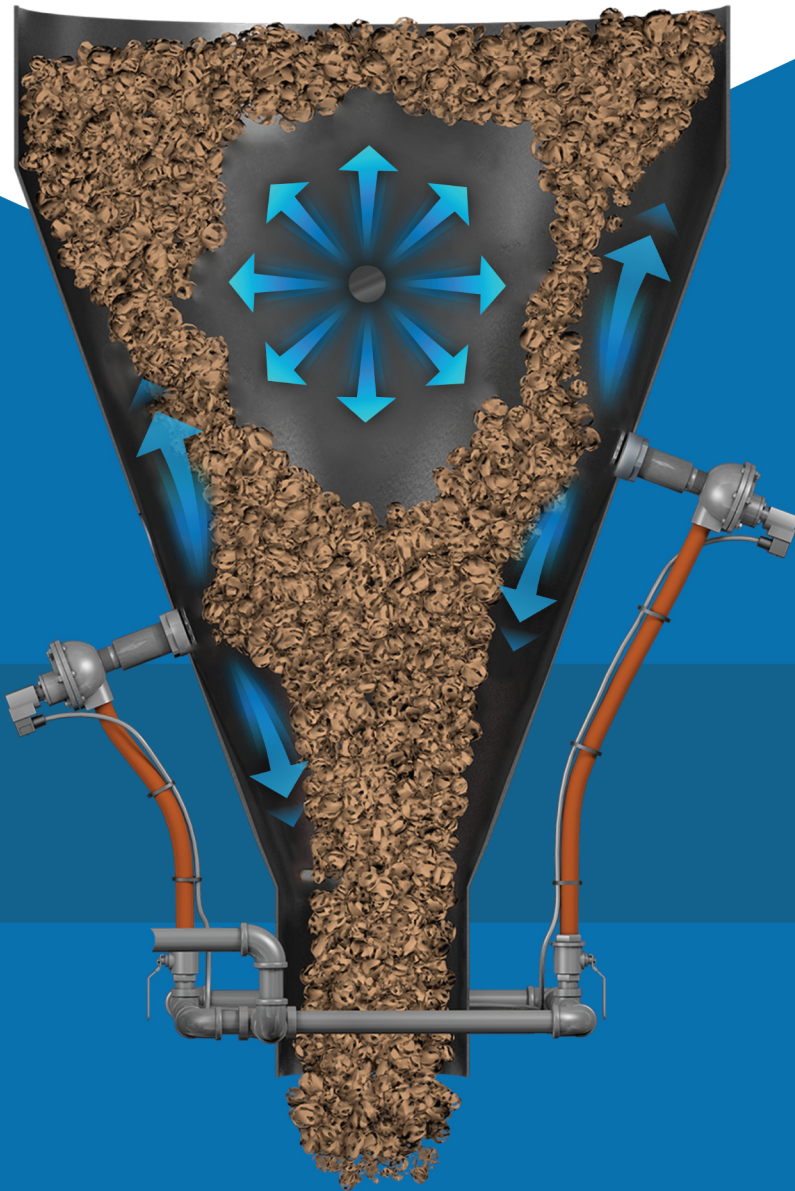




**CONTROL**<sup>®</sup>  
CONCEPTS USA



# The Top 5 Bulk Material Flow Aids

Pros, Cons,  
and Calculating ROI

Poor material flow in one vessel can create a snowball effect. It slows down the entire process, requires manual cleaning that disrupts the entire workflow, and wastes manpower. Inefficient flow aids can also create other problems: machine damage, high energy costs, stressful noise levels.

Each of these problems cost time and money. So before worrying about the cost of getting a flow aid, think about the cost of *not* getting one.

## THE IMPACT OF MATERIAL FLOW PROBLEMS



### LOST PRODUCTIVITY

One of the biggest cement companies in Southeast Asia calculated that they lost \$12,000 per hour of downtime. In North America, this downtime is more like \$25,000 an hour. They had tried air knockers and vibrators, but workers still had to hammer the silos to free the clogged cement. They were losing money, wasting manpower hours, and putting their workers at risk.



