SOLTRON

ENZYME TECHNOLOGY

What is Soltron®?

- **Soltron®** is a proven fuel catalyst. It contains naturally occurring enzymes, which modify the molecular structure of crude as well as fuels converting specific substrates to the corresponding products: improving processing, enhancing combustion, reducing emissions, sludge elimination..

- This results in increased performance, economy, and a reduction in the emission of harmful gases including Carbon Monoxide (CO), unburned Hydrocarbons (HCn), Nitrous Oxide (NOx), Sulphur Dioxide (SO2), and smoke.

- **Soltron's enzymes act to prevent the growth of micro-organisms, including bacteria, fungi and yeast as well as to eliminate them completely**

Can Soltron® Damage Your Valuable Assets?

No - Soltron® is a mixture of enzymes extracted from green plants that have very specific fuel conditioning functions. They cannot cause wear or attack seals and metal surfaces in fuel systems, tanks, engines, pipes and combustion equipment.
Indeed the reverse is true: the Soltron® enzymes eliminate or reduce the various chemical compounds and microbes which cause problems.

How does Soltron® work?

Before Processing/Combustion

- De emulsification crude of fuels, refinery, tanks, pipes…

- **Cleans the fuel of microbial contamination**: unclogs tanks, pipes, fuel filters, fuel pumps & injectors.
  (Quote from South African Bureau of Standards: **"The biocides efficacy of Soltron was tested to SABS 1434:1987 – Biocides for use in fuels. There was a 99.92% reduction in organism count").**
- Restricts the formation of asphaltenes, gums, paraffin, resin and waxes.
- Disperses fuel sludge
- Aids lubricity.

During Processing/Combustion

- Accelerates and improves processing/combustion by acting as a biological catalyst to increase thermal efficiency – the rate of heat release.
- Drastically reduction of carbon deposits
- Reduces oil consumption
- **Result:** lower maintenance costs through reduced carbon deposits and acid attack

After Processing/Combustion

- Reduced PM10's: particulates in soot / smoke
- Reduced gas emissions and odors. Quote from Dr Roy Douglas of Queens **University, Belfast**,"The two main carcinogenic products in fossil fuel emissions are the particulate matter (smoke) and the hydrocarbons (partially burnt fuel). Test results show that both of these products are significantly reduced by the use of the Soltron additive"
- Reduced engine vibration
- Increased engine power; plus fuel economy of 6-15%. Actual savings depend on driver, driving conditions, and engine condition
- Enables catalytic converters and turbochargers to work as designed

Uses in Kilns

Soltron reduces down time by:

- Keeping nozzles clean
- Prevents oil in filter bag
- Prevents carbonation of burner tips

- Facilitating optimum fuel reliability

Other benefits include:

- Quick clean start
- Increase in radiated heat (thermal efficiency)
- Quicker drying time
- Therefore increased productivity

Findings of BP and Shell test of Soltron at their joint venture refinery in South Africa

Air Pollution Abatement

- The levels of air pollution were significantly reduced in the normal operating range of the boilers. The reductions were: **SO_2 (14-18%), NO (12-32%), CO (100%), Smoke (39-55%)**

Fuel Consumption Reduction

- The fuel consumption reduction was **24%**. The fuel consumption reduction not only has a direct financial benefit but also benefits the total **air pollution** reduction form the boilers i.e. when less fuel is burned there is an equivalent reduction in emissions.

PUBLIC HEALTH

Recently published scientific research has shown there are links between air pollution and:

Lung Cancer
Bronchial complaints
Asthma
Heart disease
Damage to foetus' in the womb

E.U. is committed to improved Public Health. Reductions in air pollution will contribute to that aim AND, as a direct result, reduce the costs of treatment for diseases resulting directly and indirectly from polluted air.

TREATY OBLIGATIONS - EMISSIONS

The United States **FY 00 ILIR Program Potential Fleet Impacts** programme has an interesting summary:

"If NOx reductions of any significance are to be achieved, existing vessels will have to make a substantial contribution. The large number of Navy diesel engines, rated at less than 400 hp, operated primarily in harbour and coastal waters would be a logical target for a NOx emissions reductions effort. These stringent air quality coastal limits would significantly affect Navy operations and missions. Also, with diesel particulate emissions being identified as a toxic air contaminant and a health hazard, the regulation of particulate emissions from in-use engines is a real possibility."

Since virtually all Navy diesel engines exceed the international limits, some by more than a factor of two; **it is conceivable that the Greek Navy will be required to bring some portion of its current diesel engine population into compliance at a future date - just to satisfy International Treaty obligations.**

IMPORTANT:

Handling the Soltron® does not require not any physical protection.

What can Soltron® help achieve?

- **Savings in maintenance costs**
- **Energy saving in processing**
- **Enhanced processing facilities and engine life**
- **Compliance with the strictest emissions legislation currently in force**
- **Dramatically reduced fuel odors: improving passenger comfort**
- **Fuel cost savings**

- Reduction of lost time due to arising problems
- Enhanced engine and fuel efficiency

Who Uses Soltron now?

