



## 50% Relative Humidity & 50% Savings

**A**llegra Print & Imaging-Tulsa moved its operations into an existing facility with 6,000 ft<sup>2</sup> of production space and 4,000 ft<sup>2</sup> of office space. The heating and cooling system for the facility consisted of a single multi-zone unit system, installed in 1962 when the facility was built. Multi-zone systems are inefficient because they often run both heating and cooling at the same time, with a damper system controlling the amount of hot or cold air supplied to each zone. The over 40 year old heating and cooling system was expensive to run and had trouble controlling the temperature and humidity of both the production and office space.

“Temperature and humidity control are both critical to the production space of any printing facility, especially in this part of the country,” Jerry Holder, President, stated. Temperature control is important because the equipment produces a considerable amount of heat during the printing process and the equipment often runs continuously for hours at a time. Humidity control is important because high and unstable humidity can cause paper to curl, wrinkle, and stretch during the printing process, and even while being stored at the facility. Uncontrolled humidity also makes prints difficult to trim, score, fold and manage. In addition to being essential to equipment performance and paper storage, temperature and humidity control are also integral to providing a productive work environment for a printing facility’s staff.

Allegra Tulsa - Print and Imaging, a franchise of the Allegra Network LLC, was started in 1985 by Jerry Holder to provide business to business printing services for the Tulsa metro area. Allegra strives to provide the highest quality products possible and create long term business relationships by helping its clients reach their goals and objectives. To provide the highest quality advertisements, brochures, catalogs, manuals, and other print and digital media for their clients, Allegra uses state of the art equipment and paper.



Production Space of Allegra Print & Imaging-Tulsa

The spring after moving into the facility, problems began to show up with the printed media, including paper curling. According to Holder, “Chemical levels, water pH, and every other variable were checked until it was determined that the cause of the problems was lack of humidity control.” In an effort to improve the humidity control, a 10 ton AAON light commercial rooftop unit was added to the production space. This unit was able to supplement the cooling capacity of the multi-zone unit and also included hot gas reheat to provide some humidity control capability for the space. While this unit reduced the humidity problems during the spring and fall months, during the summer months, the humidity and temperature of the production area continued to be uncontrollable.

Because of its age, the multi-zone unit also required numerous repairs on a regular basis. Consequently, Holder began discussions with David Myers, an AAON sales representative, to determine whether or not the multi-zone unit should be replaced. “The energy efficiency gains of an AAON packaged rooftop unit replacement system versus the multi-zone system were enough to justify the first cost of replacement,” Myers stated, “and the production space would benefit almost immediately from the humidity control.” A 30 ton light commercial AAON packaged DX rooftop unit was then specified to replace the multi-zone unit to heat, cool, and dehumidify the production space along with the previously installed 10 ton unit. Four additional high efficiency split systems were specified to heat and cool the office space.



10 Ton Packaged DX AAON Unit with a Horizontal Discharge Curb

The 30 ton AAON rooftop unit features DX cooling with a high capacity evaporator coil and hot gas reheat, high efficiency natural gas heating, and an enthalpy controlled economizer. The previously installed 10 ton AAON rooftop unit features DX cooling, hot gas reheat, and high efficiency natural gas heating. Each of the units are wired to a humidistat and programmable thermostat, with night and weekend setback, within the production space.

The system for the production space now includes enough cooling capacity to control the temperature, even during the hottest days of the summer. Cooling is also staged, with multiple scroll compressors, so the system can efficiently run at both full and part load. The multi-zone system required running its single

reciprocating compressor, for cooling, along with natural gas heating, during part load operation.

**T**he high capacity evaporator coil and hot gas reheat options provided the units with humidity control, without the need for an auxiliary source of reheat (such as electric or natural gas reheat). High capacity evaporator coils consist of multi-row coils (more surface area) which provide additional heat transfer, cooling the air to the dew point and thus removing more water from the air, and reducing its relative humidity. The modulating humidity control option available from AAON provides a dehumidification mode of operation, without the need for a call for cooling. During dehumidification, modulating reheat valves divert hot refrigerant gas from the condenser coil to the reheat coil, allowing the evaporator coil to cool the air stream to the dew point and the reheat coil to heat the air stream back to room temperature, using the minimum amount of reheat needed. This allows the humidity of the space to be reduced without supply air temperature swings or overcooling of the space.

**F**or winter operation, high efficiency natural gas heating is included on both rooftop units. The AAON patented dimpled tube design of the gas heat exchanger (Patent #5,839,505) allows it to have energy efficient heat transfer while at the same time prevents the need for heat exchanger tubes with internal turbulators. Because of this design, an AAON light commercial rooftop unit's aluminized steel gas heater includes a standard non-prorated 15 year warranty, while the optional light commercial rooftop unit stainless steel gas heater includes a standard non-prorated 25 year warranty.

**F**or additional energy efficiency benefits, the 30 ton rooftop unit features an enthalpy controlled economizer. The economizer modulates outside air dampers and return air dampers, control-



30 Ton Packaged DX AAON Unit  
with an Economizer and Humidity Control

ling the amount of outside air and return air supplied to the space. With an enthalpy controlled economizer, during the economizer mode of operation, when the outside air enthalpy is below a field adjustable setpoint, the economizer modulates the outside air damper open and the return air damper closed to maintain a supply air temperature of 55°F, resulting in free cooling without the need for the compressors to operate. During normal heating and cooling modes of operation, when the outside air enthalpy is above setpoint, the outside air dampers are at a field adjustable minimum position, allowing only the required amount of ventilation outside air to enter the space, while the unit mechanically cools the air to the desired setpoint.

**B**oth units include all of the serviceability features that have come to be expected from AAON equipment. One standard feature included is service access doors, with zinc cast handles and full length stainless steel piano hinges, which provide access to the service compartment, the supply blower



section and filter/economizer section. The service compartment includes access to the compressors, controls and heat exchanger. Serviceability options included, on the units, are a powered 115V convenience outlet and a factory wired unit disconnect switch. These serviceability features and options save time and money because they allow the unit to be installed, serviced, and maintained rapidly, without wasting time removing and replacing screws and panels or bringing additional power to the unit.



Office Space of Allegra Print & Imaging-Tulsa

**S**ince the installation of the AAON units, the printing problems in the production space of Allegra facility from the uncontrollable humidity have been totally eliminated. The units are able to maintain 70°F space temperature and 50% RH, even during the hottest days of the year when the ambient temperature is over 100°F. The Allegra staff has also enjoyed the much more comfortable and productive workplace.

**W**ith the new heating and cooling systems, and with the replacement of our facility's tar and gravel roof with a white roof membrane, we have reduced our utilities bills by nearly 50%," Holder said. So, Allegra was actually able to save money

in addition to correcting their humidity problems. As Holder expressed, "If your company is experiencing humidity problems, do you and your staff a favor and take a look at AAON equipment. You will not be disappointed."

**E**quipment manufactured by AAON has been designed and engineered to be energy efficient, easy to install, and easy to service, with a variety of semi-custom options which allow the unit to be able meet the specifications of the job. The ability to control humidity, as shown with the Allegra facility, is just one of many solutions AAON can provide. Contact your local AAON sales representative to learn about more of the benefits AAON can provide for you.



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