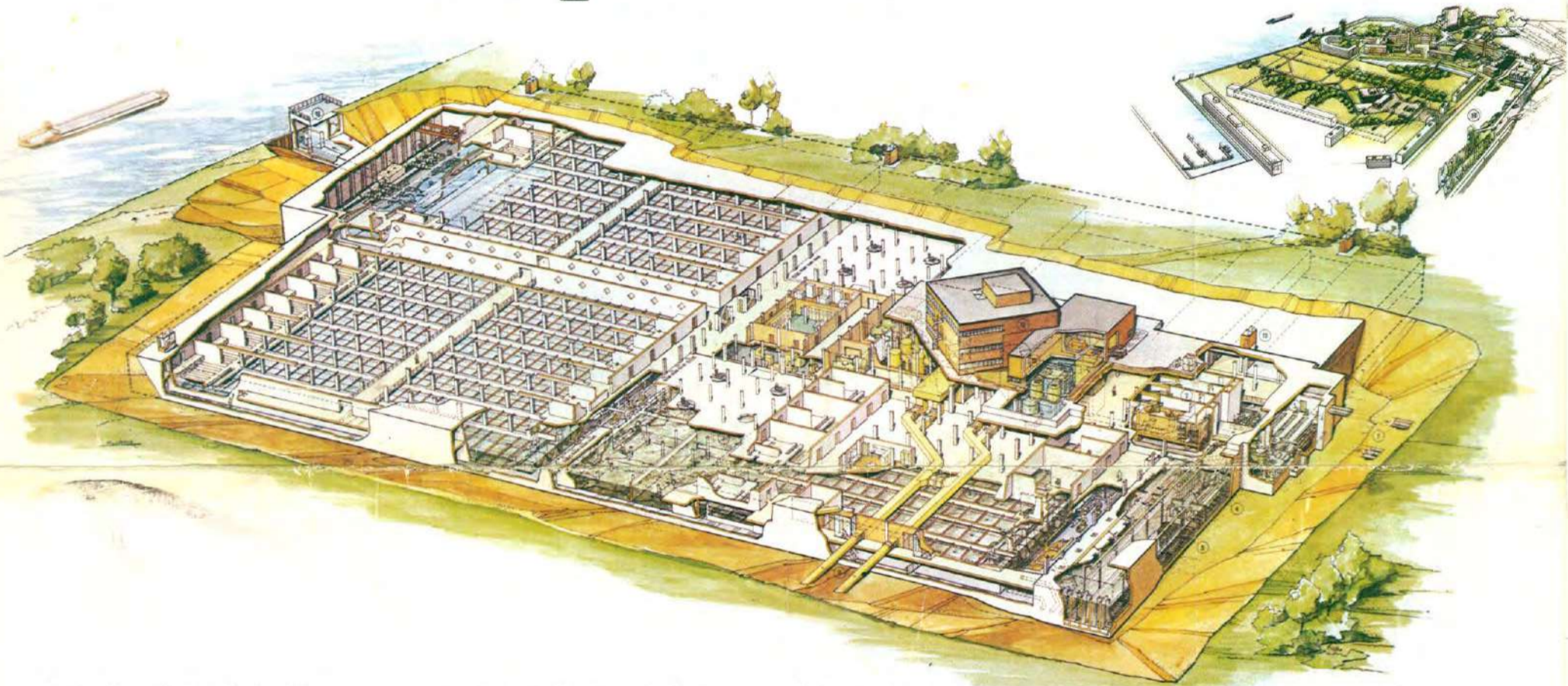


A proven answer to a constant problem



Rotterdam, Europe's leading seaport, is a beautiful city on the banks of the river Nieuwe Maas. With its one million inhabitants, Rotterdam and its neighbouring areas require an enormous amount of fresh water. The main source of water supply is the magnificent river Rhine.

Rotterdam certainly believes in clean living because immense resources are used for cleaning, filtering and purifying the water. Equal importance is given to the treatment of sewage water before it is drained; this helps check the pollution of surface water.

Hence, by order of the Zuiveringsschap Hollandse Eilanden en Waarden, under the supervision of the engineers of the Rotterdam municipality, a sewage water cleaning plant was built. It is situated underground in Dokhaven, a former harbor, and it uses the most modern water cleaning technology, hydraulic engineering, concrete application technology and auxiliary techniques.

This two-storey plant, with a floor area of 35,000 sq. metres has a capacity to clean 20,000 metres³/hour of sewage water. The entire system of corridors and technical rooms is fully ventilated so as to remove the gases liberated during the cleaning process of sewage water.

Since the temperature of the water

passing through the pipes was lower than the ambient temperature of air inside the plant, it led to condensation of moisture on the cold surface of pipes and walls. If the problem of sweating pipes was allowed to continue, in due course, it would have led to rotting of insulation and pipe coverings, damage to electrical controls, rusting of pipes, valves and instrumentation and increased motor maintenance. The solution lay in controlling and reducing the humidity to a level where the dewpoint of the surrounding air was below the temperature of the pipe surface; thus sweating could be eliminated.

In order to protect the technical installation and the operators from the effects of high humidity, four MVB-125 Bry-Air dehumidifiers, supplying a total of 80,000 cu m/hr of dehumidified air, were installed by Delair. These units, located in a pipe gallery, maintained the area at 42% RH all the year round. Dewpoints being maintained in winter and summer are 6°C and 14°C, respectively. This has been accomplished by recirculating part of the air and drawing in a large quantity of fresh air.

The warm, dry air is not usually objectionable since only a few people work regularly in these areas. This source of heat is an added advantage since the relative humidity is lowered

and the capability of the air to carry away moisture is increased.

Reactivation of the desiccant is by direct fired natural gas burners which are available in most sewage plants and give additional savings. A heat pipe heat recovery system was also installed on the reactivation side to pre-heat the incoming air, thus reducing on energy requirements even more.

This is a prime example of how dehumidification saves resources and maintenance costs in a sewage treatment plant by curtailing rust, reducing energy and the expenses of

painting and replacement of components.

The presence of humidity-related problems in water, waste water plants and pumping stations is a common condition. Over the years, hundreds of Bry-Air and Delair dehumidifiers have been installed throughout Europe and the world to solve this problem effectively and profitably.

Bry-Air dehumidifiers are the proven solution to moisture problems in water treatment plants, sewage treatment plants and pumping stations.

Getting a better eye-view of the birds



(Story on page 3)

Bry-Air — the global advantage



(Page 8)

What does embalming an Egyptian mummy have in common with dehumidification?

What in the world does dehumidification have to do with embalming an Egyptian mummy? Believe it or not — a lot!

The ancient Egyptians embalmed their dead to **preserve** their bodies for long periods. The entombed desert dry air created the ideal environmental condition that helped preserve the body for thousands of years without decaying.

Dehumidification helps in preservation too. It's proven to be invaluable in preserving rare objects, records, films, paintings and books, the world over.

