

AIRFLOW DESIGN

When preparing a grow room, the objective is to best recreate the environment that plants prosper in. Though simulating sunlight and supplying nutrients contribute to health and growth, one key aspect that can't be overlooked in the pursuit of a successful yield is the necessity for structural stability.

While outdoor-grown plants naturally experience a constant breeze that strengthens their stems, indoor-grown plants are confined to a limited space. The ideal way to compensate for this is to provide an adequate airflow system, which, when utilized correctly, not only achieves full growth potential, but also acts as a deterrent against mold and pests.



Selecting and installing a general airflow system is simple enough, but without ensuring that the environment it's creating is actually flowing equally and evenly throughout the whole room, the process and outcome are fundamentally flawed.

When insufficiently executed, it can unfortunately result in concentrated hot and cold spots forming, or air stratification, where large air pockets with different core temperatures remain intact in a layering effect. Of course, hot air naturally rises, but if airflow technology is properly implemented, there should not be that degree of variation throughout the space.



To better elaborate, when a room has hot and cold spots, even with the same plant and strain and all lights at the same level of intensity, certain areas grow larger or smaller than others. Obviously, lighting is a major factor, but given the weird effects, the fact that it ranges beyond that is evident.

Additional issues could be the presence of damper regions, or insect infestations in certain areas that are significantly drier.

With these potential issues in mind, it's clear why airflow design is one of the most underrated, underappreciated aspects of grow room planning in most facilities. As such, it's certainly where Excel Air Systems has seen the majority of issues arise, but we have the knowledge, expertise, and products to prevent, counter, or remedy these situations and protect our customers' crops.

PLANTS AREN'T FANS OF INCONSISTENCY

In general, the most important principle for facility operators to adhere to is that of engineering to their specific room requirements. Some facilities have attempted to compensate for the lack of airflow with oscillating wall fans – resulting in a small percentage of healthier plants with strengthened roots in specific areas – but the outcome is always inefficient as a whole, and constant excessive force from fans too close can damage plants. This risk factor reinforces a facility's need for even airflow.



Traditionally, in attempting to achieve even airflow, HVAC technicians would often install multiple registers in a room, which, while not totally ineffective, would still only localize those areas. With the system running, the airflow could be felt strongly in certain spots, but could then be barely noticeable as little as four feet away. In other words, this was not really even. Ideally, the desired effect is to get to a point where the airflow can't be felt at all, since it is everywhere equally in constant complete circulation, because plants are not localized to specific spots.

THE EFFECT OF OBSTRUCTING DUCTING

To determine complete circulation duration, if, hypothetically, a room was 10' x 10' x 10' – 1000 cubic feet – and there was a 1000 CFM (cubic feet per minute) fan, the entire volume of air would circulate every minute. Building on that concept, Excel Air Systems' [Evolution Series](#) units are capable of up to 3400 CFM output, whereas other systems on the market only average 1800-2000 CFM.

Understanding this distinction is imperative, because if someone initially had a traditional system with corresponding ductwork and later decided to upgrade to an Excel Air Systems unit without upgrading the ductwork as well, the ductwork would be significantly undersized, obstructing the intended airflow. With almost twice as much air now going through the ducts, the velocity of the air would greatly increase.

This concept is analogous to the difference between holding a garden hose normally and turning it on full blast, causing it to spray out in a wide column, soaking everything, and holding a finger over it to create back pressure, where the same amount of water then goes through at a higher velocity, shooting it much farther in a localized direction.

DON'T YIELD TO PRESSURE

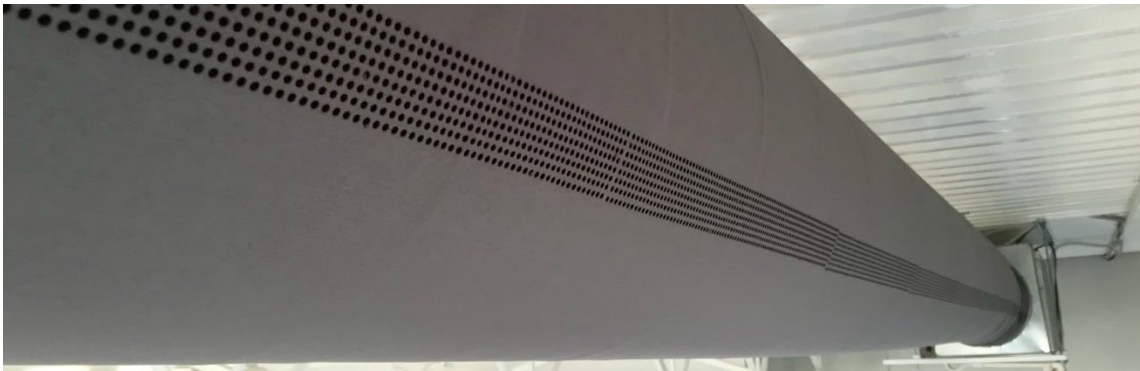
Along the same lines, if someone installs one of our systems without adequate ductwork, there's so much airflow pressure that needs to get through that the system is doing whatever it can to shoot it out.

