

DIESEL MECHANIC



MINING QUALIFICATIONS AUTHORITY

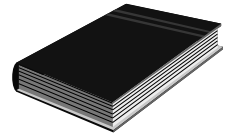
CODE: LUB-1

SET A DRIP FEED LUBRICATOR

INDEX

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SOURCE REFERENCES

Chart 2 of Plant Engineering Training Systems.

Audio-visual aids.

OBJECTIVE

You will be learning towards the outcome “Set a drip feed lubricator”. Whilst learning towards the outcome you will be required to achieve the following:

- Familiarise yourself with the different lubrication methods.
- Enable yourself to set a drip feed lubricator.

On completion of this module, the learner must be able to:

- Explain the purpose and methods of lubrication.
- Set a drip feed lubricator correctly.

During this process you must adhere to certain specified requirements as listed in the Module.

ASSESSMENT AND EVALUATION CRITERIA

You will be assessed, when you are confident that you may achieve the outcomes as listed, to determine your competence as measured against the required criteria. This assessment will be in line with accepted best practices regarding assessment.

- A theory and practical test will be set at the end of the module and must be completed without using references.
- All the answers to the theory questions must be correct.
- The lubricator must be set to correctly deliver the required feed within the limit of ± 2 drops per minute.



DICTIONARY

- Lubricant** : A substance, which provides a smooth or slippery surface between two or more moving parts.
- Lubricate** : To make smooth or slippery, so reducing friction and wear.
- Friction** : The resistance an object encounters when moving over another.
- Wear** : Damage or injury to a surface by rubbing or constant use.

HAZARD IDENTIFICATION AND CONTROL (HIAC) FORM**LUB-1****SET A DRIP FEED LUBRICATOR**

STEPS IN OPERATION / PROCESS	POTENTIAL ACCIDENT / INCIDENT	CONTROLS (BY RESPONSIBLE PERSON)
1. Use hand tools.	<ul style="list-style-type: none"> Using damaged tools or wrong tools for the job can cause injury and damage to equipment. 	<ul style="list-style-type: none"> Always use the correct tool for the job. Ensure tools are in good condition. Use tools correctly. Wear appropriate PPE. Always take good care of tools. Maintain, clean and store it properly.

NOTE: Before doing the practical work contained in this module, the learner must study the content of the above HIAC form again and then sign the statement below.

The above risks, which will be encountered in this module, are fully understood and will be controlled during the practical work.

Signature of learner:

Signature of Training Officer:

Date:

1. LUBRICATION

ITEM / TASK: Introduction.

DESCRIPTION:

- A. To lubricate means to make smooth or slippery, so reducing friction and wear.
- B. This is done by applying a lubricant, i.e. a substance, which provides a smooth or slippery surface between two or more moving parts.
- C. In most cases lubricants are either oil or grease. Grease as a lubricant will be discussed in Module LUB-2.
- D. Oil is a liquid lubricant. It is usually obtained from the treatment of crude oil.
- E. Oils are used when it is required to maintain a continuous film of lubricant between the sliding surfaces.
- F. Without lubrication, machines will operate for a very short time before breaking down. With adequate lubrication they operate longer, but for a much shorter period than they would when the incorrect lubricant is applied properly.
- G. A major cost in a badly maintained plant is that of repairs and loss of production due to faulty lubrication.
- H. Personnel responsible for the installation, maintenance and repair of machines should therefore, know why and how the various parts are lubricated.

ITEM / TASK: Purpose of lubrication.

DESCRIPTION:

The five basic purposes of lubrication are:

- A. To reduce friction.
- B. To reduce wear.
- C. To dampen shock.
- D. To cool moving elements.
- E. To prevent corrosion.

Each of these purposes will be discussed in more detail below.

A. Reducing friction

- No matter how smooth a surface may seem to be to the naked eye, observed under a powerful microscope it is not really smooth at all. It has indentations and projections of various kinds, like hills, valleys and, sometimes, jagged edges as can be seen in Fig 1.

