Suggested Actions

- Review compressed air applications and determine the required level of air quality for each.
- Review the compressed air treatment equipment to determine whether it is operating satisfactorily. If it is not, consider improved maintenance or an upgrade.
- Check condensate traps for effectiveness. If stuck closed, they will not remove condensate, if stuck open, they will leak air. See Compressed Air Tip Sheet #13, *Remove Condensate With Minimal Air Loss.*

References

From Compressed Air Challenge® (CAC):

The Compressed Air System Best Practices Manual, Guidelines for Selecting a Compressed Air System Service Provider

From DOE's Industrial Technologies Program and CAC:

Improving Compressed Air System Performance: A Sourcebook for Industry

Training

- *Fundamentals of Compressed Air Systems* – 1 day
- *Advanced Management of Compressed Air Systems* – 2 days

Offered by the Compressed Air Challenge; for the latest course schedule and locations see *www.compressedairchallenge.org*

For additional information on industrial energy efficiency measures, contact the EERE Information Center at 1-877-337-3463 or visit the BestPractices Web site at www.eere.energy.gov/industry/bestpractices.

Maintaining System Air Quality

Maintaining the proper air quality level is essential for keeping compressed air energy costs down and to ensure reliable production. Poor air quality can have a negative effect on production equipment and can increase energy consumption and maintenance needs. The quality of air produced should be guided by the quality required by the end-use equipment. The air quality level is a function of the levels of particulate, moisture, and lubricant contaminants that the end uses can tolerate. Such air quality levels should be determined before deciding whether the air needs additional treatment. Compressed air should be treated appropriately but not more than is required for the end-use application. The higher the quality, the more the air usually costs to produce (in terms of initial capital investment in equipment, energy consumption and maintenance).

Once the true end-use air quality requirements have been determined, the proper air treatment equipment can be configured. Separators, filters, dryers and condensate drains are used to improve compressed air quality. Treatment equipment maintenance is critically important for sustaining the desired air quality levels.

Grouping Equipment with Similar Air Quality Requirements

One strategy to improve air quality is to group end uses having similar air quality requirements in reasonably close proximity and install the appropriate air treatment equipment to serve these end uses with a minimum of distribution piping. Sometimes, grouping similar requirements of best quality air together is not always practical; if the requirement for this class is sufficiently high (70% or more of total), consider supplying the entire plant with this air quality level. If practical, separation of groups of end uses requiring similar pressure and air quality also allows some compressors and air treatment equipment to be located close to the end uses.

Filtration

Through proper filtration, appropriate air quality levels can be achieved. Because some end uses may require a higher level of air quality than others, it may not be necessary to have the entire airflow filtered to the highest level of air quality. Filters cause pressure drop that increases as the elements become fouled. Filters should be rated for the maximum anticipated operating pressure, but should be sized for the maximum anticipated rate of flow at the anticipated minimum operating pressure. The three types of compressed air filters (particulate, coalescing, and adsorption) have different functions and must be selected for the appropriate application.

Dryers

Compressed air dryers can be very effective at removing condensate from compressed air. Dryers are of three types: deliquescent, refrigerated, and desiccant. Deliquescent dryers provide a Pressure Dew Point (PDP) of 20°F lower than the dew point of the air entering them. Refrigerated dryers provide a PDP of between 35°F and 38°F and desiccant dryers can provide a PDP as low as -100°F. Dryers

should be sized for the maximum anticipated rate of flow and must be matched to the air quality requirements. Overdrying wastes energy.

Separators

Moisture separators and condensate traps are used to remove condensate from the air stream. Because the first step in condensate removal is to separate it from the air stream, moisture separators should follow each intercooler and aftercooler.

Condensate Traps

There are four main types of condensate drains: manual, level-operated mechanical (float) traps, electrically-operated solenoid valves and zero-loss traps with reservoirs. Traps should allow removal of condensate, but not compressed air, and should not be left open.

About DOE's Industrial Technologies Program

The Industrial Technologies Program, through partnerships with industry, government, and non-governmental organizations, develops and delivers advanced energy efficiency, renewable energy, and pollution prevention technologies for industrial applications. The Industrial Technologies Program is part of the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy.

The Industrial Technologies Program encourages industry-wide efforts to boost resource productivity through a strategy called Industries of the Future (IOF). IOF focuses on the following eight energy and resource intensive industries:

- Aluminum
- Chemicals
- Forest Products
- Glass
- Metal Casting
- Mining
- Petroleum
- Steel

The Industrial Technologies Program and its BestPractices activities offer a wide variety of resources to industrial partners that cover motor, steam, compressed air, and process heating systems. For example, BestPractices software can help you decide whether to replace or rewind motors (MotorMaster+), assess the efficiency of pumping systems (PSAT), compressed air systems (AirMaster+), steam systems (Steam Scoping Tool), or determine optimal insulation thickness for pipes and pressure vessels (3E Plus). Training is available to help you or your staff learn how to use these software programs and learn more about industrial systems. Workshops are held around the country on topics such as "Capturing the Value of Steam Efficiency," "Fundamentals and Advanced Management of Compressed Air Systems," and "Motor System Management." Available technical publications range from case studies and tip sheets to sourcebooks and market assessments. The Energy Matters newsletter, for example, provides timely articles and information on comprehensive energy systems for industry. You can access these resources and more by visiting the BestPractices Web site at **www.eere.energy.gov/industry/bestpractices** or by contacting the EERE Information Center at **877-337-3463** or via the Web at **www.eere.energy.gov/informationcenter/.**

BestPractices is part of the Industrial Technologies Program Industries of the Future strategy, which helps the country's most energy-intensive industries improve their competitiveness. BestPractices brings together emerging technologies and best energy-management practices to help companies begin improving energy efficiency, environmental performance, and productivity right now.

BestPractices emphasizes plant systems, where significant efficiency improvements and savings can be achieved. Industry gains easy access to near-term and long-term solutions for improving the performance of motor, steam, compressed air, and process heating systems. In addition, the Industrial Assessment Centers provide comprehensive industrial energy evaluations to small- and medium-size manufacturers.

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

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A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

DOE/GO-102004-1967
August 2004
Compressed Air Tip Sheet #12