Festo Automotive

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FESTO

Inside this issue . . .

Change . . .

All of these companies have something in common . . . Do you know what it is? Before you answer that question, match the company with the product they manufactured.

1. Grigsby Grunow	a. Ice cream manufacturer
2. Terraplane	b. bicycles
3. Hudson	c. 64 passenger boat
4. Atwater Kent	d. Majestic radio
5. JC Higgens	e. Automobile
6. Altari	f. Computers and video games
7. Matchless	g. Shortwave and broadcast band radios
	h. Silver Arrow Motorcycle

By: Steven Dick

How many times in your life have you said, “I wish I would have . . . .” ? It would be great to know the future, if only for one event! Take for example: Winning the Super Ball 6 State Lottery for 200 million dollars. Can you imagine how your life would change if only you knew the winning number before it was drawn and had purchased the only winning ticket? Life is made up of many choices; some cast our fate to the wind and tide, while the outcome of others is the culmination of opportunity and preparation. Since the majority of us will have to work most of our lives, the best path to choose is the one which ensures us control of our destiny.

The point that I am making is simple: “Change is inevitable, and we can either choose to be a part of the change, or become a victim of it! Therefore, we must step out of our comfort zone and learn new things so that we can perform our job better.”

Learning one job or becoming the best at doing only one thing may not sustain your way of life. Can you imagine the shock that typewriter repairmen felt with the advent of computers? Their skills eventually became obsolete, and their jobs were eliminated!

So, isn’t it time for a change? A change to seeing things for what they can be, instead of what they are!

First and foremost, Festo Corporation’s goal is to meet the needs of our customers, while acting as a trendsetter of new innovations in pneumatics. Our application, product and sales engineers, and training instructors who will work with your company to implement new equipment and training necessary to enhance productivity at your company, and keep it on the cutting edge of productivity. Festo Corporation’s help is just a call away. For more information about product or training, please contact us:

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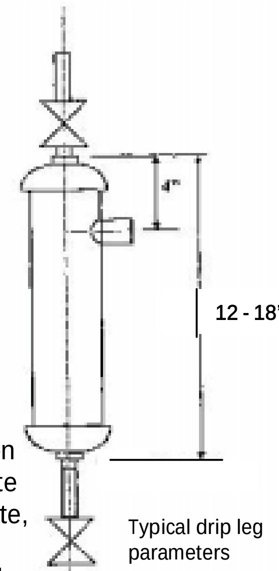
To answer the original question: All of these companies either went bankrupt or were taken over by another company!
Answers: 1 d, 2 e, 3 e, 4 g, 5 b, 6 f, 7 h

Drip Leg

By Joe Brooks and Jeff Brinker

The drip leg is the first major component in a pneumatic system. The ball valve (installed upstream) is used to isolate the entire system, for maintenance on the drip leg or to completely shut off the air to the system.

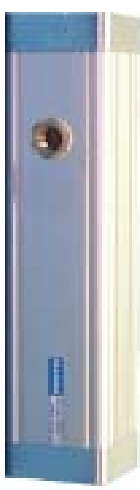
The purpose of the drip leg is to remove large particulate and condensate from entering the air stream going to the system. The drip leg does not replace the various filters required, but augments the filtering process. The less particulate debris that reaches the filters downstream from the drip leg, the longer the filter elements will function correctly.



Typical drip leg parameters

Although no international standard has been formally adopted, this discussion will focus on the major components and sizing conventions typically adopted by machine builders. Generally, either the machine builder or the systems contractor installs the drip leg. Typically, the end user provides the ball valve above the drip leg, and the installing contractor/machine builder provides the remaining equipment

The drip leg is located in the vertical position inline with the air drop line. The body of the drip leg consists of piping that is 2 to 3 times larger than the diameter of the drop line. The body of the drip leg is generally a minimum of 12 inches in length and occasionally up to 18 inches. The horizontal air pipe feeding the machine is taken approximately 1/3 to 1/4 of the length down from the top of the vertical drip leg barrel and is typically the same size as the air drop line.


Festo Drip Leg (ball valves not shown)

The increase in diameter of the barrel from the air drop line causes a reduction in the flow velocity of the air flowing through it and allows the large particulate to drop to the bottom of the drip leg. The air continues, without the particulate, into the horizontal pipe feeding the machine, which should be located approximately 1/3 to 1/4 of the of the distance from the top of the drip leg. The particulate accumulates below the horizontal air feed and must be removed from the drip leg periodically. Below is an example of how much reduction in velocity can occur in a system.

$$CFM = 60 \times V_{el} \times A$$

Base formula

V_{el} = velocity in ft/sec

A = Cross section radius of the pipe ID multiplied by π in feet

60 = conversion from minutes to seconds

Example:

A system requires 100 CFM (ft^3/min). The pipe ID that feeds the drip leg is .866 inches and the ID of the drip leg is 4 inches. What is the velocity of the air in the pipe and the drip leg?

