



INDUSTRIAL KILN & DRYER GROUP™

KILN & DRYER ROLLER ADJUSTMENTS

Without a real preventative maintenance program, your equipment may be just a step away from catastrophic failure, costly repairs and replacements. John Ross, with Industrial Kiln & Dryer Group™, has seen this scenario become reality many times while on job sites. As OEM certified kiln and dryer maintenance instructor and kiln alignment specialist, Ross spent over 29 years servicing rotary equipment (kilns, dryers & ball mills) in the mining, cement, lime, chemical, fertilizer, food, and asphalt industries and has authored and published several kiln maintenance articles.

Below, he discusses the principles of Kiln & Dryer Roller Adjustments and the importance of a healthy preventative maintenance program.

Q & A

Q. What are the three main reasons for making roller adjustments on rotary equipment?

J.R. Primarily, adjustments should be performed with the ultimate goal to control the axial thrust of the unit, while relieving the thrust pressure on the individual rollers.

Another important reason for regular adjustments is to correct any alignment imbalances, focusing on OEM-specified positions for the rollers.

Thirdly, adjustments are conducted in case of mechanical problems with the unit. For example, a unit with a hot or damaged bearing may have to be adjusted to compensate for the problematic roller, relieving the thrust on the individual bearing. This, of course, is an extreme measure, but unfortunately more common than it should be. Compensating for one individual bearing can cause the others to absorb the load, increasing wear and failure in other areas. When good preventative maintenance programs are in place, we notice that such reactionary solutions aren't necessary.

Q. What are the reasons that a unit will thrust excessively in one direction?

J.R. When we are referring to excessive thrust, it is because the unit is riding against one thrust roller for extended periods of time. And the most common reason for this condition is that the rotary unit has not been correctly adjusted and/or has not been aligned correctly or frequently.

A few other reasons may come into play. The varying types of operational settings or levels of moisture in the product will increase the weight and/or temperature, thus adjustments that had been made previously under normal conditions may no longer apply. In some kilns and dryers, sticky material can cause build ups on the inside of the shell and cause high loads and temperature changes in the shell. Atmospheric conditions such as dust, a dirty environment, rain or snow can cause the roller to bite, adding more stress.

An important note to be made is that some of the operational and environmental conditions aforementioned may be short lived. This is important to be aware of because it is best to avoid making a change to the alignment of your unit simply because of temporary factors. Making only necessary adjustments to the unit will ensure the alignment remains stable and in the correct position.

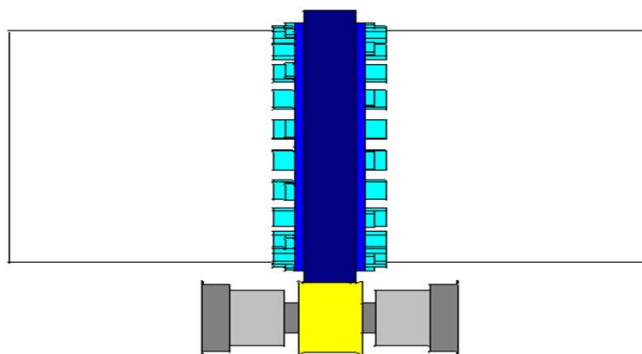
Q. How long should the unit thrust in one direction before making roller adjustments?

J.R. It is very important to monitor the unit's production and watch the unit for changes in mechanical conditions. We usually ask the control room about the production rate of the equipment, and whether it is at a normal pace. When production is normal and any high thrusting is still present after two to three weeks, the first step is to eliminate temporary factors that might be contributing to the extreme thrust. Once we know that this is a long term issue that needs to be addressed, we begin changes to the alignment.

