One of the easiest ways to determine if a portable compressor is right for your job is to look at its "design margin." This is the ideal operating level of a machine. Not to be confused with the maximum output of the engine, the design margin is the level at which a machine can produce without working too hard.

Also, understanding a compressor's makeup, specifically what is needed and what is not needed, can make a huge difference in the profit margin of a job. How powerful is the engine? What kind of cooling system does it have?

Engines

One of the more costly components of any portable compressor is the engine. Most of these compressors are rated as either continuous or intermittent duty. For compressors that run all the time, engine horsepower margin (ideal operating level) is typically 85 percent of its maximum rated horsepower. Compressors that are stopped and started repeatedly have a horsepower margin of 93 percent of their maximum output.

For most diesel engines, the life of the engine is roughly proportional to the total amount of fuel consumed by it. So if an engine consumes 10 gallons of diesel fuel per hour at full load, and it is supposed to be overhauled after 10,000 hours of operation, it will require an overhaul after 100,000 gallons of fuel have been used.

If this same engine were operating at 85 percent of its maximum power, it would consume approximately 8.5 gallons of fuel per hour and would be able to run 11,765 hours before the next overhaul. This is an increase in engine life of more than 17 percent. If you compare the cost of extending the time for an engine overhaul by 1765 hours against the original difference in engine purchase cost, you may find that the margin paid for itself.

Lowering horsepower will save wear and tear not only on your engine, but also on your fuel system. Lower horsepower in a diesel engine means lower fuel pump pressure, which in turn increases the life of your pump and your checkbook. Also, the fuel injection pressure will decrease, thus helping the injectors last longer and deliver fuel more efficiently for a longer time.

Cooling system
Another system within the compressor that can provide value from design margin is the cooling system. Cooling system margin is sometimes called "fouling margin" because the coolers can handle more dirt loading without the compressor overheating. The cost of stopping to clean the coolers of a compressor that has shut down will pay many times over for the initial cost or increased rental rate of a compressor with cooling system margin.

An oil-flooded compressor's cooling system performs two main functions. First, it removes the heat generated by the airend during the process of compressing the air. This lowers the amount of oil that is present in the compressed air. Oil vapor is present in the delivered air of any oil-flooded compressor, and the amount of oil content in vapor form increases with the air temperature. Oil vapor is a gas and it will pass through filtration or a separation system since it is not in liquid form. So if the compressor is delivering hotter air, not only will it have increasingly higher amounts of oil vapor, but the air is more likely to cool off upon entering the system being supplied, which condenses the vapor into liquid oil. Many processes, particularly industrial applications, can be contaminated by the condensed oil over time and incur enormous costs to clean their systems.

Second, the cooling system lowers the temperature of the oil that is injected into the airend bearings so they are properly lubricated. The benefit of lower oil injection temperature is longer bearing life. When oil temperatures are higher during compressor operation, the fluid gets worked harder, and the lubrication properties of the oil can break down sooner, which reduces bearing life.

Design
Finally, let's look at the "cool-box" vs "hot-box" design. A cool-box design means that the cooling air is drawn into the compressor package and flows completely through the unit before entering the fan, which then pushes the air through the coolers and out of the package. This type of design typically has air temperatures entering the fan of 10-25 F above the temperature of the compressor surrounding the compressor. Since the fan is pushing cool air it operates more efficiently, reducing the horsepower required by the fan and lowering the fuel use of the compressor.

A hot-box system pulls air through the coolers, through the fan, into the rest of the package, and out of the unit. Air temperatures inside the compressor with this type design can be 70-100 F above the surrounding air temperature. This means that all the components inside the compressor, from sensors to wiring, endure higher temperatures during operation. This reduces the overall life of the components, which is simply service and repair costs waiting to happen.

As the old adage goes, "time is money." If time between repairs and service is extended as a result of design margin in your portable compressor, you've just made money. If you find your service personnel taking more time to resolve problems, replace fuel pumps, rebuild airends, clean coolers, or simply waiting for the equipment to cool down, you are throwing away all the dollars you thought you saved on your initial purchase, and then some. **MT**

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