

Optimized processing environment

Food safety and cost savings through targeted air management

In times like ours, where budgets are drastically being reduced and requirements for food products constantly on the increase, many company are ready for a change. In-house measures shall ensure improved food safety with simultaneous cost reductions. Often both challenges can be met by simple, but still economical approaches. When looking at the processing environment from the cybernetics point of view, the basic requirements needed for achieving the goals become apparent.

A processing environment that is fit for the product has first priority in food processing and is also the basis for proper production and processing operations. Detrimental conditions arising from an insufficient processing environment are for example high airborne load, risk of smear contamination but also insufficient removal of internal loads (humidity, heat, dust, etc) and the resulting effects such as equipment overheating, unpleasant odor, condensate formation, increased energy consumption and higher refurbishing costs. In order to compile a detailed schedule of measures for a reliable (targeted and precise) and economical (as much as needed, as less as possible) optimization, the reasons for impaired hygiene must be identified during operation. There is hardly another environmental parameter that influences product quality, economical expenditures, well-being and performance of people the way air does. Inadequate room air quality often results in production

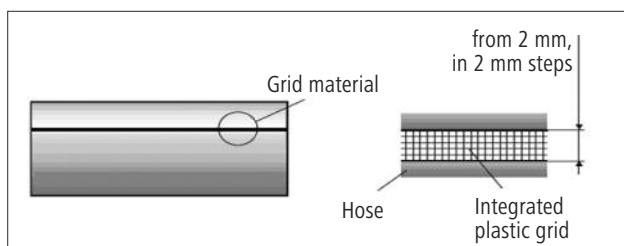


Figure 1: Hose with air slots

losses. If the room air is not suitable for the people who work there, the risk of wrong behavior (opening of windows and doors) as well as of higher product waste due to lack of concentration will increase. Thus the reasons for lacking or unbalanced air management have a detrimental effect on product quality, operating costs, the personnel and last

but not least on the necessary refurbishing work. Apart from the targeted air management, the energy situation (cooling, heating) has become a

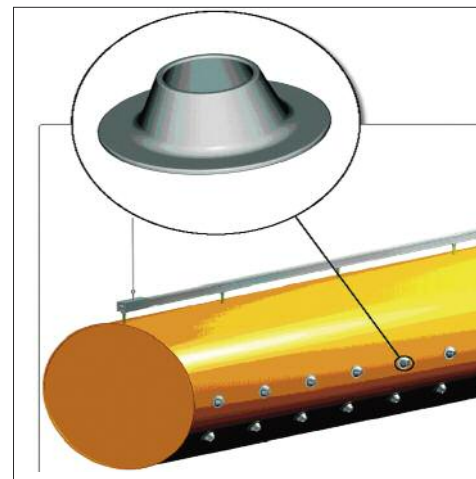


Figure 2: Hose with nozzles

significant cost reduction factor. Hygienically acceptable and conditioned air can be partly reused resulting in potential energy savings in the range of up to 80 per cent. Within the scope of a technical analysis of the working environment conducted by specialized service companies such as Just in Air GmbH, which belongs to the Air Solution Group from Bremen, Germany, comprehensive investigations of airborne count and surface load, monitoring of air temperature and humidity as well as air flow measurements are used to identify and depict hygienically and climatically weak points in the processing environment. The next step is the optimization of such weak points with simple measures. One main component for the improvement is an air management that is adapted to the specific requirements. By means of advanced air conditioning technology, constant climatic conditions

can be achieved (air flow, temperatures, relative humidity, air filter processes) for individual sections. The design has to be adapted to the product and may include all aspects as can be seen from the following example. Via air flow supporting inlet air nozzles in the room as well as via circulation fans, clean, conditioned air is moved over the product. This way the clean air supports the hygienic safeguarding of the production.

Added to that, internal loads are removed as best as possible and undesired interferences (e.g. formation of condensate at thermal bridges) avoided to the largest possible extent. The air volume flows shall be adaptable to the respective operational mode (production/ cleaning) in terms of fresh air and removed air volumes. For permanent flushing of the respective problem areas, the fresh air must be introduced in a way that all areas of the room are embraced in order to prevent air shadows and dead zones as much as possible. The fresh air can be introduced via antibacterial air hoses to prevent air drafts and for improvement of hygiene and air flow. The large air outlet area of the hoses' surfaces ensures a uniform air distribution within the entire room. However, the penetration depth of the air in the room must be taken into consideration to allow to

