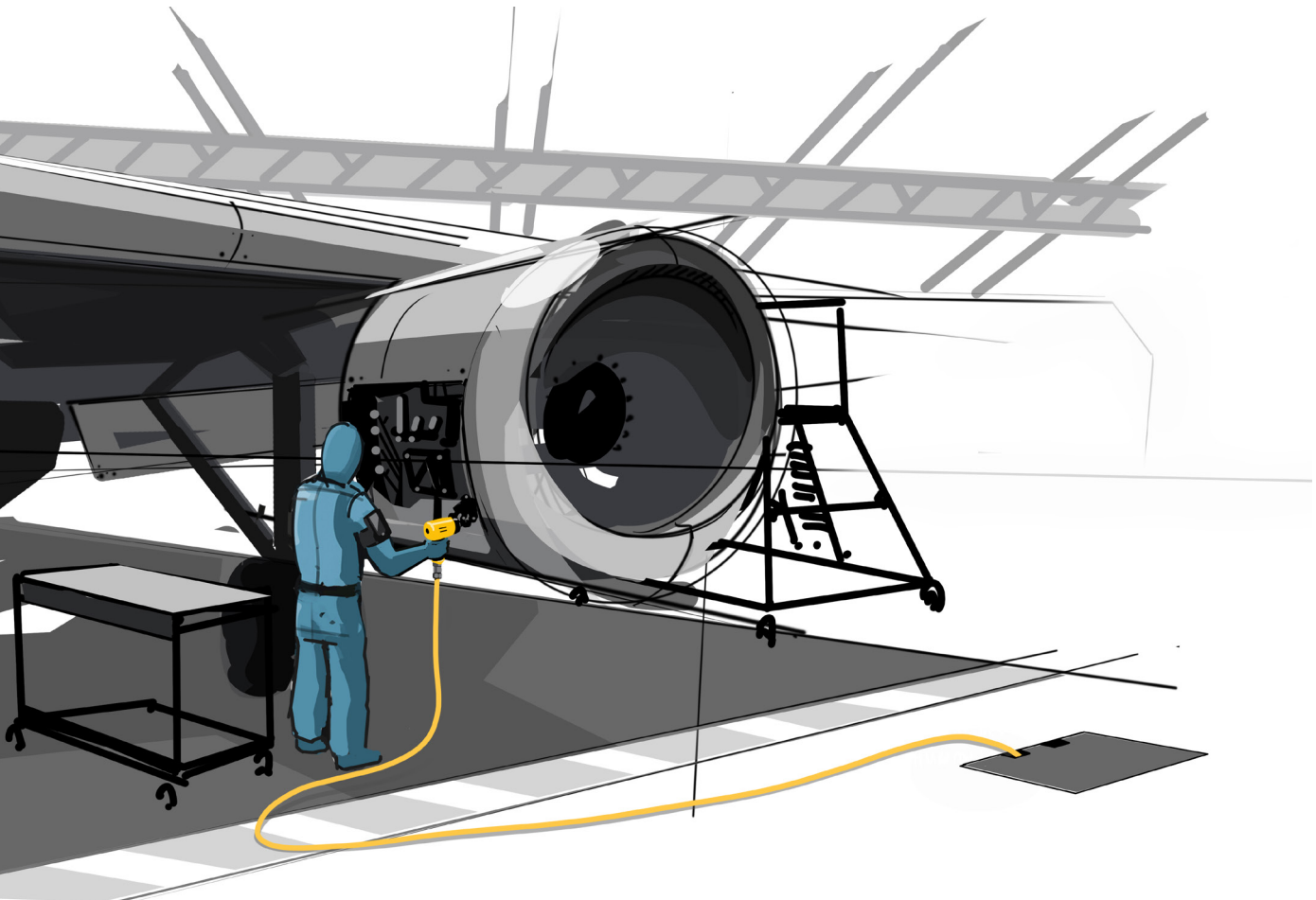




**AIR TOOLS MANAGEMENT  
IN 5 MINUTES**

Atlas Copco





## 1. Introduction

Air tools and compressed air systems are well used throughout the industry. In fact, 9 out of 10 factories globally use air tools and compressors. To help you understand the operation of compressed air systems, we have concluded some principles to show how to avoid drawbacks and additional costs that are incurred with a poorly designed air distribution system.

Many of our customers use their air tools with too low or an incorrect set air pressure. The performance of the tool is reliant on a correct setup of the air infrastructure. Wrong dimensioned hoses and old pneumatic equipment are usually overlooked in a compressed air system, and is often the main source of the problem. The following article gives some quick tips on how to improve the air line. In the end this is what gives more power and efficiency to your air tool reliant production.

