IMPROVED DUST COLLECTION IN INDUSTRIAL ENVIRONMENTS

An adequate dust collection system is vital to any chemical, pharmaceutical or food industry facility. It helps to keep employees healthy and processes safe. A suitable dust collection system is a crucial tool for Operator Exposure, Safety, Energy Reduction and Emission regulations like the Directive 2010/75/EU.

By anticipating the required emission limits to your operators and the environment, JOA offers tailor-made, highly effective dust and vapor extraction systems capable of meeting even the most strenuous of emission requirements.

WE INNOVATE AIR

IMPORTANCE OF EFFECTIVE DUST EXTRACTION

WHAT MAKES A GOOD SYSTEM GREAT? WHICH DESIGN CONSIDERATIONS PLAY A PART IN ITS EFFECTIVENESS AND EFFICIENCY? AND WHAT CAN BE DONE TO OPTIMIZE ENERGY CONSUMPTION WHILE MINIMIZING RISKS AND OPERATOR EXPOSURE?

MAIN CHALLENGES FOR INDUSTRIAL ENVIRONMENTS:

- Healthy work environment
- Operator safety
- Energy efficiency
- Legislation and emission limits
- Improving economics

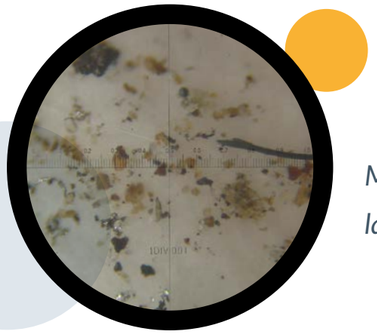
An effective filtration system is the backbone of a reliable and sustainable production process. Therefore, it's of critical importance to choose the right system. In this whitepaper we will guide you through all possible elements to improve your dust collection.

DESIGN CONSIDERATIONS

PARTICLE CHARACTERISTICS

The size, composition and behavior of the particles dictate the required extraction method and filter media.

Particle properties can differ widely between the FMCG, Chemical or Pharmaceuticals industries. This means the system needs to be engineered in such a way that the extracted dust is transported through the ducting towards the filter with optimal extraction velocities and that dust is not able to settle in the piping. Over extraction should be prevented by balancing the system and by applying product recovery hoods. This can pose a challenge as the system is required to move the dust through the extraction system while simultaneously ensuring that the extracted product does not settle or build up in the pipeline.



Microscopic image during laboratory testing.

"THE OPERATOR INTERVIEWS AND SITE MEASUREMENTS GIVE US THE RIGHT DATA AND CONTEXT TO MODEL AND DESIGN TAILOR-MADE BALANCED SOLUTIONS."