Excel Air Systems has had customers express that this is the effect that they want, not understanding that, if the system has not been engineered to properly match the ducting, there would be so much back pressure that it would be unable to go through the hole fast enough. In that instance, the fan would become limited, while the lack of airflow could lead to freezing and other damaging issues. For these reasons, we want to ensure that twice the amount of CFM is flowing freely throughout the grow space, to achieve full potential while cutting turnover time in half.

Additionally, while this heavily-pressurized, uneven airflow set-up could potentially produce some impressively large plants in certain areas – a notion that may initially sound desirable to some growers – it would be at a great cost, with many severely underdeveloped plants throughout the rest of the room, so the overall growth would still be much poorer. In contrast, keeping the average airflow per square foot relatively identical ensures consistency, which, from a business standpoint, is ideal.

FABRIC DUCTS ARE EVEN BETTER

Excel Air Systems approaches the airflow design of a room with the mentality of the more evenly, the better. We accomplish this through several methods, the most important of which is the use of our [Fabric Ducts](#) – a phenomenal ductwork solution that is specially engineered for both the volume of air (CFM) and the velocity (measured in feet per minute). Air is evenly distributed along the entire [Fabric Duct](#) – which runs the length of the room – through an equal amount of laser-cut precision air holes on both sides, effectively acting as a sort of curtain and preventing hot and cold spots from forming within the space.



This unique design allows directional dispersion to be dictated at slight angles of 4 o'clock and 8 o'clock. The size of the holes is determined by the desired velocity, while the number of holes is determined by how much airflow is going to be passing through. Then, the design property is directional, based on the idea that we want to throw the air so that it hits about halfway down the wall, then spins back up into the return air. This cycle of completely circulating the entire volume of air is consistently repeated approximately every 1 to 3 minutes, which is critically important, extending to other aspects of facility health.

CLEANSE WITH BENEFITS

Beyond improving air quality through circulation, [Fabric Ducts](#) also offer innumerable other sanitary benefits that increase facility cleanliness. Made from high-quality polyester, they are completely machine-washable, and their permeable composition prevents the build-up of dirt and debris, keeping them relatively clean regardless.



This material also renders the formation of any condensation effectively impossible, mitigating the risk of water droplets landing in the environment. As the presence of moisture leads to mold and mildew forming, which can be catastrophic to the yield, this is an important product feature.

SAVING TIME AND CUTTING COSTS

From a practical standpoint, [Fabric Ducts](#) streamline the installation process by removing the need for stressful structural engineering efforts, which would otherwise be necessary to determine how to support hundreds of pounds of ductwork and equipment.

Due to the innovative design, there is no need to spend hours cutting holes into ducts and installing vents. This saves a considerable amount of time and greatly reduces labor costs. Instead, [Fabric Ducts](#) ship at under 2 lb. per foot, and can be fully set up in minutes with the included aircraft mounting cable – a process requiring very few tools and no expertise.

GROW WITH THE THROW

The entire set-up is also completely customizable, from the length of the aircraft mounting cable to the color of the [Fabric Duct](#) itself, with different throws (the distance that the air can be distributed) being offered. Aside from the traditional sonic flow, smaller, evenly spaced micro-hole options are available if needed, as are other designs.

With a default throw range of approximately 12 feet from either side, [Fabric Ducts](#) can generally run down the middle of a room and cover a 24-foot-wide span, but this width can be extended if necessary.

If, for example, a throw of 20 feet per side was needed, this could be achieved in several ways, such as with a plastic nozzle that extends an inch or so. Designed to generate a much higher velocity of air by putting it through a tight cone, the nozzle builds up air for a longer amount of time, expands it, and then shoots it out. As a result, the air may first propel about ten feet before it really starts to disperse. Due to their more specific applications – as most grow rooms are very dense in general – we employ these custom methods far less frequently, but they remain an option if needed.

MICRO-MESHING AROUND

More commonly, what we often implement for customized set-ups is a material called micro-mesh, a technology widely used in pill production facilities. Micro-mesh utilizes strips of tiny pinholes that circle 180° around half of the duct, enabling the same amount of airflow, but less aggressively, so that air essentially rains down into the room without much velocity.

