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58^ INTERNATIONAL FAIR OF FISHING

A TECHNOLOGICAL CONTRIBUTION IN REDUCTION OF OPERATING EXPENSES IN VESSELS AND OTHER NAVAL MEANS

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SAVING ENERGY AND CLEAN ENERGY

INTRODUCTION

In general the oil saving and energy savings arise from the need to reduce the energy dependence of our country and so any action targeted towards these issues contributes to the achievement of the objectives of the European Communities.
The oil crisis of the late 70's has raised a great deal of attention to energy consumption, and if at first it was mainly an economic fact, with the passage of time, people understood that it is also and above all, a fact of relevance environment.
Scarcity of resources, renawable energy and environmental impacts are the keywords of energy management, to which direct attention to direct economic activity.
Therefore, any introductions of technologies aimed at the rationalization of energy consumption, even in an era of relatively low energy cost, is the most important motivations in economic benefits, environmental and energy obtained at the individual company, the nation and the entire planet.
Under this theme we aim was to identify and test a solution that provides access to the integrated objective and is aimed at improving the competitiveness and quality of fishery that traditionally have fewer resources planning.
As mentioned in the report is just the first result from the collaboration between the technology department of the fishing vessel of Research Institute for Marine Fisheries and the society "Tre Erre Ecological Systems" distributor of VOSGES.

OBJECTIVE INTEGRATED

The collaboration began under the inspiration of one of those most directly affected the economic aspect ot the theme : the owner of a fishing vessel.
In line with the latest standards, EU Directives on energy and environment and also some state laws giving effect to a gradual trend to the consultation of the strategies between user - supplier ed user – consumer, shared goal surely and certainly stimulating in its connections with the changes taking place in the fields of environmental energy, it has proved an occasion to promote and address the change of mentality within the logic integrated planning.
In commencing the experimental trials, they have taken account of an already partially supports the introduction of these innovations and where there is now a widespread preference for environmentally friendly products and clean technologies.
The synergy created between research, technology and the owner should allow implementation of the transmission of information between producer, distributor and user, moving the center of gravity of attention toward the latter, as regards the new

perspectives with which you measure the energy market and economic policy choises, and achieving significant results in the energy field - environment.
Basically we tried to center the study on the environmental, economic and energy are the ones who will be based on which the new National Energy Conference, held at the request of the Ministry of Industry, ENEA to be held by 1998, with the cooperation and participation of national institutional and social actors.

A NEW SCENARY OF INQUIRY

In 1987 the said National Energy Conference sanctioned the exit of Italy from nuclear power, while the following year the Government approved the last energy plan.
In 1991 (january 16) was enacted into law n. 10 which set the rules for the implementation of the National Energy Plan in the field of rational energy use, saving energy and developing renewable sources of energy.
In ten years the conditions are completely changed, in particular :

- concerns have shifted the availability of energy to its environmental and climatic effects;
- we have moved from a policy plan (implemented by ENI and ENEL) to a policy of voluntary guidelines and agreements with a multiplicity of actors;
- decisions on energy and the environment have begun to shift from Government to the Regions and to local authorities;
- has increased the importance of the guidelines and directives of the European Union and we are witnessing a globalization of the energy and power plants;
- has centralized the importance of energy policies on employment and competitiveness;
- the focus has shifted from supply to demand and use of energy.

Furthermore, any productive activity, and also that of a fishing vessel, for to be competitive must be ready to combine quality, environment and safety.
The integration is natural, but perhaps less immediately obvious. In order to link those components of the matrix common to Safety and Environment, just think of the unity of the environment on this side and beyond the gates of the company, and the human body as environmental receptor, neither more nor less than the atmosphere, soil or surface water.
Returning to the definition of quality (UNI EN ISO 8402) as a “set of characteristics that determine an entity’s ability to meet the needs expressed and implied” result that among these falls certainly the economic aspect and the respect of environment.
These are precisely the two points that will be examined below, trying to examine the possibility of their improvement and implementation using a system whose principle of action is definitely environmentally friendly.
As with other sectors, the regulation of emissions in the air for ensure air quality standard is based on the transposition of directives issued by the European Community in this field. Here, of course, affect the emission from traffic, whatever type it is, you can legitimately believe that even in the fisheries sector should be encouraged the creation of media

