HUMIDITY AND PROCESS WATER

The importance of water for paper, printing and packaging

condair systems

WATER AS A FACTOR OF PRODUCTION

FOR MORE EFFICIENCY

The three elements: water, air and heat

For many years, the printing industry has been characterised by price wars and overcapacities. Cost-effectiveness is therefore more important than ever as a means for ensuring competitive strength. Optimising production, processes and operating conditions together with modern building technology are the keys to success. And water plays its part as a factor of production: for plant, personnel and process materials!

The processing of paper, cardboard, foil, labels and other materials is absolutely dependent on the delicate interplay of a wide range of parameters. Paper and other organic materials respond dynamically to their immediate environmental conditions. More than in any other industry, the three elements of water, air heat decide whether or not the production process runs smoothly and achieves the desired level of quality.

The right water

In offset printing, it all depends on getting the water right: For offset, the most widespread technique used for printing advertising, newspapers, books and packaging, water is a factor that decides quality. Salts of minerals such as calcium and magnesium in particular can cause major problems. Untreated water is unsuitable for use as process water for producing fountain solutions. The capital outlay for a professional water treatment system is recouped relatively quickly, thanks to process tool cost savings and especially as a result of the standardisation of the offset printing process. In some cases, the water treated for use in a humidification plant can also offer the benefit of being usable for fountain solution production.

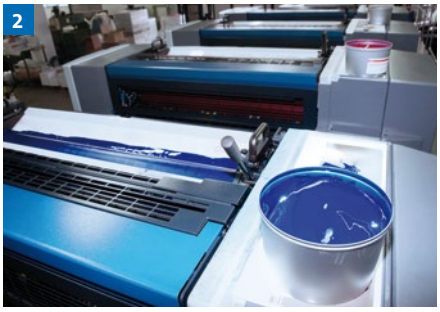
Optimal humidity

When working with hygroscopic materials (i. e. those capable of absorbing moisture), humidity must be kept uniformly constant. In most production processes in the printing industry and post-press industry, a relative humidity of 50 – 60 % is ideal with room temperatures of 20 – 22 °C. Air that is too dry will cause material changes, the build-up of electrostatic charge, increased dust bonding and health risks affecting the mucous membranes, eyes and skin.

A controlled indoor climate with optimal humidity ensures quality, higher production speeds and fewer disruptions to process flows.

Low-cost cooling

In many factory buildings and rooms, significant thermal loads due to waste heat from machinery requires additional cooling in order to keep working conditions bearable for employees. In addition, humidity is relative and therefore depends directly on room temperature: the higher the temperature, the lower the relative humidity. The energy costs for cooling an entire production building can be enormous. By utilising the principle of evaporative cooling, a direct room humidification system can significantly cut the costs of air conditioning.



Humidity and process water

Issues we can help you with

As a factor of production, water affects quality, costs and time both in the printing process and post-press processes. Yet the actual cause of problems in the production process is not always immediately obvious. The table below offers a summary of typical problems met in the areas of paper handling and post-press work.

Boosting quality – cutting costs

Water is a factor for production that decisively affects cost-effectiveness. Optimal humidity and standardised process water guard against processing problems and fluctuations in quality.

Issue	Definition	Potential causes	How water can help		
			Air humidity	Process water	Cooling
Setoff	Transfer of the fresh printing ink to the back of the following sheet in the output stack on the printing machine.	• Build-up of static charge on the paper • Wavy edges or paper under tension • Emulsified printing ink	● ●	●	● ●
Roller glazing	Ink roller does not accept printing ink.	• Water hardness too high		●	
Doubling	Double outline of elements of the printed image on the following sheet, due to mismatched transfer of the ink transferred from the previously printed sheet onto the blanket.	• Lack of paper flatness • Major differences between temperature and humidity in the press room and paper stack	● ●		● ●
Electrostatic	Sticking of materials together due to static electricity.	• Indoor climate too dry • Materials/printing stock too dry	● ●		● ●
Emulsification	Excessive absorption of fountain solutions by printing ink in offset printing.	• Proportion of fountain solution too high in the printing ink • pH value too low		● ●	
Creasing	Excessive deformation of the paper when passing through the printing machine as a web or sheet.	• Lack of paper flatness • Wavy or tight edges	● ●		● ●
Register differences	The individually printed inks are not transferred to the paper's surface to achieve 100% matching coverage, which causes blurring of the printed image.	• Dimensional changes in the paper • Wavy or tight edges • Static electricity	● ● ●		● ● ●
Toning	Printing of an extra, unwanted visible colour tone over the entire sheet.	• pH value is suboptimal		●	
Drying delay	Retardation to the printing ink drying process in the stack with sheet- or web-fed offset.	• pH value is suboptimal		●	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Water as a factor of production

FLATNESS AND HUMIDITY

THE CAUSES OF DIMENSIONAL CHANGES

Paper is dynamic

Incorrect handling and a failure to keep humidity constant have serious consequences for the flatness of paper and cardboard. As dynamic materials, they are very quick to respond to deviations in equilibrium moisture content. The trouble-free handling of these materials in the printing machine – their printability or "runnability" – are decisively influenced by the humidity.

