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Setting Up Air Abrasive Blast Equipment

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An air abrasive blast equipment system is composed of several major components, including the following.

- Air Compressor
- Blast Pot (Pressure Blast Tank)
- Blast Nozzle
- Moisture Trap
- Deadman Switch
- Blast Hood
- Interconnect Hoses

Let's take a look at each to see how they work together to provide an efficient abrasive blast system.

Air Compressor

The compressor provides high pressure air for the blasting operation. The air compressor is a machine to take atmospheric air at 14.7 psi and compress it to a pressure several times higher, usually about 120 psi. The heat generated through compression is somewhat dissipated by an air intercooler. The air then passes through oil and moisture separators to make it dry and oil-free as it exits the compressor.

Air compressors are generally identified by output capacity, such as 250 CFM, 325 CFM, or 750 CFM. CFM means cubic feet per minute, which is how the volume of pressurized air is measured. The power to run a compressor is usually provided by an internal combustion engine (gasoline or diesel), or



Fig. 1 Compressed air filter
Courtesy of Deltech Engineering

by an electric motor. Selection of a power unit is generally dictated by the area where blasting is to be

done or by the availability of utilities.

Things to remember prior to starting the compressor are

- check the engine oil level;
- check the coolant level; and
- check the belts and hoses for leaks or defects.

Blast Pot

The blast pot is a coded pressure vessel generally referred to as a pressure blast tank or PBT. Since it is a pressure vessel, it must have a stamp on it showing that it has been pressure tested. The PBT is further identified by size. For example, it may be called a 6 ton PBT or a 6 sack pot, referring to the amount of abrasive it can hold. During operation, the blast pot is pressurized and feeds abrasive into the air stream.

Blast Nozzle

The blast nozzle is a small but important piece of the blasting equipment. It is the last item to exert influence on the blast media. Nozzles are identified by their shell composition, their lining composition, the size of the orifice, and length, i.e., aluminum shell with tungsten lining, size #7, short. The orifice size number relates to the size in 1/16 in. units (#7 = 7/16 in.). The size of the nozzle has a bearing on the amount of air and abrasive used and

on the amount of work completed. The larger the size of the nozzle, the greater the consumption of supplies. Nozzles are chosen for the work to be performed.

Moisture Trap

The moisture trap (Fig. 1) is a device to allow the compressed air to shed water. As the air is compressed, heat is generated. As this hot air passes through the heat exchanger to lower the air temperature, water in suspension (humidity) is condensed. Generally, a compressor is fitted with a moisture trap. This first trap catches most of the water; however, as the compressed air continues to cool, additional moisture condenses in the bull hose. This remaining moisture is trapped by the moisture separator just before it enters the PBT. This trapping is done either with a centrifuge style separator or with a replaceable filter element style separator. Generally, it is necessary to leave an air bleed valve open in the bottom of the moisture trap when blasting to allow the moisture to be expelled.

Deadman Switch

The deadman switch (either pneumatic or electrical) allows the blaster to have remote control over the pressurization of the blast hose. With pneumatic operation this is accomplished when pressure through the deadman switch closes the air control valve and opens an escape valve. This prevents air from entering the PBT at the same time it depressurizes the PBT. Electrically operated systems use pinch valves to stop the flow in the blast hose. With electrically controlled systems, the PBT is always pressurized when the bullhose is connected and pressurized. The primary purpose of the deadman switch is safety. It provides a means to stop the discharge of abrasive from the nozzle when a safety hazard arises.