operations and containment/prevention, leaving as a last chance to regulate emissions "not be eliminated".
Althought the issue of fishing vessels not covered by specific legislation, in a logical Europeanist, where it is used more and more the term "improvement" and in each and every company the technical standard becomes manual and the procedures of behaviour technique domestic laws, is more that justified interventions aimed at respect and protection of the environment outside the workplace.
The value of such a principle is also enhanced by recent decisions of the Constitutional Court which noted environmental integrity is a good unit, which can be impaired even by minor procedures and that it must save watched in its entirety.
Any contribution to the improvement of air quality is therefore to be considered valid, in this case it is even more true when you consider the specificity of the Italian energy system to be highly dependent on oil, import almost everything, covering over 53% of total energy requirements, compared to 44% of all European Union countries (including the Italy and 33% in the U.S.A.).
The transport sector therefore plays a key role in social and productive realities of our country and, in relation to the almost total dependence on fossil fuels, has a significant impact on energy and environmental.
Indeed, transport absorb in Italy 30,4% of final energy consumption with an annual growth rate of 3,7% from 71 to 96.
In particular, road transport is responsible for 90% of total energy consumption by sector, to the urban traffic is imputable a share of between 30 and 35%.
As regards air pollution, the transport sector is responsible for 30% of CO_2 emissions, for 63% (of which 79% was due to urban traffic) of emissions of CO, for 49% of NO_X, 62% of Pb and 38% of volatile hydrocarbons.
But the specific sector and the state of the art fishing fleet unsure that good environmental policy intervention to encourage the reduction of energy consumption and improvement of the impact can be taken to improve the efficiency of vehicles flying.

POLICY MANAGEMENT AND ENERGY SAVING

The management of a fishing company the cost of fuel is definitely one of most important influences on the budget management.

The profit of the fishing can essentially be expressed by the relation

$$\mathbf{G = P_{LT} - C_T}$$

where :

P_{LT} is the total gross product (*quantity for price*)
C_T are the total costs (*both direct and indirect*).

A recent economic study conducted by the observatory fish sector ASAP (Venice), the annual operating cost items can be summarized as follows :

boat	18,02%
instrumentation	1,80%
equipment	1,35%
maintenance	4,50%
carbolubrificants	11,26%
insurance	3,60%
staff embarked	54,35%
costs of venue	10,87%

From first examination you may notice that the item has an incidence equal of costs of venue and is anyway the third item after personnel costs (*three sailors*) and the amortization of the boat (*considering an economic life of 20 years*).
Influence on fuel consumption is therefore only a discourse fundamentally economic.
The fuel economy has an influence upstream as are deducted from the sales proceeds the cost of fuels, the management of market, alimentation of the staff embarked, to ice and other management items.

Translating the above formula :

$$\mathbf{P_{LT} - S_C - S_G = R_N}$$

R_N is the net proceeds divided equally between the owner and the crew.

The part due to the owner, usually on board, is also used for maintenance costs, dock, replacement engine or a part of it, fishing tackle and various investments.
If referred the short term, the costs can be considered constant and hence also the marginal savings; in this situation the incidence ot fhe saving of fuel is directly proportional to the total savings and therefore a saving of 10% of fuel (*approximately 2.500.000 Lire for a vessel type, of 25 tons*) implies a savings of 1,1% the total cost of ownership.
As mentioned previously, the cost of fuel being removed from "upstream", an intervention that involving a saving is advantageous both for the owner to the crew.