## 2. Challenges

### 2.1. Problems with bad air infrastructure

In practice, many production work sites operate with pressures as low as 3-5 bar (43-73 psi), which leads to a significant waste of energy and productivity. With too low air pressure the air tool is not given enough power to perform properly and can therefore not reach peak efficiency. Compressed air infrastructure doesn't behave like the electrically driven. Adding more air tools, piping and connections to your existing air system will increase the amount of pressure drops and the system will lose its efficiency. This will also increase the running costs of the air compressor and the air infrastructure. Planning the air infrastructure in a factory, using proper product setups, can be beneficial in terms of tool efficiency, energy waste and minimized running costs for the system. One single grinder operated with a bad air infrastructure, just to give you an example, could increase costs with 5.760 Euros per year. And an assembly tool operated without

optimal air infrastructure, could increase costs with 9.600 Euros per year! A lot of money can be saved by regularly checking your air line installations.

One way forward is to help measure the air supply pressure and help secure productivity. In the air line system, between the compressor and the air tools, there are various pressure losses due to friction in the pipe restrictions, bendings and pipe walls.

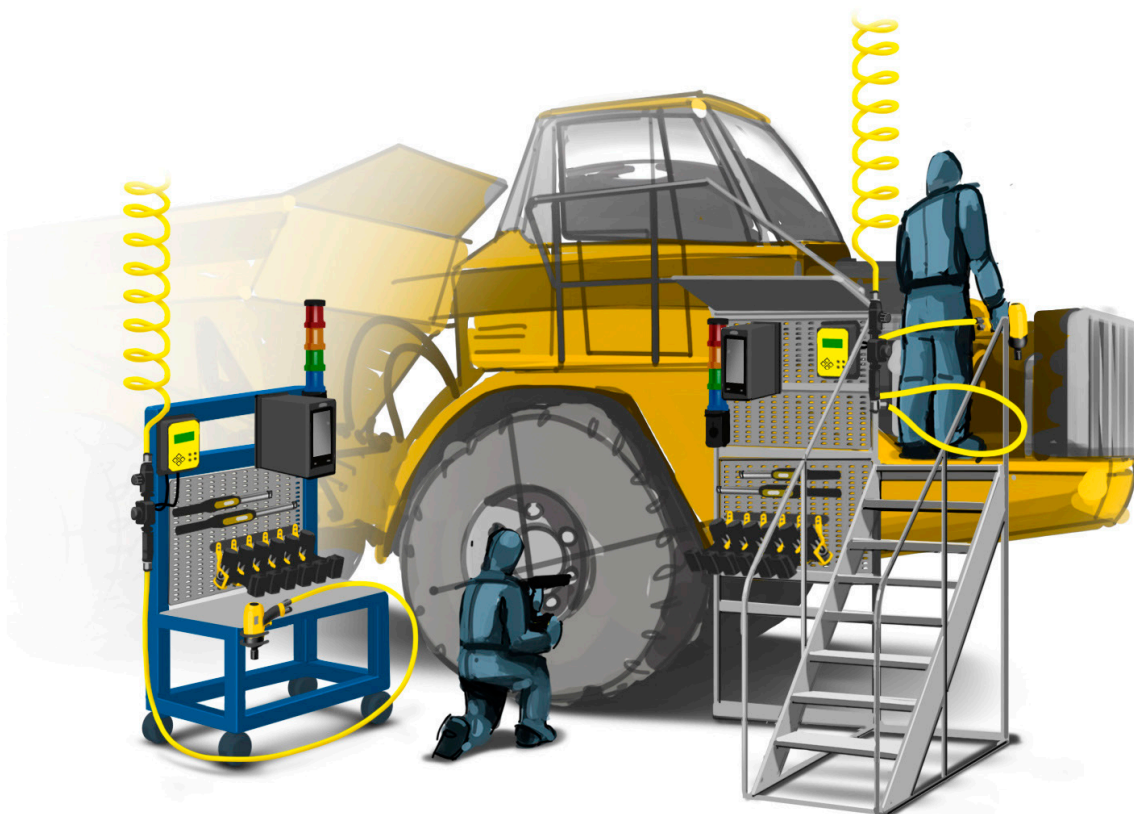
The main pressure drop occurs in the part between the pipe end and the tool, meaning the shut-off valve, the air preparation units, the couplings and the hoses. The pressure drop of these components should be kept as low as possible and not exceed 0.6 bar (8.6 psi) to ensure high productivity and energy savings.

### 2.2. Eliminate pressure drops

Reaching 6.3 bar (90 psi) at the air tool end requires approximately 6.9 bar (100 psi) at the system end, and this of course demands that the plant has an air compressor of sufficient capacity to compensate for the pressure drop in the air pipe system.

Pressure drops depend on the volume of air flow, the higher the flow – the higher the

pressure drop. And the pressure drop in an installation depends on the flow required by the air tool. Losses in air preparation units, couplings and hoses should not be higher than 0.6 - 1.0 bar (8.6-15 psi). It is reasonable to work with 7 bar (101 psi) system pressure and to obtain 6.3 bar (90 psi) at the air tool end. This will ensure an acceptable productivity of the air tool.



