



**WE ARE MAKING  
SAFE SPACES  
TO BREATHE!**

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## EVERYONE HAS THE RIGHT TO A SAFE AND HEALTHY ENVIRONMENT.

Everyone has the right to a safe and healthy environment. However, as industries continue to develop, the accessibility to clean and safe breathing air is often compromised. Employers are now seeking proven pollution control technology to ensure clean and safe breathing air to their employees.

We are living in the Era of Industry 4.0. Artificial intelligence and automation are reducing the number of available jobs as they are becoming more robotic, and thus reducing dangerous mechanical work environments for humans. However, despite these facts, these industries are still releasing toxic air emissions and air is still unsafe to breathe because of pollution. This pollution can cause detrimental issues to one's health including concerns such as heart ailments, lung disease, asthma attacks, cancer, and shortened lives.

ALLSWELL Co., Ltd. is committed to fulfilling its mission of "making SAFE SPACES to breathe and to continue saving people's health and life!". ALLSWELL is the first professional company to specialize in Industrial Air Technology (IAT) in Korea, and has state of the art IAT in the Industrial Ventilation and Process Air Technology field.

ALLSWELL has been supplying equipment to major companies of steel and automobiles in the early days of its business and the company has been recognized for its technological prowess. ALLSWELL will be growing into the best company in the days of Industry 4.0 by continuously researching and developing IAT. By doing so, ALLSWELL will remain focused on our commitment to people and their quality of air.

Yours sincerely,  
Chief Executive Officer  
James Younsoo Kang





## VISION & MISSION

### ALLSWELL's core value is 'PEOPLE'

We make safe spaces where PEOPLE can work and live!  
To make our vision and mission come true,  
we are researching and  
developing our technology continuously.  
ALLSWELL is a company specializing in IAT  
(Industrial Air Technology)

ALLSWELL makes safe spaces to breathe and  
keeps saving people's health and life!



The first mover to the worlds leader of IAT  
(Industrial Air Technology)!

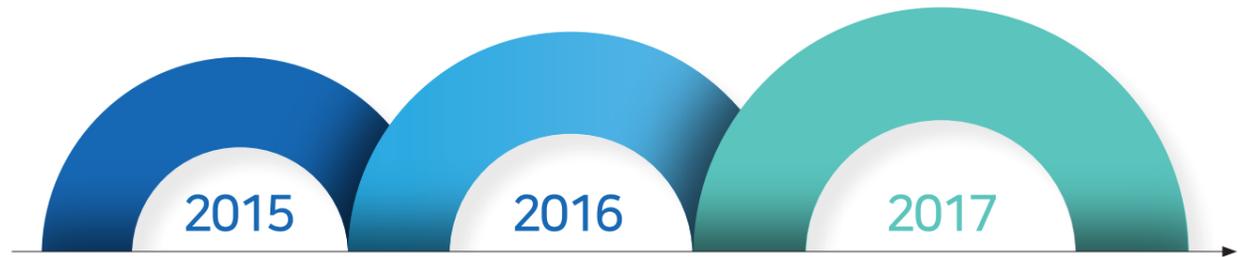




# A GREAT COMPANY THAT KEEPS CONTRIBUTING TO THE PUBLIC!

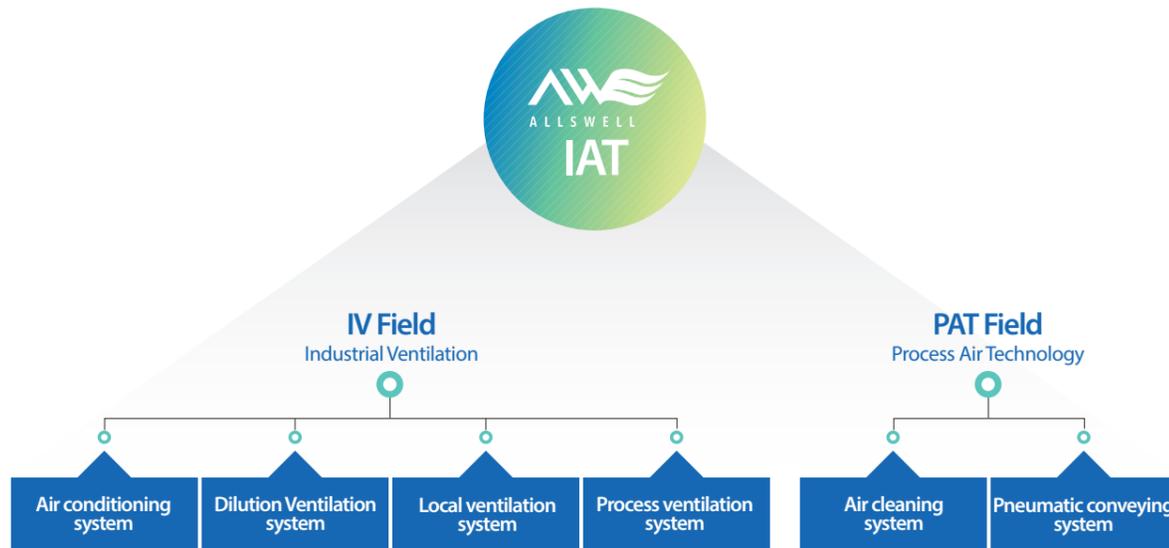


# THE FIRST MOVER TO THE WORLDS LEADER OF IAT(INDUSTRIAL AIR TECHNOLOGY)!



- |   |   |  |
|---|---|--|
| <ul style="list-style-type: none"> <li>05. Established ALLSWELL Co., Ltd.</li> <li>06. Selected as a supporting enterprise by government Technical MOU with Korea Polytechnic University</li> <li>07. Approved supplier of 'DONGBU INCHEON STEEL'</li> <li>08. Voting member of ACGIH (American Conference of Governmental Industrial Hygienists)</li> <li>09. Approved supplier of 'DONGBU STEEL'</li> <li>11. Business agreements with 'HYUNDAI STEEL'</li> </ul> | <ul style="list-style-type: none"> <li>02. Approved supplier of 'VOLVO CONSTRUCTION EQUIPMENT KOREA'</li> <li>03. Approved supplier of 'RENAULT SAMSUNG MOTORS'</li> <li>08. Established R&amp;D Center</li> <li>10. Registered as a supplier to the governmental procurement service Business partnership agreements with Global Buhmwoo Certification of ISO 9001/14001, OHSAS 18001</li> <li>11. Certified as a venture company by government</li> </ul> | <ul style="list-style-type: none"> <li>02. Winner of the grand prize for Korea Startup Innovation Festival Superstar-V Contest</li> <li>05. Selected as government export voucher project -China Highway</li> <li>06. Selected as Government Performance Assured(G-PASS) Enterprise</li> <li>07. Solely appointed as a contributing enterprise of ventilation system for TCM process of 'Baoshan Iron&amp;Steel CO., Ltd.' in China</li> <li>08. Solely appointed as a contributing enterprise of ventilation system for SPM process of 'Zhangjiagang Yangtse River Cold-rolling Co., Ltd.' in China</li> <li>10. Selected as the 1st 'Kibo Venture CAMP(Competitiveness Accelerating Management Program)'</li> </ul> <p>Selected as participating enterprise of 'China Investment Promotion Roadshow'</p> |
|---|---|--|

## THE FIRST IAT COMPANY IN KOREA



IAT (Industrial Air Technology) is a generic term for air flow control technology that manages gas emissions in the workplace on industrial sites

### IV (INDUSTRIAL VENTILATION) FIELD

- Air Conditioning System that creates comfortable working space by proper temperature and humidity control.
- Dilution Ventilation System that manages the concentration of gas emissions throughout the workspace within safety standards.
- Local Ventilation System that prevents the emission from the emission point to the entire work space.
- Process Ventilation System that improves productivity and defect rate by eliminating by-products and emissions from the production process.

