

MAINTENANCE OF TEA AND RUBBER MACHINERY

L.J.Peiris

*(Asst. Chief Engineer, Up-country Branches,
Browns Engineering (Pvt.) Ltd.,)*

INTRODUCTION

Like the human body needing food and medical care for better performance and longer existence, machinery too require proper maintenance and lubricants for peak performance and longer existence. As the food we take contains vital vitamins needed for the human body, lubricants too contain chemicals and minerals needed for the smooth functioning of vital working parts of a machine. Hence, it is important to select the correct lubricant to suit the function of the relevant machinery part. A major breakdown in a machine could always be avoided by proper maintenance and lubrication.

Viscosity of lubricant

Viscosity is perhaps the most important single property of a lubricating oil. The mechanics of establishing a proper lubricating film depends largely on viscosity. For effective lubrication, viscosity must conform to the speed load and temperature conditions of the bearing, or other

lubricated part. An oil that is more viscous than necessary introduces excessive fluid friction (friction within the oil itself), a source of power loss and creates unnecessary drag. Viscosity at operating temperature should be such that the oil maintains a fluid film regardless of the load imposed upon it. Lower speeds, high pressures or, higher temperatures, on the other hand, require an oil of a higher viscosity grade.

Tools

When dismantling and refitting machinery it is important to use correct tools. Therefore, a complete set of tools should be available in the Factory for proper maintenance of machinery.

Storing of Lubricants and Tools

It is essential that you store the lubricants in a safe place under normal ambient temperature conditions. The containers should not be exposed to dusty atmospheres. It is important to use clean containers and cans when refilling oil to gear boxes, etc. In most factories we have observed that grease is kept in open containers and the factory mechanics use a piece of stick or metal picked up from somewhere in the factory to load the grease into the gun from the container. Therefore, cleanliness is very important when lubricating a machine.

It is important to ensure that there will be no ingress of foreign matter into the housings of bearings and gearings. Foreign matter such as dust and grit or any hard and aggressive substance will act as a lapping agent and quickly damage the bearing or gearing. In a similar manner, an early failure could follow the intrusion of water which will corrode the highly finished surface of bearing or the teeth of a Gear Wheel.

It is important that we select the correct type of grease guns, oil cans and other containers, to correctly lubricate the machinery. It is also important that we thoroughly clean the grease nipples, grease cups, oil filling plugs, etc. before lubrication. Similarly, the tools too should be stored in a clean place.

MAINTENANCE OF IMPORTANT MACHINERY

Trough Witherers

Never keep a gunny bag or an eekle in front of the Trough Witherer Air Input Equipment as these items could easily be sucked into the fan and damage the entire set of fan blades. Hot and cold air dampers should be serviced regularly.

Lubricating the Motor bearing should be carried out according to the Manufacturer's recommendations.

Tea Rollers

The pressure pad guides and shoes should be periodically checked. If there is excessive play in the pressure pad, immediate measures should be taken to rectify this in order to avoid breaking of the pressure screw spindle. The following methods could be used for rectifying this defect:

- (i) Adjust Guide shoes.
- (ii) Level Guides to even out wear. Refit same to the Leaf Container using packing.
- (iii) Fit new Guides and adjusting shoes.

Never weld stainless steel Leaf Container with Mild Steel welding rod as corrosion will set on the MS Welding and subsequently, more damage would occur to the Leaf Container.

The door hinge pin mechanism and the lock should be checked periodically for excessive play and necessary repairs should be carried out without delay. This will prevent breaking of the door operating screw and damage to wood work at the door mouth. Always see that the Cone fits correctly to the door guard ring.

Check whether there is excessive play in the crown wheel and pinion. Do not allow the teeth to wear completely and try to repair thereafter. Reconditioning of teeth should be carried out at least when the teeth are worn up to 25%. The teeth of these gear wheels could get damaged due to faulty bearings on the lay shaft and the drive crank. It is also common for gear wheels to get damaged due to the key getting jammed in between the gearwheels. Hence, it is essential that you check the keys of Crown wheel and Pinion. Never fit an over-size key to a loose crown wheel or pinion. It will be necessary to skim the shaft journals, bore and bush the gear wheel and assemble same using a new key.

