

# The Building Blocks of AIR CIRCUITS

Unless all your pneumatic connections are brazed or soldered, fittings are a part of all your system designs. A huge variety of fitting configurations exist, and in many different materials. Here's a look at what we've found.

**T**he most leak-resistant joints for pneumatic lines are those that have been soldered or brazed. However, two big drawbacks to these ultra-reliable joints are installation cost and extreme difficulty if a joint has to be replaced at a later time.

For these reasons, many different type of fittings have found favor in pneumatic systems because they are much less labor-intensive at installation, and lines can be removed and replaced many times with little effort.

But what about leakage? As long as the appropriate fitting is chosen for the application, there's no reason why a connection using threaded fittings should be just as leak-tight as a brazed or soldered joint. Just as people untrained in brazing or soldering should not be making these types of connections, people untrained in working with pneumatics should not be installing fittings. In fact, the International Fluid Power Society offers certification for working with connectors and conductors.\*

## **MATERIAL—AN IMPORTANT CONSIDERATION**

The type of material making up the fitting is a primary characteristic determining success of the application. Using a material that will be attacked by a hostile environment. cannot contain the pneumatic pressure, or doesn't stand up to physical stresses transmitted to the fitting will likely lead to a catastrophic failure. On the other hand, specifying a material that far exceeds the parameters of the application wastes money.

Carbon steel is strong, with a high resistance to heat. An alloy primarily of iron and carbon, steel is typically alloyed with other metals to improve its corrosion resistance. In addition, steels used for pneumatic fittings often have coatings or platings that offer greater greater corrosion resistance than the steel itself.

Strong, durable, and corrosion-resistant, with high tem-

perature ductility and good conductivity, brass is an alloy of copper and zinc. It is the most common metal for smaller compression and threaded fitting typical of pneumatic systems because of its machinability and good mechanical properties.

Aluminum is lightweight and corrosion-resistant, but because of its low strength in its pure state, aluminum is usually alloyed with zinc, copper, silicon, manganese, and/or other metals to improve its strength and hardness.

Exhibiting high strength and high corrosion resistance, stainless steels contain less carbon than an alloy of plain steels and are alloyed of steel that contains more than 10% chromium. They have the strength and durability of steel while also providing excellent corrosion resistance, albeit typically at a higher cost.

Moving to plastics, polypropylene is a thermoplastic widely used for pneumatic fittings because of its price, broad compatibility, and relatively high strength. It exhibits good bi-axial strength and yield-elongation properties and can be used in exposed applications because of its resistance to UV, weathering, and ozone.

Composites consist of different materials merged together so that the fitting exhibits the favorable properties of both materials. They also exhibit low electrical and thermal conductivity.

But whatever the material, configuration, or application, dozens of suppliers exist that offer a wide variety of fittings to choose from. We have tabulated data from dozens of suppliers and provided them in the accompanying table. However, the table is not just a list of who's who. It contains hard specifications indicating sizes, designs, materials, and ratings offered by each.

\* Learn more about IFPS Certification for connectors and conductors at <http://bit.ly/HP0216-IFPS>.

Photo courtesy of Clippard Instrument Laboratory