### PAT (PROCESS AIR TECHNOLOGY) FIELD

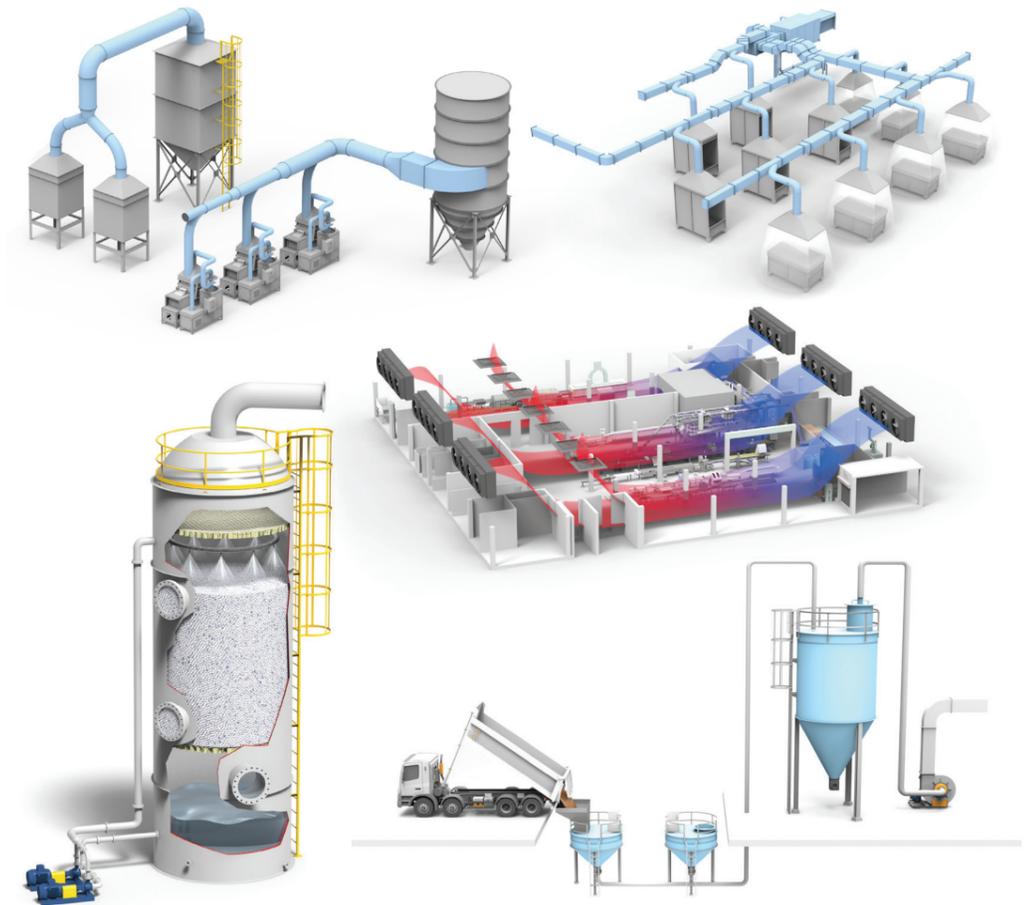
- Air Cleaning System that removes contaminants from the air exhausted from the ventilation system.
- Pneumatic Conveying System that transports powdered products, semi-finished products and raw materials through air flow.

ALLSWELL has state-of-the-art technology and engineering capability based on two (2) fields and six (6) systems of IAT above, which can build the workspace most suitable for the various and complicated requirements of the industrial field with a single or two or more complex systems.

ALLSWELL minimizes the damage and the risks that occur in the industrial field and strives to improve all the spaces where people are working safely and comfortably through the continuous development and research of IAT.

### Features of ALLSWELL's IAT (Industrial Air Technology)

1. In order to minimize the errors of existing empirical and arithmetic methods associated with setting the controlled zone for the air flow in the work space, ALLSWELL applies the three-dimensional and mathematical modeling method of advanced European countries.
2. ALLSWELL constructs a system that reflects the characteristics of the total space and gas emissions (temperature, concentration, humidity, density, etc.) to create the workspace and production conditions most suitable for people and products.
3. Facilitates a comprehensive process from the production and installation of the exhaust hood, air conveying line, air cleaning devices as well as performing the entire workspace from the emission point to the end of the pipe.
4. By applying engineering, mathematical, and physical methods that are cost, space and time effective, the client can optimize its energy efficient system to minimize installation and operating costs.
5. We can provide an 'A to Z Solution' for air flow control.

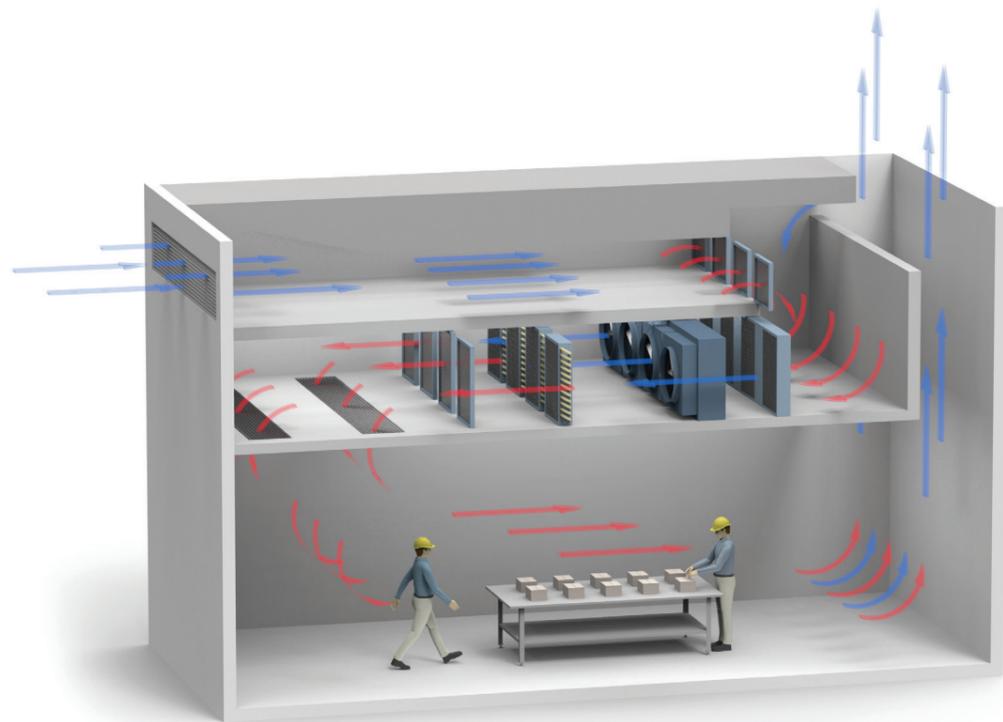
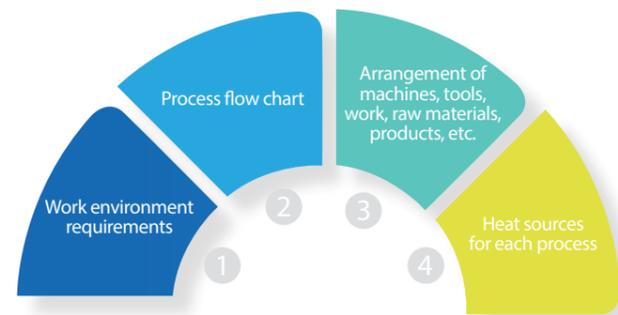


## AIR CONDITIONING SYSTEM

### What is an air conditioning system?

An Air Conditioning System provides a pleasant environment for people to maintain a suitable temperature and humidity based on heat and fluid dynamics. ALLSWELL measures the heat and humidity generated inside the room to determine the most comfortable temperature and humidity levels, and considers the amount of heat and radiant heat from the air flow when designing the Air Conditioning System.

**MAIN CONSIDERATIONS FOR ALLSWELL AIR CONDITIONING SYSTEM ARE:**



### Differentiation of ALLSWELL's Air Conditioning System

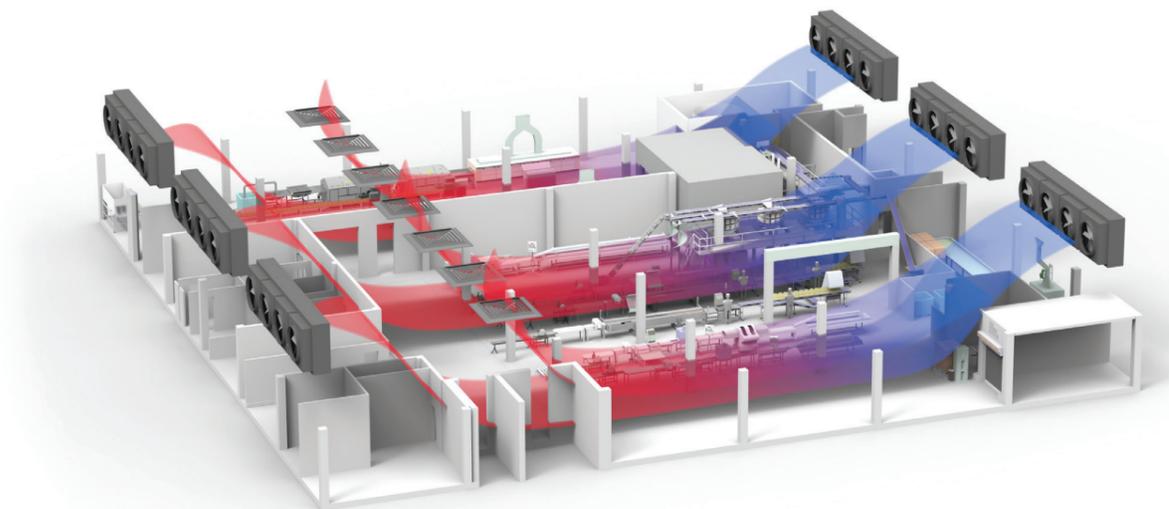
ALLSWELL minimizes initial installation and operating costs and creates the best system configuration for the client's workspace.

