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Steam humidifiers
Compressed air technology
Health protection
High-pressure systems
Air washers
Ultrasonic atomisers

Comparison of different air humidification systems for printing companies

Besides costs and performance the hygiene plays a very important role

A constant, optimum air humidity is the most important climatic parameter for high print quality and trouble free production sequence. During the winter months, in particular, air humidity in printing shops often drops to critical values: paper warpage, electrostatic charging, restricted machine operating times, production stops and thus avoidable costs are frequently the consequence of an insufficient level of air humidity.

If one disregards those printing shops, who for one reason or another still do not have an air-humidification system, one notices that the others use different systems and technologies. The range extends from Rotary atomisers, steam air humidifiers, ultrasonic atomisers, air washers in A/C systems and on to compressed air and high-pressure nozzle systems.

Hygiene and cleaning outlay

In terms of achieving as high a degree of health protection as possible the necessary cleaning and maintenance outlay for air-humidification systems takes on a special significance. The generally open storage reservoir means that *Rotary atomisers*, *ultrasonic atomisers* and *air washers* in A/C systems must be subject to particularly critical assessment. On account of the unimpeded penetration by paper and dust particles open storage reservoirs are an ideal breeding ground for fungus, germs and bacteria. For this reason, regular and thorough cleaning are absolutely essential if hygienic problems and hazards for employees are to be avoided. The implementation of regulated cleaning intervals, binding responsibilities and demonstrable documentation can only be realised in the companies through means of corresponding personnel expenditure and additional costs.

Maintenance and performance

On top of this the operating costs for the different systems are also influenced by the necessary maintenance and repair costs: therefore, the service life of *ultrasonic ceramic oscillators*, for example is generally limited, if they are not operated using deionised water. After a maximum of 2000–3000 operating hours ceramic oscillators generally exhibit a significant drop in performance or indeed they may suffer a complete breakdown. The resulting necessary demand for replacement and new parts leads to a disproportional increase in operating costs for these devices. Attributable to the operating principle it is also the fact that the performance and service life of *steam humidifiers* are restricted: minerals and floating particles are deposited during the course of time on the base of the Steam generating cylinder or on the electrodes or heater elements and thus significantly reduce the output. For air washers in ventilation/air-conditioning systems – in particular with regard to older systems – the addition of biocides into the humidification water (sump) is not only questionable in terms of health, but simultaneously also associated with significant additional expense.

High-pressure nozzle systems provide micro-fine and absolutely hygienic atomisation.

Hygienically questionable: air washers in duct.

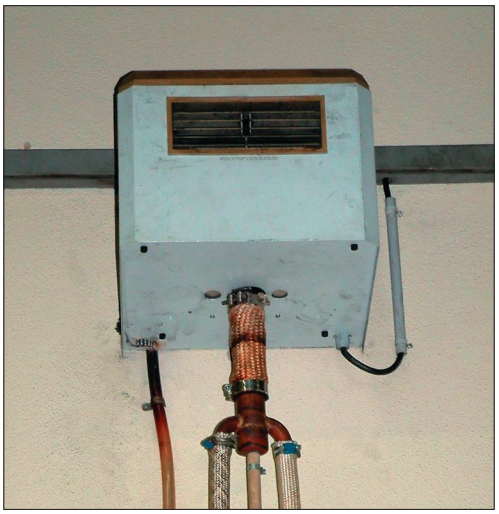
Power consumption

When compared with all other systems, steam air humidification – in terms of power and cost – is the least favourable. Electrically heated steam humidifiers exhibit approximately ten times the level of power consumption compared with cold atomiser systems, which exerts a significantly negative effect on the cost-to-benefit relation. In addition to this steam air humidifiers also exhibit an unwanted additional room heating characteristic caused by "vaporisation".

In terms of power consumption, maintenance outlay and humidification performance, *nozzle systems* are far superior to the previously mentioned humidification systems. If correctly designed and equipped with appropriate water treatment systems, nozzle humidifiers will operate extremely hygienically and maintenance free. Widely available are *compressed-air nozzle systems*, in which water is atomised using compressed air. Despite the proven technology these systems are not entirely free of disadvantages: in particular, in low-noise production premises (e.g. pre-press, digital printing) the hissing noise of the compressed air as it escapes is disruptive. In addition to this the relatively high compressed air consumption and maintenance of the required compressor incurs expenses.

Performance and efficiency

During the course of the past few years more and more printing shops have converted their air humidification systems to state-of-the-art *high-pressure nozzle systems*. Among the pioneers of this technology, for example are the *Draabe Industrietechnik* company in Hamburg, who manufacture different systems for the printing shop, pre-press, paper store and



Steam humidifiers have approximately ten times the power consumption level of cold atomisers.

office areas worldwide: in these systems water is vaporised to a micro-fine degree using a high-pressure pump (85 bar) and special titanium nozzles and practically free of noise. In comparison to nozzles operated by compressed-air, the by far greater humidification output of the atomiser (max. 32 kg/h) only incurs a fraction of the power costs. The Draabe water supply is in an enclosed circulatory system. For hygienic and reliable operation only pure, demineralised water is used, which is provided by means of an integrated Reverse osmosis system. The pure water produced here can be used optionally as standard process water for printing presses.

The providers of the different high-pressure nozzle systems can essentially be differentiated in qualitative terms by nozzle size, humidity distribution, versatility and services: systems with extremely fine nozzles (80–100 µ) exclude any danger of droplet formation and humidity condensation – in particular for low-pressure systems. Maximum and fast distribution of humidity in a room is reached by systems, which have a fan additionally integrated into the atomiser. To avoid any unwanted intake and distribution of dust, it must be ensured that the air intake – where possible – is not from below. In systems, which can be subsequently expanded – e.g. for pre-press – or connection to a building's system of pipes and fittings, inflexible (pipe) systems are preferable. A practical and simultaneously inexpensive additional benefit is exhibited by those systems, in which water treated for air humidification can also be used as standardised process water for printing presses. Last, but not least, a comparison should also consider that to ensure smooth and hygienic operation, regular preventative maintenance and disinfection of the water treatment and high-pressure system is necessary. In the interest of inexpensive and professional maintenance, modular systems, which can be returned to the manufacturer for servicing, should be preferred over permanently stationary system installations. Information on the *standard of hygiene* for the various systems is provided by, e.g. certificates or quality signs, which are issued by independent test institutes.

Conclusion: Decisive for operating cost comparison

A comparison of the various humidification systems reveals that to facilitate an investment decision – be it a new installation or a conversion – an operating costs comparison for the systems must be compiled. Along with the acquisition expenses the costs for power, maintenance, cleaning and materials must also be considered. For the various high-pressure nozzle systems the technical equipment and range of services provided in terms of operational reliability and hygiene must be compared as accurately as possible. In the interest of ensuring a high degree of health protection enclosed systems with integrated water treatment and hygiene certificates are to be preferred.

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