# Pulverizer Capacity

## The Devil is in the Details

411 North Depot Street - PO Box 429
Albemarle, NC 28002
Phone: 704-983-2040 Fax: 704-982-9657

# Pulverizer Capacity is not simply "tons throughput per hour!"

While throughput is large factor in pulverizer capacity, many other aspects can dramatically affect your mills' performance. Often times, it is the smaller details such as critical tolerances and the condition of the grinding elements. All of these details should be reviewed when setting up your pulverizer for maximum capacity. The text and curves which follow review the factors that comprise true pulverizer capacity. Capacity of a pulverizer is a minimum of five factors and these five factors are: tons throughput at a given fineness, at a given Hardgrove grindability index (HGI), at a given raw coal sizing entering the mill and at a given coal moisture content.

Throughput alone is NOT a definition of pulverizer capacity! Please read on for more explanation.

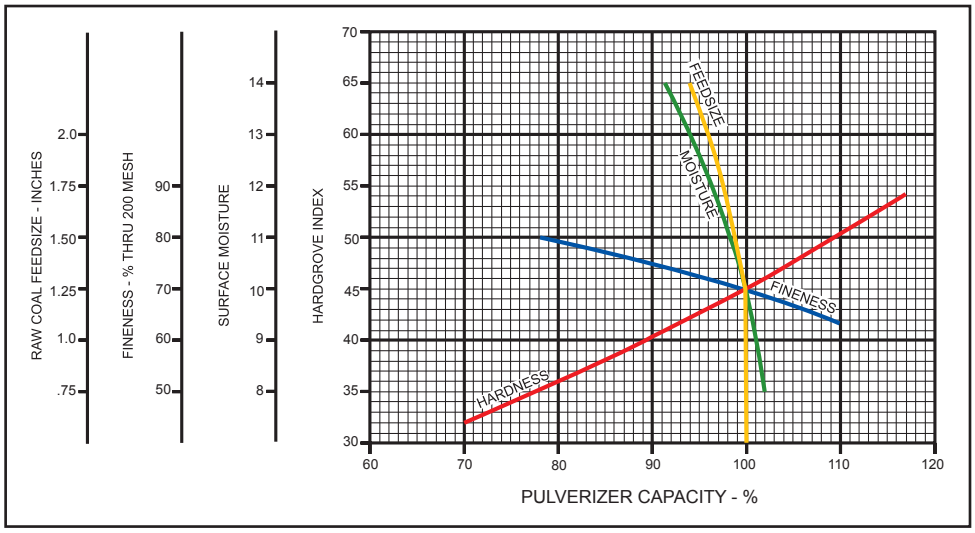
**Predicting Pulverizer Performance**

Often power plant managers and engineers refer to pulverizer capacity as "throughput." Throughput is a measure of coal ground per unit of time such as tons per hour or other units. Throughput is just one of five major factors that comprise pulverizer capacity. The key purpose of this newsletter is to explain what the definition of true pulverizer capacity is.

Pulverizer capacity is comprised of five major factors. These are throughput, fineness, Hardgrove grindability, moisture content and raw coal size. Therefore, throughput is only one component of pulverizer capacity. All five factors play a part. For example, when the fineness is reduced, the throughput can be increased without the pulverizer capacity ever changing. This shows that true pulverizer capacity cannot be measured only by throughput. For example: If the fineness is reduced from about 75% passing 200 mesh to 45% passing 200 mesh, as much as 30% more coal throughput can be pushed through the pulverizers.

The previous example is often inadvertently done by increasing primary airflows or opening classifier blades up to increase the coal flow to the furnace by sacrificing coal fineness. This can satisfy the load dispatcher for the short term, but it can create long term problems such as furnace secondary combustion, high flyash carbon content, high desuperheating spray water flows, etc.

Given the above, the true definition of pulverizer capacity is the coal throughput at a given fineness, Hardgrove grindability, moisture content and raw coal size. All of these factors should be considered when optimizing your mills' performance.




**The Major Mechanical Factors Related to Capacity**

Mechanical factors also play a role in pulverizer capacity. One of the major mechanical factors is the surface area for grinding. This is essentially the available contact pressure area between the grinding elements and the grinding table or segments. Pulverization occurs when coal particles are squeezed together with other coal particles under enormous pressure. The footprint and the pressure of the grinding elements are what govern coal pulverization. For example, the amount of contact area beneath the tires on an MPS mill is limited to three small footprints beneath the grinding tire. These three small footprints are the only areas that actually pulverize the coal. If the grinding elements are in poor repair, then it will adversely affect your pulverizer

capacity. The other mechanical factor is the amount of pressure applied to the grinding elements. That pressure should be uniformly applied to all the grinding elements to provide optimum performance.

Worn grinding elements cannot create the maximum pressures required to reach maximum grinding effectiveness. Lower HGI fuels of course, exacerbate the true capacity problem when the grinding elements are worn.