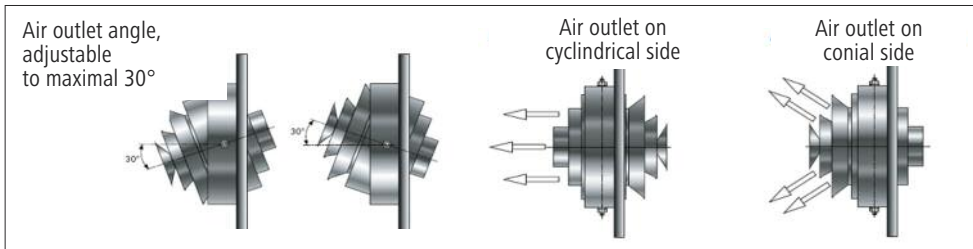


Figure 3: Special air nozzle

spread the air effectively also within the problem zones. For this reason, special hoses with slots (figure 1) or nozzles (figure 2) can be used which allow a targeted air induction. At the same time, the entire hoses may be permeable in a way that a defined low amount of air is discharged circumferentially to prevent the formation of deposits on the hoses' surfaces.

For quick removal of internal loads, the introduction of air can also be performed via special air nozzles (figure 3) or air jet nozzles (figure 4) in order to achieve a sufficient air penetration depth.

Processing areas for (chilled) unpacked products (meat, delicatessen, baked goods, beverages, dairy products) require the highest hygiene level; the fresh air introduced should have the same temperature as the room air. Added to that, circulating air coolers can ensure a constant air temperature.

The thermal requirements for the climatic air conditioning process shall be as much as possible provided by existing plant supply energy devices (brine cooler, cold water

circulation, heat recovery units) and the minimum fresh air volume in the production shall be calculated with some reserve. For additional energy savings, naturally occurring external conditions can be calculated and utilized economically. This way natural resources are included in the plant supply for free.

Hygiene locks are used to prevent hygienically sensitive areas from the uncontrolled inlet of air. The locks are operating with a higher air exchange rate and are equipped with a suction device producing a slight underpressure compared to the adjoining clean room.

Conditioned fresh air is introduced via an air conditioning unit into the chilled rooms; for energy reasons the proportion of recirculating air shall be as high as possible (fresh air proportion about 10% above the exhaust air in order to maintain a certain overpressure). However, this means that the recirculating air must be in a hygienically proper condition. This is achieved by using the active degermination products

provided by Air Solution. Neither unpacked products nor staff working in the area are subjected to any food law or hygienic-toxicological risk. A significant benefit of this process is the fact that the active agent L.O.G. is finally applied to and acting directly at the undesired microorganisms. Contrary to that, a UV-C air degermination process requires to move the microorganism to the

source of irradiation which must not be located freely inside the room. Air degerminated with irradiation will dilute the air in the subsequent areas while the active degermination

technology is effective after application in the entire downstream system (air and surfaces). There are also no air shadow and other physical limitations as with the use of irradiation.

Besides its high effectiveness the synergistically acting L.O.G. can be applied during the production and in the presence of employees. Numerous expert reports and long-term practical application experience prove the harmlessness and compatibility of the product with humans, material and food.

The mobile and compact Pick Up unit (figure 5) is an example for the flexible and feasible use of this degermination technology. This reliable and variable degermination unit is used successfully and safely in storage areas, maturing chambers, packaging, production and chilling rooms (5-200 sqm interior space), in laboratories as well as in ventilation equipment. The food product produced in the treated environmental air will have a high quality and improved hygiene. Due to the very low application quantities, it must not be feared that the

product or the people present in that area will be harmed because the active agent is composed of substances approved for the use in food. There is only a theoretical risk that the active agent might be detected in the food product (for example if not used as intended). In laboratory trials conducted by renowned institutes where fresh minced meat has been fogged massively with the active agent, no residues could be detected in the subsequent analysis. Products produced



Figure 5: Mobile degermination unit Pick Up

and packed in such a modified atmosphere must not be labeled accordingly. In addition to the possible application of the natural degermination agent via cold fogging, L.O.G. can also be sprayed directly onto the surfaces for intermediate disinfection. No subsequent flushing is required. The agent can also be added to process water (rinsing or washing water) e.g. when cleaning vegetables for salads. Basically, with a previously performed environmental analysis followed by an adequate implementation, each company is able to optimize and safeguard its product quality requirements under economical aspects in the long run.

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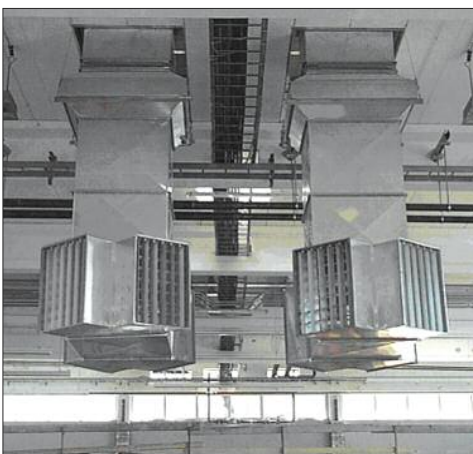


Figure 4: Air ducts