

## FUEL SAVING TECHNOLOGY

### OBJECTIVE

When the objective is to improve the Fuel Efficiency and to achieve the best cost effectiveness of the Fuel, there are two possible ways.

- Improvement in the design of Boilers, Furnaces and more specifically the Burners.
- Improvement in the Fuel Oil performance by changing its physicochemical characteristics.

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

Water in Fuel Oil has to be an Emulsion. An Emulsion is a mixture of liquids that normally do not mix with each other, like oil and water. System has to be developed to control the stability and quantity of the emulsion to make it commercially viable for industrial use.

### PROCESS SYSTEM

The Process System designed by mamko is based on Inline Mixing and Emulsification principles. The three stages of the Mechanical Emulsification process are as follows:

- **Distribution** :- Water (and Emulsifier) droplets are formed and distributed in the fuel (FO/LSHS/CBFS/LDO) matrix.
- **Mixing** :- Water (and Emulsifier) droplets are spatially mixed in the fuel (FO/LSHS/CBFS/LDO) matrix.
- **Refining** :- The droplets are refined to be of consistent size and uniformly distributed in the fuel (FO/LSHS/CBFS/LDO) matrix.

Around these Essential Equipment there are Tanks, High Pressure Pumps, Piping and adequate Pressure and Temperature Indicators which complete the system.

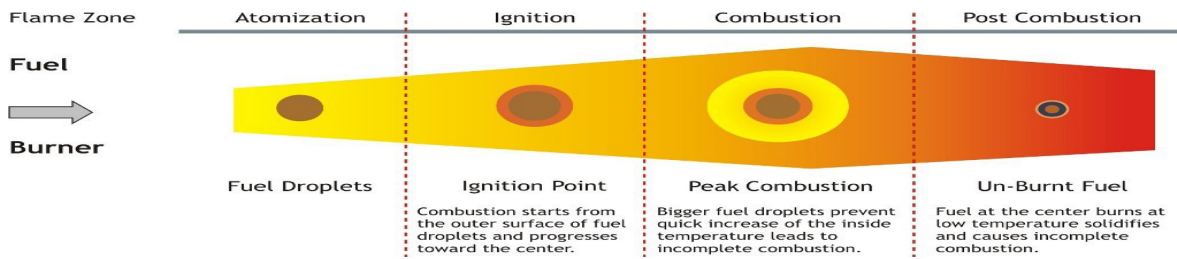
### APPLICATIONS

This system is useful in industries which uses Residual fuels (FO/LSHS/CBFS) or LDO for Furnaces, Boilers, Thermal fluid heaters and kiln operations.

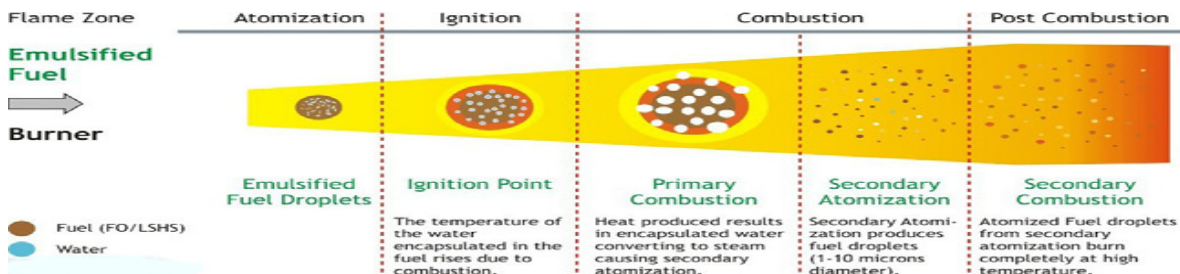
The following industries find wide usage

- **Furnaces** : Metal processing, Forgings and heat treatment.
- **Boilers and Thermic Fluid heater**: Textiles, Chemicals, Pharmaceuticals and Food processing.
- **Kilns** : Ore Processing and Paper.

## WORKING PRINCIPLE



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 SPM levels thus reducing the overall thermal efficiency.



In the combustion of Water in fuel oil, the primary spray 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 expansion of the surrounding fuel droplets, fragmenting fuel into large number of smaller fuel droplets. This is called secondary atomization. The emulsified fuel droplets 200 microns in size are fragmented into a large number of 1-10 microns fuel droplets leading to efficient combustion.

## ADVANTAGES

Complete combustion of Fuel is achieved. And therefore, Savings of between 10 and 30% of Fuel have been observed in several installations.

If you emulsify only water without incorporation of any Chemical Additives you will achieve 2 to 10% Fuel Saving. However, you will have to add a Chemical Additive, in case :

- you will need to store the emulsion for longer than 1 day.
- you wish to increase the fuel saving up to 30%
- you wish to have reduction in SPM and NOX
- you wish to get substantial reduction in SOX.

## MAMKO OFFER

MAMKO Representative will study your System that is Furnace and Boiler. Mamko shall then offer you proper Design.

Mamko include the Installation and Commissioning of the Process System in their offer.

Mamko, thus, offers custom-built or Tailor-made systems. Mamko is also open to Consultancy and Supply of 'Crucial Equipment' to achieve the objective.