**ALLSWELL TAKES THE CLIENT'S OPINION FIRST AND REFLECTS THE DESIGN THROUGH THE FOLLOWING PROCESS:**



Based on these design differences, **ALLSWELL provides a range of temperatures and humidity operating techniques**, ensuring a pleasant workspace.

1. Heat flow due to air flow from the production process
2. Vapor and moisture emissions from the production process
3. Heat and moisture flow from the outside of the production process



## DILUTION VENTILATION SYSTEM

### What is a dilution ventilation system?

A Dilution Ventilation System simultaneously implements the supply and exhaust in the work space, thereby reducing the concentration of gas emissions in the space within a level that is not harmful to people. ALLSWELL's Dilution Ventilation System delivers clean air into the work area where various gas emissions (fire, explosive dust, odors or hazardous vapors, gases, dust, etc.) are generated, creating a level of harmless concentration.

\* ALLSWELL applies to TWA (Time Weighted Average concentration) of TLV (Threshold Limit Values) in ACGIH (American Conference of Governmental Industrial Hygienist).

### ALLSWELL'S DILUTION VENTILATION SYSTEM IS SUITABLE FOR THE FOLLOWING WORK AREAS:



ALLSWELL's Dilution Ventilation System comprehensively takes into account the engineering design, the specifications of the air transfer pipeline and the location of the air nozzles, and calculates the optimum air capacity. In addition, according to the characteristic of the gas discharge, the appropriate position of the supply/exhaust hood is selected, and sufficient air is supplied to the work space to dilute the concentration of the gas discharge.

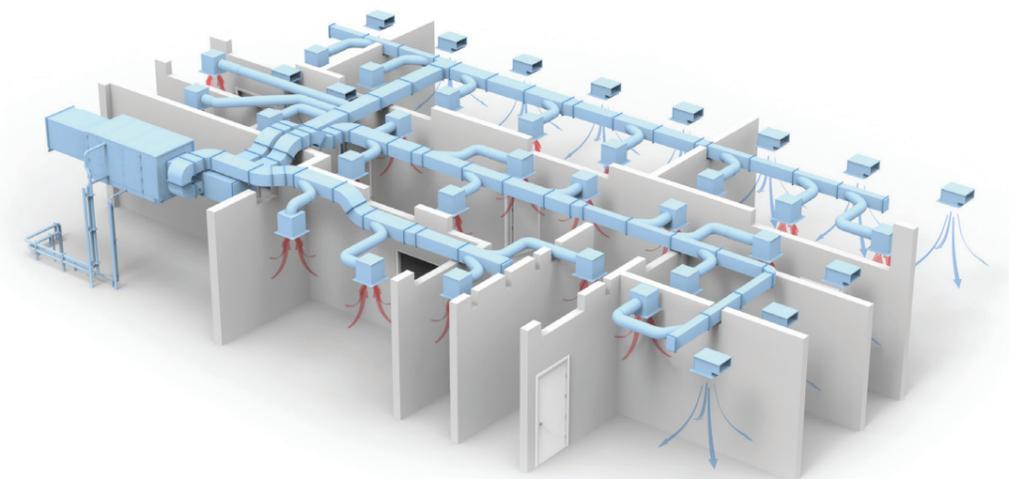
ALLSWELL creates the safest workspace based on the best cost-effectiveness.

### HOW TO MAKE AN IDEAL WORKING SPACE THROUGH THE AIR SUPPLY AND EXHAUST.

	Piston	Stratification	Zoning	Mixing
<b>Description</b>	To create unidirectional air flow field over the room area by supply air	To support flow field created by density difference by replacing the air flow out from the room area with supply air	To control air conditioner with in selected zone in the room by the supply air and allow stratification of heat and contaminants in the other room areas	To provide uniform conditions throughout the ventilated space
<b>Heat, humidity, and contaminant distribution</b>				
<b>Main Characteristics</b>	Room air flow pattern controlled by low momentum unidirectional supply airflow, strong enough to overcome disturbances	Room air flow patterns controlled mainly by buoyancy; supply air distribution with low momentum	Room air flow patterns controlled partly by supply and partly by buoyancy	Room air flow patterns controlled typically by high momentum supply airflow
<b>Ideal contaminant and heat removal efficiency</b>	∞ ←-----→ 1			
<b>Typical application (example of a general room air distribution method)</b>				

<Ref> INDUSTRIAL VENTILATION Design guidebook, ACADEMIC PRESS, 2001

\* x-axis: °C, mg/m<sup>3</sup>, g/kg; y-axis: room dim(e.g., height); SU=supply, EX=exhaust



## LOCAL VENTILATION SYSTEM

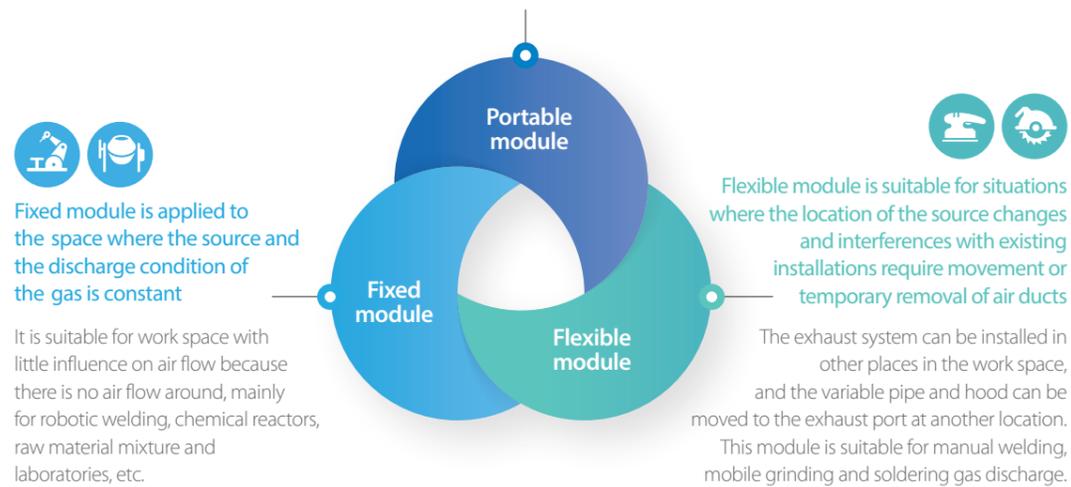
### What is a local ventilation system?

Local Ventilation System prevents emissions from entering the work space by creating areas for collection and removal of pollutants from which emissions are generated.

**ALLSWELL'S LOCAL VENTILATION SYSTEM HAS THREE MODULES: FIXED, FLEXIBLE, AND PORTABLE.**

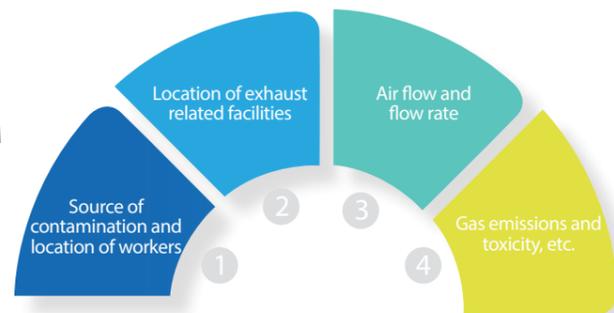
Portable module can be moved almost anywhere in the work space due to the production status of the field because the fan and exhaust port are mobile.

It is composed of the movable frame and the wheel. This module is only available with a small specification (max. 25 CMM) and is suitable for small workspace or low emissions of pollutants.



ALLSWELL'S Local Ventilation System combines a single module or multiple modules to account for the various variables in each work space.

