Dust Sags and Surges…

Stop the Madness

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Dust Control Series,

Article 1

Typical Portable Plants Dust Control System Solution

Dust Control Systems should be defined as; 1) being able to evenly proportion a known amount of dust into the mix process. And when required; 2) being able to automatically reject from the process remaining dust to a waste pit or storage silo.

Dust Control Schemes usually are significantly different for portable plants than stationary. In the Dust Control Series, Article 1 will address issues with Typical Portable Plants. Article 2, Article 3 and Article 4 will discuss at a later time, Typical Stationary Plants and Various Custom Situations. In any case, most of these systems are now being required need to be retrofitted to existing plants. This can be difficult since the plant was usually built without much consideration to dust control. The portable system discussed below was designed with easy retro fitting, easy maintenance, easy operation, easy set up and lower costs in mind.

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Problem: Baghouses were designed as a pollution control device with little regard given to the fact that it also acts as a feeder bin as much as any cold feed bin does. Feeder bins deliver material to the process evenly. The Baghouse does not. Dust should always be controlled to reduce surging to acceptable limits. The 3 pictures below have been taken in sequence about 45 seconds apart. The Transition between the Baghouse Discharge Auger and the Drum Feed Auger is not well sealed in this particular situation allowing us to see what is happening. These pictures make it obvious that Dust is actually being Surge Fed to the mix process by this Pulse Jet Baghouse. Rotary Air Baghouse Delivery can be significantly worse. Either way, without some type of surge control, dust feed to the mix process is not consistently proportioned. If the cold feed bin delivered material in this manner, most authorities would consider this unacceptable.



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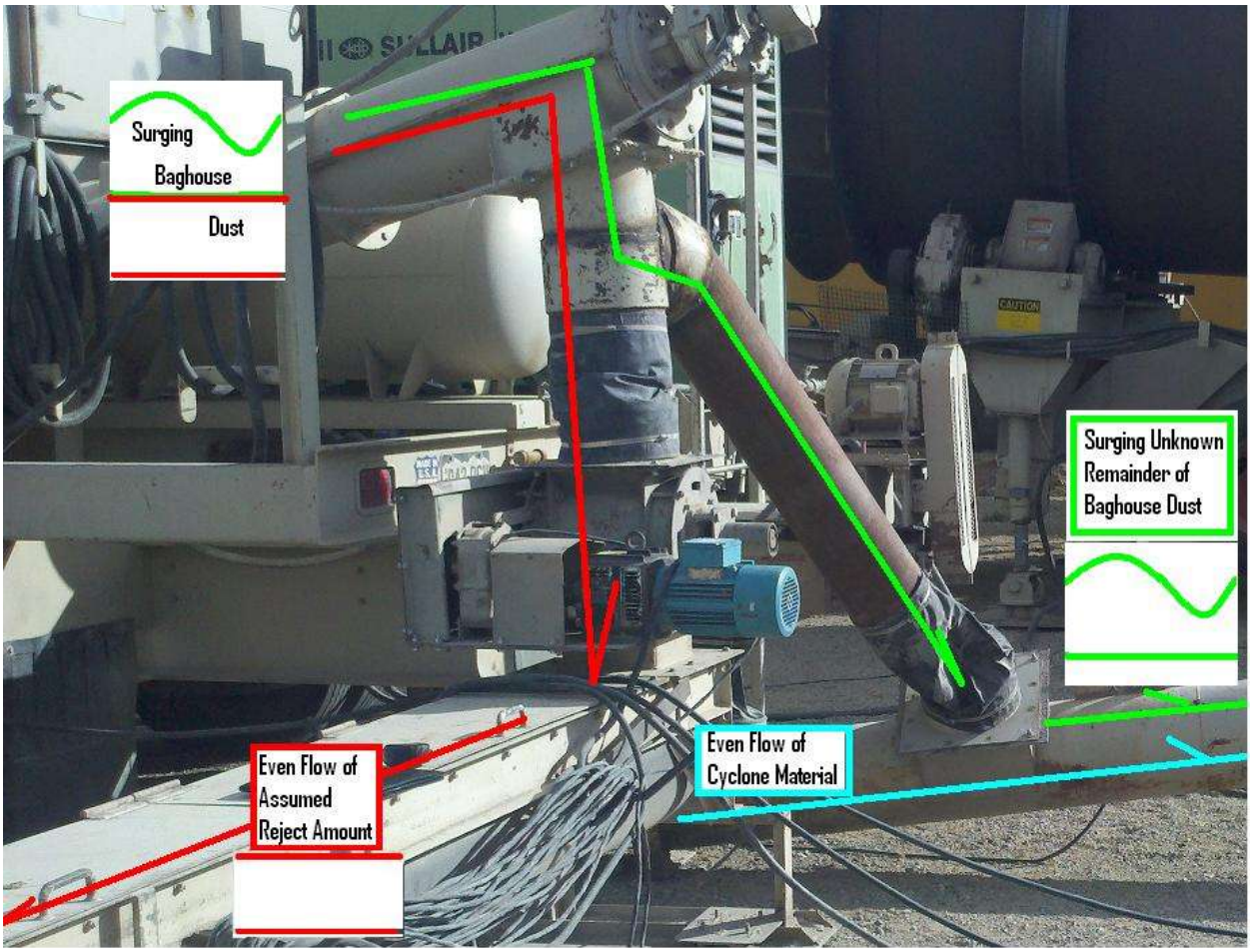
Surge Control would substantially help the situation. Surge Control normally requires the addition of a storage bin and an auger to feed the bin. Although, adding a bin is not the end of the world to fix a problem like this, a better design without a surge bin is proposed further into this article. This same design without a storage bin also has the option to handle another problem often encountered by mix producers, that problem being the controlled rejection excessive baghouse dust.

