efficiency the device is very eye-catching and especially suitable for science fair events.



FIG 4 FINAL VIEW OF DESIGN AND FABRICATION OF PRESSING STEAM BOILER

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