It's clear now understand as the input to organize a series of tests may have come from an owner, a person directly interested in the economic savings, and because the argument could have been shown great interest in research and industry, especially in a time where we try to foster collaboration and transfer of professional experience.
On the other hand was made necessary in an organic iniziative of verification of the potential of the proposed device, since it has already been installed on yachts, fishing vessels and boats working.

THE DEVICE SUPER CATALYZER

The device, exploiting the action of a permanent magnetic field and high potential, influences on the fuel allowing an improved combustion and the elimination of fouling in the engine through the exercise of a cleaning action.
Will have to discarge performances comparable to those obtainable with the best catalytic converter.
As is know hydrocarbons are constituted by a set of chimica compounds, consisting essentially of hydrogen atoms and carbon linked together by means of co-participation of valence electrons which is associated with an energy of binding.
The first effect of the field it has before combustion and consists in a reduction in the bond strength of carbon - carbon and carbon - hydrogen.
It passes to a molecular distribution characterized by a greater avalilaility of carbon atoms and hydrogen in a form very reactive called "radicalica".
With this configuration, during the combustion's process are formed, with oxigen in the air, of the intermediate compounds (peroxides), by reacting further with the unburnt elements make a further energy to the system with an increase speed of combustion and then the thermal efficiency.
Following of the radical state highly reactive that increases the speed of combustion, must be added the following phonomena :

- total oxidation of unburned elements in carbon dioxide and water;
- total recovery of the chimical energy still available in the unburnt;
- lowering of suspended particulate responsibile of the opacity of smoke;
- combustion process with less excess air;
- less formation of nitrogen oxides for the lower concentration of atmospheric nitrogen available;
- reduction of specific consumption.

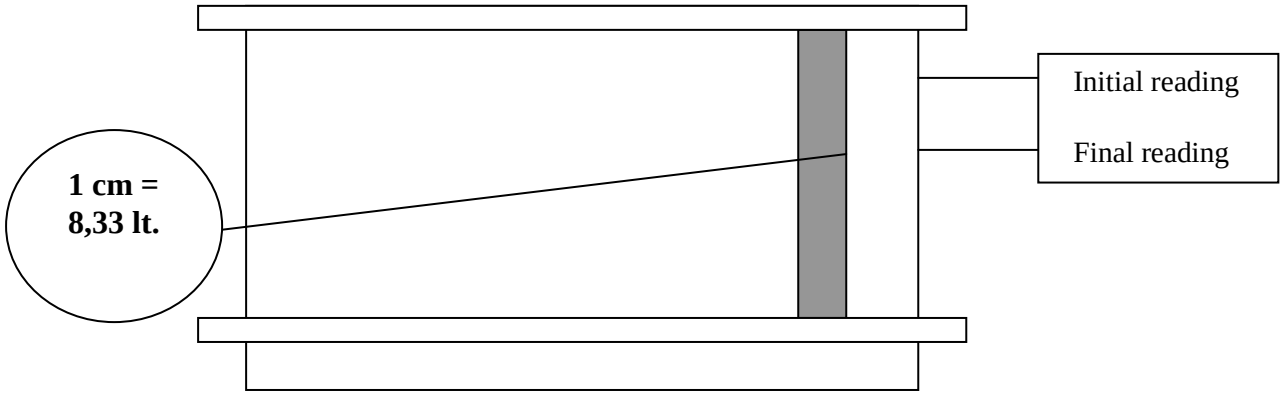
MATERIAL AND METHODS

Fot the execution of experiments was used the research vessel "Tecnopesca IT" owened IRPEM, whose geometrical and mechanical characteristics are as follows :

overall lenght	17,25 m
lenght of waterline	13,50 m
width	4,70 m
displacement	24 t
cruising speed	13 knots
material	fiberglass
year of construction	1988

The propulsion system consists of two type diesel engines from 175 hp FIAT AIFO at 2200 rpm, supercharged, coupled with two fixed pitch propellers through a gearbox to 1:1,275.