Heavy duty Model Roller gear boxes where the crown wheel and pinion are accommodated should be lubricated with Lanka Gear Lube 460. This Gear Oil is designed for severe loading conditions than straight mineral oils. They contain special anti-wear and load carrying additives which are recommended for steel mill gears and for applications under similar conditions where abnormal high tooth pressures are developed. Their resistance to viscosity decreases and deposit formation at elevated temperatures is much greater than that of conventional leaded lubricants.

The shaft mounted Gear Reduction unit should be periodically checked by removing the drain plug and examining the oil. If you find any shining particles in oil, the

oil should be drained out immediately and should be filled with fresh lubricant according to the manufacturer's specifications.

Rotorvanes

It is essential that you check daily whether the barrel is properly secured to the gable bracket before the commencement of manufacture. After an overhaul to the machine, it is essential that you check whether the vanes are exactly, in the center of two Resistors. This could be checked by taking external measurements, from the gable end. First, remove the barrel and check the measurements from the gable bracket to the center of each vane. Thereafter, check the measurements from the gable bracket to the center of resistor bolts and check whether there are discrepancies in the measurements. If there are discrepancies, it will be necessary to adjust the vanes accordingly.

It is recommended to dismantle the thrust plate at least once in two weeks: clean and lubricate the bearings and see that the felt seal is in position to prevent tea juice getting into the bearing housing.

Check for any loose resistors or vanes on daily basis, when washing the machine. When replacing resistors, make sure you use the correct bolts and make sure that the resistors are firmly fitted against the wall of the barrel.

Reciprocating and Rotary Rollbreakers

Check periodically for cracked steel frame work and damaged discharge chutes. Major repairs to these items could always be avoided by carrying out timely repairs. Also check whether gear wheels are meshing correctly at the drive bracket and the packings are fitted firmly to avoid any oil leaks.

Tea driers

Cleanliness of the drying chambers are important for trouble free service. In the case of conventional driers, there are many hidden points that should be cleaned weekly. Tension of the chain too should be checked monthly, to eliminate tray jamming problems. It is also important to see that the dampers are functioning correctly. In some cases, it was found that only the outside lever operated while the dampers inside were stuck in one place. It was also noted that the VST Gears were not serviced for years; a service once in six months is very essential. In the case of Fluid Bed Driers, it is important to clean the grid plate periodically, as blocked slots or perforation could cause problems in proper fluidisation. Accuracy of thermometers should be checked at least once in 3 months in order to fire the teas at correct temperatures. Air seals of discharge valve and side inspection doors should be checked once in 4 months to prevent hot air leaks and to maintain the out put of driers at optimum levels.

Even feeding is important for quality firing. Hence the level of the spreader blades should be maintained correctly.

The heaters should be thoroughly cleaned once a week, including the under ground flues, in order to maintain fuel efficiency. Check whether all fire bars are intact, as larger gaps than the recommended could cause excessive fuel consumption. It is advisable to carry out a smoke test on estate level, once a month and reluting of a heater too, should be carried out on estate level within the same period. In the case of circular heat exchanges, routine maintenance and luting should be carried out fortnightly. However, a complete service should be carried out once in three years, by the local agents.

ID fan runners too should be cleaned at least once a month, specially, on firewood operating heaters. In the case of liquid fuel, the ID fans should be cleaned once in 4 months.

High temperature grease should be used for ID fans and also for main fan bearings.

Servicing of Automatic Burners should be carried out once in 4 months, but it is advisable to carry out this service by the appropriate agent of the burner.

Forced Draught Combustion unit with thermostat control is recommended for wood fired heaters for better combustion and to control a steady inlet temperature.

Always use well seasoned and dry firewood, preferably in the form of billets of approximately 30 to 45 cm long (12" to 18") by 10 cm to 15 cm (4" to 6") maximum girth for better fuel efficiency. Hydraulic Wood Splitters could be made use of for splitting firewood, which will definitely save substantial amount in labour.

Special attention should be given to flue gas control dampers. Engineers' recommendations should be obtained when setting flue gas control dampers to achieve maximum fuel efficiency.

Do not cool down the heater completely immediately after the manufacture is over. Main fan and the ID Fan could be stopped when the temperature is around 150^oF. Thus the heat will be retained in the furnace and correct temperatures could be obtained within a shorter period on the following day, resulting in a saving of fuel.

Severe damage to cast iron components and other metal parts would occur due to water collection within the underground flue.