Museums, libraries and archives are all custodians of priceless treasures — invaluable paintings, objets d'art, historical records, relics of the ancient past. All these shed light on the history of man through the ages. It is of prime importance to mankind that this invaluable wealth be preserved through generations in its original state.

Over the years, the natural environment takes its toll. Paper, parchment and colours tend to decay and discolour through exposure to dust and cyclic changes in temperature and humidity.

Moisture is the natural enemy of preservation. The temperature and, particularly, the relative humidity of air have a marked influence on the appearance, behaviour and general quality of hygroscopic materials such as paper, textiles, wood and leather. This is because the moisture content of these substances comes into equilibrium with the moisture content or relative humidity of the surrounding air.

If objects in a museum are permitted to cool overnight, the next day they will be enveloped by layers of air having progressively higher relative humidities, thus effecting a change in moisture regain or even condensation. This, combined with the hygroscopic or salty dust often found on objects recovered from excavations, can have a destructive

effect. Moreover, bacterial propagation accelerates at phenomenal rates in the presence of high humidity.

Dehumidification keeps relative humidity levels low and retards or prevents spoilage from organic corrosion.

Dehumidification requirement may be common to all museums and art galleries but may differ in application and design criteria due to the nature of the exhibit.

Museums with paintings need to keep their atmosphere at 40–45% RH, at a level that not only prevents drying out but also prevents mildew formation and warping of canvases.

Museums with archival material including books and manuscripts need to have conditions of 35% RH at 55°F to 65°F (13°C to 18°C) for books. Stuffed fur bearing animals should be stored at about 40°F to 50°F (4°C to 10°C) and 50% RH for maximum preservation, whereas fossils and old boxes can be kept at higher humidities.

Some exhibits are exposed within the viewing area and some are kept within the enclosed cases, cubicles or rooms. These exhibits may require special conditions maintained by separate systems.

Moreover, the temperature and humidity ranges that are best for books, museum exhibits and works of art are usually not within the human comfort range. Thus, compensations must be made to balance the value of preserving contents against human comfort.

Bry-Air engineers are geared to offer solutions to all problems and providing the right environment for the preservation of valuable objects with the aid of the appropriate design criteria and specifications.

So entrust your problems to Bry-Air world-wide to preserve your treasures with the right environment!

No more 'yellow pages'

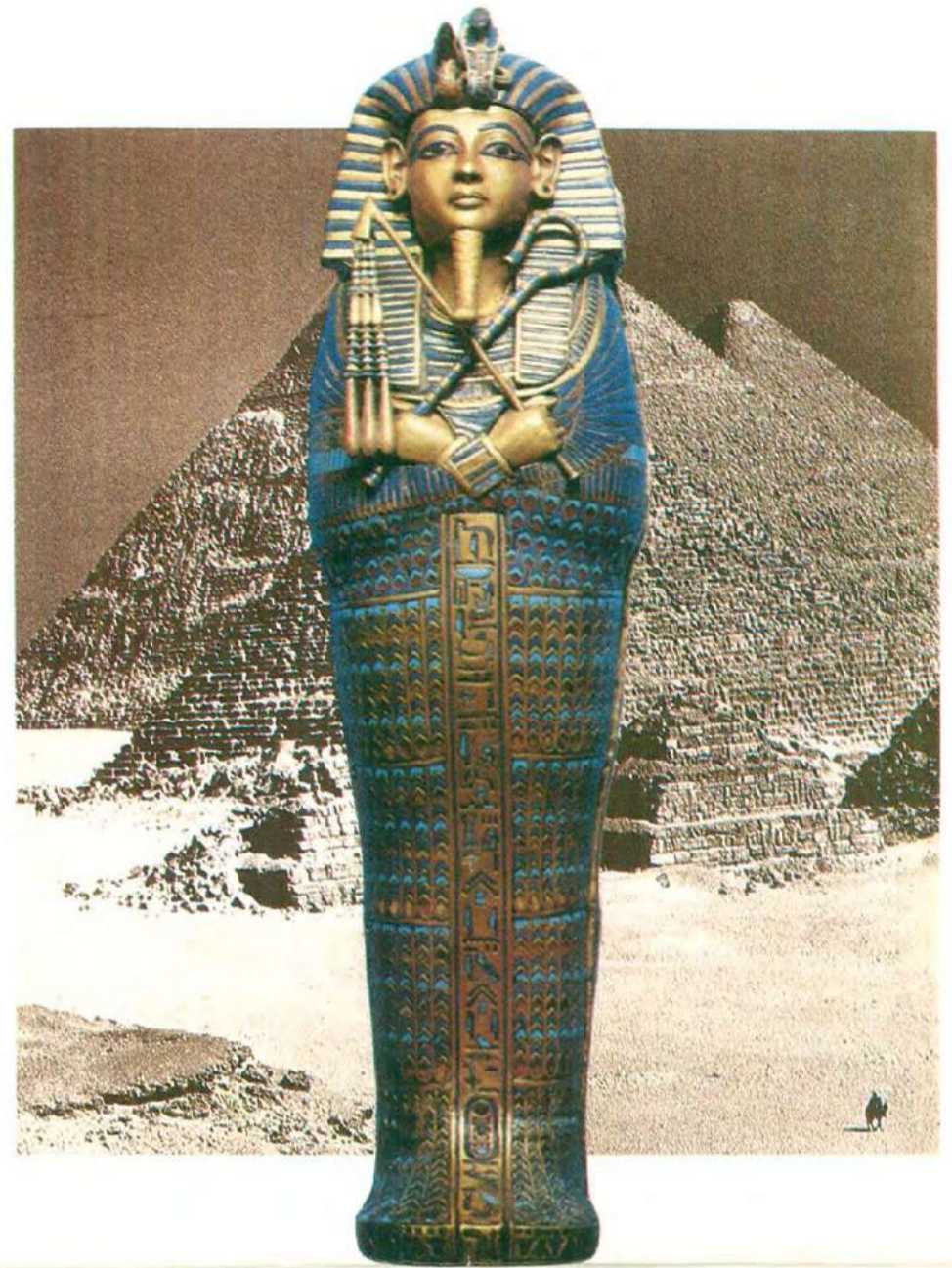
Before the 18th century, paper used for books and manuscripts was very stable and was not significantly affected by room environments. Paper produced by a cottage industry was made in small lots by breaking down the wood fibres by stamping, by using naturally alkaline water and by applying a gelatine sizing.

Industrialised production, however, in which wood fibres and ordinary water are used, and where rosin sizing is substituted for gelatine, makes a paper that is susceptible to

deterioration. This is due to the acid content in the paper and sizing, hence modern paper yellows quickly.*

For archival preservation, this paper should be stored at very low temperatures and humidity. It is interesting to note that for every 10°F dry bulb drop in room temperature, the span of the paper's life is doubled and that any humidity reduction will also lengthen the life of paper. Once again, it is dehumidification to the rescue!

(* Courtesy 1987 Ashrae Handbook)



Art treasures — survivors of a World War

The magnificent art treasures adorning hundreds of museums and art galleries in the Netherlands were threatened at the time of the Second World War. To save them from destruction during bomb attacks, these works of art were to be hidden in special casemates, designed to be built among the dunes. These special casemates were not ready for a long time, hence the art treasures in the meantime were stored in basements and underground stores.