In portable situations, many times the producer is at the mercy of the pit material and the aggregate supplier. Producers may find some dust needs to be rejected. When dust is not being measured, the producer has no way of knowing how much to return to the mix and how much to reject accurately and automatically. Consequently, all that dust is usually rejected and money and energy wasted. In some instances, the producer goes to the expense to wash material and then the expense to dry the washed material in the aggregate dryer while producing mix. This not only costs money to dry but the plant production rate is now reduced significantly.

Portable Plants…. Dust Control! How to do it.

Problem Before:



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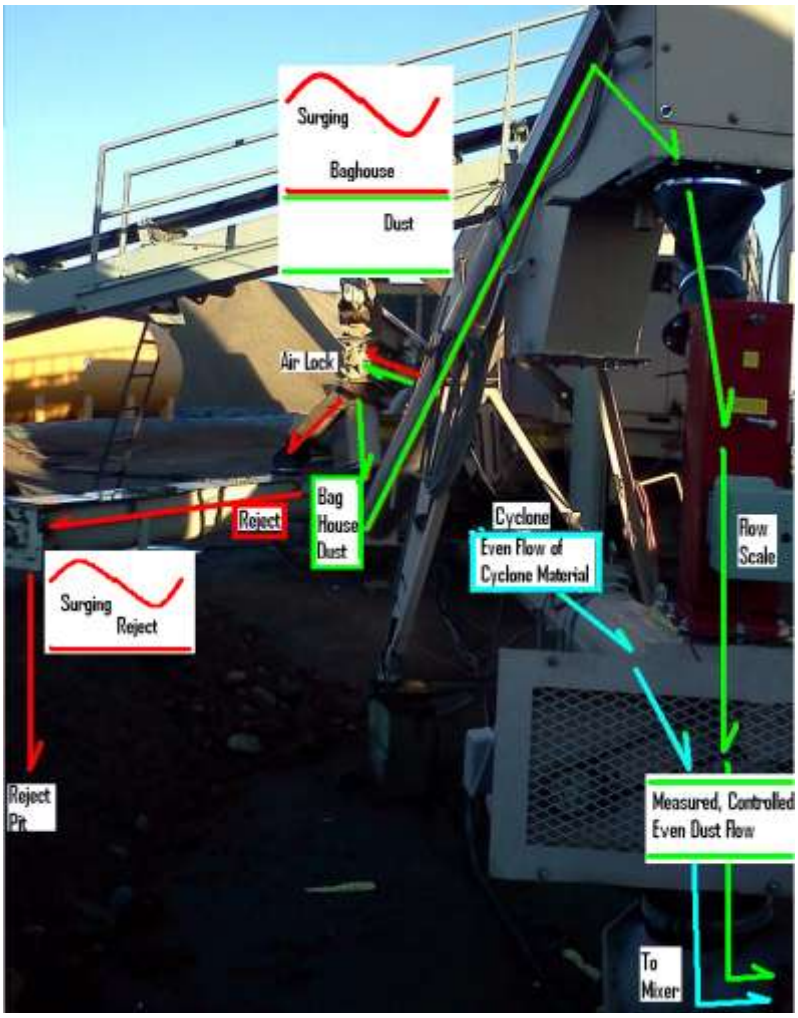
This system is often used and the benefits are often misunderstood. Not only is the dust not being measured but the dust being returned is not consistently proportioned. As illustrated, the dust amount being returned is not only unknown but being delivered in sags and surges. The dust that is being rejected is being fed to the reject pit evenly. The even feed of the reject pit is of no benefit to the process but the uneven feed to the mix process is definitely a disadvantage. The problem with this is that the Reject Feeder consistently rejects a certain flow and the remaining dust being returned to the mix varies as it lops off the top of the surges. Eliminating the surges to the mix has not been eliminated and controlling a known amount back to the mix is not possible.