This finer dispersion is ideal for use in areas where not disturbing the space is critical, such as drying and curing rooms. For example, if there is product drying in multiple racks, getting it to dry evenly (on both the inside and outside) is critical to its quality.

Otherwise, blowing air too hard on the product would over-dry the outside, while trapping moisture on the inside, resulting in mold forming. That unacceptable scenario illustrates the importance of slowly, evenly drying product with micro-mesh over a process of 7 to 10 days, while still ensuring the same number of air turns.

A LEVEL APPROACH



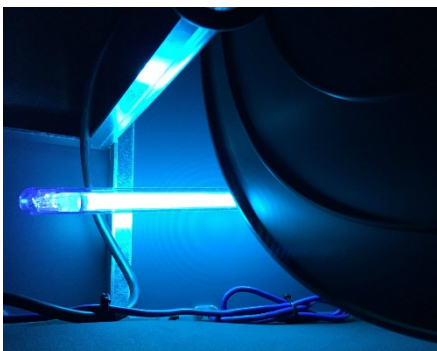
Building on that concept, Excel Air Systems' approach to designing drying rooms involves the recommended placement of vertically layered drying racks on different levels of moveable carts in the middle of the room with a 1- or 2-inch gap around the outside perimeter, in which to set up sonic airflow.

Coming out at 5 o'clock angles, the air flows against the wall first, slightly bouncing off it, but sticking within 1 or 2 feet of it overall. This effect is acting as our chase, much like a duct, allowing the air to flow to each level of the racks.

However, as this still would not otherwise effectively reach the product on the racks at the center of the room to full drying potential, the micro-mesh is utilized to counter that. This way, the airflow from the outside walls is coming in, down the wall, and back towards the center, with the micro-mesh [Fabric Duct](#) causing the air to rain down through the racks and back to the return air.

OVERCOMING IMPURE SPOTS

As an accessory to supplement [Fabric Ducts](#), the Excel Air Systems [UV Air Purifier](#) kills mold, bacteria, and viruses by changing the molecular structure of biological and chemical contaminants through DNA sterilization and photo-oxidation. Since the UV bulb has a kill range of approximately 3 inches in diameter and the air is flowing quickly, there's only a limited amount of time to purify it.



Therefore, the more frequently the air moves past, the less chance that anything is able to replicate in those areas. Most contaminant cells are capable of repopulating in a very short amount of time, but this frequent, rapid airflow circulation effectively prevents that from happening.

Similarly, in terms of filtration, the more times that air is filtered throughout the room, the cleaner the air gets, meaning airflow is also tremendously important for overall air quality and plant health.

IT'S ALL UNDER CONTROL

In addition to all the aforementioned features, there are additional benefits to operational efficiency that come from having these products integrated into a facility.

Implementing even airflow to effectively remove the impact of unwanted variables and contaminants also results in a much more regulated environment in which controlled experiments can take place.

If, for example, one side of a grow room is set up differently from another, with uneven airflow, it's practically impossible to conduct a lighting test or nutrient experiment, as there's no way of knowing to which factors the results are to be attributed.



The only way to properly do this is with [Fabric Ducts](#) in a configuration specific to the system, which will then allow you to test what works based on other locked-in factors, without anything else affecting the scenario.

EVEN THINGS OUT WITH EXCEL AIR SYSTEMS

Altogether, these uniquely-engineered concepts and their resulting benefits are important, as they collectively form a design structure that allows us to implement effective systems for a variety of set-ups in any facility. Excel Air Systems recognizes that different airflows are required for different situations – such as grow rooms, clone rooms, or drying rooms – and we've invested a considerable amount of time developing superior solutions to thoroughly adapt to the intricacies of these applications. There is no adequate cookie-cutter approach, which is why we closely collaborate with facility operators to understand what they're trying to achieve, to engineer a scalable solution accordingly.

A facility could have the world's most precisely advanced air tunnel, but if it entails a multi-month installation process, it's not an efficient, repeatable option, and therefore, not a good choice. In contrast, what Excel Air Systems offers can be deployed quickly and easily, thereby removing some of the headaches, reducing engineering requirements, and saving time and budget. Then, pertaining to airflow, the fan and ducting system are specifically designed for use together for optimal performance.

As we've established, the more even airflow, the better, and we can ensure continual air exchange every 1 to 3 minutes, 24 hours a day. Through that, we can easily leverage air filtration, air quality, and UV purification, while significantly reducing smell, resulting in a cleaner work environment. Therefore, attaining even airflow through Excel Air Systems' [Fabric Ducts](#), in conjunction with the [Evolution Series](#) and [UV Air Purifier](#), is an essential component to the propagation of a bountiful yield, and a cornerstone of achieving total environmental control.

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 LIVE CHAT



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