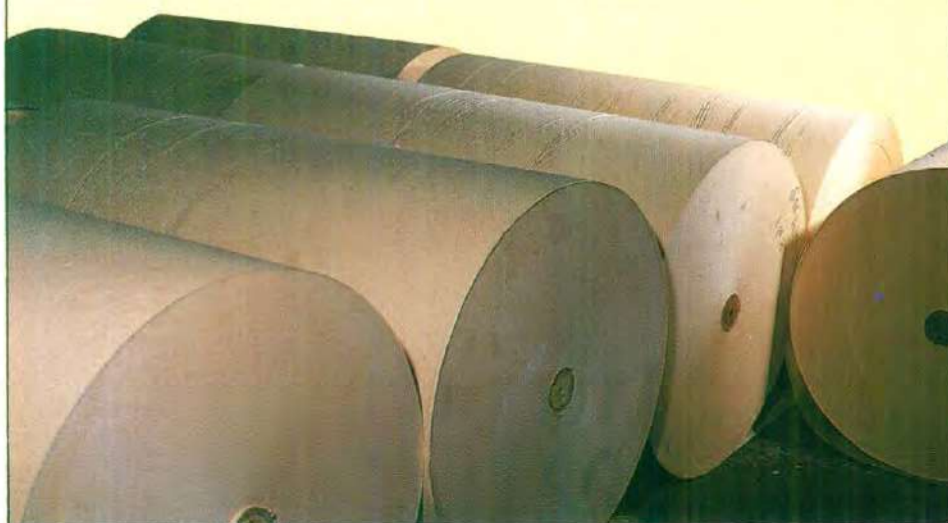
The damp and the cold would have taken the toll on these priceless treasures but for the Delair dryers that came to the rescue. These dryers were built and installed by Droogtechniek and Luchtbehandeling, as Delair was then known, in the middle of the Netherlands and in Simt Pietersberg, near Maastricht.

In Belgium, the art treasures were secured in castle 'Lavaux-Ste Anne' in the Ardennes and in the 'National Bank' in Brussels. The most important works were secured in the Bank's safe rooms.

What helped preserve them then, is also relevant today. The old dryers have now been replaced by the newer, more modern dehumidifiers which today help to preserve the national treasures in the same way as was done so successfully during the war.

The storage areas in museums often contain large numbers of articles that are awaiting repairs or for which exhibit space is not immediately available. These storage areas have to be kept within fairly close environmental conditions. The storage temperature should be quite low to lengthen the life of organic material and the RH should be maintained at 35% RH.

Bry-Air dehumidifiers combine refrigeration with dehumidification or, in conjunction with air-conditioning, they provide the right environmental conditions for effective storage and better preservation of valuable material.



Charged with power

High technology often entails working under very precisely controlled environmental conditions. Dehumidification, or moisture control, has proven itself to be an important factor in the control of the environment so as to produce higher quality products in greater volume.

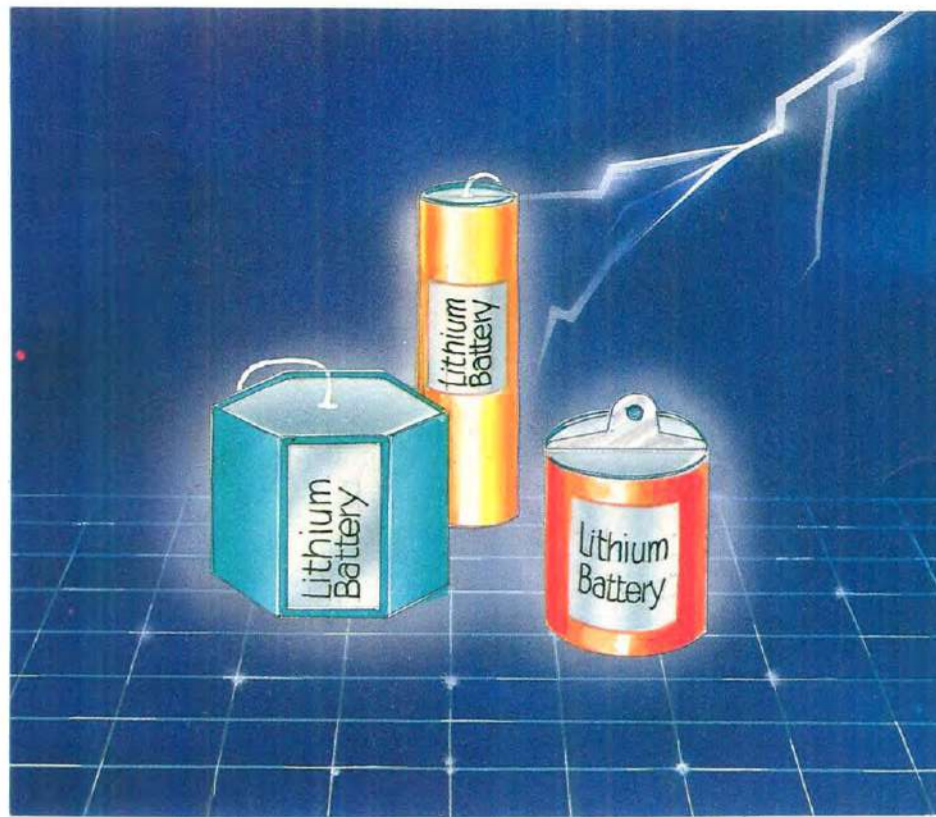
Lithium or high energy batteries are a classic example of a product where production is not possible in the absence of efficient dehumidification.

The need for dryness

Lithium is highly hygroscopic by nature. Its affinity for water and its instability in the presence of water makes the production of lithium batteries impossible without efficient moisture control. Its reaction with even small amounts of water vapor can reduce its shelf life and performance.

Hence, moisture control to very dry levels becomes a critical requirement in the manufacturing or assembly process.

Desiccant dehumidification can maintain dewpoints to very low levels, such as -40°F , consistently. However, the manufacturing areas of the batteries house men and machines and a suitable working environment needs to be created for them.



The Bry-Air system is designed to typically control moisture level in lithium processing areas at or below a dewpoint of -20°F , or moisture content of 1.8 grains of water vapor per pound of dry air.

Hence, desiccant dehumidification has helped commercialize the

manufacture of lithium batteries in large batches by providing low dewpoint working areas.

Since many years, Bry-Air has been involved in supplying dehumidification equipment of the manufacturers of lithium batteries for their production in dry rooms.

Bry-Air recently shipped out a MVB-125 dehumidifier to Moli Engineering, Canada, for a critical application of controlling the production space for manufacture of lithium batteries at 72°F and RH not exceeding 2%, 0.8 gr/lb.

The system consisted of the dryer with a built-in air cooled water chiller to provide pre-cooling and after-cooling to achieve low grain level.

