

Optimizing Break Release

Achieving top performance in a mill centers on developing an accurate schedule.

Some of the most common questions asked frequently when evaluating mill performance are related to determining the optimal break releases for the mill. Basically, there is no single

answer to this question.

The optimal break release schedule for any milling operation depends on several factors such as wheat type, wheat moisture, length of milling flow, and condition of the grinding rolls, just to name a few.

Determining Break Release

While this article won't be able to provide the numerical answer to the optimal break releases for a mill, it will offer some direction as to what determines it and how to manage the proper setting of the break release.

Optimizing the consistency of the break release schedule in the mill is important to maintain the balance of the ground stock throughout the mill flow.

Keeping the distribution of ground stock within the design parameters of the system is vital to maximize mill performance.

When the mill gets out of balance, sifters choke up, pneumatic lines drop out, and rolls are over- and/or underloaded, which causes

inconsistency of the flour quality characteristics produced and variability in extraction.

Determining the optimal break release depends on several factors to determine the optimal flow diagram required to achieve the flour quality and the extraction desired from the milling process.


Factors to Consider

Several factors are considered in designing a mill flow diagram. These factors include energy efficiency, length of the break system, target flour extraction, and expected flour quality characteristics such as ash content or color specifications. ▶

Management



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Setting Up the Break System

However, wheat type or hardness is the single most important factor in determining the appropriate flow diagram and break release.

The objective for setting up the break system is the same for all types of wheat—to separate the bran from the endosperm with minimal bran breakage.

The methods used to achieve this goal change, as the wheat hardness changes.

Milling Harder Wheat

When milling harder wheat, the strategy is to maximize the amount of coarse endosperm from the break system feeding into the purification or middlings reduction systems.

Grinding pressures and break release generally are balanced throughout the head or primary breaks (1 through 3), in the attempt to extract larger pieces of endosperm from the bran gently while minimizing



At a recent expert milling course held at the Hal Ross Mill, Kansas State University (KSU), Manhattan, Ralph Linnemann (right), flour milling expert from the Buhler training center in Uzwil, Switzerland, helps Oscar Rocha Jiménez (center), a milling student from Mexico, calculate some key wheat quality factors for determining a break release schedule.

bran breakage and flour production from the break system.

Break release must be high enough not to affect total flour production nega-

tively but gentle enough to maximize coarse endosperm production with minimal flour produced from the primary breaks.

Excessively high grinding pressure on the primary breaks causes increased high ash break flour production, reduced coarse endosperm production, and higher bran contamination throughout the remaining mill flow and flour.

Setting the tail or secondary breaks is critical to clean up the remaining bran to maximize flour extraction and while avoiding excessive cutting or grinding of the bran.

Milling Softer Wheat

When milling softer wheat types, flour production becomes the objective on the

primary breaks.

The softer endosperm flours easier and makes significant coarse endosperm production nearly impossible. Total ▶

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flour yield becomes the most important target.

Higher grinding pressures are used on first break and on the remaining primary break passages to help maximize flour production.

When milling softer wheat, a higher break release is targeted compared to hard wheat on the first break.

A significant quantity of good quality coarse endosperm can be extracted only on the first-break passage.

If the first break release is too low, too much endosperm is lost to the tail breaks, and total flour extraction is affected negatively.

Checking Break Release

Checking the break release is a simple procedure; however, each step of the procedure is important to obtain accurate and repeatable results.

For consistent results, the sampling method must be the same for each miller checking the break release.

Inconsistencies when collecting the sample will result in inconsistent test results.

So before taking the sample, check that the mill is operating under the proper load. The stock must be uniform across the roll.

To collect a representative sample, it should be taken equally from the left side and the right side of the roll and near the bottom nip or center of the rolls from front to back.

The test sifter used must be large

enough to process the entire sample collected. Sifting only a portion of the sample collected will result in inaccurate results.

Finer particles will settle to the bottom of the sampling container. Weighing off or sub-sampling of the original sample most likely will result in a break release calculation that is lower than the actual break release.

The sifting time also must be uniform. Longer or shorter sifting times will result in inconsistent results.

Proper training on the procedures used for checking the break release is



Fran Churchill (background), North American Millers' Association instructor of milling science and management at KSU, offers tips to student Courtney Reed on why good sampling methods are critical in generating accurate test results for determining a break release schedule.

critical to obtaining meaningful results and keeping the mill in balance.

Maintaining Correct Balance

The optimal break releases for each mill varies depending on wheat type and flour quality desired.

Once the optimal break release sched-

ule is determined, proper management for testing and setting the break releases is critical to maintain the correct mill balance.

Changes in wheat type, origin, and even year-to-year differences in the wheat crop will impact the optimal break release schedule.

Understanding the objectives for each break passage, consistently testing the break release, and proper maintenance of the grinding rolls will allow the miller to determine the optimal break release schedule for the mill, maximize flour extraction, and, in the end, increase the mill's overall profitability.

Mark Fowler is associate director of the International Grains Program (IGP), Department of Grain Science and Industry, Kansas State University, Manhattan.

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- Mark Fowler, associate director, IGP, KSU