### WASTED MATERIALS

A company that makes custom spices had to clean their blenders between batches, and just the material they had to use in their flushing routine was costing them \$200,000 a year.

A flax company was also “flushing away” profits. Because of the high oil and fat content of the flax and cocoa, the material would both bridge above the discharge, and cake from the vessel walls to the filter bags. They threw away 40 pounds of mixture a day, and even had to pay to have it hauled away.



### WORKER SAFETY

Hammering vessels and climbing into silos can cause worker injury — but that’s not even the worst thing that can happen.

Trapped material can also release volatile gases. For example, caked whey protein concentrate sparked a fire in a cheese company’s baghouse. If the fire had spread, they would have suffered thousands of dollars in damage. Bridging had become an urgent safety concern.

## DO THE NUMBERS: CALCULATE THE HIDDEN COST OF MATERIAL BLOCKS

### LOST PRODUCTIVITY

The effect of a blocked vessel on your daily production and output

### WASTED MATERIALS

total cost of spoiled/wasted/contaminated material you throw away

### LABOR COST

Cost of manually cleaning the vessels (*number of people x hourly rate x hours spent cleaning vessels*)

**Lost productivity + wasted material + labor cost = hidden cost**

## HOW TO CHOOSE A MATERIAL FLOW AID

But which flow aid system is *really* worth your money? Many of them give limited results and come with hidden costs. Let's look at three factors that affect your operations.



### SPEED AND EFFICIENCY

How fast will your material flow? Will it shorten your production time? Can the flow aid remove all stagnant material, or will you still need to hammer or manually clean your vessels?

A leading processor of alumina-based industrial minerals, handles more than 120,000 tons of material every year for refractory and abrasive industries. However, the processed materials plugged in the outlets when they were transferred to storage bins. It would take an hour to fill a supersack.

The AirSweep pneumatic flow aid system cut the filling time of supersacks from one hour to two minutes. They even had to hire an additional forklift driver to keep up with the output.

Think about what plant operations would look like if material flow were not an issue. How will your process improve or speed up just by resolving material blocks?



### OPERATING COSTS

Don't just look at the purchase price of a flow aid system. Compute the cost of using it — energy consumption, cleaning and maintenance, and even how it can impact the vessel that it's installed in.

## CONVENIENCE AND SAFETY

Ideally, your flow aid should be so efficient that once you install it you can walk away and focus on other parts of the plant. In reality, many flow aids will still need workers to clean it — or even clean up after it, because it didn't do its job.

Let's look at the real cost of the most common methods of dealing with material blocks.



## HAMMERING OR MANUAL CLEANING

Many plants resort to hammering vessels to forcibly dislodge trapped material. In some cases, workers may climb into the silo to break up stubborn clumps with small tools.

HAMMERING		
<p><b>SPEED AND EFFICIENCY</b></p> <p>Slow and tedious</p> <p>Material can still cling to vessel walls</p> <p>Requires total shutdown during manual cleaning</p>	<p><b>COST</b></p> <p>May seem cheap, but has hidden costs like:</p> <ul style="list-style-type: none"> <li>• manpower hours</li> <li>• damage to machines</li> </ul>	<p><b>CONVENIENCE AND SAFETY</b></p> <p>very noisy</p> <p>high risk of worker injury</p>



## FLUIDIZERS

Fluidizers use a combination of gentle vibration and aeration. Rubber discs are installed inside the hopper, bolted into place, and attached to air piping. The air causes the discs to flap and vibrate, causing air to radiate out.

Fluidizers work for very light powders like flour, but lack the volume and pressure to activate moist and heavy materials.

