White Paper on industrial dust/soot purification technologies

The dust and smoke produced in the process of industrial production are directly related to the environment of the workshop, the occupational health of the staff and the equipmentService life and environmental emission compliance. Welding,cutting,grinding,sandblasting,shotbblasting,woodworking,compositesDifferent types of particles and fumes continue to be produced during processing.

If the collection and purification is not up to standard, it will not only cause unorganized emissions, but also bring occupational health risks and accelerationEquipment wear, affecting product quality, serious may also lead to dust explosion and other safety accidents.

This white paper focuses on dust and soot sources, impact, governance standards, Core Technologies, equipment principles, systemsDesign, installation, operation and maintenance and typical application scenarios for system description, to provide enterprises with a clear, practical, can be landing governanceIdeas and technical references to help enterprises achieve safe production, green production and efficient production.

Sources and effects of dust and soot

Industrial dust and fumes are commonly produced in various manufacturing processes, such as welding and cutting of metals, grinding and polishing of various materialsX-ray, casting and workpiece surface shot blasting treatment, material crushing screening transport, as well as machining and assembly and other auxiliaryProcess, are common dust scene.

The effects of these pollutants are manifold. Inhalable particulates can be a long-term hazard to the operator's respiratory systemWhen the concentration of combustible dusts such as wood, aluminium, magnesium and plastics reaches a critical value, they may be exposed to static electricity or lightFire may explode, posing a major safety hazard; dust entering the equipment will accelerate the motor, electrical appliances and transmission systemThe scattered dust adheres to the surface of the workpiece, which will directly affect the spraying and assemblyAt the same time, unorganized emissions or emissions do not meet the standards will

make enterprises face environmental regulationPenalties and pressure to stop production.

There are clear national standards for dust and soot control in system design, emission control and safety managementAs the basis, the enterprise must strictly follow the requirements of relevant specifications in the scheme design and equipment selection.

Technical route of dust/smoke control

Industrial dust removal system to efficient collection, accurate filtering, stable cleaning, safe discharge as the core logic, the mainstream technologyArt can be divided into four directions, enterprises can be based on their own working conditions, air volume, concentration, temperature and explosion-proof flexible combination of demandWith.

The filter cartridge dust removal technology takes the folding filter cartridge as the core filter element, and cooperates with the inertial separation and the pulse back blowing to clean the dust, and forms the filter cartridge dust removal systemCompact structure, small footprint, high purification efficiency, suitable for most dry dust, welding fume, fine particlesScene Management.

BAG filter dust removal technology uses bag filter as filter medium, wide temperature range, large air handling capacity, impact load resistanceStrong ability, more suitable for high concentration, large air volume, the need for long-term continuous operation of dust control scenarios.

Centralized dust removal technology by the multi-station, multi-suction point to share a set of main purification system, to achieve a unified collection, centralizedUnder the condition of large workshop, dense fixed dust producing points and multi-point simultaneous operation, the overall economy and management effectiveness are improvedRate is better.

Explosion-proof dust removal technology for wood, aluminum, magnesium, plastic, chemical powder and other combustible dust environment, through flame retardant staticElectric filter material, explosion vent device, spark detection, explosion-proof electrical and other configuration, to meet the explosion-proof safety standards, reduce safety from the sourceAll risks.

Principle and characteristics of core purification equipment

When the dust-laden air flow enters the filter cartridge dust collector, the large particle dust is directly settled by inertial separationThe fine dust is intercepted on the surface by the filter. The system automatically starts the pulse air flow back-blowing cleaning by pressure difference or timing controlAsh, so that dust into the dust collection device, to maintain a continuous and efficient filtering state. This kind of equipment has high purification efficiency, small size,can be modular combination, filter replacement is convenient, support automatic operation and simple maintenance, but also can adapt to high temperature, moisture-proof, Flame retardant, anti-static and other filters, commonly used in welding fume, laser cutting fume, metal and composite grinding powderDust, small sandblasting dust and other scenarios.

After the dust-containing gas enters the box body, the coarse particles fall directly into the ash hopper, and the dust is fineThe dust is separated by the filter bag, and then the dust is cleaned regularly by the pulse injection system. The dust is discharged from the bottom dust discharge device and purifiedGas emission standards. The equipment has the advantages of large air volume, stable operation, wide selection of filter materials, strong temperature resistance and corrosion resistance,suitable for long-term continuous operation. Commonly used filter material can be adapted to different temperature conditions, widely used in sandblasting room, shot blasting machine, woodWorkshop, metallurgy, building materials, mines and other high-concentration dust treatment scenarios.

Centralized dust/soot cleaning system is composed of main fan, main pipe, suction arm, cleaning machine and control systemIt can support multi-station purification at the same time, and the host can be placed outdoors to save workshop space. The suction arm can be flexibly rotatedPositioning, covering the whole operation area, system resistance balance, stable operation, suitable for large welding workshop, multi-station grindingWorkshop, construction machinery production line, assembly workshop and so on.

