



## Benefits of Bulk Lubricant Storage and Delivery

**More and more fleet operators, manufacturers and retail outlets are installing bulk storage systems for motor oil, gear lube and other vehicle fluids. But is it right for you? To help you decide whether to follow their lead, Graco Inc.'s Mark King takes a look at how a bulk storage/delivery system can cut your material and labor costs.**

Vehicle servicing facilities:

More and more fleet operators, manufacturers and retail outlets are installing bulk storage and delivery systems for vehicle fluids, including motor oils, transmission fluids, gear lubricants, chassis greases, engine coolants, hydraulic fluids and windshield wash solvents. But is it right for you? To help you decide whether to follow their lead, take a careful look at how a bulk storage and delivery system can cut your material and labor costs. The bigger the cuts, the faster the return on your investment.

### **Add up savings on materials**

A big advantage of a bulk lubrication storage and delivery system is the ability to purchase motor oil, automatic transmission fluid (ATF), gear lube and other fluids in large volumes. Bulk storage of these materials is usually in aboveground storage tanks. Depending on volume, bulk purchasing can cut the price you pay for fluids by as much as 50 percent. If you use as little as four 400-lb. drums of any fluid a month, a savings of just 3 cents a pound gives you an extra \$576 a year.

A bulk lube system can cut labor costs, too. You eliminate continuous removal and replacement of empty 55-gallon drums, and there's no need to coordinate empty barrel storage, pick-ups or deposit-fee reimbursements. With bulk storage, time once spent on those chores can go to billable service work. If you use four drums a month and each drum takes 30 minutes of labor at \$15 an hour, you save \$360 a year by eliminating that handling time. Add to that the cost of drum disposal at \$25 per drum, and you save a total of \$1,560 a year if you can eliminate four drums a month.

Waste reductions can also provide savings month after month. For example, eliminate the drum bottom waste of 3 inches (approximately 45 lbs.), costing 50 cents a pound in four drums a month and you save \$1,080 a year.

So, in our example you have saved \$2,640 a year in handling time, drum disposal and waste reduction. Adding up the savings you can realize in your specific situation-day in and day out, month after month-will help you decide whether the time is right to invest in a bulk lubrication storage and

delivery system.

Using a bulk grease system as an example, let's look at some of the types of equipment and requirements you will want to consider.



**Pumps transfer bulk oil from 6,000 gallon bulk storage tanks to multiple bays in bus maintenance garage.**

### **Types of bulk grease storage**

Four types of grease tanks are available: pressurized tank with a "follower," non-pressurized tank with a follower, sloped-bottom tanks and "bag-in-a-box" tank.

To reduce the amount of wasted grease left in the tank, choose one with a follower plate that scrapes the sides of the container. Non-pressurized tanks depend on atmospheric pressure and the pump's suction to lower the follower. Pressurized tanks use 3-5 psi to help bring the follower down.

With most sloped-bottom tanks, the grease slumps down the pump inlet at the bottom. Some tanks feature a side pocket where a pump can be mounted at a 45-degree angle.

Bag-in-a-box tanks serve as one-way shipping containers that can be disposed of by the user. They are usually used only with lighter viscosity greases.

You can also choose between stationary tanks and transportable "tote" tanks. Stationary tanks are usually filled on-site from a large bulk grease tank truck. Tote tanks are filled at the grease plant, shipped to you, then returned to the grease plant for refilling.

### **Grease "pumpability" affects requirements**

As the viscosity of grease increases, the more difficult it becomes to pump. Lower temperatures will increase viscosity. In most types of grease, as the rate of flow increases, the shear rate (the relative movement between layers of grease) increases and viscosity goes down. On the other hand, some types of grease that tends to harden when subjected to higher shear rates. Therefore, the viscosity of different types of grease can vary significantly at different temperatures and flow rates.

Supply line selection guides from lubricant suppliers help in determining grease pumpability. The guides are based on a specific application, grease viscosity, pump performance data and pressure drop. You can expect the calculations to be conservative, so they will assure adequate flow rates when grease formulations or temperatures vary. Once you know the apparent viscosity for your conditions, the pressure drop can be determined and the system can be properly sized.