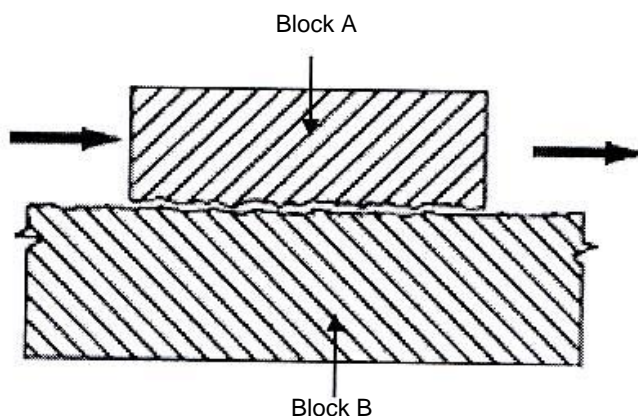


FIG 1.

- Consider the two blocks as shown in Fig 1. If you moved Block A across Block B, you would feel a considerable amount of resistance to the movement. This resistance is called **friction**.
- Friction can be imagined as being a force, which acts between two surfaces to resist their sliding or rolling across each other.
- Fig 2 show what happens when a lubricant is applied before Block A is moved across Block B. The oil spreads between the two blocks forming an even film. The contact areas of the blocks are separated and the blocks slide on the film of oil.

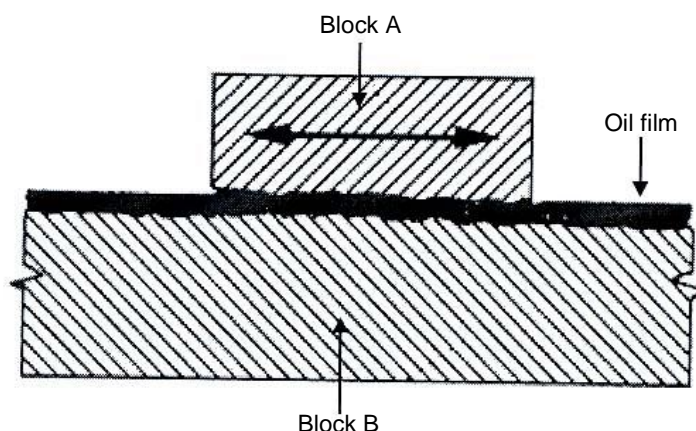


FIG 2.

B. Reducing wear

- It will be clear from the previous section that no surface is completely smooth. The amount of wear depends on the finishing of the parts, and in the thickness of the film of oil between the two surfaces.
- As can be seen in Fig 3, the high points of one surface interlock with the low points of the other. When force is applied to overcome the friction, i.e. to cause one part to move across the other, when there is insufficient lubrication, the high points of both surfaces will break off. In other words, wear takes place.

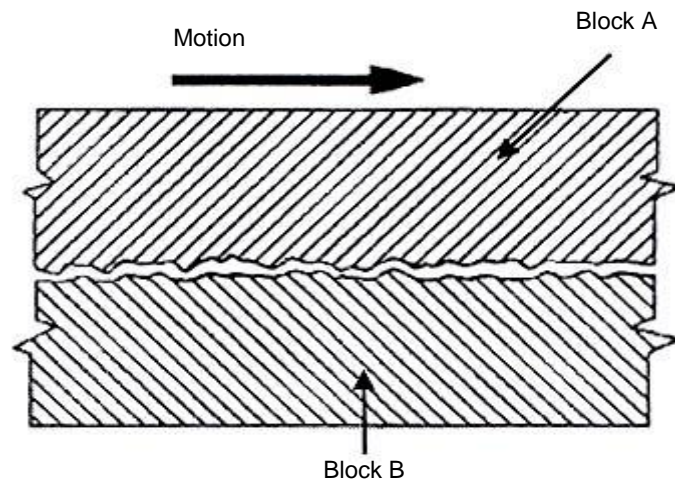


FIG 3.