The ship has two tanks, each having a capacity of 1.000 liters and equipe with a level detector, operating according to the principle of communicating vessels, not graded.
On the bridge is installed an indicator that provides, in percentage, the total amount of total fuel present.
Note the capacity and the shape of the tanks (substantially parallelepiped rectangular base) it was possible to "calibrate" the signal of level obtaining a constant conversion equal to 8,33 l/cm.



METHODOLOGY FOLLOWED

The methodology followed in carrying out these tests was as follows :

a. hightlighting the extent and level, at the time of departure;
b. evaluation of time to leave port with the engine at 1200 rpm;
c. identification of a precise route and drive the motor at 2000 rpm;
d. start counting time forward;
e. term of the progress, level measurement and again count of the return period;
f. arrival in port, evaluation of return period;
g. arrival at the dock at 1200 rpm and new detection time with final relief of the level.

At the end of each test was carried out by detection of the level of two tanks, and this allowed to trace the total difference in height which had arisen as a result on the specific output at sea.
The two value, summed and multiplied by the conversion constant 8,33 l/cm, provided the content of fuel still present.

This data was always compared, in order to avoid gross errors, with what is indicated by the level meter installed in the dashboard.
Know the initial content of fuel, by difference is date back to the consumption of fuel oil occurred during the entire trip, with the engine operating at 2000 rpm, during the test on the measured basis, and at 1200 rpm in phase maneuvering in port and at the reverse route.
To purify the quantity of fuel consumed of the rate due to rigging, we used the motor charateristics curves.
The same curves have permission to read the theoretical consumption of fuel, varying between 35 and 40 liters/hour.
Finally, the actually consumed liters were related to the total time of testing of 2000 rpm and divided by two (number of engines) thus obtaining the specific consumption time.
The data were plotted on a table for to be then processsed and compared.
The first test was carried out without catalyst and with the hull completely clean as a ship was from a few days before leaving the dry dock.
Have been installed two magnetic catalysts and have made some outputs for to maximization their efficiency; on 11 june was made the second test.
The third test was carried after about three months in the full phase of the mucilage phenomenon.
Given the charatheristics of the device, which acts on combustion, but also on the combustible, giving a certain "memory" of energy, it's waited a certain period before to make the fourth test.
With the opportunity of a long transfer (Ravenna – 1998 February) we evaluated the actual consumption in steady state operation as constant as possible, condition necessary to estimate as best as possible the influence of the device on fuel economy.

CONCLUSIONS

This note, in addition to witness the interest that the Institute raises to the issues concerning energy saving and environmental pollution, is aimed to give a qualitative information to those working in the fisheries sector interested in fuel management.
In perfect alignment with the directives of the European social policy, the energy must be managed, saved and used with the maximum combustion efficency as possible.

In light of this philosophy, purely Europeanist, and based on the results obtained from the tests, we can definitely say that the use of the device under test can help save energy and to achieve oxidation with good results.
In fact a positive date derive from the comparison between the average consumption evaluated during the first test and the second, both made with the hull in the same superficials conditions.
Using the catalyst was evaluated a decrease of 15% of the hourly consumption.

A second consideration it can be done comparing the oscillations of consumption.
Before the installation of the apparatus is usually had variable consumption between 35 and 40 l/h, depending on the operating conditions and the state of cleanliness of the hull. As the second an the third tests, carried out with the catalyst, may well represent the extremis condition of the clean and the dirty hull, the latter for the presence of mucilage phenomenon, it was possible to identify a "scissor" much smaller, passing from 14% at a 4%.
Wanting to venture an assessment of the specific average consumption during all tests, this is a result of 35,1 l/h with a decrease of 7% compared what you had before installing the device.
It's good to reiterate that all amounts reported should be taken with the right value, but surely witness a decrease in consumption, which must be associated with a reduction of pollution and lower maintenance costs for the the descailing effect of the catalyst (actions occurred, and still subject of evidence with the installation of the same device in the central heating of IRPEM).

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