FLUIDIZERS		
<p><b>SPEED AND EFFICIENCY</b></p> <p>small effective radius</p> <p>ineffective for wet or sticky materials</p>	<p><b>COST</b></p> <p>High energy consumption</p> <p>Need several units to activate material</p>	<p><b>CONVENIENCE AND SAFETY</b></p> <p>Must be installed inside the vessel</p> <p>Can degrade and contaminate materials</p>



## VIBRATORS

This vibrates the material to break the friction between the material and the vessel wall, then lets gravity finish the job.

However, some materials can actually become more compact when shaken, and waiting for material to slide down the vessel does not solve the problem of residue clinging to the vessel walls.

### VIBRATORS

#### SPEED AND EFFICIENCY

Vibrations compact sticky material even more

Material still clings to vessel walls

#### COST

Machine damage from metal and weld fatigue

Uses a lot of air and energy to operate

#### CONVENIENCE AND SAFETY

Very noisy

Need periodic shutdowns for cleaning



## AIR CANNONS

Cannons shoot large volumes of air that punch holes into the material to break bridging. While they seem powerful, air can channel through the holes and diminish its effect. The large units are also difficult to install in small vessels, and the large recoil flexes the walls and leads to long-term metal fatigue and damage.

### AIR CANNONS

#### SPEED AND EFFICIENCY

Channeling greatly reduces efficiency

Material still clings to vessel walls; periodic shutdowns and manual cleaning still necessary

#### COST

Vessel walls subjected to constant flexing and fatigue

#### CONVENIENCE AND SAFETY

Flying material enters the open nozzle and solenoid valve, thus requiring frequent cleaning

Very noisy

## AIRSWEEP SYSTEM

# THE MOST COST-EFFECTIVE, CONVENIENT FLOW AID

Clear the way for higher factory efficiency! AirSweep eliminates bridging, ratholes, and material build-up for on-demand flow.

The AirSweep® system consists of nozzles that are attached outside the vessel, and connected to a solenoid valve. Each nozzle emits high-pressure, high-volume compressed air that sweeps stalled material back into the flow stream. The pistons can be timed to release in a sequence that is most effective for the particular material and process.








## HOW AIRSWEEP WORKS



- 1 Each AirSweep® nozzle disperses a powerful burst of high-pressure, high volume air or inert gas in 250 millisecond bursts.
- 2 The quick pulse sends a shock wave along the inner vessel wall, lifting and activating stalled material and breaking the friction bond between the material and vessel wall.
- 3 The system is pulsed in a pre-set sequence when material is to be discharged from the bin.
- 4 A typical system will consist of 3 or 4 AirSweep® nozzles, high-flow solenoid valves, sequence timer/controller, air filter, regulator, air receiver, flex hoses and ball valves.

But which flow aid system is *really* worth your money? Many of them give limited results and come with hidden costs. Let's look at three factors that affect your operations.

## BENEFITS OF AN AIRSWEEP SYSTEM

-  **Higher productivity.** Reduce flushing/cleaning time between product runs.
-  **Better product quality.** Improve batch uniformity.
-  **Lower maintenance costs.** Prevent vibration, stress or wear to container walls.
-  **Lower energy costs.** Uses less than 10 cfm of plant air.
-  **No material feedback.** The patented nozzle design immediately reseals after every pulse, eliminating feedback. This means less damage to the system and pipes, less cleaning, and no risk of cross-contamination.
-  **No noise.** AirSweep runs with a soft, hissing sound.
-  **No safety risks.** Workers no longer have to climb into vessels or lift heavy hammers to clear material blocks.

## HOW MUCH CAN YOU SAVE (AND EARN) WITH AIRSWEEP?

### STEP 1

### CALCULATE PRODUCTION SAVINGS

How much money does your company lose for every hour of downtime? Here are some ways to measure.



