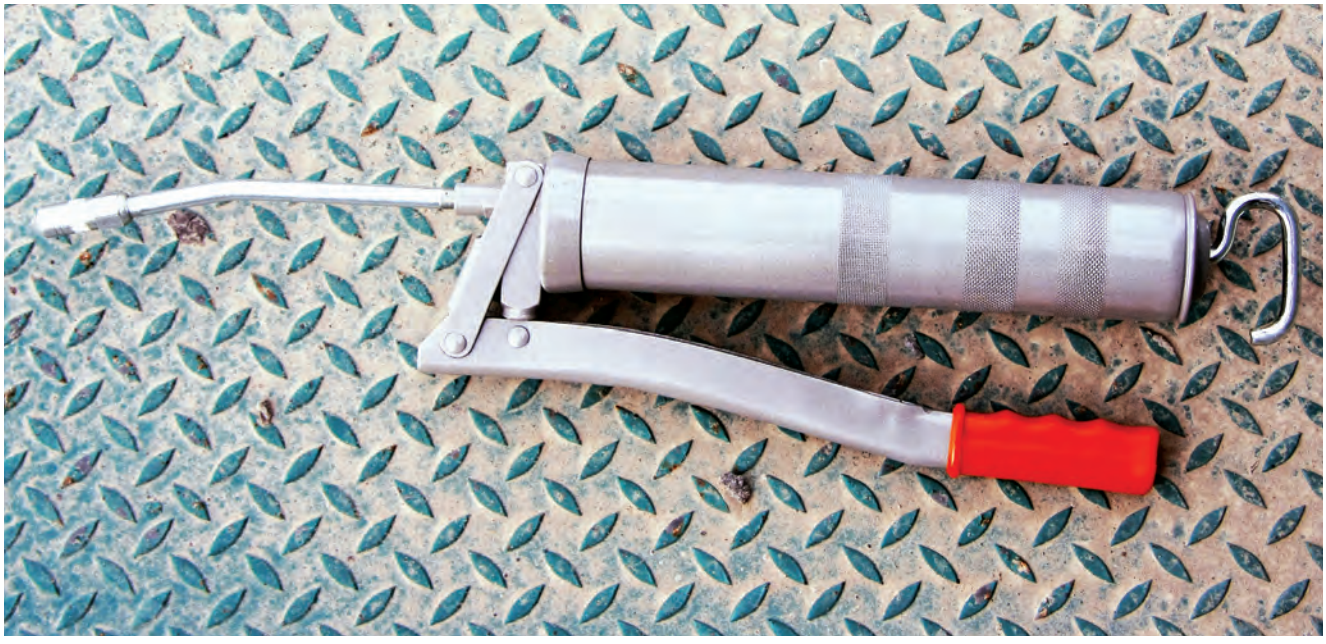
Grease guns: a front-line defense in the war on friction



How this simple tool can make all the difference – if handled correctly.

The weapon

Friction is our enemy and lubrication is our ally… if applied correctly. As with any alliance, proper lubrication requires careful equipment selection and maintenance.

One way to approach lubricating construction equipment is comparing it to a soldier's responsibility toward his gun.

A soldier knows his weaponry has to be kept in pristine condition and that certain weapons are more effective for specific tasks. The ammunition has to be appropriate for the application as well, and also must be kept clean. Dirty ammunition can cause a weapon to misfire and jam – which also applies to

Figure 1

Graphic source: Bennett Fitch, Noria.

Types of weapons: Grease guns

There are three primary types of grease guns: hand, air and electric. The hand-powered grease guns can use either a lever or a pistol grip. One other major variation among grease guns is how the grease is to be loaded: by suction fill, cartridge (tube) or bulk.

Lever (manual) – This is the most common type of grease gun and can supply between 1 and 1.5 grams of grease per pump. The grease is forced through an opening by manual pumping.

Pistol grip (manual) – This variation of the lever-type grease gun allows for the one-handed pumping method and is often more desirable than the manual lever type. It provides a little less than a gram per pump.

Pneumatic– This grease gun uses compressed air (up to 15,000 psi). Many times, the grease provided to the gun is stored in large barrels, and the air compressor applies the pressure from a pump placed at the top of the barrel, through a pneumatic hose and into the gun.

Battery (cordless) – This is a low-voltage, battery-powered grease gun that works similarly to the pneumatic grease gun. It offers the advantage of being cordless.

