PACER ROLL GRINDING WHEELS

DESIGNED FOR PAPER MILLS

PM RESIN BOND FOR ROUGHING
CORK FILLED - RUBBER BOND FOR FINISHING

A SYSTEM APPROACH TO FASTER GRINDING OF PAPER MILL CALENDAR ROLLS

ROLL GRINDING OVERVIEW

Grinding of paper mill calendar rolls is one of the most difficult grinding operations in industry. They are very long relative to diameter, hard, and have close tolerances. They require a good to excellent surface finish. Grinding of other types such as stainless sucker rolls also is no easy task.

Historically, paper mill rolls have been time consuming to rough and more so to finish. Considerable operator skill has been required as well as attention to the machine and surroundings.

Difficulties encountered may include roll deflection and sag, bearing induced effects, vibration, roll to wheel harmonics, wheel glazing, stainless steel loading and the like. Grinding, especially finish grinding, can be a sensitive process. One roll might grind with few problems. The next could take twice as long.

ROUGHING AND FINISHING PHASES

The choice of grinding wheel for roughing and/or finishing has always been of prime importance. A wheel that is too hard, soft, has hard spots or varies wheel to wheel can cause much time loss. The loss may be due to the operator having to compensate by:

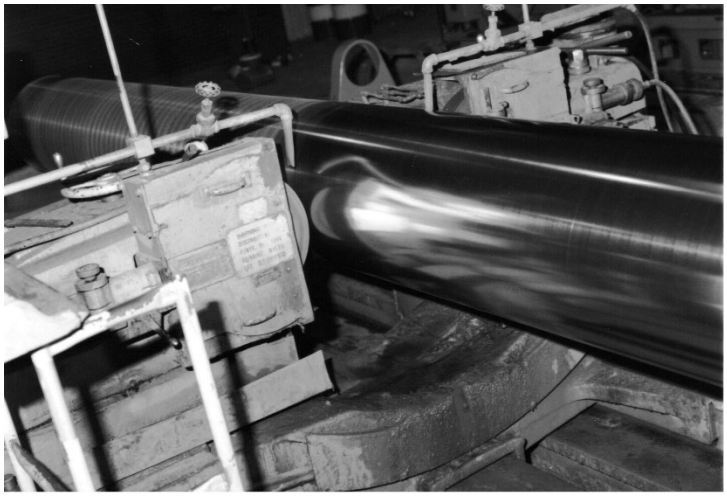
- slowing travel across the roll
- reducing depth of cut (more passes)
- regrinding to remove chatter, etc.
- dressing wheel frequently

Subtle inefficiencies can occur in roll grinding. Time-held practice may seem satisfactory. For example, the wheel traditionally used may seem to be as aggressive as can be expected. Its abrasive action, however, could be considerably less than with another type wheel. Technology has advanced.

Additionally, roughing and finishing with one wheel may take more time than with the best wheel for each. Particularly with chilled iron rolls, a wheel hard enough for roughing can be too hard for ease of finishing. The problem appears as chatter, spiral bands, heat buildup, grain pits and other such defects. Trying to finish these out requires more passes and at a slow pace.

TRANSITION PHASE

Also, to be considered when roughing and finishing rolls with one wheel is overlap between the two phases. Typically, as a roll approaches the roughing depth required, gradual adjustments are made to wheel feeds and speeds. This transition, in effect, is preparation for finishing. It is necessary but has the disadvantage of lengthening both roughing and finishing phases.



ROUGHING WHEEL OVERVIEW

Paper mill roll grinding wheels consist mainly of abrasive grains and a resin bond for holding the grains together. The abrasive generally used is silicon carbide. This black grain is sharp, hard and well suited for most rolls.

The bond generally used in past decades has been shellac resin. A property of shellac resin is that is becomes somewhat soft during the heat of grinding. This makes the wheel more able to release dulled abrasive grains and expose sharp new ones. A roll wheel must wear or breakdown at the appropriate rate in order to grind effectively.

Shellac resin has relatively low tensile strength. This limits the development of a more satisfactory (aggressive) wheel. In addition, shellac is a natural resin; thus, is affected by seasonal conditions at its region of origin. Shellac cured too soft or hard will cause too much or little wheel breakdown. Any hard spots cause problems.

PACER PM RESIN ROUGHING WHEELS

A wish list of roughing wheel features might include:

- more removal per pass
- little tendency to glaze (less chatter)
- less dressing required
- freer cutting (less heat)
- more uniform and consistent

As mentioned, technology has advanced. Pacer has developed and made patent application for a new type of resin bond grinding wheel. A version was designed specifically for the paper industry. It now is making the above list more achievable.

It is designated the PM (Paper Mill) resin bond. PM is the suffix in the wheel specification. Like shellac resin, the PM resin softens during the heat of grinding. Unlike shellac, however, its tensile strength is quite high.

THE PM WHEEL – HOW IT WORKS

The Pacer PM wheel grinds very aggressively – noticeably more than possible with shellac. The bond strength holds the abrasive grains firmly. It is felt that the added strength keeps the sharp edge of an abrasive grain against the work rather than allowing it to deflect away. Also, the grains are less likely to release too early.

Other wheels can act harder by increasing the amount of bond (shellac) in the wheel. The result often is increased wheel glazing. The amount of resin in a PM wheel is no more than with other wheels; actually is somewhat less. This increases the voids or pores available for carrying coolant.

The high-tech resin isn't the only state-of-the-art feature in a Pacer PM wheel. The abrasive is specially treated before combining with the bond. This promotes an extra strong adhesion between grain and bond during the curing process. Also, the bond contains a unique material for assisting the wheel to release grain at the proper time.