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Paper and cardboard printing stock is primarily composed of fibres of plant origin, which are hygroscopic: they can gain or lose moisture from and to the air. The degree (if any) to which this occurs depends on the material's equilibrium moisture content, the relative humidity and the ambient air temperature.

Equilibrium moisture content

Hygroscopic materials seek to bring their absolute moisture content into equilibrium with the ambient air in their environment. This equilibrium moisture content is then achieved once the paper neither gains nor loses moisture into the room atmosphere. Depending on the materials from which it is made, the absolute humidity of the paper (4–9 %) is typically in a state of equilibrium with a relative humidity of 50–60 %. If differences between the paper's equilibrium moisture content and the relative humidity are too large, then the paper will experience changes due to it gaining or losing moisture – causing the paper's fibres to elongate or shrink.

Relative humidity

When assessing room climate, the interplay of the physical quantities of temperature, absolute humidity and relative humidity must be taken into account: The quantity of water (= absolute humidity) that the air can absorb in the form of water vapour depends on the temperature. Warm air can absorb more moisture than cold air. When no more water vapour can be absorbed, the air is said to be "saturated", and relative humidity is 100 %. The relative humidity is the ratio of absolute humidity and the maximum possible moisture for the same temperature value. If temperature rises with absolute humidity constant, then relative humidity falls. For practical purposes, relative humidity is the most important metric for assessing the room climate.

$$\text{rel. humidity} = \frac{\text{absolute humidity in g/m}^3\text{ air}}{\text{max. absolute humidity in g/m}^3\text{ air}} \times 100\ (\%)$$

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Image: Fogra

Humidity and process water

Influence of humidity

Depending on the relative humidity, the paper's plant-derived fibres can gain or lose moisture, resulting in the fibres either swelling or shrinking, respectively. As a result, the fibres either grow longer (swelling) or become narrower (shrinking). These specific changes to fibre width and length result in the paper sheets losing their flatness, causing problems such as misregistration, doubling and wrinkling.

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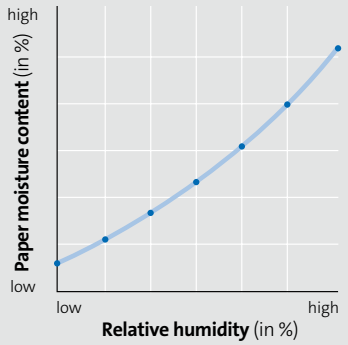

Tight edges

Tight edges is a paper problem that always occurs if a paper stack with normal moisture content is exposed to ambient air that is too dry. Since relative humidity is too low, the edges of the sheet lose moisture, shrinking in relation to the middle of the sheet. The paper's edges and corners tighten, causing the sheet to become concave. The tight edges problem typically occurs in cold weather.

Wavy edges

Sheets of paper start to develop wavy edges when the paper's moisture content is less than the humidity of the ambient air. The edges of the sheets begin to absorb moisture, causing the paper to elongate at the edges while the middle of the sheet remains unchanged. Wavy edges are therefore the result of exposing paper that is too dry to a higher humidity or paper with a normal equilibrium moisture content to room air that is excessively humid.

Recommended humidity and temperature

Application	Temperature (°C)	Relative Humidity (%)
Paper storage	18–20	60–65
Pre-press	20–22	45–55
Sheet/web-fed printing	20	50–60
Digital printing	20–22	45–55
Screen printing	22	50–60
Post-press	20–22	50–60

Typically, there is virtually no risk of tight or wavy edges occurring for deviations in equilibrium moisture content caused by up to a 5% change in relative humidity. A change of 8–10% in the relative humidity is considered to be a critical threshold for dimensional changes in the paper.