- BP South Africa – premium, fuel oil
- BP Energy +
- Caltex (formerly part of Chevron-Texaco) retail sales and for cleaning pipelines
- BP and Shell joint venture refinery in South Africa: Petroleum Refineries Pty Ltd
- National Defence Agency of Japan
- Nestle – for cleaning Fuel Oil tanks
- Volvo Penta recommend Soltron in all marine engines
- "Star Ferries" of Hong Kong, "Wightink", Caledonian "Mac Brayne use Soltron in their ferries
- Bridgestone tyres, NEC, NYK, YKK and Sony Corporation use Soltron in their boilers
- Ohji Paper products (the largest paper company in Japan)
- Okinawa Ishiagi Power Station
- All Nippon Buses and All Nippon Railways
- Indian state petroleum company for road and industrial fuel
- X Mile –chain of gasoline station – Holland
- Greeks
- France

And many, many other well known companies.

Summary - Soltron is used for

- Processing
- Cleaning pipelines and Fuel tanks
- Combustion efficiency: cleaner burn

- Fuel Savings
- Lower emissions; cleaner air
- Less maintenance and fewer repairs
- **As a unique solution to microbial infestations**
- Economical benefits in processing, using

Applications in all Countries

- Reduce air pollution dramatically by pre-treating all fuels
- Pipeline and tank cleaning – drastically reduction of sludge
- Processing
- Shipping plus ferries and leisure craft
- Power Stations' emissions
- National Guard – all vehicles and ships
- **Biological decontamination of open field**
- Cement production
- Breweries
- Fertilizer plants
- Sugar plants

If Soltron is added at the refinery, the cost will be minimal effects tremendous!!!

"Fuel must contain non toxic micro biological controlled additives that are non hazardous to health, aquatic and plants life." – Directive from EU – Government

Cost Effective

Apart of all mentioned benefits we could calculate simply:

- Fuel saving not less than 8 %
  (According to experience it could reach the level of 28 %)

- Soltron cost is less than 1 % of the saving

Additional saving:

Maintenance

- Power Plant, with normal fuel 6-7.000 MW/h (usually)
  Power Plant, with Soltron use 24-28.000 MW/h
  Scale 1 : 4

- Trains – 1 : 3 or more depending on the engine in use
- Buses – 1 : 4
- Ships – 1 : 4

Spare Parts & Consumption
Life of engine, boiler, system
Kyoto Protocol – saving penalties
Health – huge scale of environmental protection

PPC – public power corporation - simple calculation

1 litre of Soltron – 10.000 litters of fuel
Total consumption 3.000.000 tons
Minimum saving 15 % - equally to 450.000 tons of fuel
Cost ~300 Euro/Mt = 135.000.000 Euro (saved)
Soltron cost = ~ 20.500.000 Euro
First stage benefit in fuel saving = 115.000.000 Euro

EU regulation

In the European **Federation Transport & Environment**, "Controlling traffic pollution and the Auto Oil Programme", Athens is likely to fail to meet its emission targets even with the best current technology and would continue to exceed WHO guidelines.

96/0163 (COD) ***"relating to the quality of petrol and diesel fuels and amending Council Directive 93/12EEC***

In The Commission's fuels directive, the proposal also makes allowance for Member States to require the sale of higher quality fuel in areas where pollution levels are liable to exceed air quality standards (Art 6)

Road fuels.

..that 2005 roads fuels complying with EN228, BS2869, EN590 should be sold to government, industrial and commercial operations , that upon combustion by the aforementioned show the following:

A reduction in Smoke of more than 10%, using the snap emissions test k m^{-1} ;

Particulates, PM_{10} ,

CO

NO_x

within……..hours of the first snap test using standard road fuels. Furthermore there shall be no increase in exhaust emissions of heavy metals.

Following agreement on the last round of European vehicle emissions standards in 1994, the European Commission set up the Auto Oil Programme to develop scientific methods of establishing emissions standards for new vehicles. The idea was to use oil industry and motor manufacturing expertise to determine the most cost effective way of ensuring pollution from motor vehicles didn't lead to air quality problems that would damage human health.

The Auto Oil Programme has thus involved an intense series of studies and negotiations carried out by the Commission, oil industry and motor manufacturers to determine the relative merits and costs of measures to improve fuel quality, to introduce cleaner vehicles, to ensure existing vehicles are well maintained and to reduce the level of traffic*1*.

Four major stages were involved:

i) "the prediction of future air quality in the Community and in the case where future air quality was predicted to fall below an acceptable standard, the identification of appropriate emission reduction targets for road transport";

ii) "the collation and where necessary, the generation of data concerning the potential of the various measures ... to reduce emissions from road transport"

iii) "the collation and, where necessary, the generation of data concerning the cost of introducing those measures"

iv) the identification of "the most cost effective package of measures necessary to achieve the emission reduction targets identified".