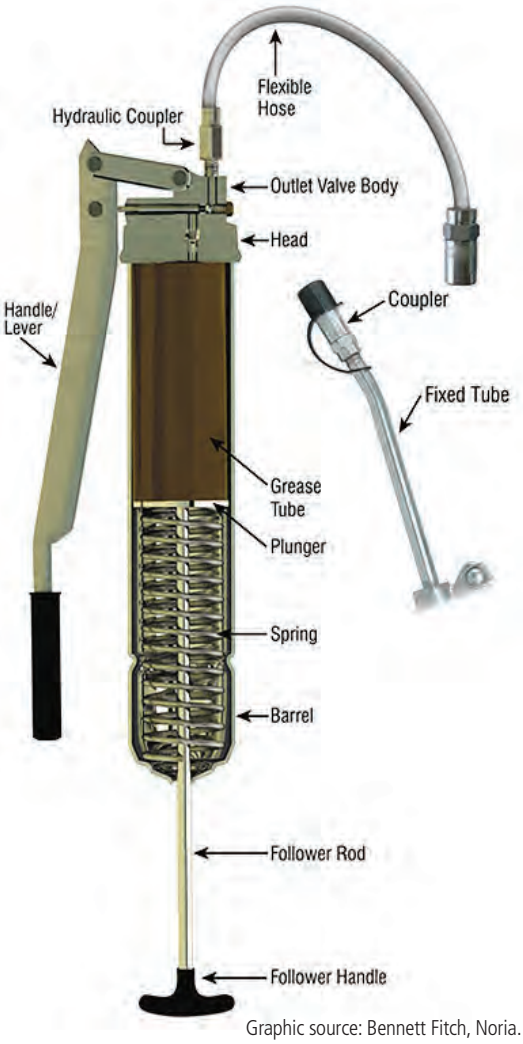
grease guns and lubrication.

A grease gun is a deadly weapon capable of "killing" your equipment. Grease guns can produce up to 15,000 psi per stroke (shot); however, most bearing lip seals are unable to withstand more than 500 psi. Because of this, grease guns can generate significant pressure and, if improperly used, can ultimately blow out the seals designed to protect the bearings from external contaminants.

When asked why there was so much grease oozing out of a bearing, an operator once replied, "If one shot is good and two is better, then isn't 50 wonderful?" No! A few well-targeted rounds are often more effective than "spray and pray." Overfilling bearing cavities can create major issues: Grease is forced outside the seals (path of least resistance) as the equipment heats up, and it is exposed to contaminants and moisture. When the equipment cools, the contaminated grease is sucked back into those same bearing cavities (part of thermal expansion and contraction) and can cause damage to the equipment. Overfilling the cavities also creates additional heat.

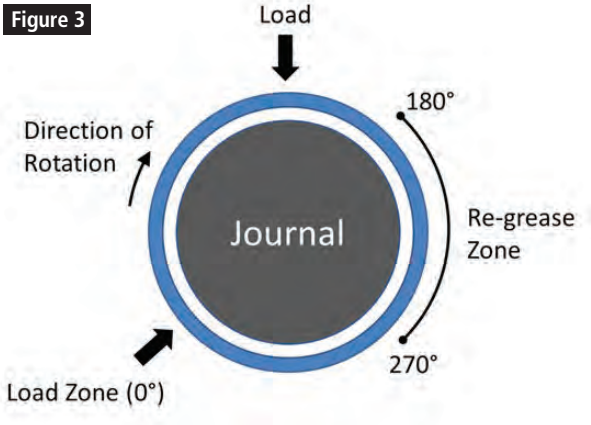
It's essential that grease is used as a lubricant because it adheres to equipment's moving surfaces without easily dripping or flowing away like oil does. Grease is a semifluid-to-solid mixture of a fluid lubricant and a thickener and may contain additives. Lubricants used in construction are either mineral oil (petroleum-based) or synthetic oil. Most grease today is composed of mineral oil blended with a soap thickener. The difference between normal oil-based grease and organic grease is that organic grease contains no paraffin or oil by-products. The organic

Figure 2 Anatomy of a grease gun.



Graphic source: Bennett Fitch, Noria.

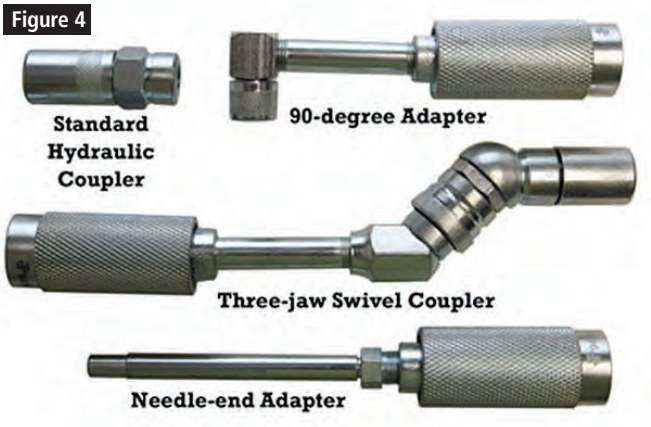
Figure 3



Graphic source: Bennett Fitch, Noria.