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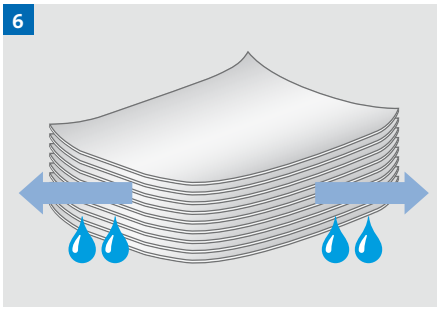

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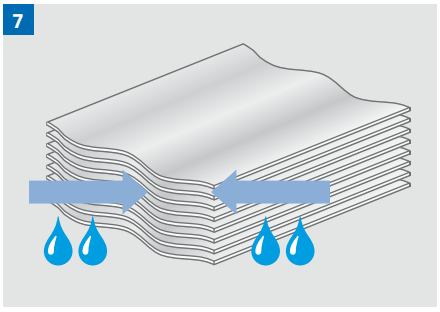


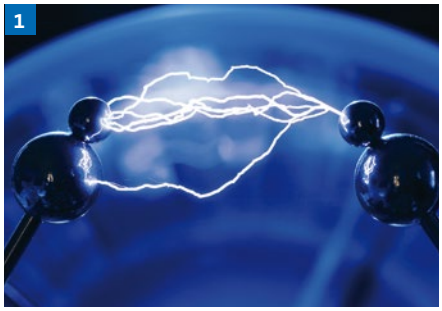
Dimensional changes

STATIC ELECTRICITY AND HUMIDITY

CONSEQUENCES OF ELECTROSTATIC BUILD-UP

A highly-charged atmosphere

The build-up of electrostatic charge can cause serious problems when working with paper, foil and packaging. Static electricity is the typical result when non-conducting or poorly conducting materials are subject to rapid friction or sudden separation. Optimal humidity promotes the harmless dissipation of electrical charge.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The term “electrostatic” refers to a positive or negative charge on material surfaces that is unable to dissipate. In the printing industry, static electricity primarily builds up on materials to be processed as a result of friction or sudden separation – such as when feeding the material through the printing machine. In the printing process, rolls and sheets of paper are exposed to high levels of friction from guide rollers and thus a risk of static electricity – especially if rollers are coated with rubber or plastic, which cannot dissipate charge since they are excellent insulators.

Humidity increases conductivity

Paper is a weak conductor of electricity and its conductivity increases when it absorbs moisture. If its moisture content is sufficiently high, then the paper’s conductivity is improved to a level where it can easily dissipate electrical charge.

On non-conducting surfaces such as plastic rollers or inorganic printing stock such as foils, a thin film of moisture is then formed, which makes the surface conductive enough that a dangerous build-up of electrical charge cannot occur.

Problems with electrostatic

A critical lower limit for preventing the build-up electrostatic charge is considered to be relative humidity of 40 % for the stack and a relative humidity of 45 – 50 % in the press room. If values drop below this limit, then the attractive forces unleashed can cause multiple sheets to be fed into the printing machine from the input stack, resulting in malfunctions within the paper handling process. Materials with low grammages respond more dynamically to static electricity than papers with a higher weight. In addition, the temporary air cushion separating the printed sheets on the output stack can dissipate too quickly, causing setoff of fresh printing ink onto the back of the new sheet. Poor paper handling in the printing machine can also result in misregistration and a substandard printed image.In web-fed offset, excessive electrostatic charge often causes problems in the folding unit or folded sheet stack.In port-press and book binding, problems with sticking to the folding unit feeder or misfeeding into gathering pockets and cover feeder attachments are also caused by static electricity.

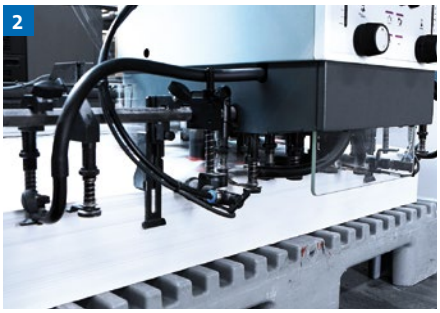
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Image: Fogra


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Humidity and process water

Humidity is the solution

The right humidity is a quality factor for many production techniques in the printing and packaging industry. For many specialised applications and techniques, only a trouble-free production process without delays and at the right quality can guarantee the desired level of productivity and profitability.


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Web-fed offset

Compared to sheet-fed offset, web-fed offset is less sensitive with regards to of humidity. Serious problems can occur, however, if relative humidity is too low in the areas where roll stands are used to store unpacked paper rolls prepared for splicing. Here, optimal conditions are assured by a target humidity of 50–60 %. If this is not provided, then two factors can lead to significant problems in production. First, the external layers of the paper rolls can lose moisture and start to dry out. The shrinkage that results then causes significant tension in the paper, leading to tears in the outer layers or breakages in the splice between the end of one roll and the "roll nose", i. e. the start of the next roll. In addition, the paste on the prepared rolls can also dry out prematurely. This results in pasting errors during the automated roll changing procedure or web breaks at the pasting point as the paper is fed through the machine. Other negative consequences can include additional spoilage, production stoppages and potential delays in outbound delivery.