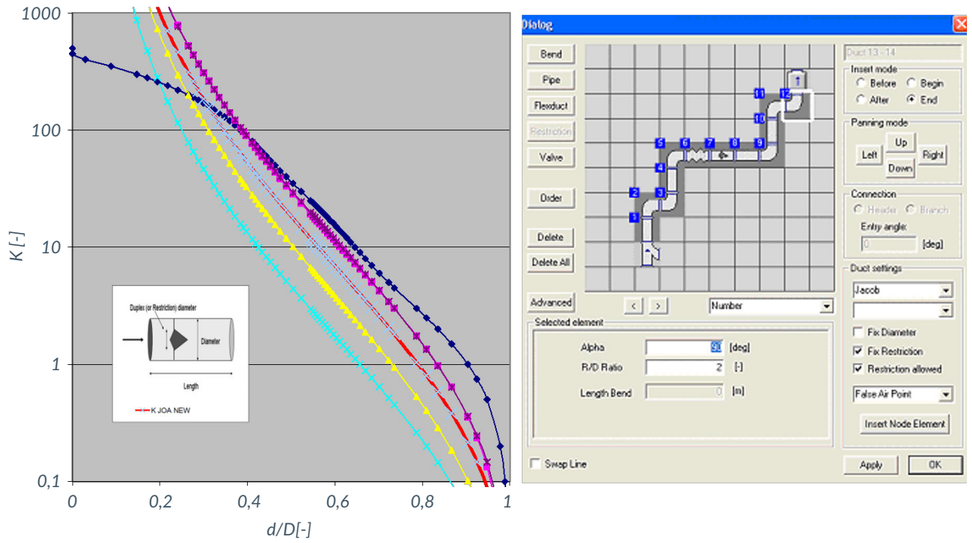
- René Bosscher, Sr. Consultant

AIR TECHNICAL MODELING

FAN AND PIPING

REDUCING MAINTENANCE COSTS AND DOWNTIME

The fan and the system's piping are often mentioned together, and with good reason. Most importantly, pipe diameters should be selected so that extraction velocities to the filter equipment remain constant and balanced at all times which prevents settling of extracted dust and reduces downtime and maintenance.

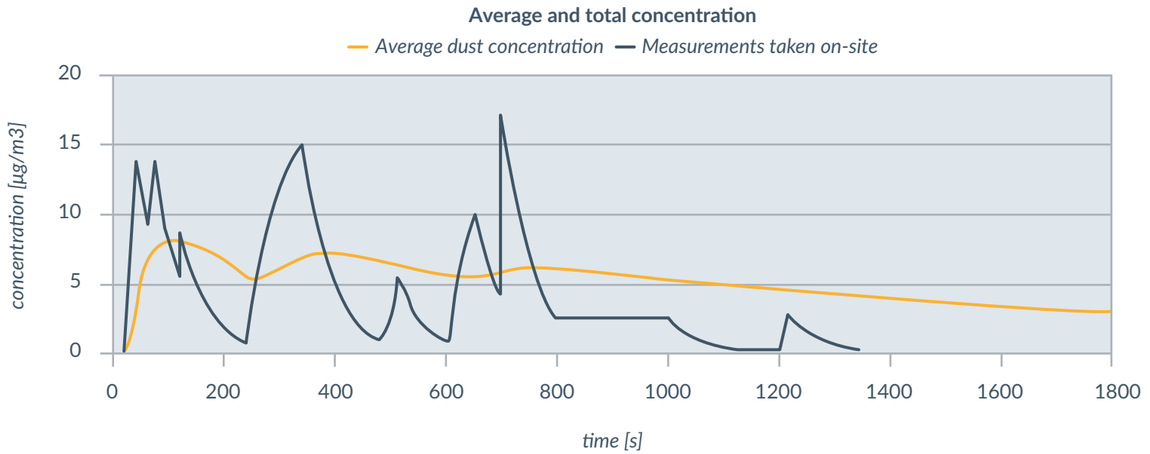


In-house developed Air Technical Modeling software.

EXTRACTION HOOD DESIGN

THE HOOD DESIGN IS BASED ON THE FOLLOWING CRITERIA:

1. Hood type selection (open hood, slotted hood, etc.)
2. Air flow modeling & calculations
3. Extraction capacity required
4. Product recovery required
5. Pressureless extraction required



Depending on the emitting dust volume, the required extraction capacity is determined and the extraction hood is designed. As there are many different applications, there is also a high variety of hoods designs available. The efficiency of a dedusting system does not only depend on sufficient extraction capacity, but also on well designed extraction hoods. These hoods are essential for capturing the dust emitted from the process and prevent over-extraction of valuable product.

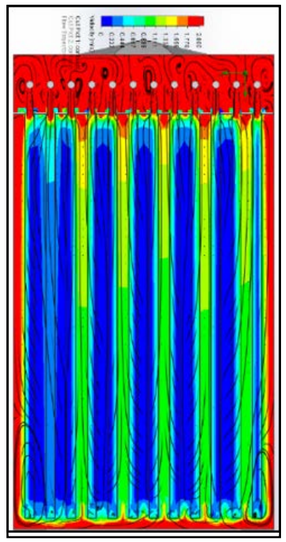
Every hood in a JOA system is specially designed and constructed for optimal performance. Analyzing the data from over 1000 JOA built systems confirms 97% to 98,5% capture efficiency. For most products, this exceeds the required values to ensure a MAC compliant working area. JOA has patented designs to build on and is able to create new designs tailored for your specific requirements.

