Mamko Design and Engineering Pvt Ltd

WATER EMULSIFIED FUELS

OBJECTIVE

When the objective is to improve the Fuel Efficiency and to achieve the bestCost Effectiveness of the Fuels,there are two possible ways.

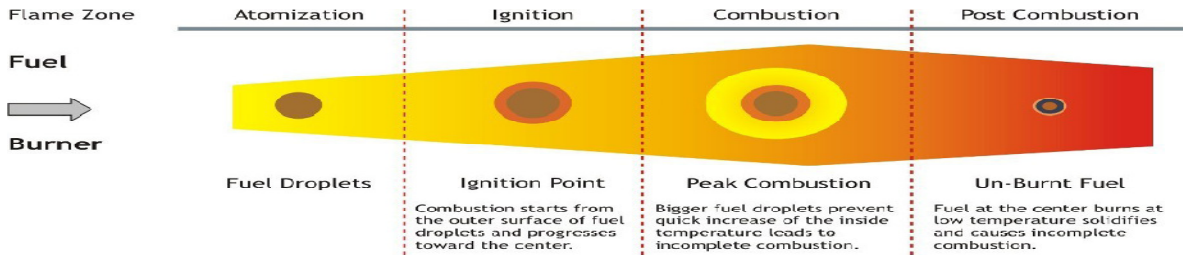
1. Improving Designs of the Burners of Boilers/ Furnaces
2. ChangingPhysicochemical Characteristics of the Fuels

Our focus has been on the second aspects that areto change the characteristics of the fuel so that its performance is improved. Thus the Fuel has better efficiency and consequentlyPollution is also reduced. The cost is also an important factor to be taken into consideration. We have thus chosen the Emulsification of fuels as the right Technology for this Purpose.

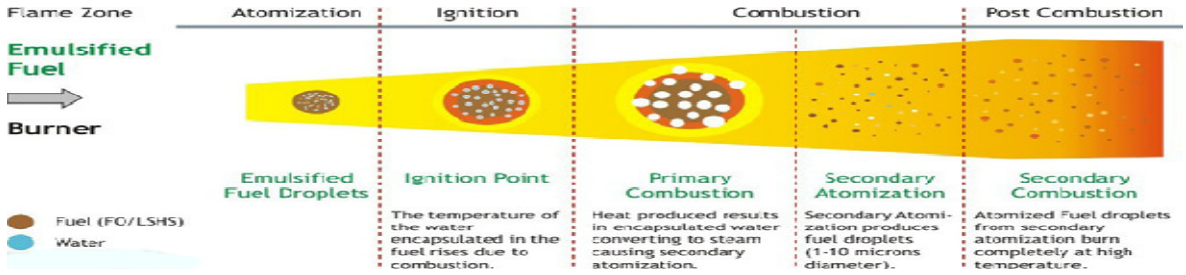
Emulsion is a mixture of liquids that normally do not mix with each other, like oil and water.We chose Water for Emulsification of Fuel Oils. The improvements in combustion and consequent benefits are described below.

COMBUSTION IMPROVEMENTS

In the combustion of the fuel, the burner produces a spray of fuel droplets of 100-200 microns in diameter. The size of the droplets depends on fuel quality and the burning system used. While burning normal fuel, the droplets do not burn completely and creates higher Particulate Matter (PM); thus, reducing the overall thermal efficiency. A pictorial view is given below.



In the combustion of Emulsions of water in fuel oil, the primary spray of fuel droplets are further divided as a result of the micro explosions due to vaporization of the water encapsulated in fuel droplets. The vaporization of the encapsulated water in the fuel results in rapid explosion of the surrounding fuel droplets, fragmenting fuel into large number of smaller fuel droplets. This is called secondary atomization. The emulsified fuel droplets 100-200 microns in size are fragmented into a large number of 1-10 microns fuel droplets leading to efficient combustion. A pictorial view is given below.



APPLICATION INDUSTRIES

Basically wherever Residual fuels (FO/LSHS/CBFS/COAL-TAR) or LDOare fired or combusted, such as in Furnaces, Boilers, Thermic Fluid Heaters and Kilns Operation, this technology can find a direct use.

Typical Industrial Processes are:

- **Furnaces** :Solvent Fractionation, Metal Processing, Forgings and Heat Treatment.
- **Boilers and Thermic Fluid Heaters**: Petroleum, Textiles, Chemicals, Pharmaceuticals and Processed Foods

ENVIRONMENTAL BENEFITS

It is clear from the Mechanism above that there shall be substantial reduction in PM (Particulate Matter). This also results in reducing soot deposition on the walls of Boilers and Furnaces.

The heat requirement for converting water into high temperature steam and increase in specific heat causes reduction in stack temperature. This in turn reduces the NOX. Further reduction in NOX could be achieved with some additives.

For effective SOX reduction some additives are necessary to be added in water. If and when they are added SOX reduction insubstantial quantity is realized.

Reduction quantities depend upon the state of the Furnace/Boiler/Kilns at the time of application of this Technology.

Reduction in

- PM upto25%
- NOX up to 60%
- Soot up to 80%
- CO2 up to 5%

could be achieved.

COMMERCIAL BENEFITS

Fuel Oil saving up to 5 to 30% has been observed in several installations. In effect, for the same heat generation 5 to 30% less is the Fuel requirement.

Fuel economy obviously reduces CO2 emission for the same heat generation.

Reduction in Boiler/Furnace MaintenanceCosts, as results of less deposition of soot on the walls, is also an added benefit.

USP OF MAMKO TECHNOLOGY

Generation of W/O Emulsion perhaps can be realized in many other ways. Often, the Emulsions so generated are so weak that the water explosion takes place even before the burning stage whereby the impact of the secondary atomization is lost.

Using the Fluid Mechanics and Rheology skills, Mamko have developed Inline Mechanical Emulsifiers, where with the help of appropriate ‘designs’ not only that small drops are formed but also you get uniform droplet size distribution.

USP of Mamko is thus to create the effective Emulsion, where the Water droplets are uniform and explode at the right time.

IMPLEMENTATION

We take up the following steps in implementation.

(1) Study your Furnace/Boiler and the operation of the same.
(2) Understand your Pollution related expectations.
(3) Understand the time cycles that is the time between the Emulsion preparation and Emulsion use.
(4) All these details shall be filled in our ‘Datasheet’ by our Engineers together with your Representative Engineers and Managers.
(5) Having received your filled-up Datasheet our Engineers shall prepare a Proposal for Emulsification System (See attached Brochure) and explain to you the Additive Programme.
(6) After reaching a mutually acceptable Agreement we shall proceed further for implementation.

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