Digital printing

As with conventional offset printing, dimensional changes in the material to be processed and the build-up of electrostatic charge are the key problems that are caused by air that is too dry. A lack of humidity also has a stronger effect on print quality than in offset: If electrostatic charge builds up within the machine due to rapid frictional processes, then the pigments can be deflected in a diffuse manner between the machine and printing stock. The result is an uneven printed image that appears "cloudy", i. e. having alternate bright and dark patches.

Packaging

In packaging printing and packaging production, optimal humidity is also one of the most important climatic parameters. For the punching and bonding of chromoduplex board, a sufficiently high level of humidity guards against dimensional changes while ensuring a 100 % fit for the final, assembled products. When processing and laminating synthetic foils, problems with materials sticking together, material handling difficulties, setoff issues, creasing and disruptions in ink transfer can all be avoided.


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Static electricity

1 Humidity reduces static electricity
2 Multiple sheets pulled off the input stack
3 Misfed sheets
4 Sheets stick together
5 Polypropylene plates become charged
6 Pasted joins dry out
7 Synthetic foils

The right water is the key!

In print shops, water is used in many applications – in rubber blanket washing facilities, for humidification and for fountain solution production in particular. Untreated water from the mains cannot be used as process water in any of these areas. The reason for this is to be found in the large number of substances in water that can cause serious problems.

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The quantity of calcium and magnesium salts – which determine the overall hardness of the water – has a substantial influence on print quality. Calcium and magnesium ions have the ability to bind to the saponifiable compounds in printing inks to form insoluble "lime soaps". In the printing machine, these insoluble solids are deposited on the inking rollers, making these increasingly hydrophilic and thereby impairing the quality of ink transfer. One effect on the ink rollers is "glazing", i.e. printing ink is no longer smoothly transferred from the ink fountain to the printing plate. The perfect fountain water has an overall hardness of 8–10° dH (German Degrees). In this region of average hardness, the formation of "lime soaps" is no longer a problem.

Optimal pH value

Alongside overall hardness, the printing process is also strongly affected by the proportion of hydrogen carbonate. Hydrogen carbonate neutralises acids, thereby influencing pH. In offset printing, the fountain solution's optimal pH value for printing is slightly acidic, in the pH range 4.8 to 5.5. Fountain solution additives are buffered to keep the pH value consistent even in the event of factors caused by papers or inks. If untreated mains water has a hydrogen carbonate content of over 150 mg/l, however, then some of the acid buffer will be neutralised. Fluctuations in the pH value lead to difficulties with printing, such as delays in drying, toning and excessive emulsification.

Corrosion

For corrosive constituents found in water, namely chlorides, sulphates and nitrates, printing machine makers define maximum limits, as these compounds are highly damaging. Treated process water protects against corrosion and can increase roller service life by as much as 70 %. Other direct cost-saving potential results from savings made on alcohols and other fountain solution additives such as isopropanol (IPA), and the reduced need for routine cleaning.

Water quality = process quality

With a water treatment system, any drinking water supply can be used to produce standardised process water that has constant hardness and a low hydrogen carbonate content, and is free from corrosion-promoting slats and microorganisms. A cost-effective additional benefit is also possible if the treated water can also be simultaneously utilised for humidification.


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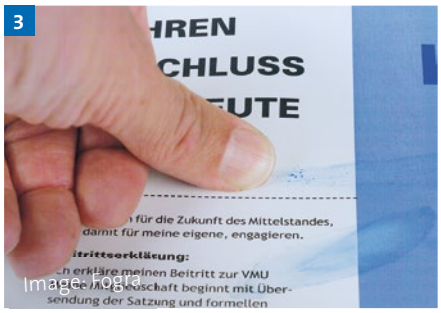

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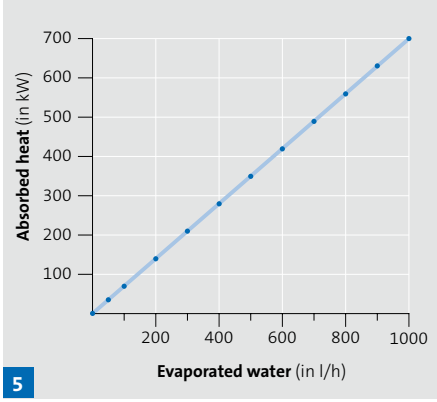
Humidity and process water

Low-cost cooling

High temperatures in production are a burden on personnel, plant and process materials. On the other hand, the cooling of production rooms requires a lot of cooling capacity, resulting in high energy costs. With a direct room humidification system using high-pressure nozzles, the costs for deploying climate control units can be significantly reduced.