A heat recovery system was incorporated on the reactivation end to pre-heat the incoming air and reduce the heating load.

The construction of the room was equally critical. A complex, energy efficient and reliable moisture control system would be ineffective if an effective vapor barrier was not used in initial construction.

Therefore, dehumidification has been responsible for bringing the production of lithium batteries from sample batches to mass production in large assembly areas and fabrication rooms.

Moreover, while the control of moisture level down to -40°F is well within the Bry-Air capability, what is more important is its application in production of other sophisticated electrochemical technologies.

Getting a better eye-view of the birds



It is always a special treat to see lovable penguins and puffins in a zoo, but they feel homesick for their cold, rain-swept natural surroundings of the Arctic. When the Lincoln Park Zoo in Chicago aquired penguins, they built a special Penguin — Sea-bird House for them. To make them feel at home, the house was maintained at very low temperatures. The sea-birds were housed in 40°F temperature and the penguins in 35°F . Both areas included large expanses of water.

The two areas had eleven viewing windows along the corridor. The windows were 4 ft. wide and 10 ft. high with a heavy plate glass against the cold and wet area and a lighter plate glass against the viewing side. A small space was provided between the two plates. The zoo encountered a problem of sweating and clouding of the windows in the viewing area.

Bry-Air supplied a dehumidifier which fed dry air to the space between the two plates of the windows. This prevented sweating on the cold side of the window and kept

the glass on the outer side warm enough to prevent clouding caused by the viewers breathing on the panes.

By recirculating about 75% of the window air and supplying enough fresh air to pressurize the windows, the dewpoint between the glass was so low that sections of windows below the surface of the tanks — especially in the penguins area — were clear of condensation.

This application was unique because of the temperature conditions of the exhibit.

However, the range of operations and manufacturing processes which could benefit if condensation is controlled are numerous. Condensation will take place on any surface colder than the dewpoint temperature of the surrounding air mass. The resulting water vapor causes deterioration of stored material and machinery and reduces production efficiency.

Warehouses, ship holds, archives, water treatment plants, ice rinks and swimming pools are all areas which benefit directly from dehumidification.

Here's to Heineken!



To beer drinkers anywhere in the world, Heineken is a special name. The major part of the beer brewed by, or under license of Heineken is exported to the United States and Canada. For thousands of foreign tourists in Amsterdam, a visit to the large, modern Heineken Brewery is a 'must'. Why? Because every day the brewery (on the Stadhouderskade in Amsterdam) offers guided tours crowned by a glass of Heineken.

What is the secret that lies behind the great tasting beer? Heineken Breweries make high demands on the quality of their beer. In fact, maintaining high quality in all aspects of production is given prime importance by all employees!

One area where quality control is most stringent is cleanliness. The brewing process involves maintaining very low temperatures. In several production areas, the temperature is often as low as 0°C to 2°C .

The production areas have to be regularly cleaned with water. This results in unacceptably high levels of humidity, which in turn, lead to condensation and growth of bacteria. In other words, cleanliness is an inherent problem in the beer-making process.

Delair, as manufacturers of adsorption-type dehumidifiers, was asked to apply their experience and know-how to solve the problem.

Delair began with the known fact that at temperatures 0°C — 2°C , if relative humidity is maintained below 70%, the growth of bacteria is eliminated. The Delair engineers designed a system which would do precisely that, and solve the condensation, bacteria and hygiene problem.

The total moisture load at a temperature of 0°C amounted to 102 kg of water removal per hour. To remove this amount of water, a dehumidifier, type MVB-200.2E, with a nominal air-flow of $34,000\text{ m}^3/\text{h}$ was necessary. Heat recovery in the regeneration section was considered. Heat source for regeneration was available by way of steam.

The dehumidifier was installed on the roof of a six-floor production building in sheet-metal housing. From there, the dried air was distributed to each of the five floors and the basement area. The exhaust air from the production areas was returned to the dehumidifier and dried again.

Endrees and Hauser humidity sensors were installed to operate the dehumidifier and control the humidity.

The system achieved all objective tests. To verify the subjective aspect, we suggest a drink of Heineken beer, to test the quality. Cheers!

Operation mothball

The World Wars were instrumental in focusing attention on the fact that materials which deteriorate from the ravages of natural atmosphere could be preserved indefinitely in a controlled humidity environment.

Between the two World Wars, the U.S. Navy carried out experiments in preserving ships through surface coatings. These proved totally unsuccessful. Before the close of World War II, the U.S. Navy embarked on an intensive research program for a practical solution to preserve many ships and military equipment. From this research came the dehumidification program for providing long-term preservation solutions.

The lessons learned then have been successfully applied over the years and is applicable to this day.

Due to fluctuating economic trends, more and more ships are being put in temporary layup status.

If the vessel is not dehumidified during layup, in about a year's time, much of the machinery would be inoperable. Paint would peel off bulkheads,

electrical equipment would not function properly and circuit breakers would pop on many of the vessel's systems once full power was restored.

In fact equipment covered with the best known preservatives and exposed to uncontrolled humidities have been known to deteriorate beyond practical repair under exposures as short as 90 days.

Bry-Air has supplied dehumidifiers to the Marine Industry since 1939 for ship mothballing and other applications such as gear casing layup, sandblasting, coating and cargo hold drying.

The areas that need dehumidification are mainly:

- a. Machinery/engine room
- b. Living quarters
- c. Midship dock housed

- d. Steering room

The cool sea water in which the vessel floats leads to temperatures inside the ship which are only 5°F to 10°F higher than the sea water, whereas weather conditions with 90% humidities are probable.