#### REVENUE LOSS

The effect of a blocked vessel on your daily production and output

#### MATERIAL WASTE

Total cost of spoiled/wasted/contaminated material you throw away

#### LABOR COST

Cost of manually cleaning the vessels (*number of people x hourly rate x hours spent cleaning vessels*)

### STEP 2

### CALCULATE ENERGY SAVINGS

AirSweep is very energy efficient, because it runs on plant air and requires less electricity than other flow aids like air cannons and fluidizers.

Based on the cost of electricity in your country, calculate the monthly energy cost for your existing flow aid and for AirSweep.



#### DEVICE WATTAGE

Device Wattage (kilowatts) x Hours Used Per Day = Watt-hours (kWh) per Day

#### WATT-HOURS

Watt-hours (kWh) per Day x industrial cost of energy = energy cost

#### ENERGY SAVINGS

Energy cost of Competitive or Current Flow Aid - Energy cost of AirSweep = energy savings

## STEP 3 CALCULATE MAINTENANCE SAVINGS

AirSweep helps you save on machine maintenance in two ways.



### MAINTENANCE OF THE VESSEL

Unlike other flow aids, AirSweep does not cause metal fatigue or dents. This can help you save on repairs and replacement of the vessel. Repair also involves downtime and installation costs.

*(Cost of vessel x number of units) + cost of installation/repair + cost of downtime*

### MAINTENANCE OF THE FLOW AID

Many flow aids like fluidizers degrade and must be frequently replaced.

*(cost of flow aid x number of units) + cost of installation/repair + cost of downtime*

On the other hand, AirSweep only needs preventative maintenance after 1 million cycles, which can take 2 to 5 years depending on how it is used in your process. All the AirSweep parts are attached outside the unit, and can be replaced with a Rebuild Kit and simple tools.

## STEP 4 ADD ALL THE SAVINGS



PRODUCTION SAVINGS







ENERGY SAVINGS



MAINTENANCE SAVINGS

## STEP 5 CONSIDER INVISIBLE COSTS

Many important factors can't be measured on a spreadsheet, but still have a real impact on your factory environment and your company's risks.

-  **Worker safety.** Hammering and manually cleaning vessels can lead to workplace injury.
-  **Noise levels.** Loud hammering, cannon blasts or vibrations are irritating and may even cause long-term hearing loss.
-  **Fire hazards.** Some materials, vessels and processes are at risk for fires if material flow is compromised.
-  **Brand reputation.** If you can't control material flow, it's hard to control product quality and consistency. This can lead to consumer complaints, and affect your brand equity.

You may not be able to calculate the daily cost, but you can look at the possible ramifications of a lawsuit or PR crisis, which can cost thousands of dollars to solve.



Add all your savings and you'll understand why one of our clients said:

“The AirSweeps paid for themselves within 2 weeks!”

Do you have any other questions about AirSweep or pneumatic flow aids?  
Get more information or contact us for a personal consultation or  
customized proposal.

### AIRSWEEP® QUICK ROI

How much money will your plant save every year by using the AirSweep® System?

**ASSUMPTIONS**

**PRODUCTION SAVINGS**

Cost per hour of plant slowing down?  \$

Average hours per week of plant slow down because of flow issue?  \$

**Production cost savings per year using AirSweep®**  \$

**ENERGY SAVINGS**

Industrial cost of kWh in your country?  \$

What type of flow solution are you currently using or comparing to AirSweep®?

Amount of energy used for comparative technology  \$

Amount of energy used for AirSweep® System  \$

**Energy cost savings per year using AirSweep®**  \$

**MAINTENANCE SAVINGS**

Cost of plant downtime per hour?  \$

Number of hours per year your plant requires extra maintenance  #

**Maintenance savings per year using AirSweep®**  \$

**TOTAL YEARLY EXPECTED SAVINGS**

Sum of the three totals:  \$

**CONTACT US FOR AN ROI CALCULATION  
AND CUSTOM ENGINEERED SOLUTION.**

**CONTACT US**



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