How Data Drives Process Improvement in Feed Manufacturing

A Case Study

The Precision Feed Manufacturing (PFM) solution package from BIG Consulting (BIG) contains a series of dashboards designed to provide unique insights into the ingredient mixing accuracy within feed manufacturing facilities. Data is gathered from commonly used feed mill batching systems and transformed into visualizations that quickly highlight opportunities for adjustments that result in less variability in the feed manufacturing process. This case study examines how an ingredient mixing issue was identified, what actions were taken to rectify the issue, and what impact the remediation had on continuing operations.

The data for this case study was sourced from a large capacity, multi-species feed mill operating in the Midwest. PFM was deployed across multiple mills operated by this manufacturer, with data for this discussion obtained from the most modernly equipped of their feed mills.

Following implementation of PFM, a BIG consultant conducted a review with their clients' operations team which identified an issue regarding the mixing accuracy of Fat AV Blend in their rations. The aggregated statistics for the time period (several days) are detailed in the table below, which is a common method of variance reporting presented by most batching systems. Notice the excellent statistical performance this type of summary indicates – which seemingly implies nothing of concern exists for this ingredient.

Stats for: FAT AV BLEND	
Actual Lbs	27,875.50
Target Lbs	27,822.50
Variance Lbs	53.00
Count of Batches	90
Variance per Batch	0.59
PCT Variance	0.19%
Over Limit (Lbs)	4.00
Under Limit (Lbs)	-4.00

PFM does not rely only on aggregated data, which can mask underlying issues within the feed mill production system. PFM produces visualizations that provide a much more accurate depiction of the actual quantity mixed – for EVERY ingredient – in comparison to the target quantity for each batch manufactured. The chart below illustrates the exact variation of Fat AV Blend for the 90 batches summarized earlier.

**Mixing Variance (Lbs) for: FAT AV BLEND**
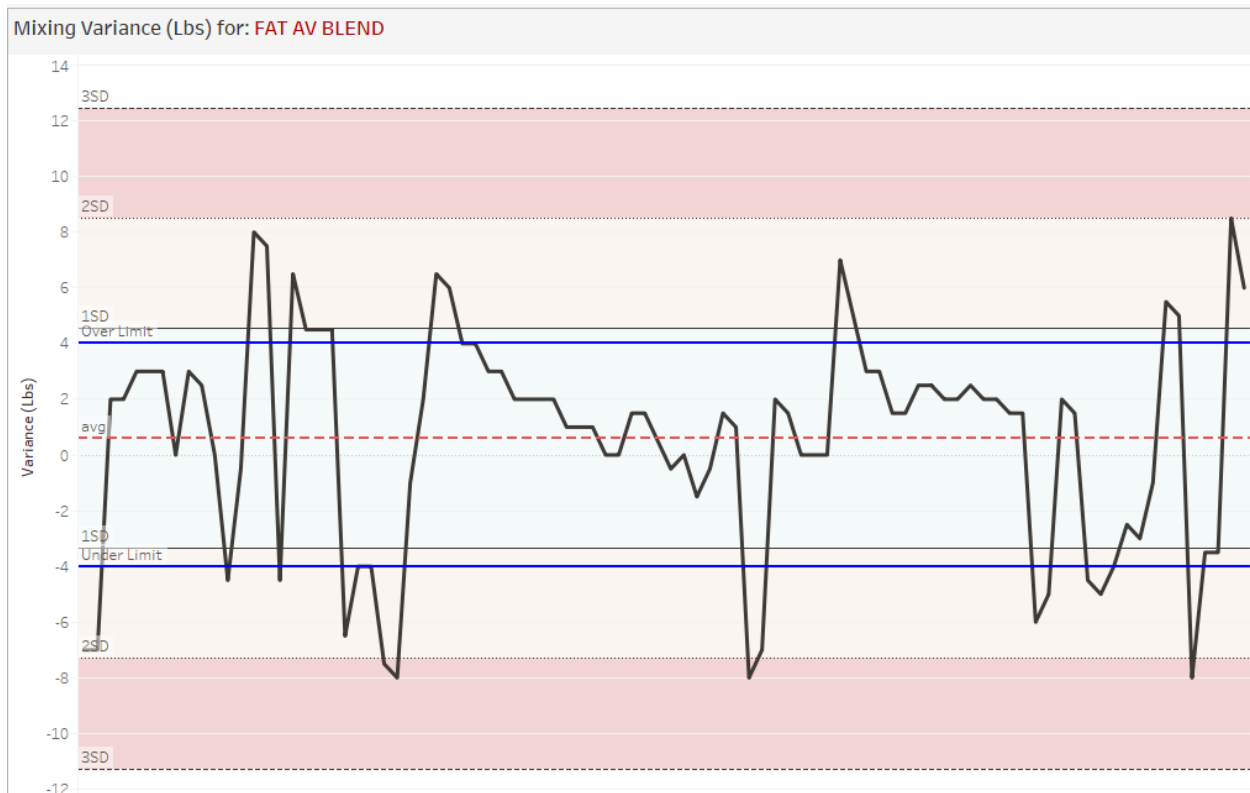
Note the blue lines on the chart indicating the tight Over/Under limits for Fat AV Blend at this mill, with the pounds of variation from each of the 90 batches containing this ingredient illustrated by the black line. The red dashed line represents the average variation over these 90 batches of 0.59 lbs. The light green, yellow, and red "channels" in the chart are drawn at the points of standard deviation (SD) as a statistical reference.