### 3. Improving the air line

Restrictions such as smaller size couplings, too long and small diameter hoses can create significant pressure losses. Spiral hoses are, due to their shape, very long and therefore create a large pressure drop. The alternative, a normal PVC hose, should in every case be considered with the pressure losses in mind.

Every coupling in an installation creates a pressure loss. A whip hose for example makes it easier to work with the air tool, but the extra coupling and small bore hose can create a pressure drop of 0.2-0.5 bar (2.9-7.2 psi) depending on size and air consumption. Below are the key questions you need to answer in regard to your air installation.



**Lubrication can prolong usage.** Air tool manufacturers make tools with special vanes in their drive units that might not need lubrication, like for instance drive units with turbine-technology. Some air tools however do need lubrication and those with short operating times require direct lubrication. Long operating times require oil-fog lubricators. Using a lubricator to air tools prolongs the usage and lifetime of the tool making it run smoother and longer.



**Distance – keep it as short as possible.**

The distance between the tool and the off-take should ideally not be more than 3-5 meters (10-16 ft.). Real life work sites show that in many cases this is not possible, for instance at shipyards in outdoor environments where distances of 20 meters (65 ft.) or more are quite common. In these cases it's most important to adjust the air pressure and secure the connections due to the length of the hose.



**Inlet thread dimension.** The connection between hoses and air tools vary in size and standards, from 1/8" up to 1/2", from BSP (EU & UK) to NPT (US) threaded connections. You must also

make sure to choose the correct nipple for each tool. Safety couplings that use mechanical features to release the pressurized air before disconnecting, is recommended.



**Air consumption.** The air consumption of the tool determines the pipe size of the air line system. Larger air consumption means larger size air line system and accessories. Consider using larger pipe sizes and couplings to ensure the correct air pressure to the tools.



**Working environment.** Outdoor use or rough environments like foundries and shipyards require more resistant air line systems than indoor bench work assembling light machinery. Outdoor usage and exposure to water and moist can corrode some products faster.



**Allowable pressure drop.** Air tools require sufficient air pressure to function properly. The system pressure can be set high if the system pressure drop is large but in any case, the maximum allowable pressure drop of the system must be determined and they should be chosen accordingly.

## 4. Installation

### 4.1. Recommended air installation



A recommended pneumatic tool installation uses an air preparation unit with shut off valve, blow-out protectors and a hose of suitable material.

Air preparation units are firstly installed on the air line, filters and regulator followed by a lubricator. Some products are integrated and are combined units that handle all three steps.

When using air installations with lubricators it is important to avoid dips in the air hoses, (i.e. a hose loop forming a low point where the oil could collect). If a low point is created, the oil will not be used for lubricating the tool and will remain in the hose.

### 4.2. Assembly tools installation



- Hose reel balancers can be used for straight screwdrivers. The need for couplings depends on if the operator needs to change tool or not. Main hoses together with a short whip hose is recommended where there are hard impacts on the couplings (impact wrenches) or when the tools are very heavy, and the weight of the tools can break the couplings.
- Small couplings are suitable for assembly tools that require low air flow rates.
- Large impact wrenches require larger size couplings. The hose sizes for an assembly tool can in most cases be from 6 to 13 mm (1/4" – 1/2") and the length is usually 3-5 meters (10–16ft.). In some few cases the hoses are larger and longer.
- Spiral hoses can be used with a straight screwdriver together with a balancer when roof mounted. Another way is to use a larger spiral hose with pistol grip tools. The need for couplings is dependent on whether or not the operator needs to change tool often.
- An installation with a straight plastic hose and couplings is the most common when working with pistol grip assembly tools with low levels of vibrations.

### 4.3. Material removal tools installation



- With material removal tools, you must use couplings of larger size, as air consumption is higher than on assembly tools. Smaller couplings are used for smaller die grinders and drills.
- The hose sizes for a material removal tools can in most cases be between 13 to 20 mm (1/2 to 3/4") and the length is usually 5-10 meters (16–33 ft.). In some cases the hoses are even larger and longer. This installation is common when working with material removal tools with low levels of vibration.
- A main hose used together with a short whip hose is recommended where there are hard impacts on the couplings. For example when using percussive tools and grinders or when the tools are very heavy and the weight of the tools can break the couplings. Some products such as swivels can be used when working with heavier air hoses. Swivels redirect the air hose away from the operator while the air hose stays straight. It can take the effort out of working in cramped spaces with heavier air tools.
- An extra hose can be used where there are long distances to cover, but remember to keep dimensions larger, if extra hoses are used.

## 5. Summary

- Avoid leakages, listen for them!
- Avoid long hoses (max. 3-5 meters/10-16 ft.)
- Use correct type of hose (plastic or rubber) depending on the application
- Use full flow couplings for best performance
- Use clean, dry, compressed air
- Use a regulator to set and monitor the air pressure