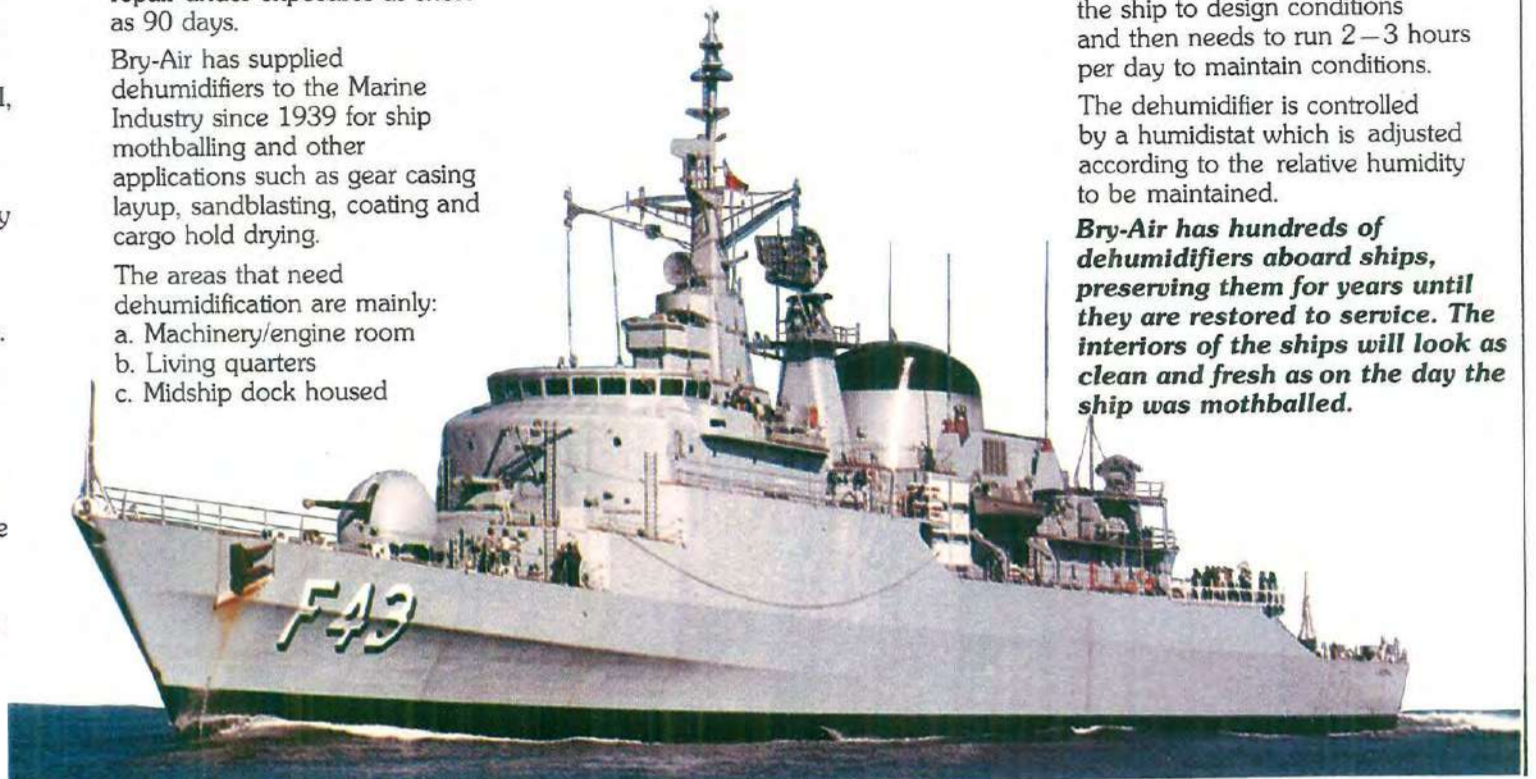
This leads to condensation on all exposed surfaces.

Hence a design condition of 40% RH is chosen as a safe condition at which the main elements of destruction — corrosion, rot and mildew — would be inhibited.

Upon layup, a dehumidifier takes about three weeks to dry the ship to design conditions and then needs to run 2–3 hours per day to maintain conditions.

The dehumidifier is controlled by a humidistat which is adjusted according to the relative humidity to be maintained.

Bry-Air has hundreds of dehumidifiers aboard ships, preserving them for years until they are restored to service. The interiors of the ships will look as clean and fresh as on the day the ship was mothballed.



Delair calling ... loud and clear

The snow covered pines on the slopes of Holmenkoller near Oslo, Norway, provide a picturesque backdrop to the Trivan transmission tower.

Trivan is the main transmission tower in Norway, connecting thousands of towers and communication lines to provide an effective communication link across the vast country, even connecting Nova Zembla with the main land.

The severe weather conditions with sub-zero temperatures, almost all the year round, would often lead to the breakdown of the well laid out communication link. Energy losses, crosstalk and arcing, time differentials were problems that kept cropping up from time to time. Some of the towers were located in places which were snow bound and inaccessible in winter and servicing them was impossible for months at a time.

Norwegian authorities were on the look-out for an effective solution to the recurrent problem. Delair provided the solution. Dehydrators/Pressurizers were installed to keep the radiolinks operative.

Dry air pressurization systems are special systems developed by Delair for pressurizing the transmission lines with very dry air.

The need for dry air

In all transmission systems, electromagnetic waves have to be transported from the amplifier to the receiver.

The transmission path is divided into several parts:

- amplifier — waveguide — antenna
- antenna — waveguide — receiver

Electromagnetic waves can only be transported completely undistorted in

an absolute vacuum and through absolute reflecting guides. In practice, however, this is impossible.

Obstacles in the form of dust particles and water molecules, etc., as well as waveguide imperfection caused by corrosion distorts the electromagnetic waves by scattering, velocity loss, time differentials and so on.

As waveguides, horn antennas and cables are never 100% air tight, penetration of moist air at barometric pressure causes corrosion. Wind speed causes overpressure on the outside of the transmission line, thus



introducing air penetration, even against low inside overpressure. Therefore, the best way to prevent penetration of moisture and dust particles is to pressurize the transmission lines.

In order to maintain a low relative humidity inside the transmission components under all conditions, the air has to be clean and very dry.

Delair dehydrators

Delair dehydrators or air pressurizing

systems are based on the principle of drying the air by adsorption techniques. The air supplied is so very dry that even under the most severe weather conditions, no water vapor can condense.

The dry air is supplied at an adjustable pre-set pressure to ensure a slight overpressure in the system which consequently avoids the penetration of ambient air through leaks. This helps improve the quality of transmission in radiolink and cable systems.

Over 800 Delair dehydrators are in operation throughout Norway keeping the country's communication lines operating trouble-free. Norwegian authorities standardized on the Delair product because of high reliability since many stations are impossible to reach for several months during the long winter season. Moreover, the equipment has a life span of 20 years or more.

A clear signal from Delair

The pressurizers are also being used by the army, navy and air force for their radar systems in several countries the world over.

This quality product is being manufactured by the Delair plants in the Netherlands and the Bry-Air subsidiary in India.

Fifty long years of experience in atmospheric and compressed air drying and developing, designing and manufacture of the dry-air pressurizer makes Delair the world leaders in this field.

A message for the telecommunication industry the world over.

Delair calling ... loud and clear!



Wherever there is smoke, there is Bry-Air!



Tobacco culture in colonial America began in the early 16th century. When Christopher Columbus and other early explorers arrived in America, they found the natives using tobacco in much the same way, as is used today. The natives used tobacco for smoking, mainly for ceremonials and for medicinal value.

The extension of tobacco culture to practically all parts of the world began with its introduction to Europe. From the dried tobacco stuffed into a rolled leaf or paper, or through a 'Hooka' to the finest cigar, cigarillos and the pipe, man has never been able to shake off the addiction of tobacco. Down the ages, he has continued experiments with tobacco cultivation, taken great care in curing, aging and mellowing the leaf in order to get the right colour and the finest flavour. All for a satisfying smoke!

Tobacco growing

The tobacco plant is grown successfully under a wide range of climatic and soil conditions, however, the commercial value of the product depends largely upon the environment in which it is produced.

Plants are ready for harvesting after three to four months of planting. Two methods are used — priming and stalk cutting. In priming tobacco, each leaf is pulled separately as it ripens. In stalk-cut tobacco, the whole plant is cut down.