**ALLSWELL'S LOCAL VENTILATION SYSTEM HAS THE FOLLOWING MAIN CONSIDERATIONS.**

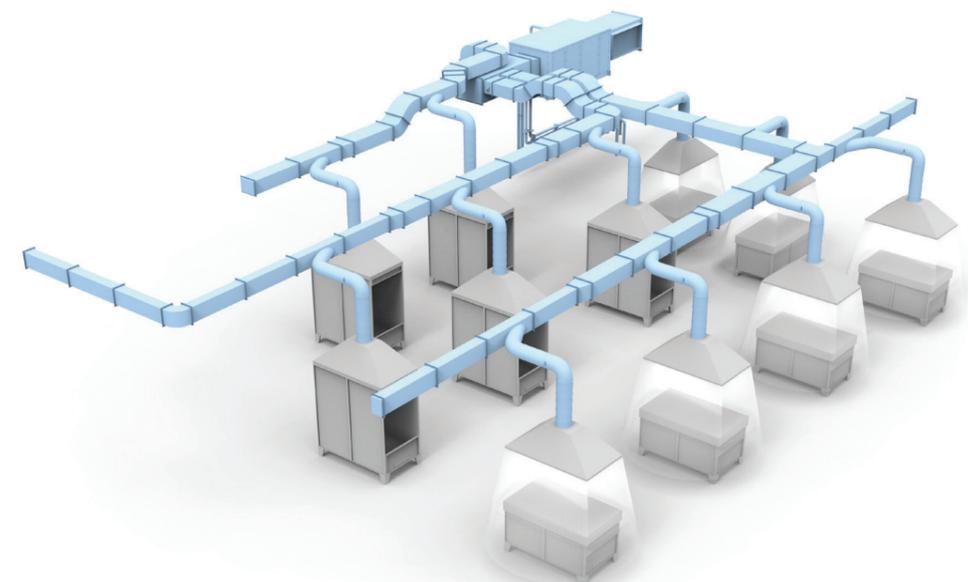


### Design Process

Design Process for ALLSWELL'S Local Ventilation System includes:



ALLSWELL'S Local Ventilation System aims to improve the productivity by making sure that the work space is not contaminated and that the worker is in a safe breathing environment.





## PROCESS VENTILATION SYSTEM

### What is a process ventilation system?

Process Ventilation System prevents the deterioration of the productivity due to the emissions or by-products generated in the production process, the contamination of the products and the generation of defective products.

ALLSWELL's Process Ventilation System encompasses a system suitable for the physical and chemical properties of emissions from most production processes and removes various forms of dust, oil, fumes, and steam through the flow of air, as well as delivering the right solution even when the product is affected by foreign contaminants.

This System allows for optimum design for the client's process speed as well as the nature of the gas emissions, which is especially effective for continuous processes.

### THE DESIGN CHARACTERISTICS OF ALLSWELL'S PROCESS VENTILATION SYSTEM ARE:



The required air volume is calculated

The required air volume is calculated by reflecting the characteristics of the raw materials and the generated emissions of the products used in the work space.

Even if the same raw materials are used, the amount of emissions generated depending on the environment, such as the temperature of the raw material, is changed. Therefore, the most suitable air capacity is calculated by reflecting the working environment and characteristics.

### DESIGN CHARACTERISTICS



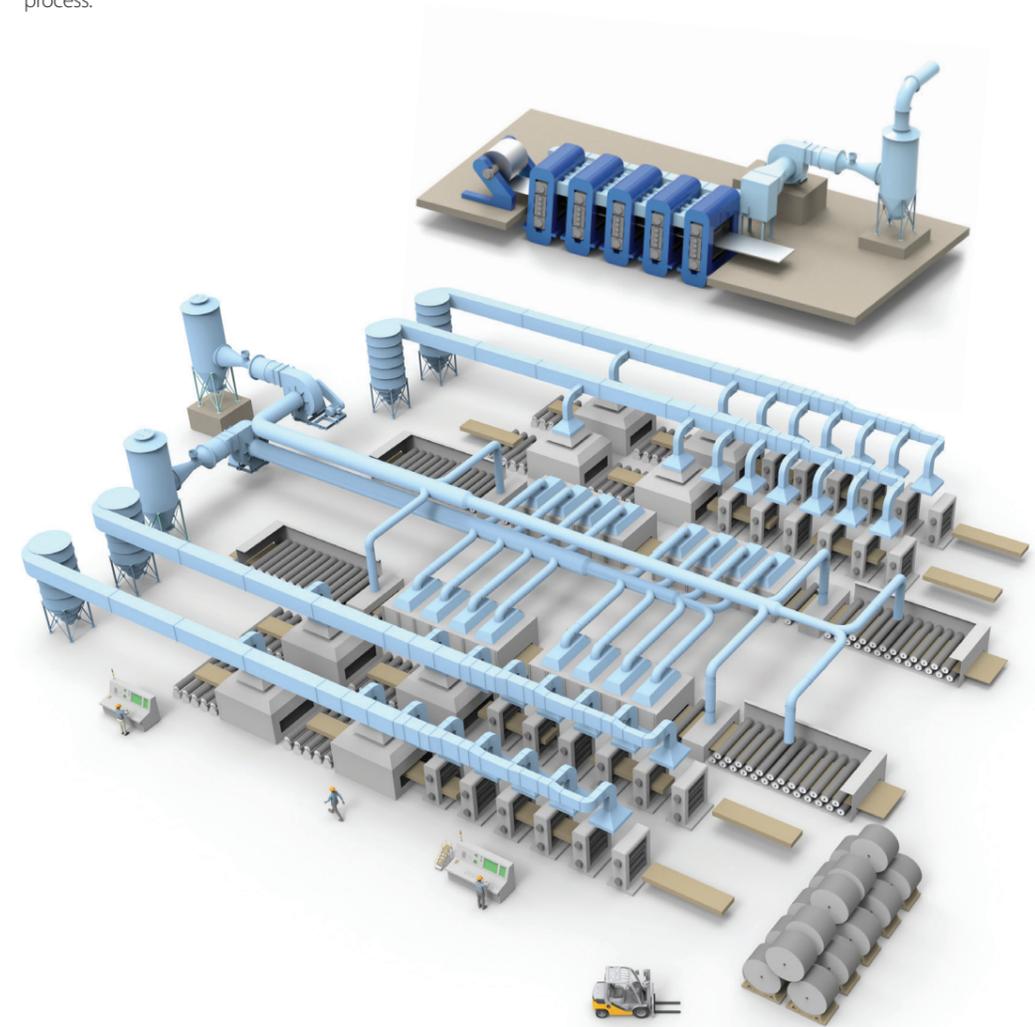
Design a ventilation system

ALLSWELL designs the hood position to collect the exhaust properly, the length and the direction of the air conveyance line, and ALLSWELL designs a ventilation system that can be transferred completely to the processing device, not just for the purpose of collection.

ALLSWELL applies state-of-the-art design techniques to improve reject rates and improve productivity of gaseous emissions from the process. This is the latest technology used in the advanced countries of the Americas and Europe, which reduces operating costs by increasing the efficiency of heat and cooling energy in the production process.

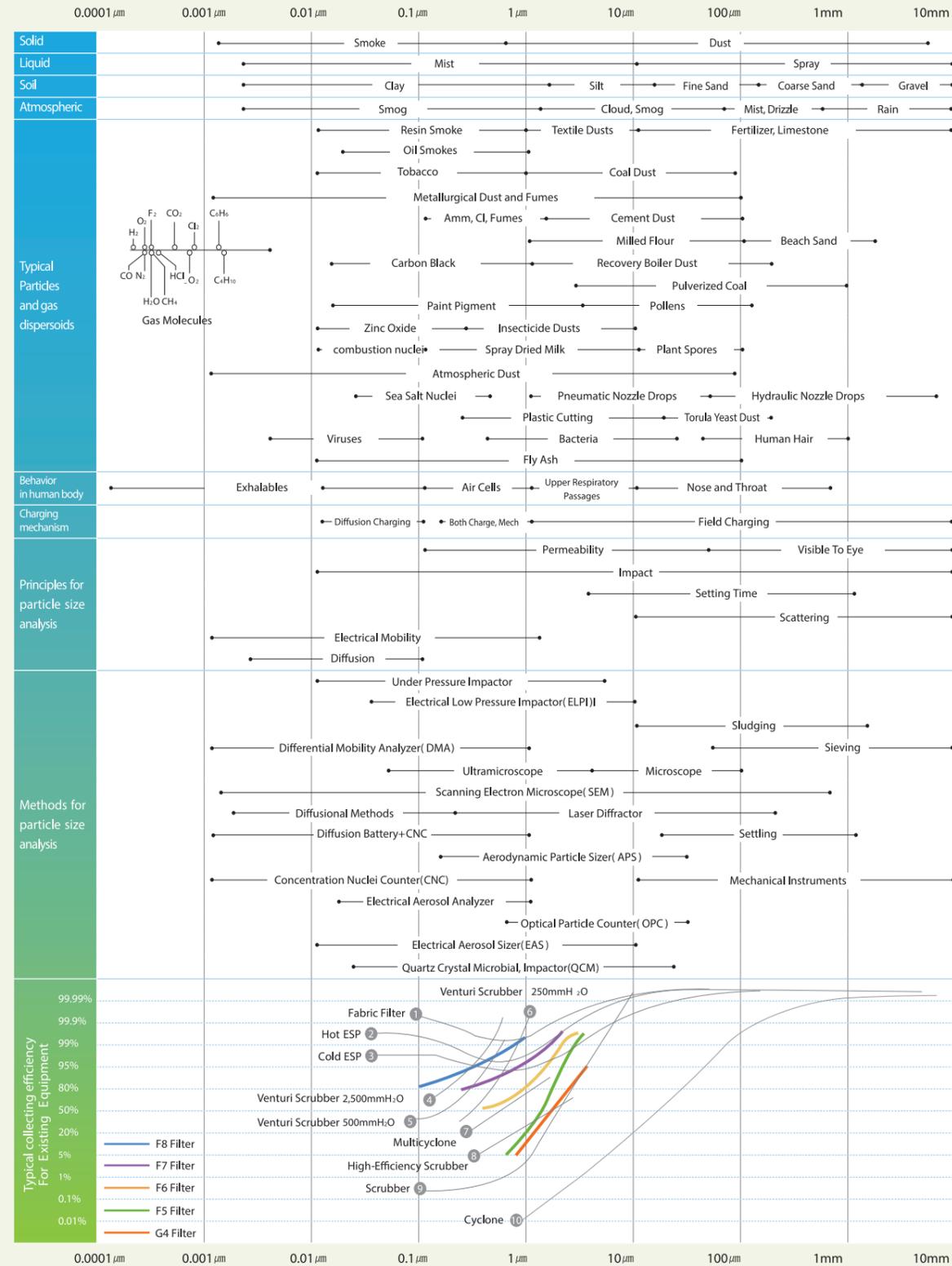
ALLSWELL can apply special Stainless Steel materials or engineered wear-resistant steel in places where corrosion or wear is a concern, and corrosion resistance can be improved through separate treatment in pipelines or equipment.