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Temperature plays a crucial role in the relationship between paper and climate: the relative humidity of a room depends on the temperature of the air. A change of 1 °C in the temperature corresponds to a change in relative humidity of about 3 %. As the temperature falls, the relative humidity rises. Conversely, relative humidity itself falls as temperatures rise – always assuming that absolute humidity remains the same (see fig. 6). For most production processes in the printing, paper and packaging industries, optimal climatic conditions are typically achieved with a relative humidity of 50–60 % and a room temperature of 20–22 °C.

Much too warm

Generated by the enormous thermal losses of machinery, heat loads in production and post-production facilities are typically so severe that temperatures are much higher than the optimal values. One consequence of this is a drop in relative humidity – with serious consequences for material handling and process stability. Personnel also suffer by being exposed to these adverse working conditions. By controlling the room temperature, businesses can make a useful contribution to quality control as well as increasing employee satisfaction.

Evaporative cooling

Climate control in production facilities requires a lot of cooling capacity, resulting in high energy costs. With the right design and technology, the deployment of a direct room humidification system can reduce the costs of air-conditioning or simply reduce the room temperature independently of such a system. This is due to the positive side effect of the high-pressure nozzles, which spray cold water at 85 bar directly into the room air without causing droplets: the complete absorption of the microscopic, atomised water droplets in the air causes heat to be drawn out of the room. The principle of adiabatic evaporative cooling achieves an extremely cost-effective lowering of the room temperature: 100 l water from a high-pressure humidification system absorbs around 70 kW heat while consuming only 0.6 kW of energy, achieving a potential reduction in room temperature of between 2 °C and 5 °C.

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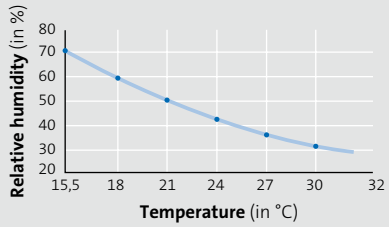

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Process water and cooling

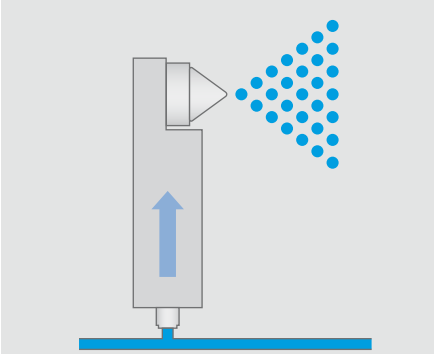
1 pH value of 4.8 to 5.5 is optimal
2 Water determines printing quality
3 Colour rub-off due to drying problems
4 Corrosion reduces roller service life
5 Humidification absorbs heat
6 Temperature and relative humidity
7 High-pressure nozzle humidifier

HUMIDIFICATION TECHNOLOGY

AN OVERVIEW OF POTENTIAL SYSTEMS

One goal, multiple options

To ensure adequate humidity, the printing industry uses a wide range of systems and technologies. Nozzle- or ultrasound-based fogging units, steam humidifiers and evaporators are the kinds of technologies typically deployed, and differ in terms of energy consumption, maintenance effort and humidification performance.



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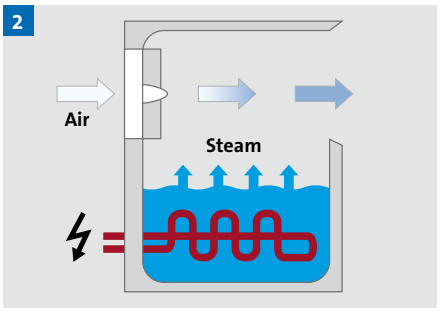
In general, we can distinguish between two basic principles in humidification: direct and indirect humidification. With a direct room humidification system, separate humidification units are installed directly in the room, and also clearly visible. With indirect humidification, moisture is added to the air in centralised air-conditioning system and fed into the working area by using a system of ducts and outlets. In the printing industry, direct humidification systems are mainly used, primarily because they offer more targeted and tailored control over humidification. Production areas used for different kinds of work and with different humidification requirements – such as paper storage, pre-press and post-press – can be humidified precisely according to demand. For specialised machinery and applications, targeted "spot humidification" for areas or materials can also be implemented, to ensure higher levels of humidification as needed.