After harvesting, the tobacco is cured. The aim is to dry the leaf in such a way so as to bring out the proper colour. Tobacco leaves normally have a major moisture content of about 85% at harvest time. The popular means of tobacco drying are air and flue curing. The desired end product is a buff tan leaf.

Overdrying of the tobacco leaf results in an undesirable green colour and low sugar content, underdrying, in an equally undesirable dark colour, and damage due to molds and bacterial growth which can reduce yields.

Tobacco storage

Once dried, the tobacco is pressed into packages of approximately 1.20m x 6 m x 0.6 m or stored in barrels with a plastic covering. Transit

storage or storage prior to processing is usually done in large warehouses.

While in storage, tobacco has to be safe from organic corrosion, growth of fungus and bacteria.

It is a common procedure to recondition the tobacco, that is, to dry the product and then return the proper amount of moisture by 'redrying' after it has been marketed and before it is packed. The purpose is to avoid damage which occurs when the leaf is packed with an excessive moisture content and to ensure proper amount of moisture for aging.

Dried tobacco under humid storage conditions will regain moisture until it reaches an equilibrium moisture content, at which time it is susceptible to attack by bacterial propagation and organic corrosion.

The damage that occurs is a result of the conditions maintained during storage.

The general practice is to retain the equilibrium moisture content of the stored tobacco at 16% to 19%. For this, a relative humidity of 50% to 55% needs to be maintained inside the storage area.

Under tropical conditions where ambient temperatures are high, temperature control is also necessary for preventing insect attacks.

Bry-Air dehumidifiers have been used the world over to maintain the aforesaid conditions in large warehouses.

Brown and Williamson Tobacco Corporation, U.S.A., have been using twenty-eight A-15-BE Bry-Air dehumidifiers for a number of years in order to maintain the desired conditions in their storage warehouses. Each warehouse had about 391,500 cubic ft of space to be dehumidified. The maximum allowable relative humidity was 65% (50% as conditions to be maintained)

Bry-Air equipment is being used in tobacco warehouses all over the world; among which, Alleghany Warehouse — Flushing, Netherlands, is worth a mention. Malaysian Tobacco Company, the makers of world-renowned Benson and Hedges cigarettes in Malaysia also use five MVBs for tobacco storage.

Satisfaction — to the last puff!

Hence we see that tobacco storage is given as much importance as cultivation, curing and aging and Bry-Air contributes in a significant way towards giving smokers a satisfying feeling — to the very last puff!



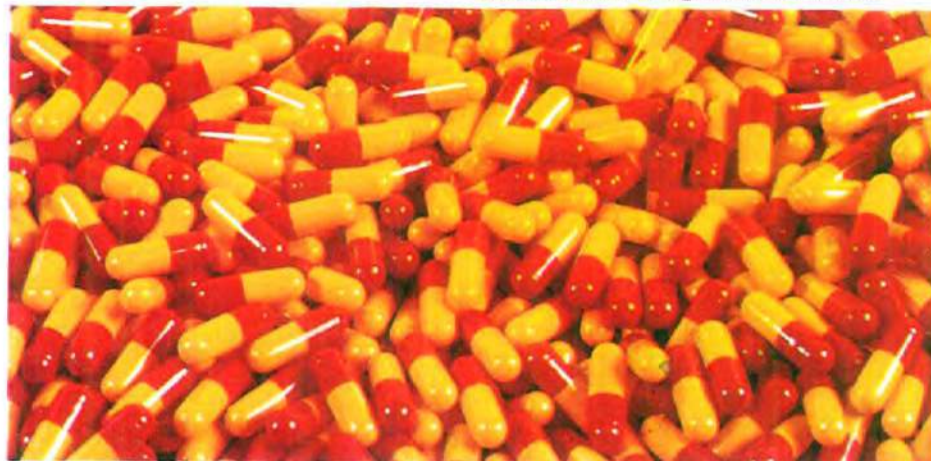
Prescription for better products

Gelatine, a raw material for capsules, foods and photographic films, must be of the highest grade to give the finest end product. Gelatine is moisture and temperature-sensitive by nature, the manufacture of which necessitates incorporating the latest in drying technology to give a quality final product. Bry-Air dehumidifiers are being incorporated the world over in the manufacturing process of gelatine.

micro filters and pre-cooling incorporated at the inlet. So no matter what the weather condition is outside, the air entering the dryer is always at the same temperature and moisture, as well as bacteria-free, throughout the year.

The cool, dry air absorbs the moisture from the product, bringing down initial moisture content of 70% to about 10% and allowing surface hardening and drying.

The dry gelatine, now in a stable condition, is stored in a separate intermediate storage area where it is



The C.J. Gelatine plant at Bhopal, India, was a recent entrant in the field of gelatine manufacture to international standards. Even though India is one of the world's largest exporters of crushed bones and ossein — the basic raw materials for gelatine — manufacturing of the high grade gelatine was being done on a limited scale. The need was felt for a plant with the latest technology and machinery of the highest standards. A plant was set up at Mandideep, Bhopal. Atmospheric temperatures at Mandideep vary from 5°C in winter to 42°C in summer with relative humidity ranging from 35% to 85%.

The process

Ossein manufactured to world standards arrives at the factory within 48 hours of dispatch. After pre-washing and soaking, it is transferred to the liming section. Liming is done under controlled temperatures for a period of 45 to 90 days. After a special deliming process, the treated ossein is now ready for the complex gelatine extraction process. This involves a series of filtration and concentration techniques. Finally the gelatine liquor is chilled in rotators. The gelatine is discharged from the rotators in the form of spaghetti noodles, which are fed onto a continuously moving stainless steel belt dryer.

Now the drying process takes place with the gelatine passing slowly over a distance of 35 metres through eight separate temperature zones, where the temperature is controlled to within plus/minus one degree. The air entering the dryer is conditioned by means of dehumidifiers which have

sampled by the process control laboratory before being finally crushed and blended according to the customer's requirements.

Even in the finished goods warehouse, the gelatine is stored under controlled conditions, so that it remains in excellent condition until it leaves the factory.

Dehumidification and product drying

Many substances requiring drying are temperature-sensitive. Thus, dehumidified air is employed to increase drying rates.

Oven drying using elevated temperatures is unacceptable for drying. Dehumidification forces the product to release its moisture by maintaining the surrounding air at a lower moisture level. The drying potential and, thereby, the drying rate is enhanced. Moreover, the quality of the product is not impaired in any way.

The Bry-Air dehumidifier is the most economical and reliable method of low temperature product drying — a sure prescription for a better product!



Don't let the heat escape!!!

Plant operations consume and often waste substantial amounts of energy. Bry-Air air-to-air heat recovery systems help recover energy from hot waste gas streams.

Waste heat — a valuable source of energy

Industry consumes about 40% of the country's energy; unfortunately, almost 25% of the amount consumed is wasted. A large portion of this waste is discharged from the plant as gases, which range in temperature from less than 100°F to well over 2000°F. These waste gases should be considered as an energy resource by the plant engineer and must be recovered instead of being discarded from the facility.