Q. What type of wear conditions will affect the thrust of the unit?

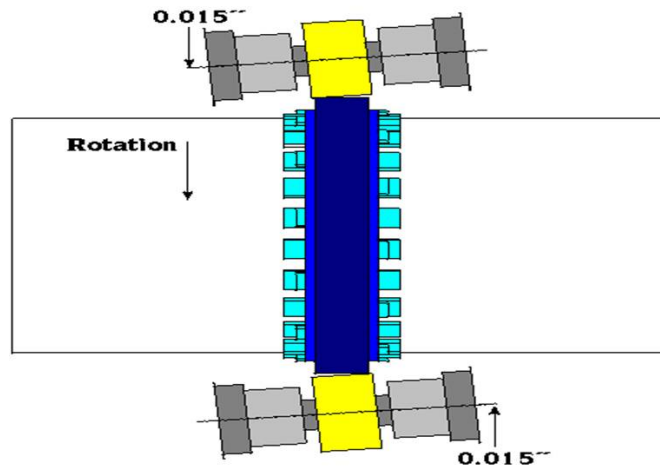
J.R. Most common wear conditions are ***concave and convex*** wear patterns where the tire wears in a crowned type pattern and the roller wears in a dished-out shape as the tire sits down into it. This should be of concern because it means the tire has been mechanically locked into place as it wears down into the rollers and can't move very well in one direction or another. This can also lead into further thrusting issues and possibly bearing problems on individual rollers.

Convex / Concave Wear Pattern



In order to minimize the additional thrust on any one roller and distribute the load to the others, we have to skew the rollers intrinsic to the design of the unit. If you look at the diagram below, you will notice where, in one case, we put pressure on the downhill side of the rollers.

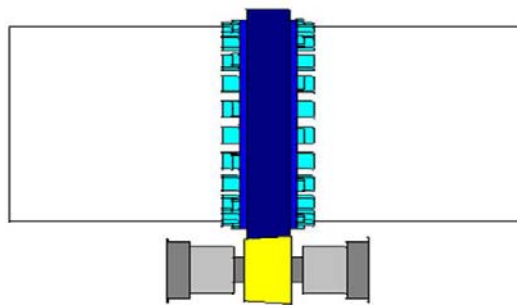
Typical Adjustment of Support Rollers



A common practice we see often is adjusting only one roller to try to drive the unit. This happens mainly because it is the easiest to access, or may be the coolest roller in an extremely hot environment. The result is having a single roller taking on the majority of the unit's thrust and, because of its negative long term effects, we do not recommend this practice.

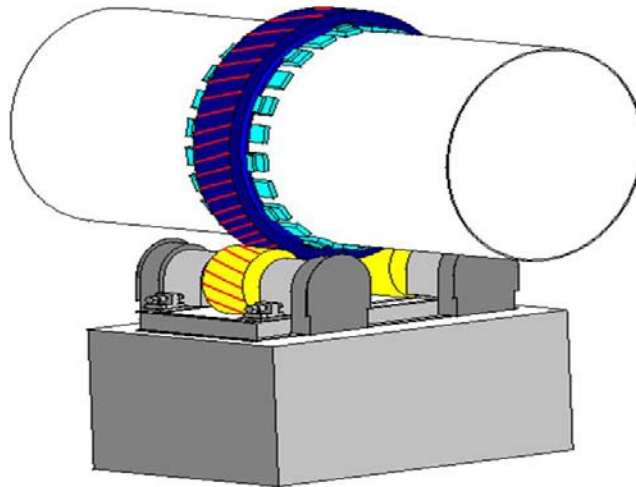
Another type of wear pattern that can occur over an extended period of time is **conical or tapered**. This is a particularly concerning type of wear because it can cause the axis of the tire to tilt and drive into the retaining blocks, leading to mechanical as well as thrust problems.

Conical Tapered Wear



Here are some more wear patterns you may encounter — **diagonal marks** are indication of roller maladjustment; a band of **pitting marks** on one side of the unit can mean there is too much pressure on that side; and **flat spots** are noticeable when other problems arise with the unit, so make sure to look into all possible causes before making the adjustment.

Diagonal Wear Pattern on Riding Ring and Carrying Roller



Q. Do excessive and lack of lubrication affect the thrust of the unit?

J.R. The answer is yes. This is such a big issue when it comes to the proper adjustment of your unit, and too much or too little lubrication can equally affect the proper operation of rotary equipment.

There are two different types of lubrication – oil and grease or dry graphite. While some are still using oil and grease, it is not what we consider best practices for your facility. This type of lubrication is usually applied in excess and can become extremely slick, with little or no resistance for the roller adjustments. Excess lubrication will necessitate more radical adjustments to achieve the desired adjustment of the rollers, while lack of lubrication will accelerate wear conditions and create unstable thrust conditions.

The lubrication we highly recommend is a dry graphite, best used in block or powder form. It is more uniform and the results are more predictable.

Q. What are some indicators that the rollers are mis-adjusted?

J.R. There are three primary signs to look for: **temperature, vibration and wear patterns.**

An increase in the temperature in the bearing taking the load is a very strong indicator of excessive thrust and wear. Unusual vibration signals the bearings are overloading.