The second stage necessitated the collection of a vast array of new data on the comparative emissions of different formulations of petrol and diesel. This collection was organised through a joint research programme known as the **European Programme on Emissions, Fuels and Engine Technologies (EPEFE)**. The third stage entailed a major cost effectiveness study led by the UK-based consultancy Touche Ross*2*

In June 1996, the results of Auto Oil Programme were reported to the European Parliament and Council of Ministers through a Communication (COM(96) 248 final). This included two proposed Directives - one on the quality of petrol and diesel fuels (96/0163/COD) and one relating to measures to be taken against air pollution by emissions from cars (96/0164COD). Three further proposed Directives are expected to be published in 1997 - one on emissions from light commercial vehicles, another on emissions from heavy duty vehicles and the third on inspection and maintenance procedures.

Altogether, the proposals coming out of the Auto Oil Programme represent a major step forward that, if fully implemented, should ensure significant improvements in air quality throughout the European Union. They are far and away the most important measures currently being taken to reduce the incidence of traffic-related smogs. However, there is no doubt that they need to be improved if we are to see an end to traffic-related smogs in the foreseeable future.

What did the Auto Oil Programme conclude?

The Auto Oil Programme demonstrated that, despite the introduction of catalytic convertors, further significant reductions in the emissions of cars, light goods vehicles and heavy duty vehicles are needed if air quality targets are to be achieved. Using an air quality model*1*, based on data from several European cities (including London), it concluded:

. *"with regard to carbon monoxide, the impact of already agreed measures .... will ...by 2005 reduce urban background concentrations in all the cities studied to below the level of the most stringent air quality standard."2*

. *"with regard to benzene the results indicate ... a marked improvement in urban background concentrations... Only in the case where an air quality standard of 2.5 µg/m3* [as an annual average] *is used ... are emissions reductions foreseen to be necessary in a number of the most polluted cities" 3*

. *"with regard to oxides of nitrogen, the air quality modelling results clearly demonstrate that if one uses the more stringent air quality standard ..*[93 µg/m*3* as a 98% percentile of hourly averages]*.. it will necessary to make reductions in emissions of up to 50% (in 2010)."4*

. in respect of particulates *"reductions in the range of 50-65% are required in order to meet the air quality standard of 50 µg/m3"* as a daily mean in most European cities*1*.

. in respect of ozone, *"it is only when an 80% emission reduction (compared to 1990) of precursors from all sources is achieved that over 90% of the EU land area is predicted to have a maximum ozone concentration below 180 µg/m3"2*

As a result, the Programme concluded that nitrogen dioxide, ozone and particulates are the pollutants of greatest concern.

The Programme then identified a range of technologically feasible measures that could be adopted to achieve reductions of these pollutants (or, in the case of ozone, its precursors). These included changes to the vehicles (such as more effective and more durable catalysts), changes to the fuels and changes to inspection and maintenance procedures.

Finally, the impacts and costs of these measures were compared to develop the most cost effective package of measures to achieve air quality targets by the year 2010. This showed, that in the long- term improvements in the vehicles sold offered the greatest potential to reduce emissions cost effectively. This conclusion has been criticised by the European motor industry because it ignores the fact that improvements to fuels could lead to emissions reductions more quickly*3*

What has the European Commission proposed?

As a result of the Auto Oil programme, the Commission has published two proposed directives:

. 96/0163 (COD) *"relating to the quality of petrol and diesel fuels and amending Council Directive 93/12EEC"* proposes new fuel quality standards to come into effect from the year 2000. For the first time, a comprehensive set of specifications will govern the quality of the petrol and diesel sold in the Union. Significantly, this will lead to reductions in the benzene and sulphur content of petrol, thereby reducing emissions of hydrocarbons and nitrogen oxides (Art 3), and the sulphur content of diesel thereby reducing emissions of particulates (Art 4). **The proposal also makes allowance for Member States to require the sale of higher quality fuel in areas where pollution levels are liable to exceed air quality standards (Art 6) and bans the sale of leaded petrol (Art 3). Finally, the proposal makes provision for tougher fuel standards to be introduced by the Commission to come into effect by the year 2005 (Art 9).**

. 96/0164 (COD) "relating to measures to be taken against air pollution by emissions from motor vehicles and amending Council Directives 70/156EEC and 70/220/EEC" proposes new limit values for the emissions of petrol and diesel cars to come into effect for new models from the year 2000 and for all new cars from the year 2001 (Art 3). Furthermore, the proposal makes provision for the Commission to propose a further tightening of limit values to come into effect from the year 2005 (Art 5) and for Member States to introduce fiscal incentives to encourage the purchase of vehicles meeting firstly the 2000 limit values and then the 2005 limit values before they are mandatory (Art 4). Finally, for the first time, the proposal includes a requirement for motor manufacturers to fit **on-board diagnostic systems** to new cars so that the driver can be informed if, for any reason, the emissions reduction technology breaks down.