The value of waste heat recovery

The primary value of waste heat recovery equipment is in the area of economics. Heat recovery equipment reduces the plant's fuel requirements by at least 5% to 20% in most cases.

Secondly, heat recovery systems often cut the expenses for major capital equipment such as boilers or chillers by reducing the size needed.

The Bry-Air heat recovery system

The Bry-Air air-to-air heat recovery system is based on the heat pipe concept.



A heat pipe is fabricated with an internal capillary wick, evacuated and charged with a small amount of special working fluid and permanently sealed. Thermal energy applied to either end causes the working fluid in that area to vaporize. The pressure created by the addition of heat, forces the working fluid vapor towards the opposite end, where energy is removed by the cooler air, causing the vapor to condense into a liquid again. The cycle is completed as condensed liquid flows back to the evaporator to be reused.

The heat pipe based heat exchanger can effectively recover upto 85% of exhausted waste heat and is suitable for temperatures between 50°F and 500°F. However, specially constructed heat pipes are suitable for 800°F to 900°F.

The economics of the Bry-Air system

- Reduces heating fuel consumption
- Can be applied for process to process, process to comfort and comfort to comfort applications
- Payback periods are as low as 12 to 18 months

Additional advantages are that the Bry-Air heat pipe based heat exchangers are compact, operate with low temperature differentials and have no moving parts to malfunction.



Bry-Air Heat Exchangers are suitable for dryers, ovens, furnaces and HVAC exhausts

Energy management Indian Petrochemical saves \$ 10,000 a month

The Indian Petrochemical Corporation Ltd. at Baroda is one of the largest government-owned manufacturers of chemicals and petrochemicals in India. IPCL had two huge dryers which required large quantities of steam to heat the incoming ambient air for process. IPCL desired to reduce the steam load by recycling the thermal energy from outgoing exhaust to incoming cold air.

The conventional type of systems available in the Indian market were studied. However, they were rejected as they were found non-efficient and uneconomical for the temperature range of the exhaust.

Bry-Air solved the problem by using the heat pipe based heat exchanger which can recover upto 85% of the waste heat at low temperature differentials too. A heat pipe heat exchanger was installed at the outlet of the two dryers which would pre-heat the ambient air upto 90°C – 95°C.

The dryer intakes approximately 16,000 cu m/hr and discharges the

same air quantity at 130°C. By incorporating the Bry-Air heat exchanger, the exhaust temperature was brought down to 60°C – 65°C, thereby recycling 260430 kcal/hr. This saving is equivalent to 560 kg of steam. Thus, net saving is Rs. 140/hr or \$ 10,000 a month. Hence the payback period was 3,215 operating hours i.e. 140 days.

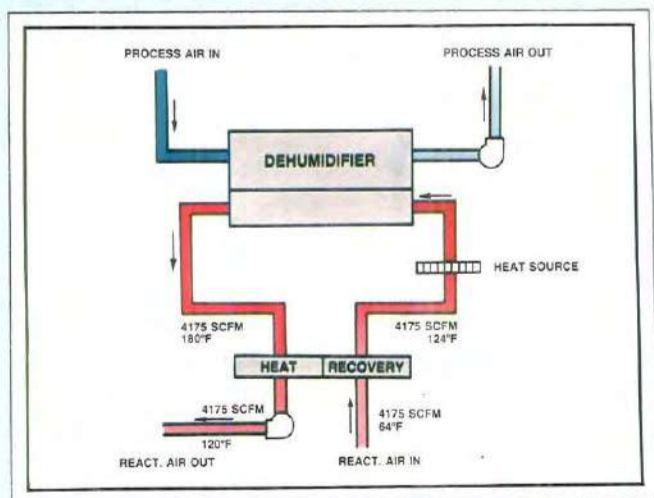
The world's chemical industries are major consumers of energy both as feedstock in forming the basic raw material for the industry's chemical intermediates and products, and in the form of heat and power to drive the processes.

The rise in energy prices has focussed attention on improving energy efficiency to reduce costs.

Techniques of 'energy management' are being integrated into general plant operations.

Effective use of waste heat recovery and its utilization as an energy resource is a step towards efficient energy management.

Waste not ... want not



Waste heat recovery in process application is the most cost effective because the systems operate all year round.

Space and make up air heating produce significantly lower temperatures. Consequently, savings are smaller and the payback periods tend to be much longer.

Waste heat recovery installed with the desiccant dehumidifier gives tremendous savings, cuts energy requirements for heating and reduces the operating costs.

Consider this. A heat recovery unit installed on the desiccant dehumidifier

has 19.7 sq. ft. of face area and seven rows of pipes, each with 14 fins/inch to maximise heat transfer. The heat pipes handle 4175 cfm and exchange 270,000 BTU/hr, pre-heat increases the supply air temperature by 60°F and saves the company \$ 12,650 per year.

Many such systems have been installed with payback periods as short as one year.

Bry-Air heat recovery systems can be retrofitted or pre-installed with the MVB dehumidifier to bring you additional savings year after year.



Mold sweating — a packaged solution



Mold sweating is a real and common-enough problem with the plastic processors.

Production efficiencies and product quality demands that the hot plastic molds be cooled by chilled water to harden the plastic quickly and release the molded parts. Nominal or high ambient humid air coming in contact with the cold molds, leads to condensation or mold sweating, which produces distortion in the molded parts and also leads to rusting and corrosion of the costly equipment.

The traditional method of avoiding the problem is to raise the mold temperature. Unfortunately, this lengthens the cycle, lowers the quality of the components and slows down the production rate.

With the increasing volume of applications that require chilled water cooled molds, the decrease in

production during humid weather was often more than the plant management could tolerate.

The solution to this problem lies in simply lowering the dewpoint surrounding the molds by 5°F to 10°F lower than the temperature of the chilled water in the molds.

Therefore, chilled water temperature can be lowered, improving cycle times which will substantially increase machine productivity.

All this and more is easily possible through the Bry-Air 'Mold Drying Package'. This package includes:

- A MVB dryer,
 - A pre-cooling system, with water-cooled condensing unit, coil and controls,
 - An after-cooling system, with water-cooled condensing unit and coil and controls,
 - Electrical panels and controls.
- All mounted on a common skid.

Along with the package, Bry-Air also design, as per individual need, a plant wide control, a centralized control or individual control systems.

Bry-Air's plant wide desiccant dehumidification often is the most economical approach where multiple machines occupy a large area.

Centralized control may be desirable in situations which do not require plant wide dehumidification because the ratio between the number of machines and total plant area is too small. In this case, dry air is ducted directly to each mold area rather than plant wide. Each mold area is shrouded to control the permeation of the high humid ambient air to the mold area.

Bry-Air also has dehumidification dedicated to a single machine and mold area. The dryer is small enough to be mounted directly above the mold space.