- If the film of lubricant is thick enough, the two surfaces will never actually be in contact with each other, and little, if any, wear will occur.

However, if it is not thick enough to completely separate the surfaces, then some of the high points will still be broken off.

C. Dampening shock

- A lubricant can dampen shock as it is able to change its resistance in response to a variation in pressure.

A practical example of this property is in the lubrication of gears. See Fig 4 on the next page.

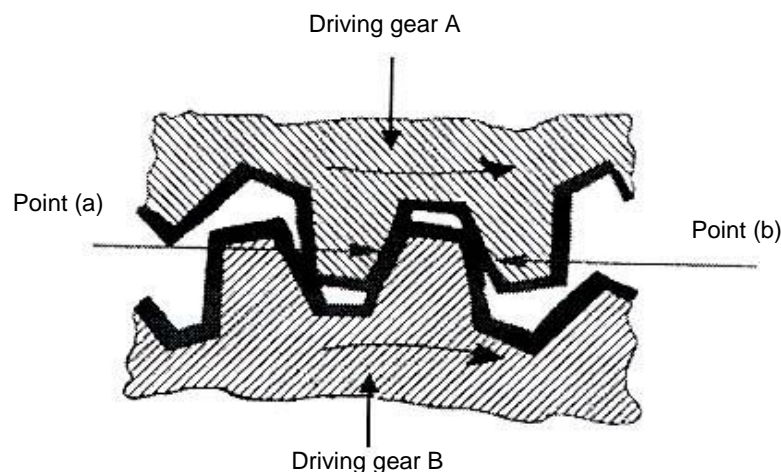


FIG 4.

The pressure on the lubricant is much greater at point (a) than at point (b), because gear A is the driver and gear B the driven. Therefore the lubricant, by accommodating the increase in pressure, will cushion the shock which results when the gears mesh.

D. Cooling moving elements

- Heat causes metals and other materials to expand. Each type of material has its own rate of expansion and allowance is made for this when material is used to manufacture parts.
- Friction generates heat. The greater the friction or resistance to the movement of the parts, the greater the heat generated. The metal will thus expand accordingly.
- Accurately joined parts can expand to the point where they "seize" (melt together), if there is no way of cooling them or preventing excessive expansion. Lubricants are used to prevent seizing.
- A lubricant does not usually have much cooling action by itself. It primarily prevents excessive friction and minimises its effect. In doing so it reduces the amount of heat generated.
- Secondly, the lubricant carries heat away from points where it is generated to cooler areas where it is transferred.

E. Preventing corrosion

- Another main function of lubricants is to prevent or control rust and corrosion.

ITEM / TASK: Prevent contamination of lubricants.

DESCRIPTION:

A. Lubricants are usually contaminated by:

- Water which either washes the lubricant away or forms an emulsion with it.
- Gritty matter which turns it into abrasive materials.

B. Lubricants, containers and bearings must consequently, be kept away from all sources of contamination. **SURGICAL CLEANLINESS** is required.

REMEMBER



Bearings and their lubricants must be kept clean, or their life will be shortened.

This is not easy in a plant, especially an underground plant, but it is possible and important.

**DO SELF TEST 1 BEFORE CONTINUING WITH
THE REST OF THE MODULE.**



SELF TEST 1

Answer the following questions without referring to the notes :

1. What is lubrication?

2. What are the five basic purposes of lubrication?

a.

b.

c.

d.

e.

3. Why is cleanliness so important in lubricants?

Ask your Training Officer to check your work and if it is correct, to sign below and then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

2. OIL LUBRICATING METHODS

ITEM / TASK: Introduction.

