A DEAL FOR AN EFFICIENT CLEAN AND FRIENDLY OIL INDUSTRY

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INTRODUCTION

I started Prometheus company after a long experience in oil refining including the design and ten years management of the 235.000 bbl/sd Italian refinery ISAB in Sicily.

Prometheus has now more than 20 years of experience in assisting refining companies to improve their technical operation and their economic results: in Italy we assisted IPLOM and IES oil refineries to achieve the present profitable refining scheme, in Ukraine we planned the modernisation of Odessa Refinery, in Russia the efficiency improvement of Ufa refinery: in last years we assisted various North African oil companies, among which the Egyptian and Libyan National Oil Companies, providing refinery surveys and optimisation models, and training managers and technicians: in all cases, together with local personnel, we found ways to improve the refinery operation and the economic results.

For process studies we utilise the best software available in the market, but for planning and feasibility studies we found very important to create our own software, designed to be more amicable than the other packages available in the market: indeed in our vision, to be of real help, an optimisation software must be used directly by refinery managers and technicians without the interface of information technology experts: oil industry professionals are too busy to follow complex training courses, and being too careful to trust the results of software models operated by people without direct refining experience, they end with taking little advantage of these technologies.

To create this software, we utilised teams of process refining, information technology and operational research experts: we invested for many years in this sector, trusting that a real efficiency improvement will be obtained when the operators will be able to calculate autonomously the impact of thousands of variables (technical and economical), that affect every day refining profitability: these variables are too many to be accounted for at the same time

without this type of tools. Now we can offer four software tools using the same database, plant simulators and blending methods that all together form a **Decision Support System**: a crude oil quality data base builder (CUTS), product blending optimiser (OTTMIX), a modeller for the refinery operation optimisation (SIMRAF), and an process plants scheduler (PROLAV).

These tools can be used to find more profitable process conditions for existing plants according to the crude oil quality and products specifications as well as to calculate the investment return of minor or major investments: the results of our studies were tested positively on plants operation, and our suggestions are now applied in various refineries: but we found that frequently other factors have to be considered to achieve a real operational change and constant improvement of refinery operation.

PROMETHEUS VISION

The first one is the human factor: the manager and the technicians that are entitled of the operational change will have to agree on their application: in Italy we say "between saying and doing there is the sea in the midst": indeed an operational change involves the responsibility to consider that change carefree.

To accept the challenge of innovation, people need to be motivated: not only with economic incentives, but also with incentives that would improve their professional and personal realisation, the quality of their social relationships and consequently their quality of life. We all spend half of our life time on work, but when this activity has the unique goal to provide a minimum income, work looks more like slavery then self realisation.

In the work organisation figured by Taylor each worker was considered a "production factor" and these aspects were forgotten, but the modern work organisation is suggesting to take advantage of the creativity and co-operation of each worker and also to adopt the "Corporate Social Responsibility", that is a company management that cares not only of the satisfaction of shareholders, but also of the "stakeholders": suppliers, customers, social organisations and institutions that are in some way linked with the company activity: local authorities, population, environment.

Our vision proposes to sign an agreement between shareholders and company management, in order to offer to refinery managers and workers to use the resources realised in

excess for workers economic incentives, but also for investments to consolidate the company profitability and to improve the territory: to reduce pollution, to improve or build sport structures, schools and hospitals.

To help the refinery to obtain the improvements, we suggest to put at disposal of refinery managers the DSS tools that can help them:

- to have a clear idea of the present efficiency of the company operation,
- to find the process conditions that better cope with processed crude oil quality and market demand that, when not satisfied, will require more imports, paid at international price.
- to foresee the order of magnitude of minor/major investments profitability,
- to calculate, at the end of each year, realised improvement and earned incentives

They will have the possibility to check the profitability of different process approaches without need of plant tests, and to foresee what will be obtained from a test run with certain process conditions.

The models could also simulate the economic result of a unit debottlenecking, the construction of new plants, giving to managers and technicians the possibility to use their creativity at advantage of the company, of the territory and of the workers.

OIL INDUSTRY TODAY

In the last years we had dramatic changes in oil sector: the increasing gasoline and distillates demand, mainly due to the Asian countries, was matched with difficulty because conversion refineries were already working near their full capacity, and the excess of heavy fuel oil coming from hydro skimming refineries greatly increased price differentials against light products.

The huge price differential made high conversion refineries very profitable, pushing up crude oil international market price, and made unprofitable low conversion refineries, where, in some cases, products net back value became even lower then crude value.