The cross section area of the pipe and drip leg is found by dividing the diameter in half and converting inches to feet. The base formula is then manipulated to find the velocity of air in the pipe and drip leg.

$$V_{el} = \frac{CFM}{(60 \times A)}$$

$$A_{pipe} = (.036\ ft)^2 \times \pi = .0041\ ft^2$$

$$V_{elpipe} = \frac{100\frac{ft^3}{\min}}{(60\frac{\sec}{\min} \times .0041 ft^2)} = 406.5\ \frac{ft}{\sec}$$

$$A_{dripleg} = (.167\ ft)^2 \times \pi = .0873\ ft^2$$

$$V_{eldripleg} = \frac{100\frac{ft^3}{\min}}{(60\frac{\sec}{\min} \times .0873 ft^2)} = 19.1\ \frac{ft}{\sec}$$

Drip Leg *(Continued from page 2)*

By Joe Brooks and Jeff Brinker

From this example, the velocity of air in the pipe is considerably reduced when entered into the drip leg. By reducing the velocity of air in the drip leg, the particulate and water that is resident in the air at high velocity is then dropped to the bottom of the drip leg.

At the bottom of the drip leg is a ball valve (usually 3/8"). During normal operation, this ball valve is in the closed position. When the ball valve is open, the accumulated particulate and water from the drip leg is expelled under the escaping pressure. Depending on the age of the mains and the incoming air quality, the condensate should be expelled on a monthly or quarterly basis.

Depending on the drip leg location, a pipe to lead escaping condensate to the floor or a dump should be considered. Capping of this pipe (ball valve) off should be avoided, so the discharge process is easy and unencumbered.

With a properly designed drip leg integrated in a system, filter life is extended, and much smaller particulate can be removed. This ultimately results in cleaner compressed air for the system and longer life for the components.

Oils and Rubber

By Scott Holmes

Today there are hundreds of different oils on the market, so which oil do you choose, and does it really make that much of a difference?

In a pneumatic system, there are rubber seals on valves, cylinders, actuators and even fittings. The most common material is Nitrile, commonly known as Buna N, or just Buna. Some oils work great with metal to metal contact, but are not intended for use with rubber. WD-40 and Marvel mystery oil are two such oils. Unfortunately the most common reactions with rubber occur over time and may make it difficult to troubleshoot.

The swelling of rubber seals is the most common effect. This in itself may not cause a problem. The problem occurs over time. When the rubber swells, it is breaking down the natural bonds internally, and this causes the rubber to become softer and wear much quicker. The swelling of rubber on dynamic seals also creates much more friction. So between the rubber getting softer and being exposed to greater friction, valves, cylinders and actuators may wear out their seals prematurely if the wrong oil is being used in the system.

Most pneumatic suppliers today are designing for non-lube service. This means the device is either pre-lubed at the factory, or a special seal material may have been used. In any case, the best advice is to always check with the manufacturer for recommendations on which oils to use for those devices requiring lubrication.

One thing to always remember, once you start to lubricate a system, is not to let your lubricators run dry. The pre-lube that was used in the factory has been washed away by the introduction of oil from the lubricator. If the system runs dry, the friction in the system may cause damage to the system components.

Liquid Level Control

By Steven Dick

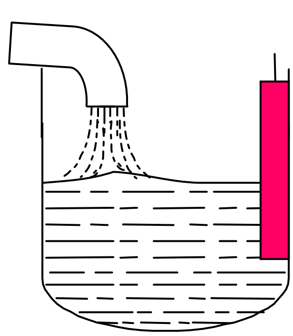
Most factories use large coolant filters, which from time to time will need more water or coolant. In most plants, this is done manually! The trouble with doing it manually is the expenditure of valuable time (watching it fill, and shutting it off)! This whole process can be eliminated by constructing a liquid level control (see circuit and picture below).

The principle is very simple. When water reaches the bottom of the low level tube, a pneumatic signal is sent to the electronic pressure sensor (Festo part SDE 1). This signal then turns on a relay, which causes a fill valve to shift to a passing condition. This fill valve is a 2/2 valve, solenoid, spring return, normally non-passing, such as an Asco valve. When this fill valve becomes active, it will allow the fluid to fill the tank to the desired height, which is determined by the second signal setting (back pressure in the tube). As the fluid reaches the high level setting, another signal will be given to the electronic pressure sensor, which will then shift the valve back to a non-passing condition. A third setting is recommended to activate a high-level alarm to alert maintenance personnel that a problem exists. To properly build this liquid level control, the following components are recommended:

1 - Festo GRP precision flow control valves
1 - Festo precision gauges
1 - Festo regulator with gauge
1 – Festo air filter (filtered to 5 micron)
1 – 2/2 valve, solenoid, spring return, normally non passing (Asco fill valve)

* Festo GRP precision flow control valves enable the user to obtain a desired flow rate by using a rotary knob and, thanks to the adjusting scale, the value can be reproduced precisely at any time.

