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## Results

Results obtained in the Dalkia group (global leader in energy services) after the installation of one MIVI sensor in a central heater boiler with mechanical sprayings

<b>Unburned residue</b>	Reduction by 85%
<b>Smog temperature</b>	Reduction from 240°C / 465°F to 200°C / 390°F
<b>Maintenance operations</b>	Division of number of interventions by 10
<b>Combustion parameters</b>	Stabilization from 4% to 1%
<b>Impact of viscosity variation on O<sub>2</sub> smoke value</b>	0.5 cP for 1% variation
<b>Fuel consumption savings</b>	1% or more

## Benefits

The installation of the **Sofraser MIVI inline process viscometer:**

- accurately provides and controls fuel oil viscosity of fuel oil at a specifically set point
- adjusts for variations in each supplier's fuel oil quality
- standardizes fuel prior to spraying for efficient combustion
- optimizes fuel consumption
- reduces burner / boiler maintenance

## Return on Investment

Installations in combustion applications proved **process optimization savings ranging between 1 and 2%**.

For example: A combustion process burning 10,000 tons of HFO can expect a savings of 67,000 USD per year.

<b>Quantity burned / year (tons)</b>	10,000 t
<b>Cost (USD / ton Feb. 2013)</b>	670 USD
<b>Process optimization rate</b>	1%
<b>Savings / year</b>	<b>67 000 USD</b>

In this example, the Sofraser MIVI viscometer provides **ROI within less than 4 months**.

## HFO combustion control users:

Stein Heurtey, Saudi Aramco, Dalkia, Astra Calvé, Hyundai Heavy Industries, Mitsubishi Heavy Industry Co, Shenzhen Southern Float Glass, Korea Chemical Co, Ltd, GIE Evry, EDF, Société de Distribution de Chaleur de Saint Denis, Orléans Cofret, BIP diffusion, Cofreth, Aéroports de Paris, Naphtachimie, Ciments Français, Comuhex, Papeteries de Gascogne, Compagnie Sénégalaise des Phosphates de Taïba, Tecni, Afrique Mines et Industries, ITE, Rente, Tabriz Thermal Power Plant, Université de Laval, Compagnie Parisienne de chauffage urbain, Fine Co., CCIAG, CORECA, Air Liquide, Nolis Spa...

## Guide for identifying viscosity measurement needs

### Topics and Key Points

#### Does the smoke temperature exceed the manufacturer's specifications?

Smoke temperatures are provided by boilers' manufacturers in order to identify optimum combustion. Energy is costly to produce. If temperatures are in excess of manufacturer's specs, energy is wasted.

#### What pollution control legislation regarding air particle concentration is in effect?

Particles in the air are unburned fuel in the smoke. By controlling viscosity, in-air particle emission is reduced.

#### Is the smoke black?

Black smoke indicates fuel rejection, which means inefficient energy use.

#### Is there unburned residue in the combustion chamber?

Unburned residue generates increased maintenance operations which, in turn, cause production down-time.

#### How often is maintenance performed? How much does each maintenance episode cost?

Frequent maintenance intervenes with production. Maintenance itself costs money, and production lapses generate loss.

#### How are fuel viscosity nominal values and tolerances given by the equipment supplier assured?

Maintaining tolerances given by the manufacturer assures combustion's optimum yield.

#### Are there noticeable variations in the fuel supply?

Even a slight variation in fuel viscosity generates a shift, alters combustion parameters, and diminishes performance. Precise monitoring enhances performance.

#### Is the smoke O<sub>2</sub> level compliant with the manufacturer's specifications?

A variability of even 0.5 cP can generate a 1% deterioration of the O<sub>2</sub> combustion parameters.

#### Are all combustion parameters stabilized?

With inline viscosity control, it is possible to stabilize parameters within 1%.

#### Are temperature controls used to verify fuel viscosity?

Only inline viscosity control can stabilize the viscosity before spraying. Using only temperature controls will not identify batch-to-batch viscosity changes.

### Sofraser recommended solution

<b>MIVI 9510</b>	Options for relays and alarms Can be combined with external controller
<b>MIVI 9100</b>	Low price positioning Can be combined with external controller

Contact Sofraser for detailed sensor configuration

### Main competitors in this application:

Worldwide:

- VAF
- Emerson

### This system is also efficient in:

- other liquid fuel combustion applications
- petroleum or chemical residues (high temperature preheating) combustion
- coal slurries
- high viscosity liquid fuel combustion applications
- black liquor combustion
- marine engine regulation / transition from heavy to light fuel



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