ALLSWELL's Process Ventilation System is the core system of its Industrial Air Technology(IAT), which can contribute to a client productivity and product quality by applying the state-of-the-art IAT technique to manage the entire production process.





The physical and chemical nature of particles, From molecular level to 10 mm size



Dust Size F7 Filter, F8 Filter : 0.3 μm ~ 1.0 μm F5 Filter, F6 Filter : 1.0 μm ~ 3.0 μm G4 Filter : 3.0 μm ~ 10.0 μm

<Ref> INDUSTRIAL VENTILATION Design guidebook, ACADEMIC PRESS, 2001

## AIR CLEANING SYSTEM

### What is an air cleaning system?

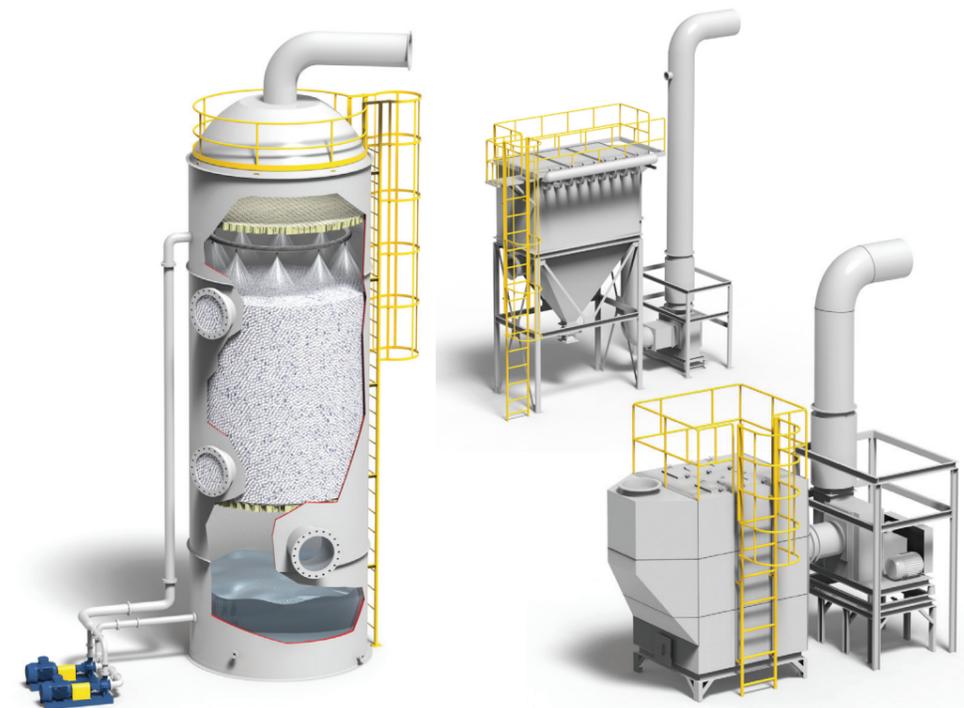
An Air Cleaning System removes contaminants from the air exhausted from the ventilation system and discharges clean air to the atmosphere.

ALLSWELL's Air Cleaning System removes various types of contaminants in the air that is emitted before polluted air is discharged, according to the Air Quality Conservation Act and accepted standards. The nature of the contaminants is diverse and complex, but ALLSWELL implements simple, economical and efficient technologies.

Particle size-specific air purification technology is already common within the industry, and ALLSWELL reflects more variables and characteristics that must be considered in the design process. The table on the left shows the physicochemical properties of the particles ranging from the molecular level up to 10 mm in size, and classifies them into chemical, physical, and human impacts. In addition, the table also shows the air purifiers suitable for the particle size.

ALLSWELL's design techniques for Air Cleaning Systems are based on mathematical techniques (numerical analysis, differential equations, etc.) based on a variety of engineering (thermal and fluid dynamics) theories to best suit your requirements. To minimize errors in system design, ALLSWELL utilizes **MATLAB®** to ensure that expensive Air Cleaning Systems do not incur any additional costs due to excess or insufficient capacity.

ALLSWELL offers the most complete systems and services to save you valuable time and money. In particular, the Air Cleaning System can remove fine dust without filters as a result of ALLSWELL's unique technology.



## FILTER-LESS FINE DUST ELIMINATION SYSTEM(FLES)

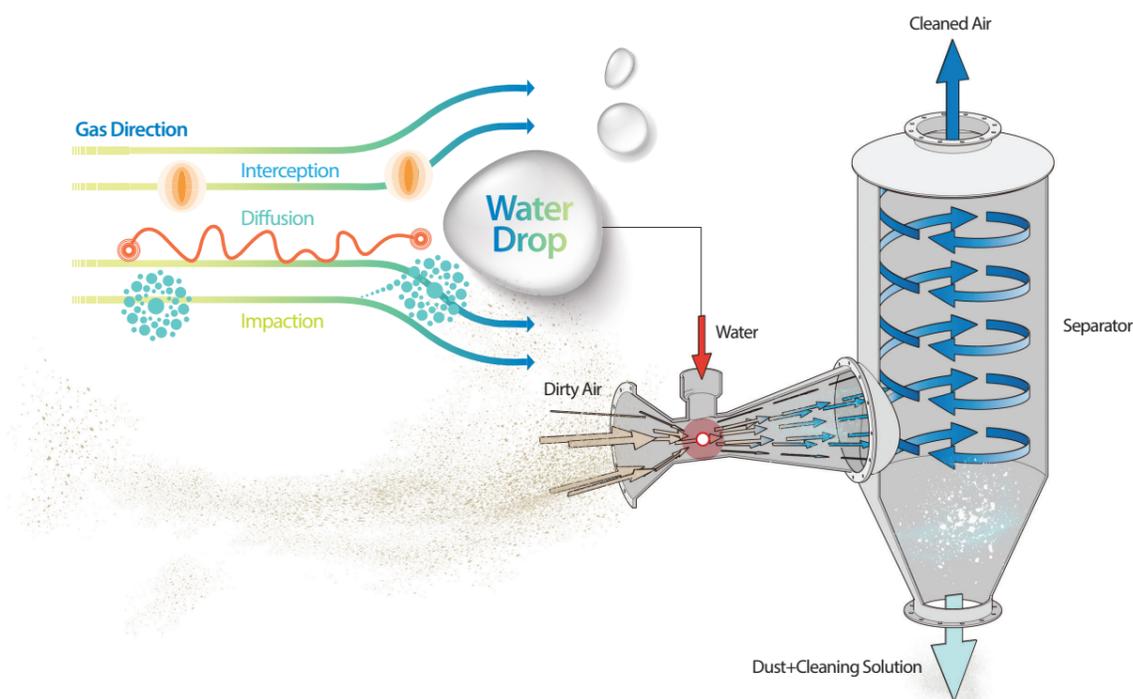
### What is a filter-less fine dust elimination system?