DESCRIPTION:

There are different methods of lubricating machinery and they can be broken down into these general categories:

- A. Manual methods.
- B. Gravity methods.
- C. Natural methods.
- D. Pressure methods.

Each method will be briefly discussed below.

A. Manual lubrication

- Manual oil lubricating is usually done with an oil can. While the squirt-type oil can is still found in a lot of plants, the hand pump oil can has become more popular.

See Fig 5.



FIG 5.

B. Gravity lubrication

- Gravity lubrication is frequently called "drip-feed" oiling. In this application, the lubricant is held in a container mounted above, or to one side of the point requiring lubrication.
- The lubricating oil is then allowed to drip through a needle valve at a predetermined rate as described later in this module. See Fig 6 on the next page.



FIG 6.

C. Natural lubrication

- Natural lubrication includes the various types of "splash" or bath and "ring" type oilers.
- In natural type lubrication systems, a portion of the machine housing is used as an oil sump. This sump holds the oil at a specified level allowing some of the moving parts to be partially immersed.
- As these parts move or rotate, they transfer the lubricant to the area requiring lubrication. A few of these methods are shown in Fig 7.

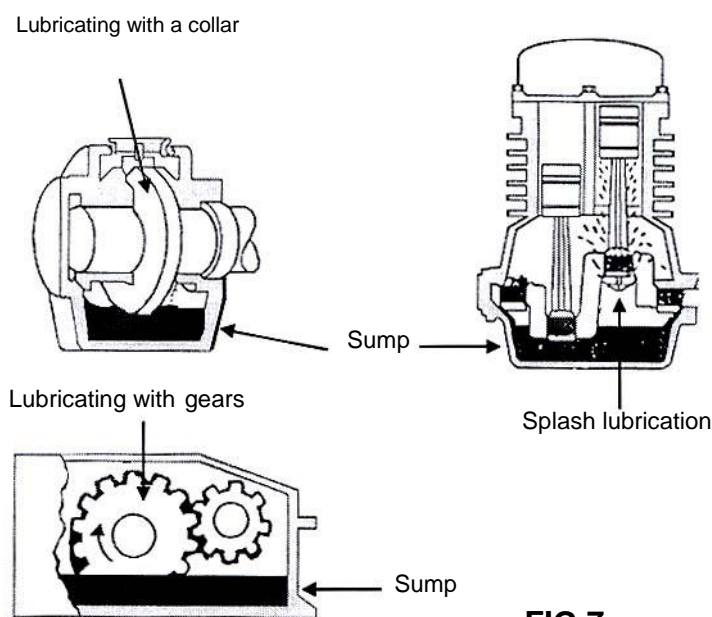


FIG 7.

The “splash” method of lubrication is probably the most commonly used of all the natural methods. The best examples of splash lubrication are found in the gear reducers used to drive equipment. Usually one or more gears extend into the oil in the bottom of the gear case. As the gears revolve they pick up oil and deposit it (splash it) on the other gears and the shafts.

D. Pressure lubrication

- In most instances, a pressurised oil system supplies oil at a constant pressure and volume.
- One of the more common pressure circulating systems uses the lower part of the piece of equipment, or machine, as an oil sump.
- The oil is drawn from the sump by an internally or externally mounted oil pump, pressurised and then distributed to the various lubricating points, i.e. bearings, gears, shafts etc. This system is commonly used in motor car engines. See Fig 8.
- The means of distribution can either be through external piping, internally drilled oil passages or both.