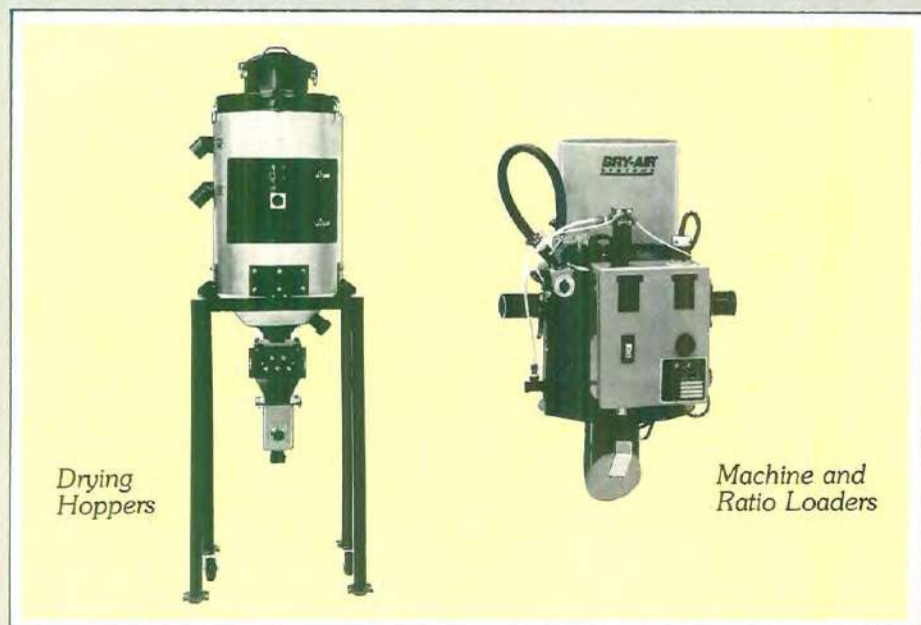
The most important benefit of the single application is that individual

machine dehumidification can be achieved without major capital expense. The individual mold environment can be adjusted or changed to fit specific needs. Additional units can be added as needed.

The Bry-Air mold dehumidification package assures better molded parts, lower rejection rate, increased machine and labour productivity and total cost savings!



Everything Bry-Air makes, makes plastics handling easier



Drying Hoppers

Machine and Ratio Loaders

Drying hoppers

The Bry-Air hopper is an ideal and reliable companion to the Bry-Air plastic dryer. Bry-Air manufactures an extensive line of drying hoppers ranging in size from 10 to 12,500 pounds working capacity. These hoppers are constructed of either aluminium or mild steel or stainless steel and are designed for smooth first

in, first out material flow to ensure proper drying times. Designed and engineered for ease of cleaning and high drying capacity, the hopper gets maximum benefit from its supply of dry air by distributing it evenly through a perforated diffuser cone.

As the wet material does not enter the molding machine, profits go up as production of moisture-related defects

are eliminated.

Standard features on these hoppers include removable air distribution cone, material drain, clean out door and sight glass. Optional features include fibre glass insulation, vacuum take off boxes, drawer magnets and multiple hopper floor stand arrangements for central drying systems.

Bry-Air machine and ratio loaders

In the plastics industry, there are many common problems experienced in the use of loaders. These include clogged filters, blower motors and gasket leaks. Another problem which may occur is when a gaylord bin simply runs out of material. All of these problems interfere with a loader's ability to convey material to the hopper. Typically, operators are surprised when they find that their machine hoppers are unexpectedly out of material.

However, with Bry-Air Systems' Load Star Loaders, an audible alarm sounds off if the material is not conveyed to the hopper. The alarm alerts the operator to the problem so that

corrective action can be taken. The user benefits from greater automation and control over the production process. Worries of downtime due to machine hoppers running dry are eliminated. This unique alarm feature distinguishes the Load Star Loaders from all the others.

The Load Star II Ratio Loader allows the flexibility of varying the ratio of virgin and regrind material delivered to the processing machines.

What sets Bry-Air system apart from the competition? A unique product, of course. Plus the ability to work closely with the customer and meet his specific needs.



Bry-Air — the global advantage ...

The old adage, that 'nothing happens until someone sells something' is still the fundamental law of business.

However, Bry-Air, an international organization, operates on the premise that sales alone are not enough. The foundation upon which the Bry-Air corporate philosophy rests, is that service, before and after sales, is of fundamental importance. It is this philosophy which has been the prime mover in the growth of this dynamic company.

The Bry-Air dehumidification engineering and expertise of today dates back to 1939, when it was developed by the Bryant Air Conditioning Company. Bry-Air, Inc. became a separate entity in 1963. The unique engineering concept which began so successfully in 1939, and the constant upgrading and modification through continuous research and development has successfully satisfied thousands of customers over the years. With the addition of modern state-of-the-art controls and auxiliary equipment, Bry-Air units are today able to satisfy increasingly sophisticated applications.

The constant standard of excellence requires a level of trained personnel capable of looking at the real needs of the customer. The salesman must survey the actual situation and make proper recommendations which will not only take care of the customer's immediate needs but assist in developing the flexibility which will aid them in their future plans.



Bry-Air U.S.A., Delair Holland and Bry-Air India have committed themselves to obtaining and training the best sales/engineering personnel possible for the accomplishment of the above tasks.

The global sales network

Bry-Air U.S.A. services its customers through exclusive territorial representatives. There are 63 active Bry-Air representatives operating in the United States, Canada, Mexico and South America. They introduce the Bry-Air method to customers who need assistance in environmental control situations. Bry-Air plastic drying and conveying systems has 21 representative groups calling on the plastics industry.

Delair Holland also operates through territorial representatives. They have 29 exclusive representatives located in all the European countries, the British Isles, Africa and the Middle East.

Bry-Air India is in direct sales circumstance, through a network of offices and sales personnel in major cities of India. The Far Eastern and most South East Asian countries are covered through representatives.

Service through co-operation

Start up capabilities and after-sales service are not separated from the sale. Bry-Air personnel, world-wide, do not abandon any installation.

If the product manufactured by Delair is in Singapore and needs start up services, Bry-Air India's highly trained and qualified representative in Singapore will perform the task.

The three companies enjoy collectively a good territorial reputation as being problem solvers. Customer satisfaction is the measuring stick of Bry-Air's success. Bry-Air's motto is, 'There will be no orphans in the field'.

Selling strength through training

One of the major strengths of Bry-Air has been in application engineering support. Bry-Air engineers are trained to solve humidity-related problems and they can provide the customer complete support, from designing to installing the appropriate equipment. All new engineers and representatives, even though they may be experts in the field of air-conditioning and refrigeration, are trained by factory engineers in all aspects of dehumidification and heat recovery, to be able to properly apply the correct environmental control equipment.

This, coupled with the total support of the Bry-Air factory network — which draws from over 48 years of environmental control experience — ensures the customer that Bry-Air has a positive solution to his environmental control problems.



International Connections! Prime Minister of India, Mr. Rajiv Gandhi, meets Mr. Paul D. Griesse, President, Bry-Air, Inc., U.S.A., at the Indo-U.S. JBC meet in Washington

... in sales, service and solutions!



Representatives from 16 different European countries and member companies of the Bry-Air group at an International Meet in Holland.

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