Technologies

The technologies available today for use in direct room humidification systems vary in terms of their energy consumption, maintenance costs and humidification capacity. With **evaporators,** a fan is used to draw in room air, which is then passed over a moist wick. The humidification process itself is caused by evaporation on the surface of the wick. While these kinds of humidifiers require very little electricity to run, humidification performance is also low, and there is a high risk of bacterial growth without thorough cleaning and inspection. **Steam-based** humidifiers generate steam in a heatproof plastic or stainless steel cylinder, in which the humidifier water is heated to 100 °C. Steam humidifiers are hygienic, since microbes and bacteria are reliably killed off by this process. For electrode- and resistor-based steam humidifiers, energy consumption is very high, and the service life of the steam cylinder is limited due to lime scale. With **humidifiers,** water is broken into a spray of tiny water droplets. A fan then propels the aerosols so generated into the room air, where they are absorbed immediately. Fog humidifiers are available with ultrasonic oscillators and compressed air or high-pressure nozzles. Fog humidifiers can humidify large interior spaces while consuming very little energy. Fog humidifiers typically require a water treatment plant capable of producing sterile, demineralised water.



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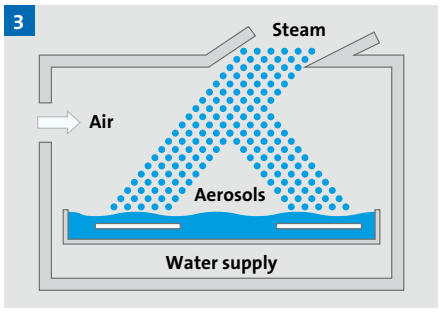

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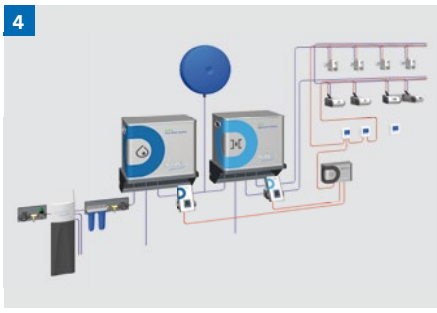
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HUMIDIFICATION TECHNOLOGY

HYGIENE AND MAINTENANCE

State-of-the-art technology

In recent years, many companies have replaced steam and compressed-air humidifiers with high-pressure nozzle systems. These systems use a high-pressure pump and special nozzles to atomise the water into a fine mist as part of a virtually silent process. Energy consumption is also only a fraction of typical values for nozzles powered by compressed air or steam humidifiers. The adiabatic cooling effect of cold water evaporation also creates a pleasant indoor climate. To ensure operation is hygienic and trouble-free, only ultra-pure, demineralised water is used – provided by a reverse osmosis plant that is integrated into the humidification system. In facilities where the water treated for use in the humidification system can also be used as standardised process water for the printing presses, this offers a practical and cost-effective additional benefit.

Maintenance is a must

A humidification system is only as hygienic, safe and reliable as the process water, and the service and maintenance model that is in effect. Even if it appears clear and pure, and is perfectly suitable for use as drinking water, untreated water will typically be unsuitable for use in most humidification systems. This is because of the large number of substances found in water: bacteria, microbes, algae, sand, suspended particles, salts and other minerals can pose a serious threat both to human health and the functional capability of humidifiers. Typically, a reverse osmosis plant is used for the treatment of the water to be used in humidification systems. Despite optimal pre-treatment of mains water with a softener and filtration stages, undesirable deposits can still form on reverse osmosis membranes and other key components within a humidification system. These are not only capable of seriously compromising the performance and service life of the plant, but also – and above all – present a serious risk to human health. Routine inspections, maintenance, disinfection and the replacement of heavily worn system components are therefore absolutely essential for the safe and hygienic operation of humidification plant. Details

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of the hygiene standards of the various humidification systems can be obtained from certificates issued by independent testing labs, and from manufacturers' maintenance and service programmes.

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Humidification technology

1 High-pressure nozzle humidifiers
2 Steam humidifiers
3 Ultrasonic humidifiers
4 Water treatment for high-pressure nozzles
5 Microbes and bacteria must be avoided
6 Routine maintenance
7 Internal hygiene monitoring

CASE STUDY

HP INC., BARCELONA

Speed and quality in digital printing

At its 4,000 sqm Demo and Training Centre in Sant Cugat del Vallès (Barcelona), HP Inc. presents its customers with the latest digital printing technology, from large-format printing to packaging and job printing. To ensure optimal results for print and production, the HP Demo and Training Centre requires air humidity values to be kept constant.