PACER PM WHEEL – ADVANTAGES

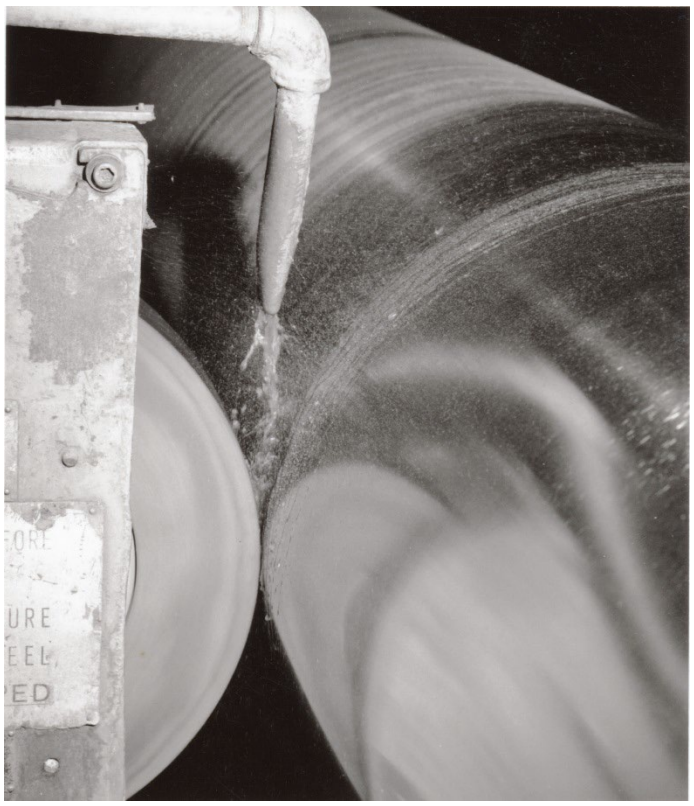
The main advantage of the Pacer PM roughing wheel is that it is more aggressive – more abrasive. It can rough grind rolls faster because it cuts more freely and does the job in few passes. There is less pressure; less change for roll deflection. An operator soon finds this to be a different wheel.

Pacer has been well known for cork finishing wheels. Now it has developed a new generation roughing wheel. Operators find the PM, like the cork, to perform as claimed. The wheel can be an important tool in reducing grinding costs, whether used alone or followed by a Pacer cork wheel.

FINISHING WHEEL OVERVIEW

Roughing wheels are made to remove stock. They can have difficulty taking light cuts on hard, large diameter rolls. Low grinding pressure causes abrasive grains to wear flat and the wheel to glaze. The following problems often have existed when finishing chilled iron rolls:

- chatter
- spiral lead line (barber pole appearance)
- grain pits – random
- variation of finish across roll
- heat buildup



A dull wheel acts hard and can bounce on the roll. Machine vibration and wheel/roll harmonics also induce chatter. A spiral line around the roll is a product of a hard wheel face burnishing the roll. Abrasive grain pits are the depressions caused by loose grains (from wheel or coolant) crushed by wheel in to the surface. Variation of finish results from the changing condition of a glazed wheel face. Heat buildup is friction from flat grains rubbing on the hard roll.

Finishing chilled iron rolls with standard wheels often takes much longer than roughing – especially considering transition time. Also, after hours of effort to approach the finish needed, chatter may appear. They only course is to start over again – to regrind; with no assurance the situation will not occur again.

PACER CORK FINISHING WHEELS

A faster way to finish is to use a Pacer cork filled, hard rubber bond wheel. It can remove roughing marks and then produce a smooth, consistent surface from end to end. It is used most often for chilled iron but also is very effective on other rolls:

- hard rubber (stonite)
- granite
- chrome plated
- stainless steel
- bronze

Pacer's special formula allows the wheel to act soft. The cork filler and rubber bond deadens any vibration because the abrasive grain is slightly cushioned. Grain is able to release more readily during light cuts. Pressure of the cork and rubber has a polishing action on the roll. Pacer cork wheels are heavy-duty and made to be run wet.

Typically, a cork wheel is used after the roll is roughed. For very light removal, however, the cork wheel alone is sufficient. Relatively quickly, the wheel can be mounted and ready to go. Often, cork wheels are kept on their own mounts to minimize changeover time.

Pulp & Paper Magazine published a case history of cork used on chilled iron. Contact Pacer for a reprint.

PACER CORK WHEELS – ADVANTAGES

90 and 120 grit are the most common cork wheels used. A 90 grit wheel is aggressive enough to finish an 18" diameter x 18' long chilled iron roll in four hours. The finish always is good. Little skill is required but, to help, an instruction sheet is packed with the wheel. It recommends the best rpms, amps, traverses, etc.

The 90 grit cork wheel gives an 8-12 micro finish. A 120 grit would reach the 6-8 range. For extra bright and smooth finishes, the 90 or 120 would be followed by a 240 grit to achieve a 2-4 finish.

Pacer cork wheels make it easier to predict and control finishing costs. The rolls have uniform diameter and finish across the length. The roll surface is of high quality, an important advantage in the production of many types of paper.

GENERAL INFORMATION

PM roughing wheels and cork finishing wheels are stocked at the factory. Next day air UPS delivery is possible for many sizes. The Pacer factory staff has considerable wheel/roll experience and would be pleased to answer any application questions. Performance always is guaranteed.

Improper use of grinding wheels can be dangerous. Follow the instructions set forth in the ANSI B7.1 American Standard safety Code for "The Use, Care and Protection of Abrasive Wheels."

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