As the severity of fine dust is grows, the feeling of rejection of chemical substances such as filters and disinfectants is increasing. The filter type has the disadvantage that the fine dust is released without being removed at the beginning of operation or when the dust layer is shaken, and the function is deteriorated when the dust accumulates. However, due to the limitations of current technology, more than 90% of the countries adopt the filter method. ALLSWELL fundamentally solves this problem through a system that removes fine dust without filters (FLES).

ALLSWELL has a unique technology that can remove up to 99% of ultrafine dust without filters, and protects people's health and life by spreading these systems. The system is divided into wet and dry. The wet system uses pure water with no chemicals added to remove dust, minimizing user anxiety about chemicals. The dry system has solved the problem of wastewater that can occur when using water to remove dust by applying physical principles.

Especially if you are experiencing problems with metal, gas or viscous materials sticking to the filter, ALLSWELL 's FLES will help you. The FLES is also particularly efficient in applications where high temperature gases can not be processed and high temperature process filters are not available.

### WET TYPE FILTER-LESS FINE DUST ELIMINATION SYSTEM(W-FLES)



In ALLSWELL's W-FLES, the Venturi Effect\*, which increases the speed of the air, including dust, increases the weight of dust and water droplets combined. Droplets, including dust, are separated from the air in the separator and only clean air is discharged.

\* Venturi Effect : As the pipe size narrows, the air flow rate increases.

Amount of water required for 99% removal of PM2.5 (L/min)	Gas velocity in venturi throat(m/s)					
	50	60	70	80	90	
Gas flow rate(m <sup>3</sup> /min)	50	94	83	75	70	66
	100	188	165	150	139	131
	150	282	247	225	209	197
	200	376	330	300	278	263
	250	470	412	375	348	328
	300	563	495	450	418	394
	350	660	577	525	487	460
	400	756	659	600	557	525
	450	846	744	674	626	590
	500	942	828	749	696	660

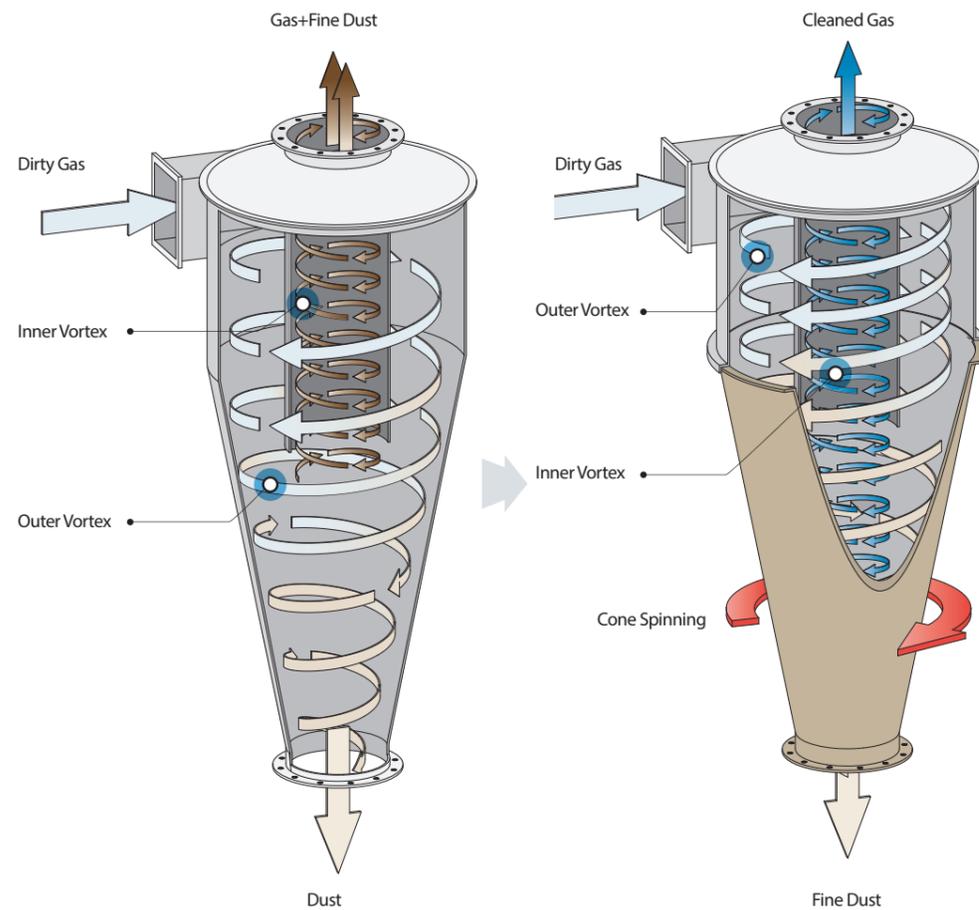
Amount of water required for 99% removal of PM2.5 (L/min)	Gas velocity in venturi throat(m/s)					
	50	60	70	80	90	
Gas flow rate(m <sup>3</sup> /min)	50	67	64	62	59	57
	100	134	127	122	118	114
	150	200	191	183	177	171
	200	266	254	243	235	228
	250	332	317	304	294	285
	300	399	380	363	353	342
	350	465	443	426	411	398
	400	531	506	486	470	455
	450	598	570	547	528	512
	500	666	636	612	587	569



W-FLES application for the world's first steel production facility

## FILTER-LESS FINE DUST ELIMINATION SYSTEM(FLES)

### DRY TYPE FILTER-LESS FINE DUST ELIMINATION SYSTEM(D-FLES)



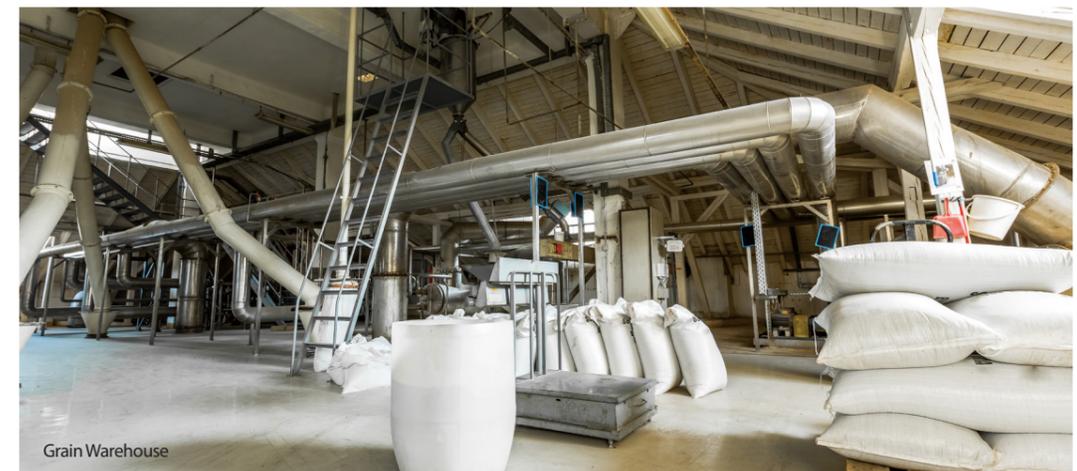
ALLSWELL's D-FLES is a system that greatly enhances the ability to remove fine dust, which is the apex of conventional cyclone dust removal systems.

Vortex occurs when air containing dust enters the cyclone, and centrifugal force acts on the dust due to vortex. Thus, the dust is gathered downward by gravity and friction force from the wall of the cone barrel.

Conventional cyclone has difficulty to remove fine dust less than 10µm, but ALLSWELL's D-FLES is a unique system which makes it possible to remove fine dust by improving the centrifugal force through the rotation of the conical cylinder.

ALLSWELL's D-FLES has the advantage of minimizing maintenance due to its simple structure. It can also remove ultrafine dust using only filterless centrifugal technology. D-FLES is an efficient and economical system to reduce air pollution caused by fine dust.

### MAJOR APPLICATIONS



## PNEUMATIC CONVEYING SYSTEM

### What is a pneumatic conveying system?

Pneumatic Conveying System is a system that mass-transfers or injects almost all kinds of materials(cereals, cement, coal, etc.) using the air flow from one or more input sources to one or more destinations.

ALLSWELL's Pneumatic Conveying System is a very practical and economical system for transferring material over other types of mechanical transfer systems(belt conveyor, screw conveyor, vibration type, etc.). It has the following three characteristics.