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Every year, over 6,000 delegates from the EMEA region visit the Demo and Training Centre of this leading digital printing specialist to seek inspiration and participate in training. The Spanish site views itself as “Dream Factory” that aims to stimulate and foster new customer product ideas, and demonstrate the digital printing techniques for turning them into reality. To ensure optimal results for print and production, the HP Demo and Training Centre requires air humidity values to be kept constant. “Electrostatic charge, changes to the paper dimensions and fluctuations in print quality all adversely affect our training and demonstration work,” explains HP Trainings Manager Adam Goldthorp. “In addition”, says Goldthorp, “the various printing technologies and materials (e.g. plastic, cardboard) also need different levels of humidity for processing.” The existing centralised ventilation system with steam humidification was no longer able to handle the requirements and was accordingly decommissioned. Since 2013,a direct room humidification system with high-pressure nozzles has been ensuring constant, optimal humidity.

Simple installation

Over 50 high-pressure DRAABE Turbo-FogNeo humidifier units guarantee controlled humidification in various areas and parts of the building. For installation, HP Inc. merely required a mains water system and drain, plus an appropriate electricity supply. Everything is supplied to the building from a central mechanical room, where both the water treatment systems and the high-pressure pump are installed. These systems are connected to the humidifiers using specialised high-pressure hoses and control lines. The compact humidifiers, attached to ceiling suspension or wall-mounted, are each oriented both horizontally and vertically in the various rooms to ensure optimal humidity distribution. High-pressure nozzles spray out an ultra-fine fog with a droplet size of less than 15 µm, which is immediately absorbed by the air and uniformly distributed within the room.

Lower energy costs

The required humidity is regulated using a digital control system. In each of the individually defined humidification zones (rooms or parts of rooms), control units measure the current level of humidity and activate the humidifiers when it falls below the set target value. This means that rooms can be humidified individually, exactly as required for their various uses.


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Humidity and process water

For José Baena from HP Inc. Global Real Estate, the new technology offers major advantages: "We now have optimal values across the various zones and printing systems. And we've also managed to cut energy consumption for humidification by over 95 %." The energy-efficient high-pressure humidification system ensures a constant relative humidity of 50–65 %. Depending on the printing process and material, the relative humidity in the Demo and Training Centre can be adjusted quickly – and increased for printing onto plastics, for example.

Automated maintenance

Both the high-pressure system and the corresponding water treatment unit are installed in small portable containers that allow quick replacement and servicing. The reverse osmosis system used for water treatment demineralises and cleans the mains water of impurities. Every six months, these containers are automatically replaced at HP Inc. with fully maintained and cleaned systems. The used systems can be easily released from their wall brackets and sent back to the manufacturer for servicing, where they are dismantled, inspected, rinsed out and cleaned. Worn parts are replaced and technical updates installed.

Humidity is a must

For HP Inc., zero maintenance, all-inclusive service and the individual humidification solutions were the key reasons for picking the new high-pressure nozzle-based technology. Since then, the DRAABE humidification system has been providing individually adjusted, optimal humidity throughout the Demo and Training Centre, so as to protect against static electricity and dimensional changes in printing stock. Impressed by the positive experience gained in their use, HP Inc. also deploys high-pressure nozzle systems for quality control at international trade fairs: at drupa 2016, the world's flagship trade fair for the printing industry, an entire exhibition hall was fitted out with a humidification system. "My team and I were really pleased to see the effects of a perfectly balanced relative humidity on our machine demos and the general room climate," reports Rotem Sagi Shteinmetz, Operations Manager in HP Inc.'s drupa Team, summarising the importance of optimal room humidity.

Fact file

Humidification:	54 high-pressure fogging units
Space:	18,000 m³
Required humidity:	50 to 65 % rel. humidity
Commissioning:	2013

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HP Inc., Barcelona

1 Demo and Training Centre
2 Humidity protects against static electricity
3 High-pressure nozzle humidifier
4 Individual positioning
5 Replaceable water treatment units
6 Rotem Sagi Shteinmetz

CASE STUDY

HEIDELBERGER DRUCKMASCHINEN AG, WIESLOCH-WALLDORF

More than machines

With the Print Media Centre (PMC) Commercial and Packaging, Heidelberger Druckmaschinen AG in Wiesloch-Walldorf operates the world's largest showroom for commercial and packaging printing. Optimal humidity and standardised process water increase performance while ensuring a trouble-free printing process.