Sifting Room Machinery

Bearing failures in Moors Chota Sifters are very common due to made tea particles

entering into bearing housings through broken felt seals and covers. Hence, proper lubrication alone will not prevent machinery breakdowns unless you take other precautionary measures for proper maintenance.

It must be ensured that the trays are properly secured to the framework. Here again, timely repairs should be carried out to the tray discharge chutes. The Feed Conveyors too, should be properly maintained and ensure that the belts are running at the center of the head and tail pulleys. This will prevent unnecessary damage to the Conveyor belts.

Timely repairs will prevent damage to tray frames and spring blades of Myddletons. Hence, if there is a slight knock, it will be necessary to ascertain the cause and rectify the defect.

The Tea Cutter Blades and the Cylinders should be sharpened by experienced personnel. Uneven sharpening will give poor performance and reduce the lifespan of the Cutter cylinders and blades.

In general, it is recommended that the cleaning of the Sifting room Machinery is done on a daily basis by using a Dust Blower. Breakdowns of Stalk Extractors in particular could be avoided by servicing the machines at least once a week.

RUBBER MILLS

Maintenance of a Rubber Mill is much easier compared to the maintenance of Tea Machinery. Nevertheless, lubricating of bearings, pressure screws and gear wheels is very essential for smooth function of the mill. The Mills fitted with Torque Arm type Gear Reduction units could be maintained in the same manner as described under Tea Roller Gear Units.

Special grease, LANKA GEAR COMPOUND M CODE P 332, should be used on gear wheels. This grease is compounded to provide water resistance, water displacement rust protection properties and contains a volatile, non-flammable diluent to facilitate applications. This is black in colour and could be obtained from the Petroleum Corporation or from their dealers.

The internal pipes of water cooling systems should be checked as only a part of the roller may get cooled due to a broken pipe inside the roller.

DRYING TOWER HEATING EQUIPMENT

A recent survey carried out by us revealed that most of the Drying Towers are not functioning correctly due to improper maintenance, installations and equipment.

Most of the imported Boilers available in our Drying Towers are used in other countries for heating up buildings during

the winter and are designed for firing with coal. Therefore, proper results cannot be achieved from these Boilers when rubber wood is used, specially, due to heavy scale formation in the combustion chamber and the exits.

The locally made cross-tube type Boilers have been specially designed for rubber firewood and the combustion chamber and the exits have been designed for easy cleaning. A number of these boilers have already been installed in various Rubber Factories and these have been tested by RRI and found to be much efficient compared to the imported units.

To achieve better results it must be ensured that the bottom level of the Radiators are placed about the level of Ventilator holes of the Drying Tower.

The saturated air existing in the ceiling should be properly maintained to achieve best results from the Drying Tower.

The Forced Draught drying system designed and patented by the author, along with Mr A. M. S. Kulasekera, is an efficient system which could be tailor - made to suit any Drying tower. If this system is properly operated sole crepe could be taken out from a Tower within 36 hours, thus maintaining the colour of laces.

GENERAL

Bearings of reputed make should be used on high speed machinery and on other important machinery, such as Tea rollers, Rollbreakers, Chota Sifters, Drier Fans, ID fans, Winnower Fans, etc.

Grease nipples should not be painted, when painting the machinery. The grease nipples could get completely blocked due to applying paint over the machinery. All grease nipples and cups should be thoroughly cleaned before lubricating.

ELECTRICAL

All the electric motors, starters and switch gear should be serviced biannually by a competent person and any defects found during the service should be rectified. It is very important to maintain the overload settings of starters, accurately, to minimize breakdown to motors, due to overload.

In most cases it has been found that earth continuation is disconnected. Therefore any loose earth clips and earth wires should be tightened and missing wires should be replaced without delay.

Tightness in machinery due to improper lubrication and misalignments could cause unnecessary power consumption. Starting of all machinery at the same time could also increase the maximum demand unnecessarily.

If a Tea Roller motor trips on load, the pressure cap should be released before restarting the machine.

It is recommended that a Power Factor Meter is fitted on the Main Switchboard, in order to check and maintain the power factor at the correct levels.

An annual merger testing should be carried out on each circuit of the factory to ascertain faulty lines.

CONSULTING ENGINEERS' SERVICES

Finally, it is recommended that a Consulting Engineer's services should be obtained annually and repairs should be carried out according to his recommendations, which will definitely reduce major breakdowns in the factory.