* Festo SDE 1 is a comprehensive modular system of electronic pressure sensors ideally matched to the needs of pneumatic installations.



"Pneumatics": The Most Reliable Form of Automation

By Edward Goodwin

When a new piece of equipment goes into operation, do you expect that machine to operate throughout its full life cycle without complications? Probably not, but you should expect the pneumatic components to do just that! Now, that is not to say that the occasional, unexpected outside influence won't cause problems, but under normal circumstances, pneumatic components should outlast your machine.

Those of you who are dealing with breakdowns regularly may question that statement, but let me explain. There are production plants in operation right now which are experiencing that kind of reliability with pneumatic equipment. The real secret to this kind of longevity is not overbuilt, super-expensive components, but well engineered standard products that are applied correctly. It is well recognized that the most common cause of failure of any component is misapplication. Take it from one who has been asked to inspect new equipment prior to shipment, even the most experienced machine builder can overlook the obvious when it comes to applying pneumatics properly. You should be able to rely on your pneumatic supplier for guidance that will prevent misapplications at the build stage. Once in the field, a component that is applied incorrectly often leads to the repetitive breakdowns we all abhor.

Another cause of repetitive failures is faulty installation. The size and type of plumbing is crucial and simple, and inexpensive procedures can prevent major problems. For instance, the use of risers and drip legs will increase filter element and component life significantly. Once the equipment is in operation, very little maintenance is required. Most moving parts in a pneumatic system are permanently lubricated or lube-free.

There are production lines in operation right now, using hundreds of air valves that have had no trouble in over six years. Now that's reliability!

When applied properly as to require a minimum of maintenance, pneumatics offers far better reliability than alternative power sources.

Rotary Actuators and Mass Moments of Inertia

By Mark Kuenzel

Typically when sizing an actuator for an application, the main factor to be considered is the force requirements. In other words, we are usually concerned with how much force a cylinder will generate so we can achieve the necessary velocity.

When working with a rotary actuator application, many factors must be considered in order to properly size components. The Mass Moment of Inertia is commonly overlooked, and perhaps the most critical aspects for sizing rotary actuators.

Where Mass Moment of Inertia becomes critical is typically when it comes to stopping the load at the end of the rotation. Although an actuator may be able to rotate the load, it may not be robust enough to sufficiently stop the load.

Basically, the Mass Moment of Inertia of a solid is a measure of that solid's ability to resist changes in angular velocity about a specific axis.

There are different formulas for calculating the Mass Moment of Inertia depending on the type of mass and where it is in relationship to the rotational centerline. Is the mass centered or offset? What is the shape and size of the mass? What are the materials and weights?

All of this must be calculated in order to properly size a rotary actuator. If it is not accurately calculated, the actuator may experience erratic behavior or premature failure.

Shock absorbers can be used if the calculated Mass Moment of Inertia is greater than acceptable for the cylinder selected. The use of shock absorbers will cushion the load at the end of the stroke. This will allow the use of smaller rotary actuators in some applications.

The shock absorbers will need to be sized in accordance with the application-specific parameters.

Festo Corporation offers software that will assist with the necessary calculations for Mass Moment of Inertia as well as Shock Absorber Selection. This software can be downloaded free of charge from the Festo web-site.

Lean and Mean, user friendly is becoming a very big issue.

By David Lovell

Bottom line: ACCIDENTS COST ALL OF US.

Issue:

Lowering manual forces needed to move (articulating) end-of arm tooling.

Concern:

When manually moving end-of arm tooling, it often must be jiggled into place. It is imperative to have a low operating force and quick response times so as not to fatigue the operator, which in turn causes muscle and nerve damage.

One Solution:

One way to accomplish this is to use cylinders with special low air break-a-way (piston movement) seals to reduce the cylinder friction. Keep all airlines and devices as close to the cylinder as possible. This will greatly add to the response of the system.

Over-size the exhaust port to get air in and out quicker, achieving quicker reaction times. Use precision air regulators to better "balance" the load.

Better Solution:

Install a Festo LRP Precision Low Pressure Regulator. This unit has the highest internal exhaust capacity of this size in the industry. Care should be taken in choosing the correct regulator for the pressure needed. This is also important in the proper sizing of the air valve. Too large a valve will make system sluggish, and too small a valve will increase the manual force needed to move tooling.

Note: You should install a Festo Slow Start/Exhaust valve downstream of Lockout valve, Filter/Regulator, and before system. This will allow air to come on slowly to the system, thereby reducing the cylinder slam when air is applied.

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