On construction equipment, grease should be applied at a 90-degree angle leading to the load zone.

Figure 4



Graphic source: Bennett Fitch, Noria.

Grease guns come with a variety of adaptors and couplers for different jobs and angles of application.

grease also outperforms oil-based grease by three times the pressure. Because there is a significant difference between oil-based and grease-based application, it is important to understand the use of the proper equipment.

Acquiring the target

The location for 'firing our weapon' is not random. For a rolling element bearing there isn't much of an issue, but in construction equipment where many grease applications are bushings, grease should be applied within a 90-degree angle leading into the load zone (see figure 3).

Sighting-in: Calibrating the grease gun

Just as soldiers sight-in weapons to tighten the shot group, operators need to calibrate grease guns as well. Studies have shown that an individual stroke or "shot" of grease from a grease gun can vary from .5 grams to 3 grams. That is a 600-percent difference. In other words, three strokes from one grease gun may produce 1.5 grams of grease while three strokes from another could produce 9 grams.

How do we minimize this issue? It is important to calibrate each grease gun and note the volume of grease each gun delivers with one full pump or stroke. One of the common ways to calibrate grease guns is to measure the weight of one slug of grease using this method: Take a Post-it note sheet and place it on a scale. Measure its weight. Now, shoot 10 full strokes or shots of grease onto the Post-it. Deduct the weight of the paper and divide the balance by 10. That is the weight per stroke. Mark that on the grease gun, i.e. "2.5 gm/shot." It's ideal to standardize the type and therefore, the weight/stroke, on all grease guns used.

Weapon attachments: Connectors, adapters and couplers

A grease gun may come with the standard connection adapter, such as a hydraulic coupler. However, there are several variations depending on the application. The standard hydraulic coupler is the most commonly used. A 90-degree adapter is

ideal for fittings in confined areas that require a 90-degree bend. A needle-end adapter provides a thin, precise amount of grease for tight places, while a three-jaw swivel coupler offers a variety of locking positions for different applications.

The weapon barrel: Flexible hose vs. fixed tube

The decision about whether to use a flexible hose or a fixed tube depends on a machine's grease-fitting type and ease of location, as well as the type of grease gun used. For example, a hard-to-reach location would benefit from a flexible tube. On the other hand, lever-style grease guns require both hands to pump the grease and would favor the fixed-tube alternative.

Additional accessories

Grease-gun meters can be retrofitted onto a grease gun to help optimize lubricant consumption. Plastic caps provide benefits such as preventing corrosion and debris. They also can be color-coded so that cross-contamination does not occur. Color-coded caps can also indicate the preferred frequency of application. Other accessories such as sonic/ultrasonic devices are also available.

Are they rounds or bullets? The grease fittings

Grease fittings have several names, such as a Zerk fitting, grease nipple or Alemite fitting. This is the lubrication point where the grease connector is attached. The standard hydraulic grease fitting is most commonly used for standard applications. It can be either upright or angled. The button-head fitting is ideal for good coupler engagement when large volumes of grease are being added. A flush-type grease fitting is preferred when space is limited for standard protruding fittings, while the pressure-relief vent fitting helps prevent higher pressures that could lead to damaged seals.

Malfunctioning weapons and other issues

Rapid fire issues: High grease gun pressure: A high-pressure manual grease gun is

designed to deliver from 2,000 to 15,000 psi. Applying too much pressure while greasing will damage the bearing seals, which rarely can handle more than 500 psi. Symptoms of high grease gun pressure include collapsed bearing shields, damaged bearing seals, grease driven into electric motor windings, and safety and environmental issues.

Reloading: Re-greasing frequency: Matching re-greasing frequencies to optimal conditions is necessary to avoid long-term machine health problems. If the frequency interval is too long, symptoms may include lubricant starvation, which promotes wear, friction and grease contamination. If the frequency interval is too short, excessive grease consumption and safety and environmental issues may occur. OEM recommendations should be examined and coupled with historical data from your computerized maintenance management system.

Firing for effect: Over-greasing and under-greasing: It is important to know the exact amount of grease necessary for your greasing application to avoid over-greasing or under-greasing. Symptoms of over-greasing include damaged seals and motor windings, environmental issues, and fluid friction, which lead to increased heat generation, higher grease oxidation rates and higher energy consumption. Symptoms of under-greasing include bearing starvation, which results in friction wear and increased contamination.

To overcome this problem, it is necessary to calculate the amount of grease that is released from a grease gun per stroke. Refer to the calibration method mentioned earlier. EW

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