CONSERVE ENERGY
BY
ADOPTING TO TOTAL LUBRICATION MANAGEMENT

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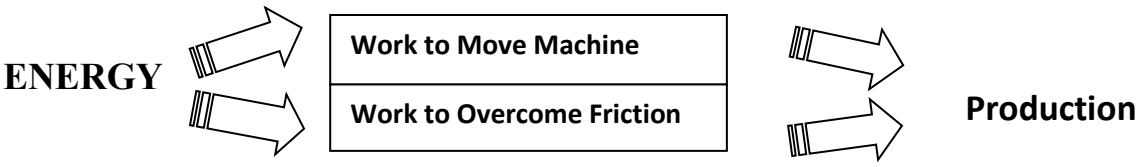
It is a simple fact, Good Machine Lubrication can lead to energy savings and an improved mechanical maintenance, thus helping in corporate profitability. This ought to interest any plant management, who is looking for ways to reduce operating costs, and is especially significant at a time when operating in competitive global economy, besides Energy-conservation is a national cause.

This article describes how manufacturing plants can use **"Total Lubrication Management"** (TLM) recommended best practices to reduce their energy consumption, emissions and operating costs – all at the same time.

Power utility bills of the plants are far larger than the maintenance and lubrication costs. So, while controlling or reducing maintenance and lubrication costs is important, reducing electricity usage is critical. There exists tremendous opportunities for use of improved lubrication reliability programme to decrease plant energy costs, thereby increasing plant profitability.

ENERGY FOR WORK

During conversions from one form of energy to another, some useable energy is lost. These energy losses can be extremely costly. The science of physics reveals that lubrication can play a role in reducing energy losses by reducing friction. Placed between two moving surfaces, a lubricant decreases the co-efficient of friction. Naturally, this would also mean the more a lubricant decreases friction, the less energy a well lubricated machine consumes.



LUBRICANT FORMULATION

All lubricants consist of Base Oil of required Viscosity, blended with special chemicals called "Additives". These additives are carefully selected by the Oil companies, keeping in view the end use application – such as Engine Oils, Gear Oils, Transmission Oil, Hydraulic Oils, Compressor Oils, etc. etc.
A lot of research work is done by the oil companies before oil is approved for an application. All lubricants are approved by OEMS after field tests under stringent test conditions. Lots of research work is done by oil companies and OEM before a lubricant is approved to be offered to users or reach the market. However, just buying an expensive lubricant also does not ensure maximum lubricant performance and energy savings. The lubricant must be the right one for the application and must be properly maintained for its quality in order for it to provide maximum machine performance.

So, how does the end-user know what to do? The answer is to adopt to Total Lubrication Management (TLM) system. The basic recommended parameters of TLM implementation are:

1. Select correct grade and viscosity of lubricants for the specific application and ensure this grade has OEM acceptance.
2. Store oil in clean environment to keep oil uncontaminated in storage. Greases should be stored indoors to avoid day/night temperature fluctuations. This can lead to soap-oil separation, making grease unfit for usage. Good house-keeping at lubricants storage is the most important and is at fulcrum of entire activity.
3. Adopt colour coding to eliminate any possibility of mix-up in oils leading to contamination.
4. Use good and clean lubrication equipment to ensure feeding uncontaminated lubricants to machines.
5. Keep oil clean by providing "Breathers" on machines oil sump and inspect oil filters on machines oil systems regularly.
6. Test oils regularly for oil condition and machine condition, i.e. contamination, additive depletion, wear debris and elemental analysis, etc.
7. Regular Training to Lubrication staff for correct lubrication techniques. All lubrication staff should be in skilled category.
8. Enforce excellent house-keeping at oil storage, handling and dispensing area.
9. Keep oil points at machine 'clean' to ensure that no dust or dirt particles go in the machine sump along with oil.
10. Adopt target based oil management system. Ensure that atleast 95% oil is drained out from the sump, before feeding new oil into the sump, failing which, may be adding new oil into 'muck' in the oil sump or machine system.