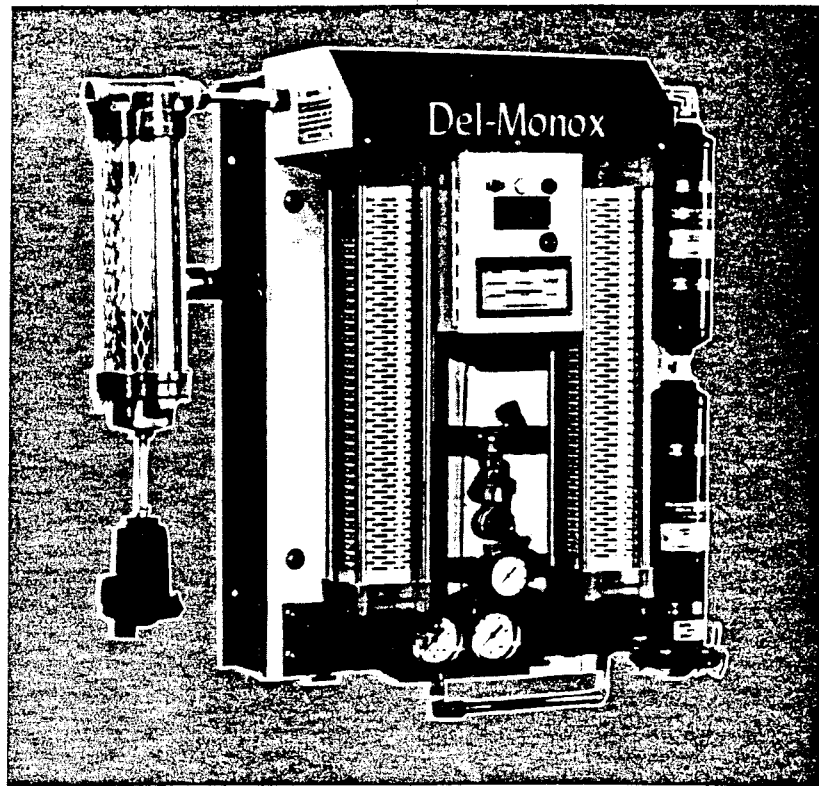


Fig. 2 Air purifier for breathing air
Courtesy of Deltech Engineering

The fact that it allows the blaster to start and stop work at his discretion is a secondary purpose.

Blast Hood

The blast hood is a piece of safety gear that provides a degree of comfort to the blaster as well. This hood is generally a reinforced plastic shell with a replaceable skirt that covers the torso of the blaster. It has a double face shield of clear plastic for eye protection and an air feed line to provide positive pressure under the hood (Fig. 4). The positive air pressure under the hood prevents the entrance of harmful blasting dust and abrasive. Air coolers are also available. If the air is coming from a diesel compressor, an air purifier (Fig. 2) and carbon monoxide monitor are required.

Hoses

Hoses are variable in size depending on the work to be performed, available air capacity, distance to work area, and other

considerations.

The first in the sequence is the bull hose (Fig. 3B). This is generally a short hose, (less than 50 ft, approximately 2 1/2 in. ID) that provides passage of air from the compressor to the PBT.

The next hose is an air line of approximately 3/4 in. ID or less that provides air first to a moisture trap and then to the blast hood (Fig. 3C).

The section between the moisture trap and the hood is smaller, down to 1/4 in. ID.

Control hoses (Fig. 3A) can be down to 1/8 in. ID and are generally duplex (dual line) hoses. They run from the control valve on the PBT to the deadman switch and back to complete the circuit when the blaster is ready to commence work. Included here is the electrical wiring necessary if the deadman is electrically operated. It generally operates from a 12 volt DC source