1

"More than machines" is the claim asserted for the two fully equipped print shops, spread over an area of about 10,000 m², where the primary focus is on the integrated overall processes and the required components. With its comprehensive portfolio of offset and digital machines, software, consumables and services, the PMC covers any and every topic likely to be faced by a modern, industrial-scale print production business. Over 1,200 individual customer demos are held yearly, educating international delegates in how real-world production processes can be organised to be more economical and more reliable. The Print Media Centre Heidelberg forms part of the Global Print Media Centre Network. Other members include the Print Media Centre Atlanta in Kennesaw and the Print Media Centre Shanghai in Qingpu, which serve the US and Asian markets, respectively.

Fault-free sheet feeding

To ensure optimal climatic conditions for machine demonstration work, the PMC Commercial, opened in 2015, controls relative humidity with a high-pressure nozzle system featuring the latest generation of humidifiers. "Our presentations have to be right on the money and must not be disrupted by wavy or tight edges or electrostatic build-up on the paper. Perfect sheet feeding is a basic requirements for our demonstrations," explains Head of Print Media Centre Roland Krapp. In choosing its humidification system, Heidelberg can draw on almost 20 years of experience: the first high-pressure humidifiers were installed in Heidelberg's manufacturing facilities back in 1996. Over 200 units are now in use, ensuring that printing and testing in the assembling halls proceed as intended.

Water treatment

The right water plays a major role in ensuring the quality of offset printing at PMC Commercial. Accordingly, germ-free, demineralised water is produced as part of a multi-stage process both for the high-pressure nozzle fogging units and as specially treated process water for the printing machines. The process begins with water softening. Here, the calcium and magnesium salts responsible for water hardness are replaced with readily soluble sodium salts. Once treated, this soft water is then purified by being passed through a two-step mechanical filter stage.


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Humidity and process water

This separates out solid contaminants with a particle size of up to five-thousandths of a mm. The heart of the water purification process is the third stage, reverse osmosis. Here, a membrane separation technique is used to effectively sterilise and demineralise the pre-treated water. The reverse osmosis process is entirely self-contained and runs in a portable, compact module that enables the comprehensive maintenance and disinfection of the plant by simply replacing the entire module. This standard service is performed by the manufacturer automatically at half-yearly intervals. From the reverse osmosis plant, some of the pure water produced is fed directly to the humidification system.

Process water as an additional benefit

To produce the fountain solution, the 95% demineralised water passes through a fourth process stage, in which a specialised hardness concentrate is added to the water. After this standardising step, the process water now has a residual hardness optimised for offset printing and is routed to the Heidelberg printing machines via a separate supply line. Some of the treated water is also held in reserve as a fountain solution for subsequent use, in a separate tank. By deploying this standardised process water, Heidelberg ensures that the ink/water balance for the ink in the machines remains stable, and that toning, roller glazing or setoff does not occur. The water has a constant quality, with a pH value between 4.8 and 5.5 and a hydrogen carbonate content of less than 150 mg/l.

For personnel and plant

At Print Media Center Commercial, optimal humidity and standardised process water are key parameters that guarantee maximum performance while avoiding disruptions to the printing process. In selecting its humidification system, Heidelberger Druckmaschinen AG has devoted particular attention to maximising operational reliability and constant hygiene, emphasises Roland Knapp: “Requirements for occupational safety and health as well as maintainability were reviewed in great depth by the specialist departments beforehand. And we are very happy with the result: Our new humidification system reliably creates the conditions required for peak performance by our personnel and plant.”

Fact file

Humidification:	36 high-pressure fogging units
Space:	4,700 m³
Required humidity:	45 % rel. humidity
Commissioning:	2015

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Heidelberger Druckmaschinen AG

1 Print Media Center Commercial
2 Printing machine at PMC
3 High-pressure nozzle humidifier
4 Optimal: humidity and process water
5 Water treatment at PMC Commercial
6 Expert know-how at Heidelberg

HUMIDITY AND PROCESS WATER

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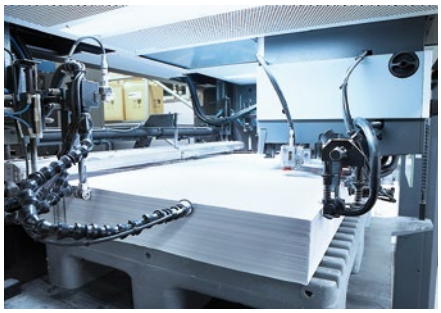

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