"Always remember that "***OIL IN MACHINE IS LIKE BLOOD IN HUMAN BODY"*** - So, keep it clean and free from any contamination.

LUBRICATION AND ENERGY SAVINGS

It is possible to measure energy savings in a variety of ways, including production output, temperature changes or reduction in electrical energy consumption. Another measurement is maintenance costs and fuel consumption.

Production output

When using any mechanical equipment, it is possible to evaluate the equipment's energy efficiency by recoding its production output. For example, if a machine is capable of producing a certain number of parts in a given amount of time and the lubricant is kept clean as per recommended cleanliness standards and lubrication systems are improved. This shall be resulting in a higher volume of production in the same amount of time, than the machine has become more energy efficient and productive.

Temperature Changes

Monitoring temperature changes is another way to optimize lubrication programme performance. Increased friction in a machine moving parts results in higher operating temperatures. Friction is a result of metal-to-metal contact that occurs between two surfaces moving relative to another. Even between highly machined surfaces, under microscopic view, asperity contact occurs.

The greater the amount of metal to metal contact, the greater is the amount of friction. As a result, more energy is required to move the surfaces relative to one another. This friction results in higher electrical power costs. Lubricants and good lubrication system can reduce that friction. Therefore, when friction is reduced, less electricity is required to drive a gearbox, compressor, pump or other equipment, and this leads to Energy Conservation in the Industry.

Electrical Energy reduction

Tracking electrical consumption is a highly reliable way to evaluate improvements in plant energy use. In fact, various organizations have been able to document improvements in electrical energy efficiency after implementation of lubrication management programmes. Companies that upgrade their lubrication and reliability practices have been able to document a 5 – 10% reduction in power consumption, more than enough to pay for implementing good lubrication programme by professional service providers. Average documented savings were 10% in gear boxes, 12% in air compressors and 4% in electric motors.

Electric motors power most plant machinery, including gearboxes, compressors, refrigeration systems, pumps, hydraulic systems and ball mills. The following equation can determine the amount of electricity used by an electric motor:

a) kW = V/1000 x A x 1.73 (where V is volts and A is amperes)
b) kW = $\sqrt{3}$ VI. Cos Ø – corresponding Cos Ø at 0.9 which all the plants are meeting as per requirement of Electricity Board.

Both are common metric measurements of electrical current measured using a voltmeter or ammeter. For a three-phase motor, 1.73 is a standard factor. Data logging equipment is available that allows one to measure and collect data for either amperes, volts or both. Yet, most electrical consumers pay for electricity by kilowatt-hour (kWh) per month. The following formula is commonly used to determine the electrical charge per month (ECM):

c) ECM = kW x h x EC (where h is hours of service and EC is the electrical charge.

Air compressors are an excellent source for energy savings. Compressed air is one of the most 4expensive uses of energy in a manufacturing plant, and approximately 70% of all manufacturers have a compressed air system. These systems power a variety of equipment, including machine tools, material handling and separation equipment and spray painting equipment. According to a study, compressed air systems account for 10% of all electricity and roughly 16% of industrial motor system energy use. This adds up to large amount of expenditure per year in energy costs. Energy audits conducted suggest that more than 50% of compressed air systems at industrial facilities have significant energy conservation opportunities.

CONCLUSIONS

Energy Conservation is very important to Industry, as important as conserving natural resources, reducing emissions and improving profitability. Governments and corporate management in the industry alike are looking for ways to reduce energy consumption.

It is possible to make dramatic gains in energy efficiency by reducing friction, and one of the best ways to do that is to "employ good lubrication practices", including the use of high-performance lubricants and the adoption of lubrication reliability best practices.

Adopt to Total Lubrication Management for Energy Conservation, Manufacturing cost Reduction and Improve Productivity and Profitability.

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