Improving the Grease Dispensing Process.

By Melvin Miller, Sale Manager

Automotive parts manufacturers as well as other manufacturers have been challenged with dispensing liquids and pastes while assembling components in their facilities throughout the world. Part of the manufacturing process has included the application of small quantities of grease into these assemblies. Initially the parts manufacturers gave little thought to the dispensing of grease. Often the preferred technology was a thin stick, or a small brush. The amount of grease applied varied widely depending on the tool used to apply the grease and the operator. Contamination of the grease was another concern as the supply of grease was usually an open cup or can that was left open to collect any debris that happen to be in the air.

These two issues became costly to the manufacturers. When too much grease was applied, it tended to end up on other surfaces within the assembly creating performance and warranty problems. Additionally, too much grease needlessly added un-intended additional costs. Too little grease caused assemblies to fail prematurely creating additional warranty issues. Debris found in the grease also had a negative impact on the performance and longevity of the assembly

As different manufacturing processes have been examined to improve product quality and reduce operating costs, manufacturers have tested several different processes to improve the dispensing of small, precise amounts of grease onto their assemblies. Several manufacturers have reported, they have been successful in identifying several different technologies that meet their requirements for improvement. These different technologies either include the use of valves as part of their automated process improvements or for less automated and less precise dispensing, the use of time/pressure dispensers has been employed.

What Are the Factors To Consider

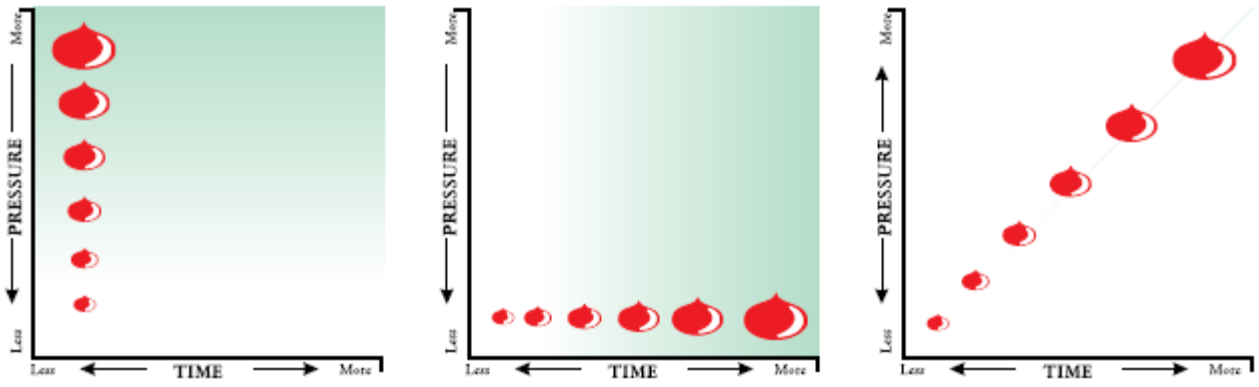
Grease is lubricating oil that has had a thickening or gelling material added to cause the grease to stay where it was deposited and to release the oil onto the surfaces as intended. Grease can be found in various thicknesses ranging from under 400 Cps (low viscosity) to over 100K Cps (high viscosity). Therefore different dispensing technologies are required when addressing different viscosities.

Several dispensing factors need to be considered when dispensing fluids and these are equally true when dispensing grease. Dispensing tip size, dwell time, and pressure are the main factors to be considered. Additional factors to be considered are, the type of packaging the grease is supplied from, the viscosity of the grease to be dispensed, and some types of grease may contain a filler material that may need to be considered.

Different applications will require different techniques and equipment to meet expectations. Some of the factors to consider are shot size, shot size repeatability, shot frequency, level of automation, and the length of the overall project life. (Insert shot size chart from catalog)

When considering the correct dispensing tip size, the following factors need to be considered. Dispensing Tip inner dimension (ID) should be a minimum 25% smaller than the desired dot size. This will allow for better material control when producing very minute dot sizes. Keep in mind when dispensing material filled grease, the tip ID needs to be a minimum of 3 times the material particle size. This consideration is important in eliminating tip clogging. Filled materials have a greater tendency to clog and using a larger tip will eliminate this concern. When dispensing materials with higher viscosities, the use of a straight walled (cannula) dispense tip may be ineffectual and a taper walled dispense tip should be considered. Taper tips are designed to have the same ID at the outlet point as a straight walled dispense tip but reduce resistance and material separation due to the tapered wall. The taper tip will give better accuracy and repeatability when dispensing grease. When dispensing less viscous grease a straight walled dispense tip may be the better selection.