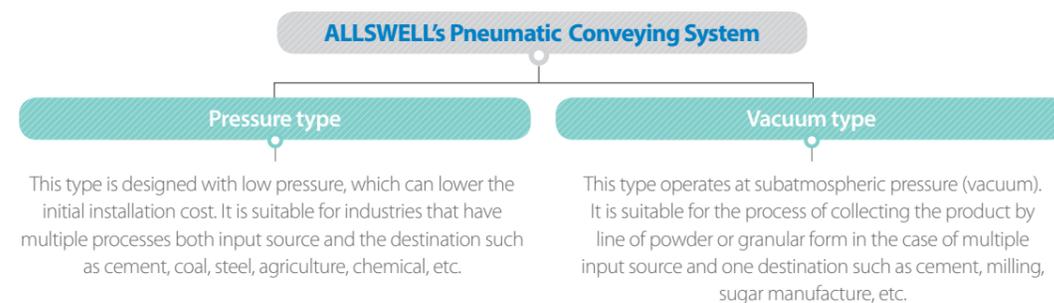


There are three types of material transfer using Pneumatic Conveying System : dilute phase transfer, dense phase transfer and air-film transfer.

ALLSWELL's Pneumatic Conveying System can be used for a wide range of densities from 16 to 3,200 kg/m<sup>3</sup> from fine powder to granules, and the applicable particle size can be up to 50mm in diameter within the allowable density range.

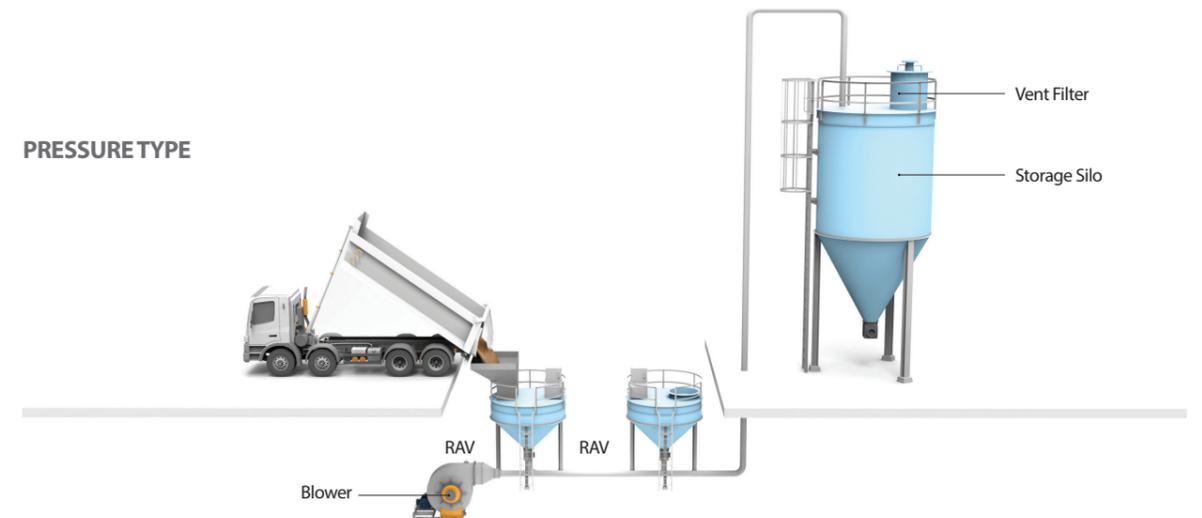
ALLSWELL professionally designs the Dilution Phase Conveying System. Dilution Phase Conveying System is a transfer system that pushes or pulls the target material from the input source to the destination by keeping the air velocity in the transfer pipe sufficiently. This is suitable for transporting large quantities of material a short distance. It is applied to continuous processes with high velocity, low pressure and small amount of material to transfer various materials at the same time.

ALLSWELL's Dilute Phase Conveying System is designed in two types, pressure and vacuum.

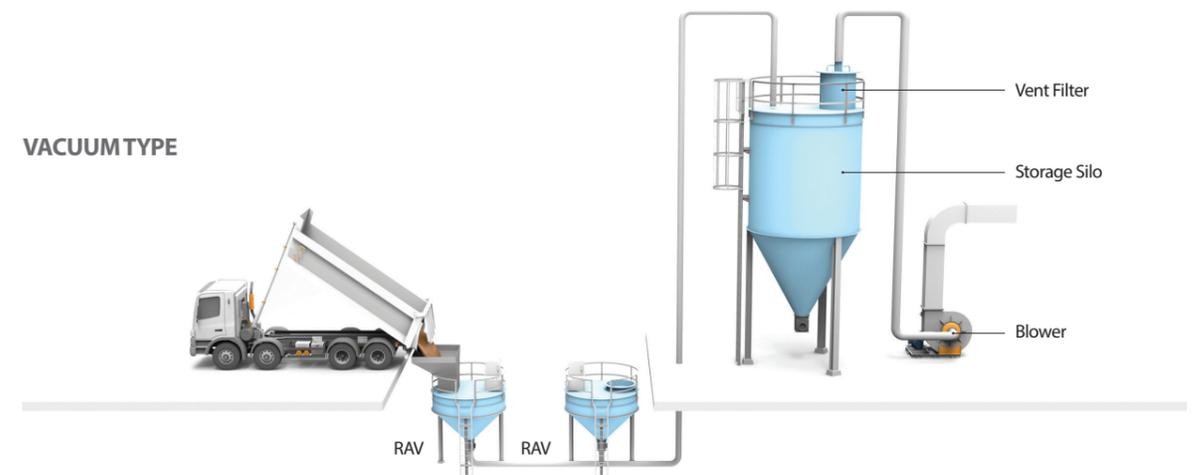


Kinds	Dilute Phase		Note (Dense Phase)
	Pressure type	Vacuum type	
Transfer rate	Less than 1~50 ton/hr	Less than 10 ton/hr	More than 100 ton/hr
Transfer velocity	975~2,438 m/min	917 ~ 2,438 m/min	61~610 m/min
Transfer distance	More than 183m	More than 91.5 m	More than 3,048m
Pneumatic conveying device	Reciprocating piston blower, or Fan		Compressor (screw, rotary, reciprocating)
Operating pressure	2 atm	Vacuum degree 50%	9.5 atm
Air and transport material ratio(Air/Material)	More than 2.0		Less than 0.2

### PRESSURE TYPE



### VACUUM TYPE





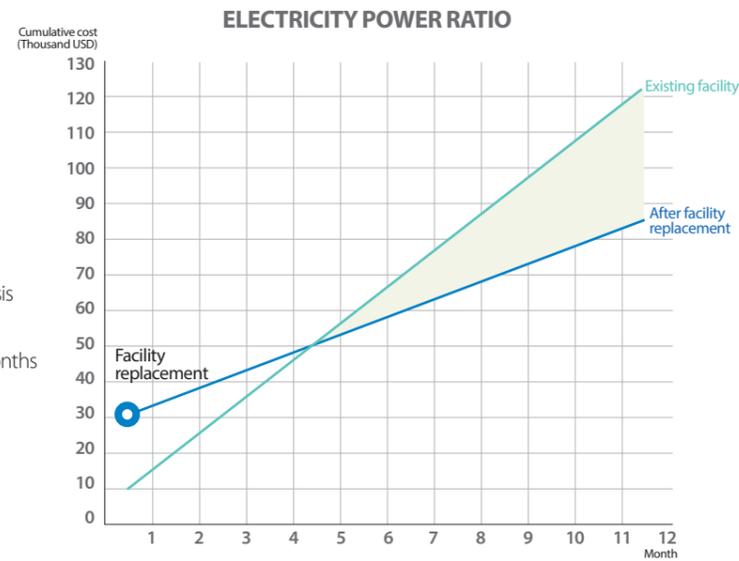
## FACTORY OPTIMIZATION BASED ON ALLSWELL IAT

### FACTORY OPTIMIZATION BASED ON ALLSWELL IAT

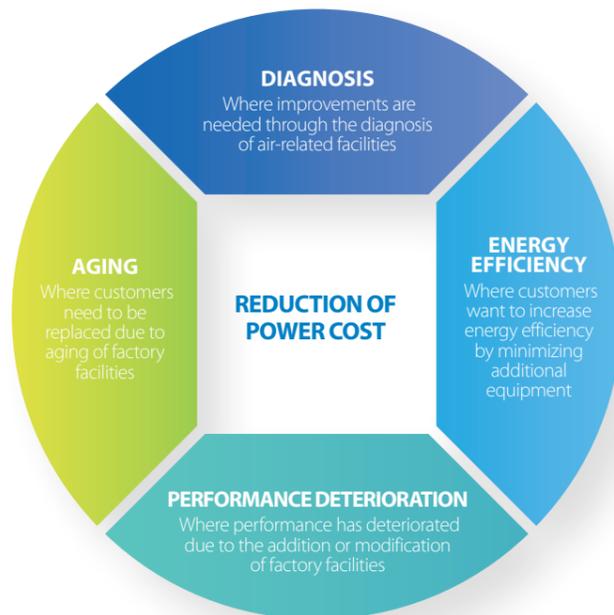
Diagnoses and improves existing ventilation systems based on Industrial Air Technology(IAT). Reduces power costs by quantitatively analyzing air flow, redesigning ducts and blowers, and improving efficiency.

