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Gravimetric blenders offer plastics processors considerable savings. Their tight control over expensive additives eliminates the need to overfeed in order to maintain a minimum specification. For example, eliminating a 1% overfeed of a $5.00/lb. additive on a machine running 100 lbs/hr can save up to $30,000/year during a three-shift operation. At this rate, the gravimetric blender can pay for itself in juts three to six months.

But if your blender is not properly maintained, its accuracy may be compromised and you may not see the expected savings. Here are typical examples of maintenance-related issues that can arise with gravimetric blenders.

Problem: Our blender's usage of material is different from the inventory level displayed on the blender control. What is causing the discrepancy?

Cause: Improper calibration of the load cells is the most likely culprit. When was the last time you calibrated the blenders? We often find blenders that have been installed and used for quite some time without routine maintenance.

With gravimetric batch blenders, the ratio of materials used is constant because all materials are weighed in a common weigh hopper by one or two load cells. The first indicator of a calibration problem would be a disagreement between blender inventory and the actual amount of materials being used.

With continuous loss-in-weight blenders, each component is equipped with its own load cell. While this allows accurate metering of very low percentages (less than 1%) of additives, calibration problems cause both the ratio of the blended material and the inventory level to be off. If the calibration is off substantially, your product quality may suffer. For instance, the use of too little color concentrate is easily visible, but use of too much color may not be apparent but could alter the mechanical properties of the finished product. Such a problem often is not discovered until long after the product is shipped to a customer.

Load-cell calibration can vary considerably if the load cells have not been properly calibrated to a known weight. Moderate inaccuracies may be hard to see in the end product. If an important component is off by a significant amount, though, bad product will result, or additional money will be spent on wasted material.

Damaged load cells can be detected during routine testing. Damage can be caused by any of a number of factors, such as having been stepped on or run into with equipment of boxes, having been used as a grab handle, or having been exposed to an electrical spike during a power surge or to excessive static electricity.

Solution: Regularly calibrate each of the blender's load cells using a calibration weight of a known value. The calibration process takes less than five minutes and can usually be completed without shutting off the process machine. When accuracy or documentation is critical, calibration should be checked once per shift or once per day along with actual material inventory. In less critical situations, monthly calibration may be sufficient.

Networking and remote monitoring software centralizes control of the blender so the supervisor can monitor all blenders from a remote location and can select how often blender data is gathered. Batch-to-batch consistency can also be documented.

Problem: We are experiencing inconsistent material metering and too-frequent alarms.

Cause: Check the quality of your air supply. The pneumatic slide gates that are used to meter materials will not operate properly if dirty air is being used. Dirty air might contain water, rust, and/or other contaminants. Symptoms to look for include discolored air lines, premature cylinder wear, and cylinders that sound like they are sticking when cycling (indicating faulty seals or rods). If the lines contain foreign material like dried oil or sludge, you can often hear the cylinders stick, then break loose and slam open or closed.

Also, watch to see if the gate is opening and closing properly. Quite often a poor air supply can be detected before faulty product is delivered to a client. If air quality is really poor, the blender's filters may become plugged in less than a day, even in just an hour. The pneumatic valves have small ports that plug easily, so be sure the filter element is always in place and properly maintained. In addition, verify that your vacuum-loading receivers are sealed and vented properly, so a vacuum is not created in the blender supply hopper. This will prevent material from feeding when the metering gate on the blender opens.

Solution: Ensure a good, clean air supply by adding an additional filter, a better filter, or both to the air supply line at the blender--or better yet, at the air compressor, where it will clean up the air supply for the whole plant. Also verify that there is proper sealing of the vacuum-receiver flapper and proper venting of the supply hopper.

Problem: Occasionally the air cylinder disconnects from the metering gate. What could be causing this?

Cause: The most likely cause is loose parts. LocTite or other locking devices are used to manufacture the blender, but when maintenance was performed, they may not have been put back together correctly. Also, vibration from the ma- chine, especially an injection molding machine, can loosen parts over time.

Solution: When starting a shift, take a couple of minutes to look over the equipment to be sure everything is working as it should and that no parts have come loose, or are coming loose. There are no hidden parts, so any potential problems should be easy to spot.

Problem: One of our new operators has blue coloring from the previous job showing up in the red coloring of his current job.

Cause: An incomplete or improper clean-out will allow ingredients from the previous job into the next job.

Solution: When switching jobs, drain the hoppers and either blow them out or use a shop vacuum to thoroughly clean the supply hoppers. Be sure to clean the vacuum receivers as well as the corners of the supply hoppers, and thoroughly clean the metering-gate assemblies and mix chamber. If the blender has a surge bin underneath, don't forget to clean that as well. If any of the hoppers or other components seem to be coated with dust from a previous material, wipe it down to be sure all residue is removed. A thorough blender cleanout takes juts five to ten minutes and may be most conveniently done while changing molds or processes.

Problem in the making: One of the guys here at the plant wants to bypass the safety circuit switch.

Warning: Doing so would present a real danger. An operator could be seriously injured. The safety circuit is there to protect the operator from the slide gates that meter the material and from the rotating mixer that mixes the blended mate- rial. If the safety circuit is not working, the operator could be in the mixing chamber cleaning out the blender, or making a repair, and have the metering or slide gate close, or the mixer start up, causing injuries.

Solution: Inspect the safety circuit once a day or once a shift. To confirm that the safety switch has not been bypassed and is not defective, open the mix chamber door. The blender should stop immediately. Because the power to the blender will be killed, test the safety circuit by opening the door immediately after a batch has been dumped so the batch is not affected.

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