Solution After:

These problems have been resolved to this very system illustrated above as depicted below by adding a Flow Scale and adding a VFD as illustrated below.



Notice the dust surges in this new situation have been moved from feeding the mix process to feeding the reject pit and the amount of dust being returned to the mix is being measured and controlled evenly. Notice a Surge Bin is not being used. The fact that the system has a flow scale and a large variable speed auger (20 cubic feet) feeding, the sags and surges can be eliminated

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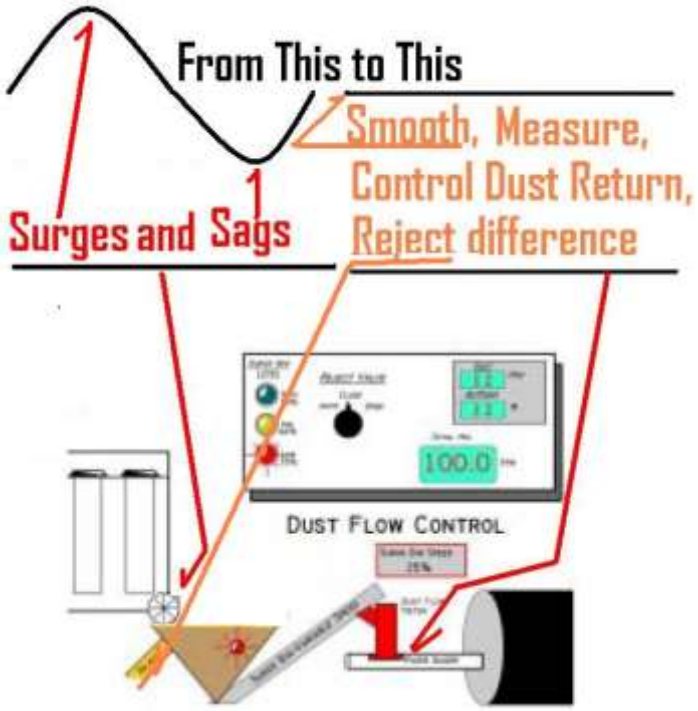
without the bin expense and setup effort. The volume of Scale Feed Auger-Feed Port acts as a Surge bin. Dust spills over into the Reject Auger when the Large Feed Port fills.

How it Works (The System)

Elam's Plants Manager Jeremy Dade operates the system differently depending if the job mix and material call for dust to be rejected or not (**Reject Procedure or Even Dust Feed Rate Procedure)**.



Reject Procedure or Even Dust Feed Rate Procedure

In the **Reject Procedure**, the aggregate contains more dust than the mix requires. In that case, the controller may be set to return 3% when the baghouse is actually delivering between 2.5% and 5.5% dust. The Scale reports the flow rate and when the flow rate starts to get too high (above 3%), which is most of the time, the Scale Feed Auger automatically slows lopping off the surge peaks and excessive dust under the peaks. The excess dust spills over from the Large Feed Scale Feed Auger Port into a Reject Pit or to a Reject Auger, etc.

In the **Even Dust Feed Rate Procedure**; all of the dust is being returned to the mix. The System is used to correct the Baghouse Dust Delivery Surge Problem. By observing the panel instruments indicating whether the Large Feed Port is being over filled (Large Feed Port High Level Indicator) or under filled (Flow Scale Rate fluctuating); The variable speed auger is controlled at a speed that maintains the dust flow rate between the Scale Feed Variable Speed Auger running empty and Large Feed Port over flowing into the Reject Auger.

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Some of the features of this particular scheme is the small size of Large Feed Port is offset by the long 12"diameter-25' Scale Feed Variable Speed Auger. The reason the Pod (Large Feed Port) is so small is that there was not much dust discharge height from this portable baghouse. The existing auger (now Scale Feed Auger) was converted from a constant feed auger to a variable speed auger which not only 1) feeds the Scale and 2) controls the amount to the Scale but 3) also acts as 20 cubic feet of Surge Pod since it can normally sustain dust flow delivery (absorbing the Sags and Surges) by automatically adjusting Scale Feed Auger Speed.

How it Works (The Flow Scale)

Material slides down it's feed throat against a plate suspended by patented plate suspension. The material impact force on the plate is transferred to a load cell which converts the gravimetric force to digits on the readout that display both the flow rate in Tons Per Hour (LBs/Min, etc) and the Tons of material that has passed through the scale since the Totalizer was last zeroed.

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In this situation, Elam's Quality Control Manager - David Fife, put the flow scale to the test by 1) reducing the amount of dust being measured by the Flow by 1.00% and then 2) compared burn off tests before and after. The Burn Off Results indicated a 1.00% decrease in minus 200.

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