

# Why Two Chambers Are Better Than One

By Russell Roden, Atlantic Design, Inc. | [calladi.com](http://calladi.com)

Double-dump air locks come in many types and sizes, but all have the same purpose — to transfer material continuously from one pressure system to another system with a different pressure level. The dump valves can be any type of valve, from plungers and flapper plates to butterfly or ball valves and slide gates. Anyone who has used a pressure- or vacuum-transfer system understands that you cannot open the system directly to ambient pressure, or you will lose all the material and may create a safety hazard.

For example, on a vacuum system, when the receiver tank or dust collector is full, you cannot simply open the tank under vacuum, as all the material in the tank will be sucked back into it, and nothing will be discharged. The only way to discharge the material from the vacuum tank is to balance the pressure inside with the atmospheric pressure outside.

There are two primary ways this is accomplished. One method is to halt operation of the vacuum by stopping the vacuum source or to use a vacuum breaker or shutoff to stop the vacuum while the equipment continues to run. A vacuum breaker is usually the preferred method for a variety of reasons.

A vacuum breaker is a valve used to create a temporary barrier between the vacuum source and the vacuum tank. This allows for balance of the pressure inside and outside the tank so the collected material can be dumped from the tank. This type of system usually runs on a cycle timer. The breaker valve opens to allow the ma-



A double-dump valve is a low-cost, bolt-on assembly that can convert single-dump timer systems on vacuums and blast pots to dramatically increase production with minimal installation costs.  
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material to be dumped, and then after a certain length of time, the breaker valve is closed and the vacuum starts again.

Typically called a single-dump system, this process is low-cost but very inefficient. It allows material to drop out inside the vacuum line, which can take up to 20 minutes to clear. This means that the vacuum will pull more slowly until the entire length of hose is cleared.

Another method for balancing the vacuum system with the atmosphere is through a double-dump air-lock assembly. Fundamentally, a double-dump assembly is two stacked valves, operating in sequence with a small breaker valve used to isolate the vacuum from atmospheric pressure and allow continuous removal of material from the vacuum tank — even while the tank is under vacuum.



By running uninterrupted, a vacuum with a double dump can increase production up to 25 percent more than a system with a single-dump valve.

I equate a double-dump assembly with getting out of a submarine. When the sub is under water, you have to go into a room — or lock — and close a door behind you. A small valve is then opened to allow the space to fill with water, slowly and safely. Once the room is full, an outside door can be opened and the operator can safely exit the room. Failure to balance the room before the outside door is opened would cause water to rush in, preventing the operator from exiting and, possibly, creating a dangerous situation.

A double dump in a vacuum system essentially does the same thing. The double valves are sequenced using a cycle timer to alternately open and close gates or valves, mimicking an air lock similar to that in the submarine example.

A double-dump valve mounted below a vacuum tank starts out with both valves closed. When the timing sequence is initiated, a small balancing valve opens, allowing the intermediate chamber between the valves to go under vacuum. Once

the intermediate chamber is pressure-balanced with the vacuum tank above the double dump, the top valve opens, dumping material out of the vacuum tank into the intermediate chamber above the bottom discharge valve in the double-dump assembly. After a certain amount of time, the top valve is closed, trapping the material between the two valves. Then the small breaker valve is closed, allowing the intermediate chamber to go back to atmospheric pressure. Once atmospheric pressure is restored, the bottom valve opens on the double dump, allowing the

material to fall out of the chamber.

This sequencing separates the vacuum from the atmospheric pressure and allows the material in the vacuum tank to be continuously discharged, allowing the vacuum to run uninterrupted. A vacuum system using a double-dump valve can, therefore, achieve up to 25 percent more production in a given time frame than a system with a single-dump valve.

Using double-dump valves is not limited to vacuum systems; they can also be used in loading systems, pressure systems and even between pressure and vacuum systems. For example, a vacuum in conjunction with a double dump can be used to load hoppers. A satellite receiver tank with a double dump can be located above a hopper or trash dumpster to vacuum up debris and material and discharge them into the dumpster for removal.

Another typical use of a double dump is in the loading of material into a positive-pressure, pneumatic transfer line for filling silos and tanks. The double dump is located below a feed hopper and used to feed the material from atmospheric pressure into the pressurized transfer line.

Double dumps can also be used in higher-pressure applications, both in loading and unloading. Essentially, a double-chambered pot is a double dump. The operation is similar to a vacuum in that a cycle timer is used to sequence the plunger valves along with the pressure-relieving valve to continuously load grit into the blast air, allowing continuous blasting at high pressures of 150 psi and more.

Another high-pressure double-dump application is the use of high-pressure air to transfer or push grit from one location into another. A typical application, considered safe and convenient, involves loading grit from low ground-level feeders into storage hoppers.

A different and unique application of high-pressure double-dump valves is to install one on top of a bulk, single-chambered pot to convert it into a continuous blaster. Operators get the constant pressure and flow of a bulk pot along with true nonstop blasting like that of a double-chambered pot. Converting a single-chambered bulk pot also only makes the pot 12 to 16



One unique high-pressure, double-dump valve application is the installation of one atop a bulk, single-chambered pot to convert it into a continuous blaster.



inches taller. The ultimate combination double-dump application is a high-pressure double dump used to load a double-chambered pot.

## CONCLUSION

A double-dump valve is a low-cost, bolt-on assembly that can convert single-dump timer systems on vacuums and blast pots. There is no need to double the size of the vacuum tank or blast pot to get the benefits of a double dump when the installation of a small precision valve can lower cost, increase production, enhance safety and provide better access than large double-chambered vessels.



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Russell Roden graduated from the University of Houston with a degree in Mechanical Engineering in 1984 and has worked in the Blasting and Coating industry ever since. In 1997 he founded Atlantic Design, Inc. where he has secured several patents and set new innovation, quality, and safety standards for Abrasive Blasting Equipment in a worldwide market.



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