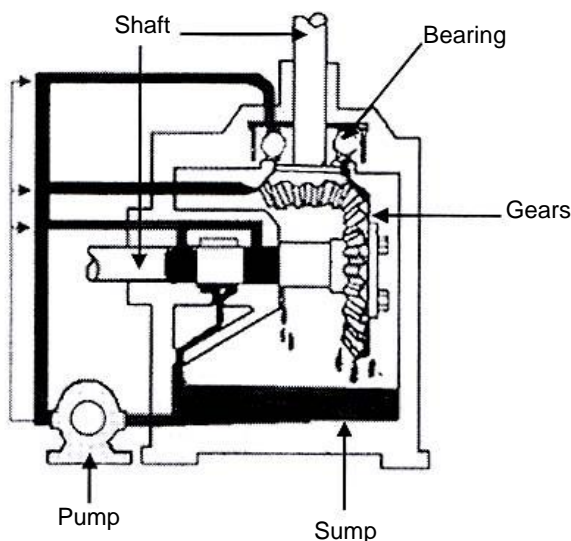


FIG 8.



NB:

It is very important that oil levels in machine sumps be maintained as specified by the manufacturer of the machine.

**DO SELF TEST 2 BEFORE CONTINUING WITH
THE REST OF THE MODULE.**



SELF TEST 2

Answer the following questions without referring to the notes :

1. Name four methods of lubrication used in industry:

- a. _____
- b. _____
- c. _____
- d. _____

2. What is important regarding oil levels of machines that are lubricated by natural or pressure lubrication methods?

Ask your Training Officer to check your work and if it is correct, to sign below and then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

3. SET A DRIP FEED LUBRICATOR

ITEM / TASK: Method.

DESCRIPTION:

Refer to Fig 9.

- Clean the outside of the lubricator with a cloth.
- Close the needle valve by pulling the toggle shut-off to a horizontal position.
- Close the feed nut by turning it in completely.
- Fill the lubricator through the oil filler cap.
- Open the needle valve by pulling the toggle shut-off to a vertical position.
- Slowly unscrew the feed nut and frequently check the feed rate until the required number of drops per minute is achieved.

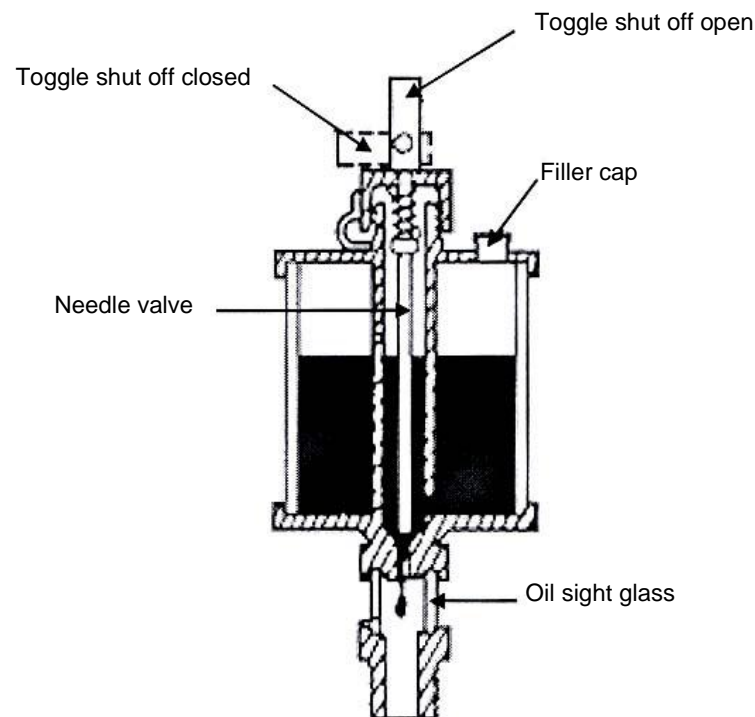
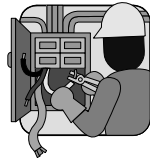


FIG 9.

DO THE PRACTICE ON THE NEXT PAGE.



PRACTICE

Practice setting a drip feed lubricator to deliver oil at different feed rates as stated by your Training Officer.

Drops per minute : _____

Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :



REMEMBER ALWAYS WORK SAFE

Once you have passed the entire self tests and practice, you are now at liberty to request a Formative Assessment from your Assessor.