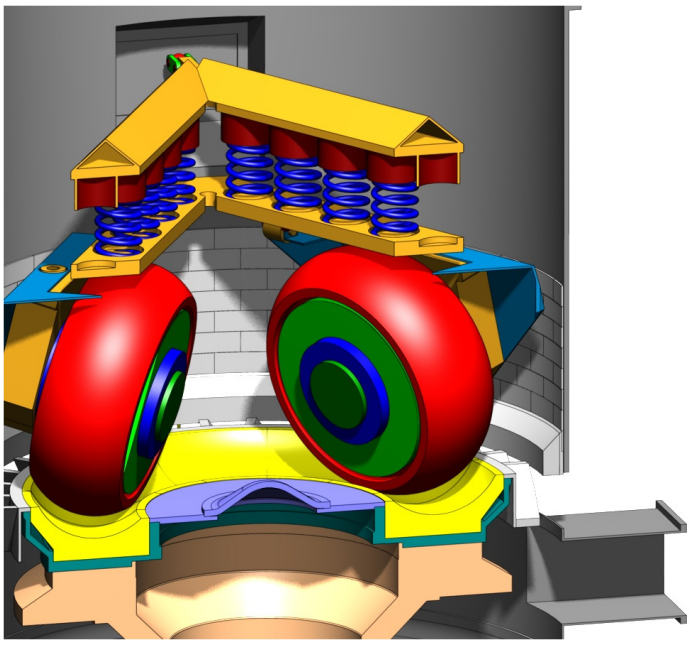
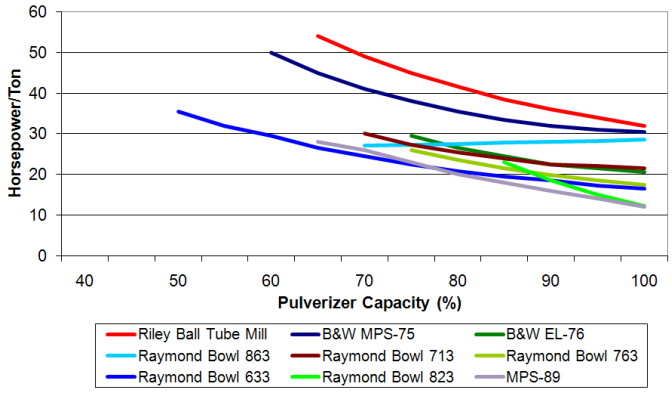


*Illustration of the "grinding zone" on a MPS mill*

**Horsepower/Ton Consumption**

Below is a typical HP/ton consumption chart based on our experience. However, keep in mind that power consumption varies with mill types but are also largely influenced by coal feed rate, HGI variations, spring pressures, coal fineness, mechanical alignment of the grinding elements, bearing condition, optimum or reduced air/fuel ratios, etc.




Our experience proves that monitoring mill HP/ton consumption for a given fuel HGI and/or mill fineness can serve as a performance indicator to ensure the preservation of the milling system performance.

**Comprehensive Performance Optimization**

Performance optimization includes a thorough process of evaluating the existing performance, inspecting the internals of the mill and mill maintenance blueprinting. This process is for achieving critical tolerances, developing the fuel loading curves, evaluating the measured and controlled air-fuel curves and measuring actual performance of the incoming and outgoing air-fuel ratios to the burners.

For best results, mills should be tested and maintenance driven by the test data collected, not by hours of operation or tons of throughput. We call this, "Performance Driven Maintenance". It is surprising to us that many plants do not perform mill maintenance and overhauls based on accurate coal fineness and distribution test data.

The pulverizers are the "heart" of a pulverized coal fueled power plant and as such, must be set up for maximum effectiveness so that the best furnace performance can be achieved. Factors such as fuel flexibility, furnace slagging, unit heat rate improvements and electrostatic precipitator performance often are related to the pulverizer performance. Storm's "13 Essentials of Optimum Combustion" continue to prove themselves in importance!

Storm Technologies, Inc. can provide a comprehensive approach toward optimizing your pulverizer performance. Call or write us if you would like to apply "Performance Driven Maintenance" to your pulverizers. From diagnostic testing services to complete mill performance components, we have the resources and expertise to achieve results.

SHORT COURSES

**Strategic Planning Workshop**

When: April 27-28, 2010
Where: Neundorfer Training Facility
4590 Hamann Parkway
Willoughby, OH 44094
Cost: $1,200 per seat

**Large Electric Utility Boiler Combustion and Performance Optimization**

**(2) Day Fundamentals Location:**
When: June 2-3, 2010
Where: Charlotte Marriott SouthPark
2200 Rexford Road
Charlotte, NC 28211
Cost: $1,300 per seat

**(2) Day Advanced Location:**
When: June 30 - July 1, 2010
Where: The Westin Hilton Head Resort & Spa
Two Grassland Avenue
Hilton Head Island, SC 29928
Cost: $1,300 per seat