ENGINEERING NEWS

THE NEWSLETTER FOR ENGINEERS IN THE PALM OIL INDUSTRY

Issue No. 6 **April — June 1987**

MESSAGE FROM THE EDITORIAL BOARD

The recent PORIM Workshop on the Current Status of Automation in Malaysian Palm Oil Mills established the fact that although Malaysian Palm Oil Millers have taken the first step on the road towards complete automation we still have a long way to go to achieve this end. One of the vital needs to achieve our goal is the development of probes or sensors for on-line monitoring of the various process control parameters

In the meantime let us make sure that we can defend any accusation from the "anti-automation" lobby that we cannot maintain the simple form of instrumentation and control systems presently installed in our mills. We would therefore recommend that all mills should start a planned maintenance and calibration programme for all their instruments and recorders if they have no such system in operation.

● LETTERS TO THE EDITOR

ENERGY CONSERVATION IN THE REFINING INDUSTRY

Palm oil refining is an energy intensive industry. On the average for every tonne of crude palm oil processed into RBD oils, the direct variable cost is approximately as indicated below:

Electric Power	$5.00
Fuel Oil	$11.00
Bleaching Earth	$11.00
Others (chemicals, water, etc)	$3.00
Total	$30.00

Clearly, more than 50% of the variable cost is attributed to energy consumption, *i.e.* in terms of combined electrical power and heat. Steam fuel alone makes up about one-third of the variable production cost. With such a high proportion of the manufacturing cost attributed to energy and coupled with the current economic necessity to improve cost competitiveness, it should take little effort to impress upon management the need for energy conservation.

Whether inspired by cost or social obligations, the incentive for energy efficiency within the palm oil refining industry is great. It calls for a thorough reappraisal of all heat and energy users against their current economics and techniques. Both management and technical inputs are necessary to develop a conceptual plan of action, involving focusing of efforts on two main streams of energy sources, *i.e.* power from the electrical grid and process steam from the boiler. Energy reduction is, in general, more easily accomplished by reducing fuel and steam usage than by cutting electrical usage.

Boiler

Boiler house is the heart of the steam generation system. While is it often assumed that the boiler when installed was correctly engineered, technical and economic developments may give rise to the need to re-examine some of the factors. This is particularly true of older plants which were built when energy was a cheap and therefore an expendable commodity

The three major sources of energy losses from a boiler system are indicated in Table 1.

TABLE 1: MAJOR SOURCES OF ENERGY LOSS FROM THE BOILER

Source	Loss expressed as a percentage of energy input to boiler
Blowdown	0.1 – 5.0
Radiation	1.0 – 5.0
Flue gas	10.0 – 30.0

Combustion efficiency is crucial and is largely dependent on the performance of the burner and its related control which should cope efficiently and speedily with various boiler load fluctuations dictated by steam demand. In a refinery using heavy fuel oil-fired boilers, combustion efficiency will generally rest upon the following parameters:

Level of excess air above stoichiometric proportion.

Quality of fuel atomization and air-fuel mixing.

Level of waste heat recovery from flue gas.

Good housekeeping

Modifying plant and equipment

Installing new plant and equipment

The operation of boilers can be improved by such measures as control of air, replacement to a more fuel-efficient burner, use of on-line control or even an alternative fuel source.

Process Steam

It is a common remark that many plant engineers know where all their energy comes from but do not know where most of the energy goes to. While gains of 2-3% efficiency in the boiler house is commendable, unintended losses of 20-30% is common for process steam. Many refineries do not have adequate instrumentation to monitor energy use. Without identifying and quantifying major users, energy reduction is difficult to be effectively carried out.

There is no need to acquire details at individual users by installing a large number of meters across the whole plant. Rather, selected flow readings at critical points are required. To compose a basic steam balance, the essential information required is consumption figures of steam plus meaningful data concerning the level at which production has been running.

Saving energy by improved process operations can be divided into the following three levels:

Where no attempt has been made before, it is certain that significant amounts can be saved by simple improvements to the standard of maintenance and housekeeping in the plant. These represent a low cost category of bringing about energy reduction across the steam system. Rectifying steam traps and replacing missing lagging or insulation are simple examples. Steam leakage is another common energy wastage. A quick calculation can reveal the significant fuel losses as a result of these unattended leakages. For instance, a 3 mm leakage along a steam line at 50 psi is capable fo discharging upto 10 kg/h of steam. This means a loss of 2 litre of fuel per hour. As a general rule, the older the process plant the greater the potential benefits in employing good housekeeping practices for energy saving.

The second category relates to the relatively inexpensive modifications to plants and equipment. These may include installation of improved sensors, regulators, valves or simple metering to enable control to be exercised in a more appropriate manner. For example, a temperature regulator for the oil tank to shut off the steam inlet valve to prevent overheating. Another example, is the addition of a heat exchanger to enhance heat recovery from a waste heat stream.

The third category deals with major high cost items to bring about dramatic improvement in energy usage. This may include a closed condensate recovery system, a more efficient heat exchanger or a more sophisticated plant. Investiments of these nature are of longer term and require specialised know-how.

Summary

The potential to save energy in the palm oil refining industry cannot be ignored. Possible savings of upto 30% of current fuel usage is achievable with successful energy program implementation. It is an objective worth achieving.

(Su Swee Peng)