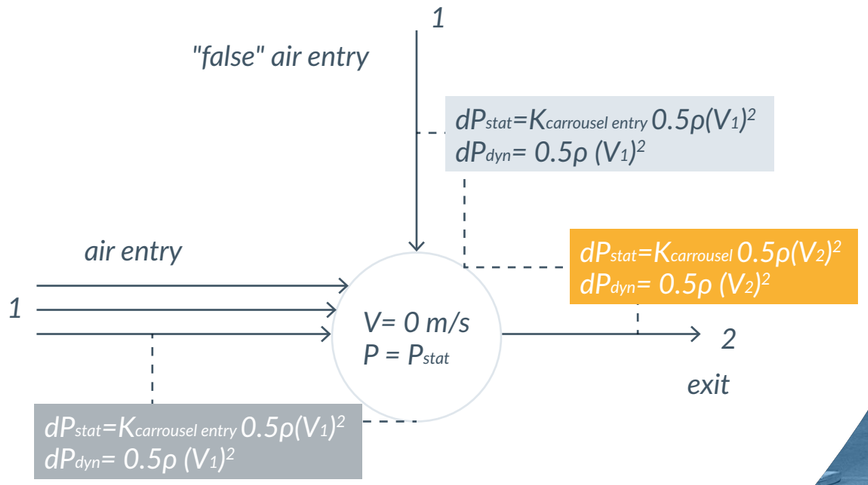
FILTER SYSTEM SELECTION

FILTER SYSTEM

Taking all variables in to account, we consider the following selection criteria:

- Extraction circumstances such as humidity and temperature
- Type of Dust Particles extracted (sticky or dry)
- Specifications of the extraction system
- Required maximum emission level
- Particle sizes





V0-Crit Calculation determining optimal extraction velocity.

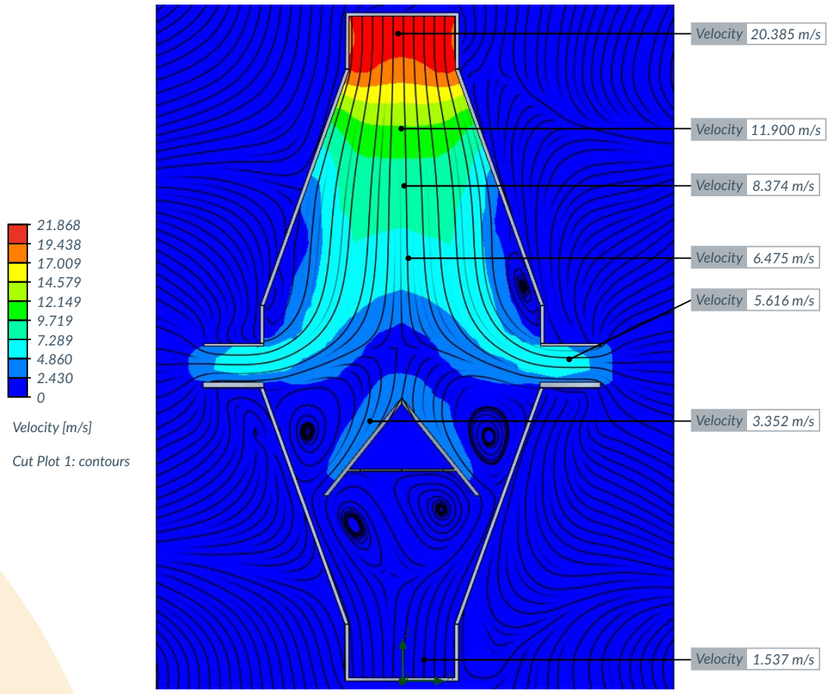
ADVANTAGES OF A HIGH-END DUST EXTRACTION SYSTEM

THE HEALTH AND SAFETY OF YOUR FACILITY WORKERS ARE EVEN MORE IMPORTANT AS THE PRODUCTION PROCESS ITSELF. THERE ARE MANY OTHER ADVANTAGES TO USING A HIGH-END DUST EXTRACTION SYSTEM:

- Ensuring the facility and its processes meet health and safety demands
- Doing it better; JOA systems surpass current regulations. This makes your facility ready for the future, especially when more strenuous emission limits are anticipated.
- Guaranteed extraction capacity at all extraction points by balancing technology
- Optimized energy consumption
- A key component in sustainable production
- Improved economics

REDUCING MAINTENANCE

Balancing of an extraction system is often done by manual butterfly valves. However as we see these valves often used, they are polluting quickly. Also, the performance will decrease and in some cases, settled dust in piping could be explosion hazardous.