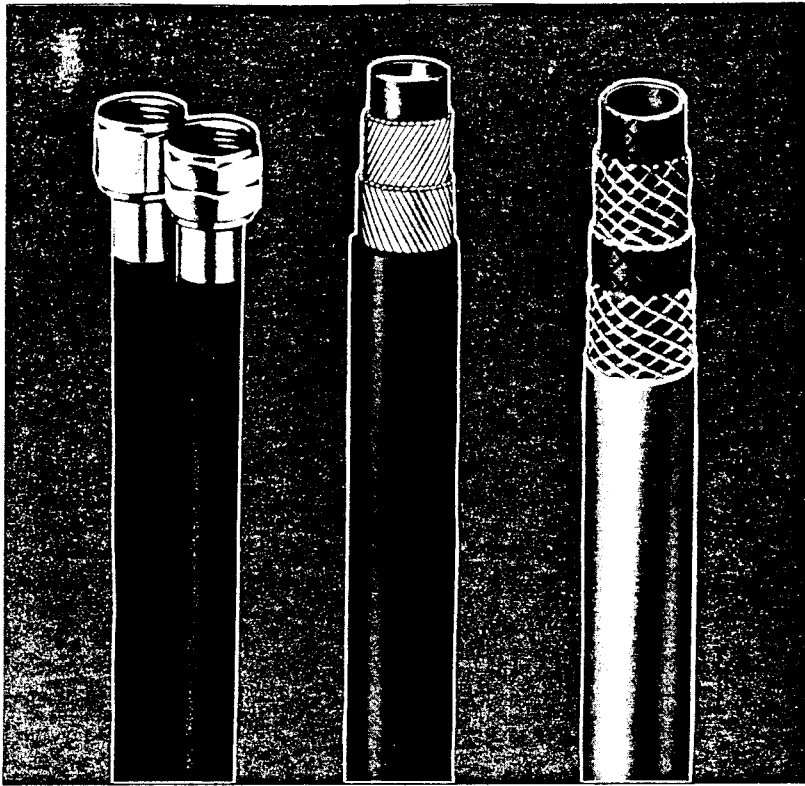


Fig. 3 Duplex control hoses (A), bull hose (B), and air line hose (C) (not shown to scale).
Courtesy of Jason Industrial Hose

such as the compressor power unit's DC system.

The last hose in the circuit is the blast hose. It is a thick-wall, wire-reinforced hose designed and constructed to contain the high (up to 120 psi) pressure air and abrasive mixture that moves from the PBT to the blast nozzle. The blast hose is constructed in 3 layers, an inner wearing lining, a conductive layer, and an outer wrapping. Abrasive passing through a blast hose builds up static electricity. The conductive layer is needed so the whole system can be grounded. As a general rule, the hose should be 3 times the diameter (ID) of the nozzle orifice, ideally, 1.25 in. to 1.5 in. for optimum production.

Setting Up the System

With the major sub-assemblies identified, we can now set up our

blasting equipment. Position the compressor upwind from the work area so that airborne grit does not enter the cooling or air intake systems. The compressor should be level so that the oil and water separators can function efficiently. The power unit's lubrication system also depends on the compressor being level. After fluid levels (oil, coolant, fuel) have been verified and topped off, the compressor is ready to start.

The bull hose should be laid out with no kinks and a minimum of bends. Prior to making connections at the compressor and PBT, the sealing gaskets should be examined for tears, cracks, or other sealing problems. As soon as the connectors have interlocked, a safety pin or wire should be inserted to prevent accidental separation of the joint. If this separation should occur, there is great potential for personnel or property damage as the hose whips around. The hose should be examined for damaged

locking lugs, missing gaskets, soft spots, torn cover, or other damage. If any defects are observed, consideration should be given to replacement of the worn or damaged part. If all appears in good condition, make the connections at the compressor and PBT moisture trap.

The next step is to lay out the blast hose utilizing the same inspection procedures used for the bull hose and fittings. If all is in good shape, connect the selected nozzle and pin all fittings.

When the blast hose connection is complete, you can run the hose for the deadman switch. The fittings on the ends of this hose are brass, male/female, threaded type. It is necessary to use the proper size wrench to prevent damage to the brass hex surfaces. As the hose is installed, care should be taken to lay the hose parallel to the blast hose. The control line should also be secured to the blast hose by tape or other means to minimize possible damage to this less durable hose. This is important because air leaks in the control line will not allow the control valve to pressurize the PBT and thus no blasting takes place. The threaded fittings should be tightened securely but not over tightened.

Now, go back to the air source for connection of an air line to feed the small moisture trap for hood atmosphere. These fittings usually are 3/4 in. crow's foot, quick disconnect. Inspection of hose gaskets and locking lugs is once again necessary. Be certain to pin all quick disconnect crow's feet.

The hood atmosphere line is the last hose to be hooked up. This hose has brass screwed fittings similar to those on the control line. The same care in hook up should be exercised, with particular attention to preventing entry of debris.

Now, having all the hoses connected to their respective fittings, you are ready for pressurized