As the chart illustrates, several batches exceeded either the Over Limit or Under Limit (69% were within tolerance) as summarized in the table below:

Over Tolerance	14
Under Tolerance	14
Within Tolerance	62

Upon reviewing another visualization of these 90 batches containing Fat AV Blend, a trend appeared that identified a correlation between inclusion rate and accuracy. The chart below illustrates the 14 instances where the actual ingredient amount mixed was below the -4.0 lb. Under Limit (indicated by red diamond marks), which interestingly occurred when the Target amount for Fat AV Blend was at or below 130 pounds per batch. In fact, there were 30 batches during this period that had a 130 lb. or less Target amount and only

16 of them (53%) were above the Under limit and also within the Over limit range of 4.0 lbs. (represented by green diamonds). The 14 batches that exceeded the Over limit (orange diamonds) were all at inclusion rates above 240 lbs. per ton.
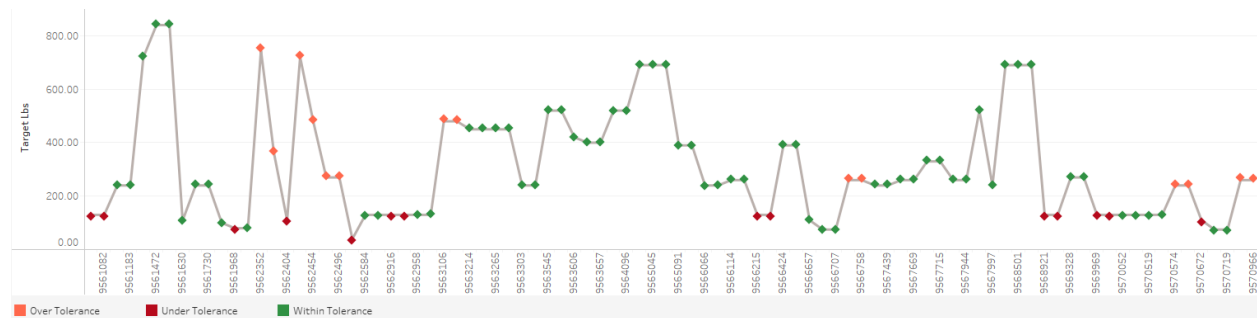
The manager of the feed mill recognized this data was relevant regarding the performance of the frequency drive on the liquid pump. He proceeded to make an adjustment by reducing the full speed and the freefall speed settings the pump had been operating at. This allowed the freefall weights of Fat AV Blend to be more consistent and resulted in a vast improvement in accuracy (as illustrated in the following chart) produced after implementing the process change:
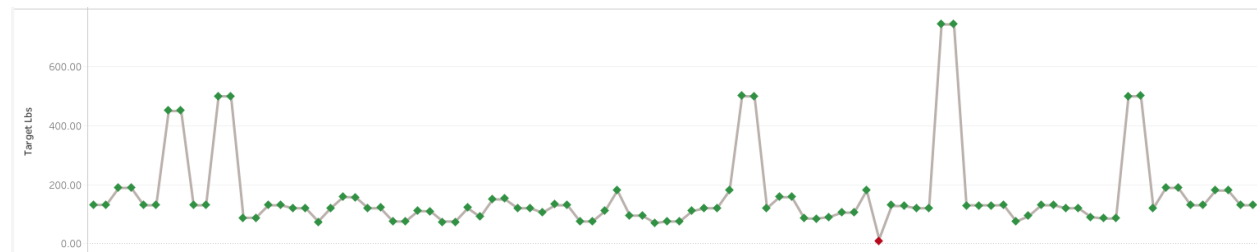
A total of 94 batches were mixed with Fat AV Blend over several consecutive days following the pump speed adjustments, with 69 of them (73%) with Target amounts of 130 lbs. or less. With the lone exception of one batch that had a Target amount of 15 lbs., all of the batches were mixed within the +/- 4.0 lb. limits. In fact, 91 of the 94 batches had the Fat AV Blend added to the mixer within +/- 2.0 lbs. – a remarkable improvement from previous levels. In total, the average variation for the 94 batches manufactured with Fat AV Blend during this period was reduced to -0.15 lbs. per batch (-0.09%).

The company operations manager later recapped how PFM visualizations provided deeper insights that led them to change the pump settings:

"This resulted in us hitting the target and not falling short of the target inside the tolerance window (which was set relatively tight), which then allowed the system to move onto the next ingredient. Pretty basic stuff, but by having a source of information to quickly visualize this inaccuracy within our batching system, we were able to make adjustments to improve our process and the overall quality of feed we are supplying to our customers."

To learn more about how PFM can positively impact your feed mill operations and schedule a demonstration, please contact BIG Consulting at: info@BIGurus.net or 888.230.8810.