**Pumps transfer oil from tote tanks to bays at truck fleet company.**



### **Selecting the right pump**

Transferring a high volume of grease from a bulk grease tank requires loading the pump at a high rate. Good suction load capability is critical because, if grease can't be drawn into the pump quickly enough, the pump will cycle at a high rate with reduced output and excessive air consumption.

Air-operated grease pumps are described in terms of the ratio of fluid pressure to air pressure: a 3:1 ratio pump will develop 300 psi of grease pressure with 100 psi of inbound air pressure. Because efficiency increases with lower ratio pumps, supply lines need to be larger to reduce flow restrictions. It is not unusual to find two-inch diameter supply lines being used to transfer grease 50 feet at 15 gallons per minute (gpm).

To assess which pump is right, start by noting that pump requirements will vary from one application to another, as explained below:

**Automotive chassis lubrication**-Despite differences in automotive chassis lubrication systems, they share a need for high pressure pumping with a relatively low volume at the dispense point. Pumps with a 50:1 ratio-which will develop 5000 psi of grease pressure with 100 psi of inbound air pressure-are typical for auto chassis lubrication. But when several drop lines or grease control valve outlets will be supplied from one grease pump station, a larger diameter air motor pump will be needed.

**Industrial bearing lubrication**-Lubricating bearings on machinery and equipment involves a multitude of applications under a variety of plant conditions. In many cases, a pump much larger than a high-pressure low-volume 50:1 ratio pump will be needed. Situations could include lower in-plant air pressure levels, pumping over longer distances, pumping at lower temperatures, or lubricating larger bearings and filling grease cavities. In those cases, a 75:1 ratio pump may be the minimum needed to maintain adequate pressure and flow through grease supply lines.

**Grease transfer systems**-Unlike bearing lubrication, which involves forcing grease through a small diameter fitting, grease transfers do not require high pressure. Generally, if supply lines are properly sized to maximize flow, the most efficient grease transfer pumps have a 3:1 to 20:1 fluid-to-air pressure ratio.



**High pressure pumps transfer bulk oil, ATF and other fluids from the remote storage area to multiple bays where maintenance is performed on ground service equipment at airport site.**

### **Pump mounting choice important**

To feed the pump, the right pump mounting choice is critical. Most grease can be pumped from its original container with any of the following three methods: drum cover mounting, inductor mounting or air-operated ram mounting.

The drum cover mounting method has the lowest purchase price. However, 3-5 inches of grease typically remain in the bottom of the drum-a waste that can add up.

Inductor mounting takes advantage of the pump's weight to help the follower plate with rubber wiper scrape down the drum sides to reduce waste. Drum changing is also clean and convenient, reducing contamination.

The most efficient method is an air-operated ram mounting. It uses two air cylinders to force the pump and follower plate down as the grease is used, providing a tight seal that reduces waste. They can handle extremely viscous grease and provide high-volume pumping and a safe, durable, clean and convenient method of changing drums.

If a standard drum-length pump is an adequate size, the pump can be mounted in one of three ways: from the top of the container, in a side pocket or horizontally at the bottom outlet of the tank (if it has a follower plate).

For higher flow rate and pressure requirements, you'll want to choose a high-volume pump and feed it from the tank's bottom outlet. Because of their size, high-volume pumps are often mounted on a standpipe or the pump invert is mounted at the bottom of the tank. If mobility is important or if the user experiences uneven ground, such as at a construction site, choose a cart-mounted pump or mount the pump directly to the side of the steel tank.

### **Pulling it all together**

With the choices available in bulk tanks, drums, pumps and mounting methods, a central bulk lubrication system can be developed that exactly meets your needs. To make sure the bulk system you install is the best possible solution, you'll want to make sure your equipment supplier and the grease supplier have a full understanding of your special situation. The better the working relationship, the better your system.

Mark King is the Engineering Group Leader in the Lubrication Equipment Division with Graco Inc.