WORLD CRUDE OIL PRODUCTION

If the crude oil price increase of the last year was not due to lack of supply, today it is generally foreseen that the new offshore oil fields discovered in Brazil and West Africa, will be just able to compensate western countries declining production, and that probably we are reaching the technical maximum of crude oil world production.

HOW TO IMPROVE REFINING?

If this is true, the foreseen additional demand of gasoline, jet fuel and diesel could not be supplied processing more crude oil, not available, but only obtaining more light products from the present processed quantity of crude oil: this either increasing the conversion capacity in existing refineries or building brand new refineries and shutting down the old and less efficient ones.

To realise this scenario will take years and huge investments: in the mean time more light products can be obtained optimising the operation of the present refineries adopting modern technical calculation tools such as those offered by our Decision Support System.

Additional improvements in short time can be obtained realising minor innovations that may be have already been considered usefull, but that were not realised because it was too hard to demonstrate their economic advantage: with tools calculating it, the proposals will be supported by arguments that the refinery management could not ignore.

But as I have already emphasised before, frequently technological tools are not sufficient to start up and maintain a constant efficiency improvement process: it will be necessary to dispose of technical personnel willing to apply and realise it, available to take the responsibility of the changes.

Normally in the refining world, technical people believes that his duty consists in securing a smooth and continuous plants operation, minimising chemicals and catalysts consumption. Process changes that can affect the smooth operation or that can increase variable cost, is normally seen with suspect: the global economical value of the production usually is not the objective of the refinery people.

Our approach is to share with refinery personnel, with the help of DSS tools, the economical aspects involved by production, to make them aware of how much their will of

improvement can affect them. Advanced calculation tools and personnel motivation can obtain unforeseen improvements: I remember the dramatic 2.5 USD/bbl improvement realised in ISAB refinery, without big investment, beacuse the personnel motivation were enhanced by the danger of bankrupcy due to 1979 oil crisis: this improvement tranformed ERG into the first italian private refining and distribution group.

CHALLENGES FOR EFFICIENCY

Today, to reach the yields improvement requested by the market demand, new conversion plants in the existing refineries or new refineries are to be built. The DSS tools will make possible to select the right processing technologies, but other challenges will arise, such as the difficulty to obtain from local autorities their approval for additional units, being a refinery considered dangerous and pollutant.

In our vision an efficiency agreement with the refinery that will promise not only additional employment or higher salaries, but also social benefits linked to refinery efficiency and employers behaviour, will be a strong argument to match the challenges of local autorities and population.

A DEAL FOR AN EFFICIENT CLEAN FRIENDLY OIL REFINING

Considering all the arguments above exposed, Prometheus conceived, and already formulated for a North African Country National Oil Company, a global proposal of an Efficiency Agreement between the National Oil Company and its Subsidiaries dedicated to oil refining and distribution.

The agreement foresees the sharing of the yearly documented improvements in refinery production, calculated on international product prices, for investment in the refinery aimed to improve production and reduce pollution, for social activities in favour of the territory where the refinery operates, and also for economic incentives for managers and workers.

The proposal foresees to create for each refinery, with Prometheus co-operation and benchmarking, a refinery model reflecting the present efficiency according to previous years results, able to calculate the quantities of products that the Refinery will be able to obtain with the past efficiency: the market value difference between these "contractual" yields with the real

products quantities obtained in the next year will be the value of the economical improvement to be shared with the refinery, the territory and the workers.

Signing this contract, every refinery worker will practically share some of the profit of the company where he works: profits directed not only to his family, but also to improve his place of work and the territory where it works.

PRODUCTION BENCHMARKING

An important step to realise without difficulties the Agreement suggested above is the definition of the Refinery "Basis Efficiency", that is the contractual start point to calculate the yearly economic improvement.

Indeed every year the processed crude oil quantities and qualities will change, as also product qualities and market demand, and it will be necessary a reliable refinery model accurately representing the initial operative efficiency.

SIMRAF and CUTS tools are specifically designed to build this model: the detailed crude oil characterisation and the distillation simulator of SIMRAF considering the fractionation efficiency of each sector of distillation, make possible to obtain a reliable prediction of distillation profiles and to tune it with historic results.

Moreover other plant simulators are available in the model to reproduce the behaviour of main conversion processes: also in this case calculated results can be fine tuned actual plants' performances.

So the Model adherence can be tuned to reproduce exactly the refinery yearly production and the model can be adopted as contractual basis for the incentive contract, if requested with Prometheus assistance for the benchmarking and arbitration.

Thanks for your attention