

10 Tips on Combustion System Care

by Jim Roberts, Eclipse Inc. , Eclipse Combustion
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Look at, listen to and feel your combustion system to keep it running smoothly.

Instead of howling about energy costs and indications that gas costs are going to remain double what they have been in recent years, you can begin to save valuable energy dollars by conducting routine maintenance and using common sense.

TIP 1: Keep Filters Clean

Any filter blockage will result in serious problems. As the system bogs down under a clogged filter, your process may not get the required input. Clogged filters put undue strain on the combustion air blowers over time, so your electrical and motor maintenance costs may escalate. And, worst of all, the burners may go fuel rich. This wastes fuel and can create carbon, which at its best is an insulator and a mess. At its worst, it is a fire hazard.

TIP 2: Check Your Pressure

Combustion experts speak in terms of pressures, velocities and flows because these are critical to burner operation. By understanding and knowing burner pressures and flows, you can detect changes in performance early and help troubleshoot any problems.

A manometer is an inexpensive device for measuring air pressure. If you do not have one, get one. Have your burner technician show you where to check the pressure inputs on your burner, then check them monthly. If you notice a change in pressure, alert your combustion technician to get the burner back in tune.

TIP 3: Make Sure Exhaust Systems Are Properly Functioning and Clean

Today's combustion equipment is sophisticated and sensitive to pressure fluctuations. If the exhaust is restrictive, the burners will struggle to get the proper input to the process. Clean exhaust also minimizes any chance of fire. Check flues monthly

TIP 4: Eliminate Excess Air

If controls have moved or another phenomenon has caused the burners to lean out, it could be costing you a fortune. Most burners are designed to burn with a small percentage of excess air (less than 15%). Some exceptions include air heating equipment and low temperature operations where the excess air is used to control the temperature of the flame. If you have a burner designed to run at 10% excess air and the burner drifts into the range of 50% (that is a difference of 5% O₂ or 7.5% O₂ in the products of combustion), the difference in a 1,000°F (538°C) oven operation is 7% loss of efficiency. If you had a 1 million BTU/hr burner, and gas costs of \$5 per 1,000 cfm, keeping one burner in tune would save approximately \$2,600 per year.

TIP 5: Use an Oxygen Analyzer

Measure the content of oxygen left over from the chemical process of combustion with an oxygen analyzer. Costs for simple portable units range anywhere from \$400 to \$3,000, but the devices should pay for themselves within a year. In oven or heater operations, have your combustion technician show you where to spot check the flue products so you can detect changes. If changes become dramatic, have your technician tune the burners. Remember, in some operations, O₂ levels may be high due to air entrainment from other sources, but the O₂ can still be measured and change may be recognizable. Check monthly.

TIP 6: Commit to Educating Yourself and Your Staff

A number of good combustion schools are offered by burner equipment manufacturers and trade organizations to help educate you and your staff on proper burner operation. Most are less than one week in duration and cover principles of combustion and application issues.

TIP 7: Regularly Conduct Maintenance Inspections

Many times, combustion service groups are called to fix burners that do not require repair. The reason for diminished process operation is the loss of heat through the gradual breakdown of insulation or door seals. This is not a reflection on the equipment - face it, thermal equipment is under tremendous duress day in and day out. Unless it is maintained, it will wear out. If there is a leak, the burners do not know there is a change, so their output remains the same. But, you notice the oven or heater begins to slow down production and call the combustion service company. Conduct walk-around inspections religiously and regularly. Does it feel warmer next to the oven than normal? It is probably not an accident; it is losing heat to the room. Maintain your process heating equipment according to the manufacturer's recommendations.

TIP 8: Reduce the Amount of Time Spent Analyzing Performance Changes

If you commit to learning about combustion equipment and controls, you can be your own best helper when analyzing changes in performance or production. If you can call your technician and say, "My flue products have fluctuated 2% in oxygen and my air manifold pressures have changed 5" in water gauge pressure," you have already saved valuable time in analyzing the situation.

TIP 9: Check Flame Color

If you notice a variation in flame color, something has changed, and not for the better. Bright, luminescent flames generally indicate a gas-rich condition. The exception would be radiant tube or incinerator burners, which are designed to be luminescent. A bright white or wispy blue flame often indicates lean burn or excess air. The exception is air heat-type burners that, by design, burn with a lean flame. And, of course, if you see soot or carbon on the floor, bad things are happening in the combustion process. With the exception of one or two industrial processes, a sooty flame is not desirable. If a sooty flame occurs, have a technician review the burner settings as soon as possible. Soot is a solid form of your fuel dollars.

TIP 10: Listen Closely to Your Equipment

When a burner is properly tuned and running as designed, and the process is working well, there usually is an identifiable noise associated with the equipment working in concert. What does a change in pitch on the combustion air blower indicate? Is the burner sputtering or has it changed from a low drone to a high pitched roar? When a burner changes sound or a valve creaks, it is never an indication of a positive change. If you heard the brakes on your car squeal, you would have them looked at by a brake specialist. Afford the same concern to your combustion system to keep it running smoothly.

Notes:

Educate yourself and your staff on proper burner operation and conduct walk-around inspections regularly

Whether a simple pilot burner or a large velocity burner, combustion equipment is designed to operate at a recognizable and repeatable level of performance. The days of low fuel costs and an open pipe belching flame are long gone. Learning about this equipment and appreciating how efficiently it can perform for you will save energy and maintenance budgets. Do not approach combustion maintenance with a "just try this" attitude. Take advantage of the companies that are willing to teach you. Safety should be paramount in your mind.

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Understanding burner pressures and flows will allow you to detect changes in performance.

A burner technician can show you where to measure air pressure. Check the pressure inputs on your burner monthly