Side view Airspeed

Instead of manual valves, JOA systems use internal fixed restrictors that balance extraction capacities. This provides a “maintenance free” extraction system that is balanced without the need for iterative adjustment.

The required fan capacity and total pressure is calculated based on:

- Required total extraction capacity
- Minimal extraction velocities
- Required duct length and routing

Fan selection

Using an under sized fan will result in insufficient extraction velocities and an unbalanced extraction system. Using an oversized fan could lead to higher purchase costs, unnecessary energy consumption and overextraction of valuable product.

ON-DEMAND EXTRACTION

JOA CARROUSEL

THE INTELLIGENT HEART AND BRAIN OF THE SYSTEM

A continuous dust extraction system is not always a good choice. Sometimes it is more efficient when extraction is only available when required. For these mostly batch produced processes, the JOA Carrousel is the right solution.

The JOA Carrousel creates optimal on-demand extraction, only when this is required. JOA Carrousels integrate all piping branches into a single central point (the Carrousel). Depending on the demand, one or more carrousel valves open providing only extraction when required and maintains optimum extraction velocities at all times.

"WITH OUR SMART, STABLE, ADAPTIVE AND ENERGY EFFICIENT SYSTEMS, WE ARE ABLE TO OUTPERFORM STANDARD SOLUTIONS"

- Sarfraz Ghani, Chief Engineer E&I / Automation

This design approach allows for the installation of smaller filters and fans as compared to continuous extraction systems. Due to scalability, the extracted capacities are reduced to minimum levels which result in savings from reduced energy costs, as well as savings in CAPEX and OPEX.

The JOA Carrousel is provided with automation and a control cabinet, putting you in the driver's seat of your extraction system.

IMPLEMENTING THE JOA DUST EXTRACTION SYSTEM

Every JOA dust extraction system is tailor-made and engineered to meet the specific dust extraction challenges faced at your production facility. That is why the implementation of all JOA systems is done in five phases:

CONSULTANCY

Every case is different and requires a thorough prior analysis. We cooperate with your team of process owners, production specialists and operators, and gather as much information as possible to fully understand your unique system requirements.

MODELING

By combining 3D engineering with integrated GCM Air Technical Modeling we can guarantee efficient project execution for both greenfield projects and upgrades in running plants. This ensures system performance from the start. We can precisely predict the performance of the new system, which prevents unpleasant surprises and learning on the job.

ENGINEERING

By interactively engineering solutions based on your specific requirements, we ensure the long-term reliability of the newbuild and updated Exhaust Air Treatment installations. We provide adequate preventive maintenance advice and advise on how to handle process and equipment changes adequately.

REALIZATION

Upon customer approval, JOA implements the system as designed. All our projects are carried out by dedicated project managers with multi-disciplinary backgrounds. Their experience will guide your production facility through the implementation and ensures the project is delivered on time. Depending on the location, we can cooperate with local content manufacturers and installation partners, or bring in our own.

SERVICE

After project completion, we will stay in touch and offer you the best service possible. We provide spare parts and tailor-made preventive maintenance advice to realize long-term reliability of your exhaust air treatment installations and feeding systems.

CONTACT US TODAY

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GET IN TOUCH

and make an appointment with one of our specialists to discuss your dust extraction challenges.

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ABOUT JOA

JOA Air Solutions provides tailor-made, turnkey and guaranteed improvements to all your Dust, Vapor and Aerosol challenges. With JOA you will reduce downtime, improve OPEX and become more safe & sustainable. By effectively predicting your required specifications in advance, we implement reliable 1st time right Industrial Filtration Systems.

As Compliance, Safety and Energy Efficient Production is growing in importance every day, you need the peace of mind provided by an expert in air technology with an inhouse multi-disciplinary team of knowledgeable engineers. At JOA, we love to solve complex challenges where we combine smart filtration techniques with environmental and economic benefits.

www.joaairsolutions.com

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