Dwell time and pressure are linked as they are usually controlled by the same device. Increasing the dwell time or pressure will increase the dispensed amount. Decreasing the dwell time or pressure will decrease the dispense amount. This rule is equally true when using a time/pressure controller with a valve or when using a manual held plunger with a syringe.



The type of packaging needs to be considered when addressing the dispensing of grease. Grease is available in many different types and sizes of packaging from very small syringes to large barrels. Depending on the dispensing method to be used, care will need to be used while handling and possibly repackaging of the grease. With the goal of increasing accuracy while dispensing small dot sizes, great care will be required to eliminate all air from the grease as air pockets will have a negative effect on accuracy and repeatability of the deposit size. While there is a cost associated with using smaller packaging many companies elect to use smaller pails or cartridges when concerned with accuracy to eliminate the introduction of air pockets into the process.

Just With a Syringe

Manual syringe dispensing may be acceptable when applying small dots or lines of grease without care for repeatability. The use of a syringe barrel with a piston and manual plunger will allow an operator to place dots and lines. Unfortunately this technique is not ergonomically friendly to the operator causing fatigue. The fatigue increases the difficulty to the operator while dispensing the same dot size or line thickness multiple times. After a short time the operator becomes unable to repeat the dots or lines.

Time and Pressure

Many of the grease dispensing applications can be addressed using the Time/Pressure Dispensing (TPD) systems. The TPD is acceptable when the application does not require the speed or accuracy of automation. The TPD consists of an electronic dispenser, syringe head adapter assembly and syringe assembly. The dispense tip is selected based on material and dot size. The syringe head adapter assembly connects the electronic dispenser to the syringe. When activated the dispenser releases a measured amount of air pressurizing the syringe head assembly and syringe of material. Naturally the material in the syringe wants to escape this pressure causing the material to flow through the dispense tip.

The TPD method is the most widely used method. The primary advantages of TPD are it is an inexpensive dispensing method and that it is simple to set up and use. The disadvantages of TPD relate to consistency. When the syringe is full of material and the operator starts the dispensing process, there is very little air in the syringe as compared to the grease. During this time the dispensing is very repeatable because the grease does not compress when pressure is applied. As the grease leaves the syringe and is replaced by air, the repeatability falls off. This is caused when air pressure is applied, the air does compress while under the same situation the grease does not. When the compression takes place the dot sizes become inconsistent.

Valves

Valve technology is the most accurate and repeatable dispensing method while dispensing grease. For this discussion applications will be divided into two classifications- Higher flow/ larger dots and Lower flow/ smaller dots.

Spool valves are capable of dispensing materials ranging from 5K Cps to 3000K Cps and are perfectly suited for dispensing grease. Spool valves are selected when dispensing dots at a high rate of speed. When input air pressure is applied the spool assembly drives forward opening the material path, allowing material to flow from the material inlet to the material outlet. Closing off the input air causes the spring to reverse the spool assembly closing off the flow of material. This design also ensures a quick “fail-safe” shut off of material flow.

Spool Valve

When manufacturing management determines automation is required many applications require the use of spool valves. Many spool valves are capable of 400+ dots per minute when part of an automated system. The spool valves deposits small dots at high speed with excellent repeatability. Spool valves can be found dispensing grease in small mechanical assemblies used in industrial and automotive applications.

Auger valves are capable of dispensing materials ranging from 5K Cps to 1300K Cps and are also suited for dispensing grease. The auger valve employs a feed screw that when rotated in one direction very precisely creates a shot and when reversed, creates such back to eliminate dripping.

Auger Valve

Shot size is determined in-part by the material dispensed and the size of the dispense tip. Some auger valves create 0.010” (0.25 mm) shots and are extremely repeatable. These valves are found in automated systems where electro mechanical or electronic assemblies are manufactured. While the auger valve is slower than the spool valve, it is the valve relied on for the smaller more precise shots.

When dispensing grease, delivering the correct amount of grease to the correct location is the primary goal while minimizing costs. Several different approaches can be taken to satisfy this goal.