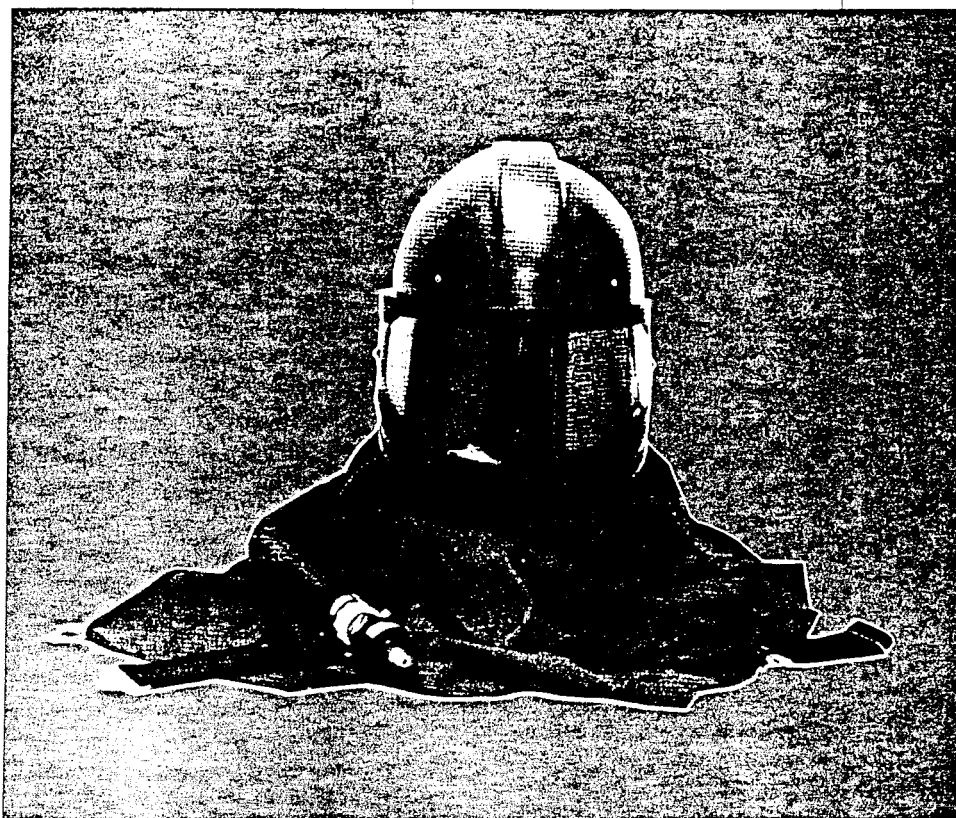


Fig. 4 Blast hood with skirt and air line
Courtesy of Clemco Industries

air. Close all air outlet valves on the compressor. Press the shutdown bypass button as well as the start button. The compressor should start and run. After the temperature moves up to the operating temperature, it is time to press the service air switch. At this time the air pressure gauge should register approximately 110-120 psi. If the reading is higher or lower, adjustments should be made before beginning the blasting operation. When the compressor stabilizes at working air pressure, slowly open the valve to furnish hood atmosphere air. After the quality (oil and contaminant-free) and quantity of this air are verified, slowly open the valve for the bull hose. There should be no air escape except at the moisture trap bleeds. If air leaks are present, they should be repaired. The PBT can now be filled with abrasive.

The blaster should clothe himself with sturdy shoes/boots, heavy pants, long-sleeve heavy shirt, and leather gloves for protection from bounce back of abrasive. When the blaster has been properly suited up, he can check operation of the blast equipment. He does this by opening the deadman valve to pressurize the PBT and thus force a quantity of abrasive to enter the air stream to the blast hose. Adjustments in the amount of abrasive delivered to the nozzle can be made with an abrasive valve located close to the bottom of the PBT. Enough abrasive to do the work should be delivered, but not so much as to slow the impact or choke the blast hose or nozzle.

To assure the quality of cleaning, 2 important checks should be made.

The first is a white rag or blotter test. This test determines if the blast air is free of moisture and oil as it is delivered to the nozzle. The

abrasive valve is closed to allow no abrasive in the air stream. A white rag or blotter is then placed in the air discharged at the nozzle. After one minute the rag is removed and examined for oil or moisture contamination. If evidence of oil is present on the white rag, adjustments must be made to the system, possibly by service personnel from the supplier of the compressor.

The second test measures nozzle pressure. This measurement is taken with a needle pressure gauge. The needle is inserted into the blast hose in the direction of air/abrasive flow. This insertion takes place close to the

nozzle with the abrasive flowing. Nozzle pressure is read directly on the face of the gauge. Nozzle pressure should be approximately 90-100 psi for productive work.

With proper set up of equipment and a thorough knowledge of good safety practices, your job should be safe and trouble-free. **ATB**