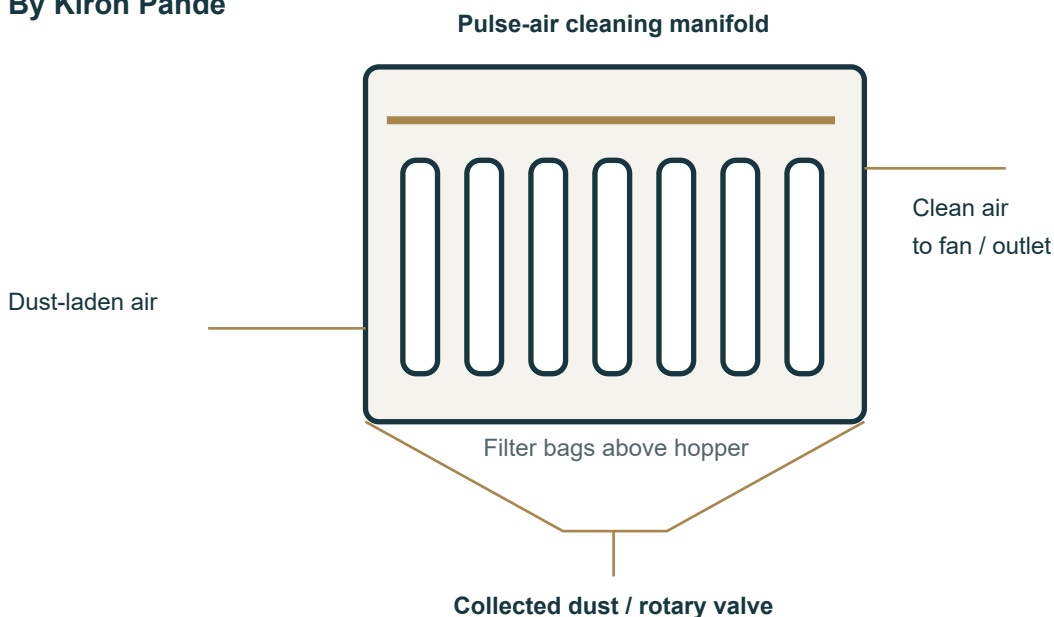


01 / SYSTEM OVERVIEW

Dust Collector Efficiency

A practical guide to auditing bag filters, improving pulse cleaning and reducing avoidable energy use.

By Kiron Pande



Simplified bag-filter arrangement. The fan draws air through the filters; short compressed-air pulses remove the dust cake.

Begin with the whole system

A dust collector depends on three things working together: the right extraction airflow, effective filter cleaning and a stable compressed-air supply. Improving one part without checking the others can shift the problem elsewhere.

Audit priorities

Measure airflow and filter differential pressure, inspect pulse valves and filter bags, and record air pressure at the cleaning manifold while it is pulsing.

Scope: general bag-filter performance, with examples from cement, clinker and raw-material handling. Combustible-dust applications require a separate hazard assessment and equipment-specific protection.

02 / AIRFLOW AND FILTRATION

Match airflow to the duty

Maintain the capture and transport airflow required by the process as filter resistance changes.

Control fan speed where appropriate

Clean filters offer relatively low resistance. An uncontrolled fan may then deliver more air than the process needs, increasing energy use, filter wear and product carryover. As dust accumulates, resistance rises. At fixed speed, airflow can fall; a controlled fan may require more power to maintain the same airflow.

Assess a variable frequency drive (VFD) with suitable airflow or pressure feedback instead of relying only on damper throttling. Confirm the fan curve, minimum transport velocity and operating range before making a change. For long-running equipment, also assess a correctly sized, high-efficiency motor.

Check the air-to-cloth ratio

Air-to-cloth ratio = airflow / effective filter area

Use airflow in m³/min and filter area in m². The result is m/min, also written as m³/(m²·min). Excessive loading can increase pressure drop, impair cleaning and reduce extraction at the pickup point.

Material examples	Values cited in the original presentation
Slag, coal and clinker dust	1.2 m ³ /(m ² ·min)
Limestone and cement dust	1.5 m ³ /(m ² ·min)

These figures are discussion references, not universal design limits. Confirm the permissible ratio for the dust properties, filter medium, temperature and cleaning system with the collector supplier. Coal dust also requires a combustible-dust review.

03 / PULSE CLEANING

Clean when the filters need it

Use differential pressure, valve condition and cleaning sequence together.

Move from a timer to demand-based cleaning

A timer pulses at fixed intervals. An on-demand controller starts cleaning when filter differential pressure reaches a high setpoint and stops at a lower setpoint. This can avoid unnecessary compressed-air use and reduce cycling of valves and filter media.

The source presentation suggests a 3-4 in. water-column range as an initial discussion point. Actual start, stop and alarm settings must follow the collector supplier and observed operating conditions. Check pressure-sensing tubes and ports before trusting the reading.

Observed condition	What to investigate
High or rising differential pressure	Dust loading, blinded bags, insufficient cleaning, failed valves or restricted sensing lines.
Unexpectedly low differential pressure	Low airflow, torn or missing bags, bypass leakage, poor seals or a faulty pressure reading.
Pulsing does not restore normal operation	Pulse pressure during firing, valve response, bag condition and dust discharge.

Review the sequence and pulse settings

The presentation contrasts adjacent-row cleaning (1-2-3-4-5-6-7) with a spaced sequence (1-4-6-2-5-7-3). Review whether a spaced sequence helps limit dust re-entrainment in the specific collector. Pulse width and interval should be set for the valve, nozzle and filter arrangement.

