

# TIRE RETAINER PRESSURE CORRECTION

NAK Instruction 32  
Revised November 2, 2006



Tires move relative to the shell as the kiln rotates. This movement is referred to as tire creep. If the plane of the tire is not perpendicular to the rotating axis of the kiln, the direction of rotation of the tire is slightly different than the direction of rotation of the shell. In other words, the tire creep has a horizontal component in addition to the circumferential component. The horizontal motion component is the source of tire retainer pressure.

The tire retainer pressure is directly proportional to three variables: a) the angular misalignment between the plane of the tire and the kiln axis, b) the tire creep, and c) the coefficient of friction between the tire ID and the shell. Therefore, three strategies are available to lower the retainer pressure.

1. Lubricate the tire ID. This is the only effective immediate option to lower high tire retainer pressure. It will lower high pressure regardless of the cause of the problem. Lubrication of the tire ID will decrease the coefficient of friction between the tire ID and the support pads. With a low coefficient of friction, there is insufficient traction between the tire and the pads to place a high load on the retainers.

Graphite is not an effective lubricant for this purpose. Because it is easily dislodged from the interacting surfaces, continuous application of graphite is required for proper results. The best lubricant consists of soft metal powders (copper, zinc, or aluminum) suspended in a sprayable carrier. The soft metal powders laminate onto the tire ID and the support pads, providing lubrication after the carrier dissipates. Anion SlickSpray, available from [www.anioncorp.com](http://www.anioncorp.com) is a lubricant specifically formulated for this purpose. It is easily applied from a distance, eliminating close human proximity to very hot moving kiln components.

2. Realign the tire plane relative to the kiln axis. The angle between the plane of the tire and the kiln axis is a function of the support roller slopes. If this angle is not 90 degrees, the tire creep has a horizontal motion component. If the roller slopes are too high there will be high pressure on the downhill retainer. If the slopes are too low pressure will be high on the uphill retainer. Changing the roller slopes by shimming the bearings will decrease the pressure. This is the preferred and permanent means of correcting the problem of high retainer pressure.

The correct support roller slope is not necessarily the same as the kiln overall slope. The shell span between piers sags due to gravity. If this

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vertical shell axis deflection is greater on one side of a tire than on the other (often due to buildup), the shell axis slope at the tire will tilt in the direction of the higher deflection. In other words, the slope of the shell axis at the tire will be different than the overall slope of the kiln. Unless the support rollers are set to the tilted axis slope, rather than the kiln overall slope, tire retainer pressure will be high.

Another mechanism that tilts the plane of the tire relative to the shell axis is a taper condition on the tire or the rollers. This condition is corrected by resurfacing the tire and the rollers. Tire and roller tapers are caused by wear resulting from high support roller thrust loads. The thrust load on each roller should be measured and corrected as part of a comprehensive kiln alignment scope of work.

3. Decrease the tire creep. There is a direct one to one relationship between tire creep and stop block pressure. If the tire creep is decreased by 50%, the retainer pressure will decrease by 50%. This option is only possible on kilns equipped with tire support pads. The pads have to be shimmed or replaced to decrease the tire clearance and thus decrease the tire creep. In addition to lowering the retainer pressure, the shell ovality is also decreased by this repair procedure.

The angle between the plane of each tire and the kiln axis is an important alignment variable; its determination should be part of a kiln alignment scope of work. A misaligned tire plane implies incorrect roller slopes or radius variations on the tire and the rollers. These conditions cause high tire retainer pressures and need to be assessed to assure kiln mechanical stability.

*Proper analysis of problems pertaining to kiln stability requires in depth knowledge of the variables involved. If the above information is something you have not seen before, you need NAK as your kiln service provider. Please contact NAK for reliable solutions to all kiln related problems. We are your best source for rotary kiln technical information that makes sense.*

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