Explosion-proof dust removal system as a whole in accordance with explosion-proof standard design, equipped with anti-static flame-retardant filter material, explosion venting device, SparksDetection and extinguishing system, explosion-proof motor, explosion-proof control cabinet and anti-static grounding, etc. , to

reduce the combustible dust environmentExplosion risk, applicable to aluminum-magnesium alloy processing, wood processing, plastic dust, pharmaceutical and chemical powder and other scenarios.

Main points of design and selection of dust removal system

The air volume of dust removal system needs to match the actual working conditions. Insufficient air volume will lead to incomplete collection, and excessive air volume will lead to incomplete collection.

To increase energy consumption and noise, the design stage should be combined with the number of stations, operating frequency, continuous running time comprehensive calculation, to ensureBalance between management effect and operation cost.

The premise of efficient governance is efficient collection. The fixed dust producing point is suitable for fixed-point collection, with closed hood and side suctionHood and upper suction hood are used to realize nearby capture. The scene with unfixed operation point can be collected by moving, and the flexible suction arm, Mobile dust removal cabinet to enhance flexibility; sandblasting room, shot blasting machine and other large-scale processing equipment, suitable for the use of integrated closed way,to suppress dust diffusion from the source.

The design of filtration and dust cleaning directly affects the efficiency and service life of the equipmentSpeed, with differential pressure control or timing control of the automatic dust cleaning system to ensure long-term stable operation of the equipment.

Control system, the mainstream configuration includes PLC control, frequency conversion fan, overload protection, remote monitoring and other powerCan realize automatic start-stop, automatic cleaning, abnormal alarm and energy-saving operation, reduce the intensity of manual operation, improve the systemSystem intelligence level.

Installation, operation and maintenance and safety management

Dust removal system in the installation should try to make the pipeline short and straight, reduce elbows, reduce system resistance; suction point should be

coveredAll working areas, to avoid unorganized emissions; outdoor equipment to do a good job in rain, sun, shock absorption and fixed treatment;Explosion-proof system must be strictly in accordance with the specification to complete the installation of grounding, explosion venting and alarm devices.

Daily maintenance focuses on the fan, pulse valve, gas path and control system operation status, according to the frequency of use andDust concentration regularly replace the filter cartridge or filter bag, timely cleaning of dust collection barrel and pipeline dust to avoid clogging, and regular detection of emissionsDischarge concentration to ensure long-term stability.

Safety management is the key to the operation of dust removal system. In combustible dust environment, it is strictly forbidden for open flame and high temperature heat source to be close to the dedusting deviceRegularly cleaning the dust inside the pipeline and equipment can eliminate the hidden danger of explosion, electrical components and control systems need to be explosion-proof, etc. Class A configuration and regular inspection, at the same time set up the equipment ledger and operating standards, regular safety training of operators.

Typical industrial application schemes

Welding workshop dust control to centralized purification system, with multi-station flexible suction arm, can achieve multi-pointIt is widely used in construction machinery, steel structure, auto parts, rail transit and so onIndustry.

Sanding and polishing dust control more use of filter dust collector or sanding dust table, nearby collection, nearby netThe effect is stable in scenes such as hardware, composite materials, woodworking, stone, furniture manufacturing, etc. .

Sandblasting and shot blasting dust control usually choose large air volume bag filter, with closed blasting room or shot blasting machine

Is the overall collection, can withstand high concentrations of dust, support continuous operation, suitable for ships, steel structures, aerospace, machineryMachinery and heavy industry.

In view of the flammable and explosive dust environment, the comprehensive treatment of explosion-proof dust adopts explosion-proof dust removal system combined with spark explorationCombined with spark detection,

explosion venting, flame retardant, anti-static and other measures, to meet the requirements of safety standards and environmental protection.

Development trend of industrial dust removal technology

In the future, the industrial dust removal technology will develop towards higher purification accuracy, and the filtration capacity will be gradually upgraded to sub-micron levelTo meet more stringent ultra-low emission requirements. System operation will be more intelligent, internet of things monitoring, remote operation and maintenance, forecastingFunctions such as sexual maintenance and automatic air volume regulation will be gradually popularized.

Energy-saving design has become an important direction, low resistance structure, frequency conversion control, waste heat recovery technology will continue to reduce the systemOverall energy consumption. The combination system of dust removal and waste gas purification can solve the combined pollution in one stationProblems and simplify the process of enterprise governance.

Safety level, a higher level of intelligent explosion-proof, explosion suppression, explosion-proof technology will be further mature and universal, flammableDust environment to provide more reliable protection.

Conclusion

Dust and soot control is the basic work for enterprises to achieve safe production, ensure occupational health and meet environmental complianceProject. Scientific selection, reasonable design, standardized installation and standardized operation and maintenance can significantly improve the working environment of the workshop and prolong the working lifeProlong equipment life, improve product quality, and reduce safety and compliance risks.

This white paper provides a general technical reference, the actual project needs to be combined with the enterprise site conditions, process layout, layoutCustomized design to achieve the optimal treatment effect.