A pressure reading is a diagnostic clue

Confirm the cause by inspection and trend data. Differential pressure alone does not prove that a bag is sound or that emissions are acceptable.

04 / COMPONENTS AND MAINTENANCE

Improve cleaning at the source

Repair failures first, then evaluate nozzle and filter upgrades against a measured baseline.

Pulse valves and solenoids Locate valves that remain open, fail to fire or leak between pulses. Check the electrical command, diaphragm, pilot circuit and air quality before replacement.

Filter condition Inspect damaged, blinded or incorrectly fitted bags, seals, welds and duct joints. Maintain the hopper and rotary valve so collected dust can leave the system.

Monitoring Row or compartment monitoring can help locate failed pulses and filter leaks. The presentation cites Auburn FilterSense, IntelliPULSE and DynaCHARGE as examples; assess compatibility and required detection performance.

Nozzles and bag geometry

Coanda-type injectors and venturi arrangements can entrain additional air and alter the cleaning pulse delivered into a bag. Performance depends on geometry, alignment, pressure and bag length. A venturi does not by itself establish that the flow is supersonic; validate the nozzle design and operating pressure.

Pleated or star-shaped bags can increase available filter area within an existing housing. Confirm cage compatibility, dust release, pressure drop and cleaning requirements. The source cites StarBag® and StarCage®; product selection should follow an application review.

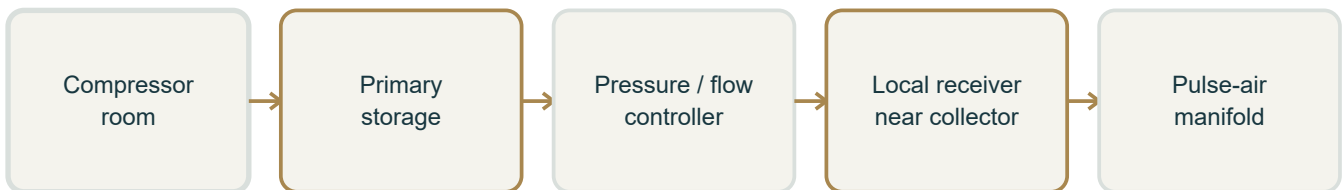
Upgrade	Evidence to request
Injector retrofit	Air consumption per pulse, residual differential pressure, emissions and bag condition before/after.
Alternative filter geometry	Usable filtration area, cleaning pressure, expected life and actual maintenance history.

Supplier performance claims from the original presentation are retained as reference information on page 6; they are not guaranteed outcomes.

05 / COMPRESSED-AIR SUPPLY

Stabilise pressure at the collector

Use storage and pressure control to meet short cleaning pulses without disturbing the wider system.



Concept from the presentation. Final receiver and controller positions depend on the control strategy and required recovery time.

Measure manifold pressure during a cleaning pulse, not only between pulses. Check restrictions in pipework, filters and regulators, and confirm that the supply can recover before the next demand event.

The original example shows approximately 5 kgf/cm² at the cleaning supply. Treat this as an example only; use the cleaning-system manufacturer's pressure requirement and verify it under load.

Interpret the pressure trend in context

Presentation example	Reported header-pressure range
Without the flow controller	78-93 psig
With the flow controller	75-78 psig

These ranges describe the illustrated site example, not a universal saving. Compare equivalent production conditions and record air consumption, compressor power and dust-control performance before claiming an energy benefit.

A practical audit record

Record fan speed and kW, extraction airflow, filter differential pressure, pulse pressure and timing, valve failures, air consumption, bag condition, hopper discharge and emissions indications. After each change, repeat the measurements at a comparable operating duty.

Prioritise the work

Repair faults and leaks; correct airflow and cleaning settings; then evaluate controls, storage, injectors or filter upgrades using verified results.

06 / REFERENCE NOTES

Evaluate claims with evidence

Selected supplier figures and references retained from the original presentation.

CK Injectors figures cited in the source include the following. They have not been independently verified for the reader's plant; request the test conditions and measurement basis.

Claim in the supplied material	Reported change
Compressed air / filter differential pressure	20% reduction each
Installation area / maintenance cost	30% / 20% reduction
Dedusting efficiency / productivity / product movement	20% increase each; definitions not supplied
Bag length / bag life	1.5-2 times (up to 8 m) / up to 2 times
Pulse interval	Longer off-time; no numerical value stated

The star-shaped bag slide claims up to five times the bag life. Treat this as an application-dependent claim. Injector models C3 and C2 are listed with A/B/C values of 60/142/80 and 82/165/100; units are not stated in the source. Materials listed are SS400, SUS304 and SUS316L. Obtain a current approved drawing before selection.

Further reading and source credits

Donaldson - On-demand cleaning systems: [Read reference online](#)

Donaldson - Optimising collection airflow: [Read reference online](#)

Sly - Venturis and dust collection (cited in the source): [Read reference online](#)

Filter-bag illustrations referenced in the presentation: [Read reference online](#)

Injector animation referenced in the presentation: [Read reference online](#)

Based on Kiron C. Pande's presentation, Auditing the Dust Collectors / Bag Filters and opportunities for efficiency improvement. Other original credits: Auburn FilterSense; CK Injectors, Korea; discussions with Nitin Asnani on cement-industry filter design. Diagrams in this edition are explanatory schematics.