#### ELECTRICITY COST REDUCTION TREND BEFORE AND AFTER IMPROVEMENT

Reduction of Power Cost through Diagnosis based on IAT technology  
 → Return on investment(ROI) within 6 months

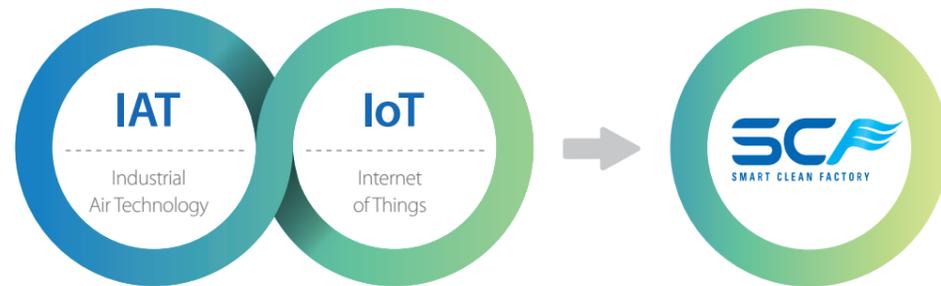


#### COVERAGE OF FACTORY OPTIMIZATION

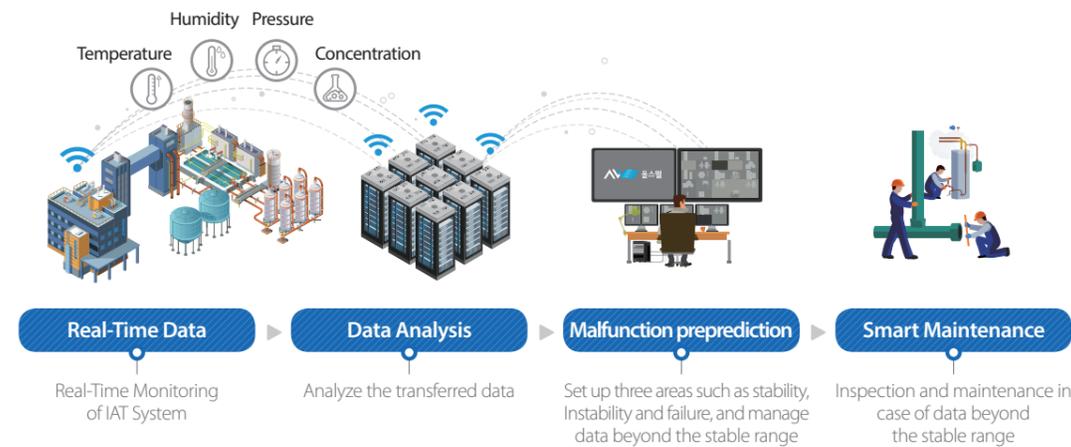




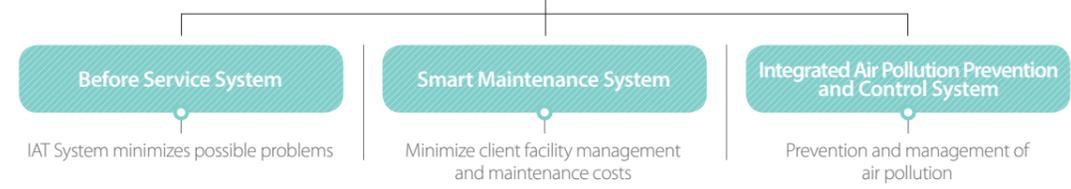
Smart Clean Factory is ALLSWELL's total management system that recognizes system abnormalities in advance and prevents problems in the workspace or process of the client by combining IAT (Industrial Air Technology) with IoT (Internet of Things).



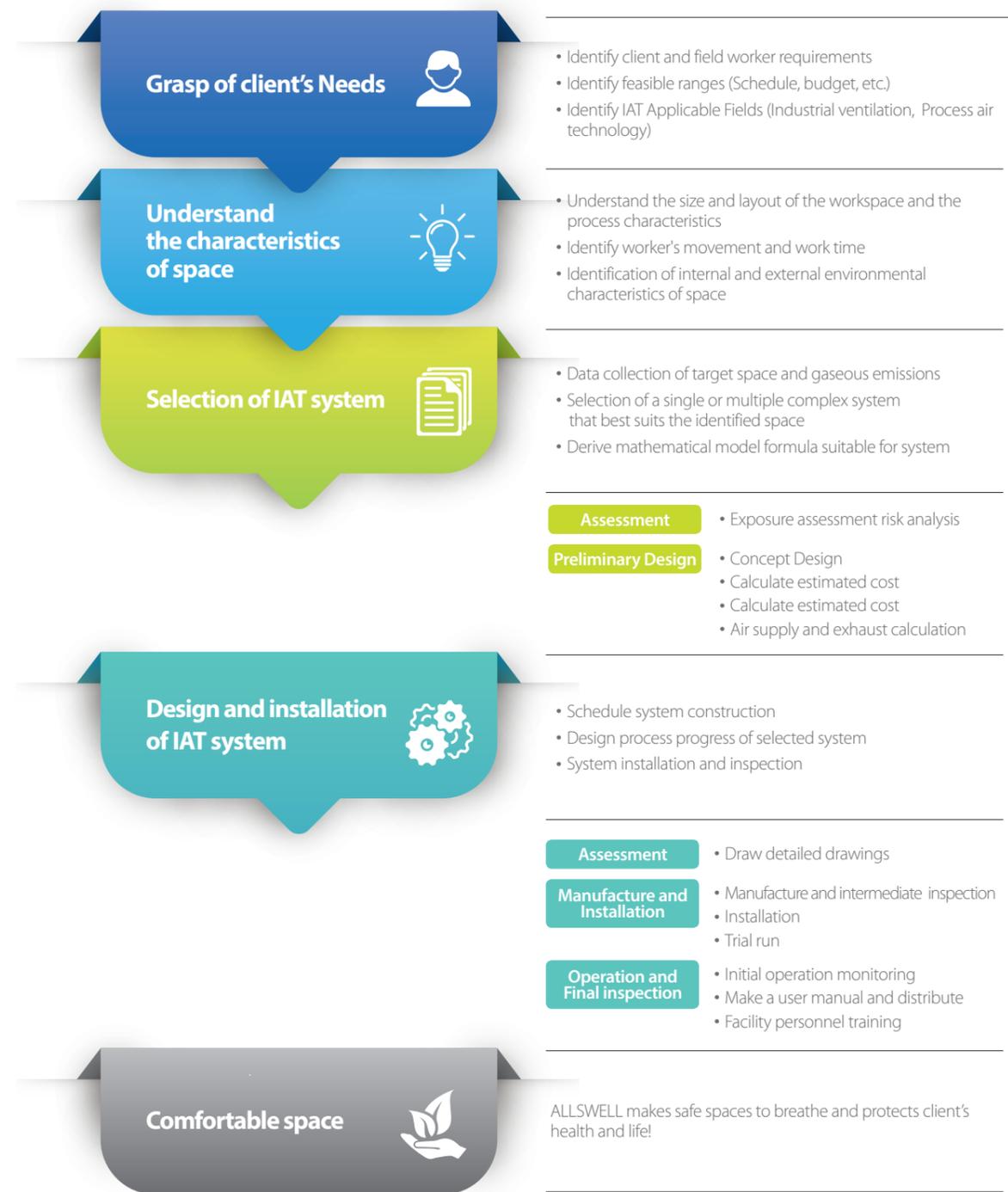
Various sensors such as temperature, humidity, pressure, and concentration are installed on ALLSWELL's Smart Clean Factory and data is collected and analyzed to recognize abnormalities in the system or target space.



### Advantage of Smart Clean Factory



## ALLSWELL'S IAT PROCESS





· Making spaces that clients can breathe safely!  
→ Accomplish ALLSWELL's vision and mission

· A company specializing in IAT(Industrial Air Technology)  
→ A to Z Solution for airflow  
· Providing best IAT for client's workspace and process  
→ Improve productivity and quality

· Providing the most economical IAT system based on engineering  
→ Efficient combination of 2 fields / 6 systems  
· Serving the highly cost effective technology

· Designing based on our technology and knowledge about IAT  
→ On time design with our engineering systems  
· Optimizing delivery based on accurate mathematical model  
→ No additional cost and time





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