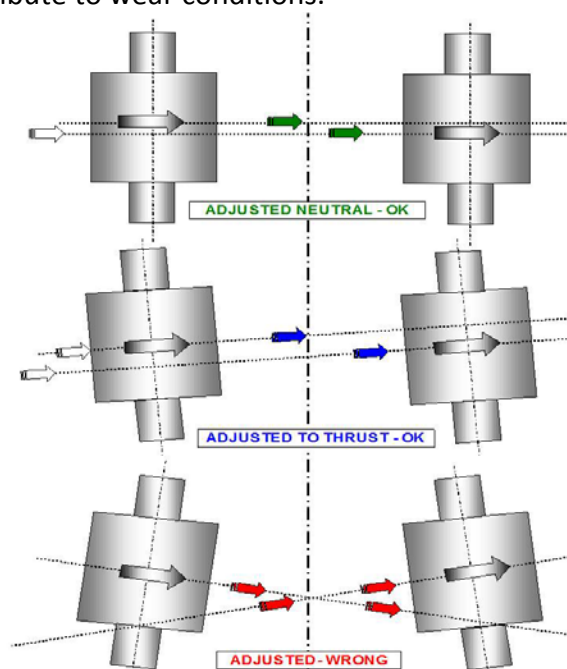
Thirdly, we look for specific wear patterns. The unit might present concave or convex patterns; spalls or metal flaking where the tires are thrusting too hard; diagonal marks showing an excessively skewed roller; or even flat spots, indicating the gear is bottoming in the pinion. Any of these signs point to undesirable mechanical conditions and adjustments will need to be made.

Q. How does misalignment of rollers affect drive amperages?

J.R. When the unit is misaligned, it is working much harder to complete the production process. With this extra load, drive motor amperage will automatically spike. Therefore, maintaining and adjusting the equipment timely and correctly will also give you a drop in drive amperage and a twofold benefit: less wear and less cost.

Q. What is the best way to adjust rollers to not have alignment issues?

J.R. The best way to adjust your unit's rollers falls within the best practices of alignment procedures outlined in your OEM specifications. The key adjustment advice we can offer is to always balance the load between all rollers versus one particular roller. It is a common practice as well to adjust the height of the gear from bottoming in the pinion by moving the rollers in on the drive pier. This will eventually cause a misalignment of the unit that can contribute to wear conditions.



Q. How often should rollers be returned to neutral position?

J.R. We recommend units go back to neutral positioning at least once a year. Industrial Kiln & Dryer Group™ provides a great alignment tool for quick operations: the T-Trac™ - TRUNNION TIRE ROTARY ALIGNMENT CORRECTION SYSTEM. Find out more at

<http://www.industrialkiln.com/images/TTRAC.pdf>

The reason behind neutral positioning is to avoid alignment issues: even if rollers may appear to be tracking pretty well, they can be skewed in different directions. Excessive skew on individual rollers will cause wear patterns to develop and will increase the power consumption to operate the unit. So, from time to time, it helps to regain a neutral alignment and start over.

Q. Is it necessary to resurface the tires and rollers so roller adjustments can be made more efficiently?

J.R. The key word here is “necessary.” While this practice is common, we believe it is overused across industries. One should rarely have to resurface because it involves continuously removing material and in many cases does not correct the underlying problem. Excessive resurfacing of the tires and rollers is an indication of more serious mechanical problems that are affecting the reliability of the unit. Eventually components such as rollers and tires will need to be replaced because of the material removal and the “root” cause of the wear problems was never addressed.

Instead, with correct roller adjustment, and scheduled alignment surveys, this practice can be avoided. IKD specialists recommend keeping up with the roller’s OEM-designed hertz pressure in order for the unit to run efficiently. When contact between the tire and rollers is at less than 80%, the hertz pressure at the contact point will increase exponentially and accelerated wear will occur.

Q. Is it possible to move the tires off retaining/stop blocks by adjusting the rollers?

J.R. This is another practice that we notice plant personnel attempting in the field and we do not recommend it. When wear is causing extreme thrust between the tire and the stop blocks that hold it in place, many will pigeon toe the rollers in to compensate for the wear. This not only doesn’t correct the issue, but adds to the thrust and increases the wear rate significantly. Some will also compensate by adding a greater amount of skew, so much so, that bearings will over-heat and/or fail and we start seeing excessive wear patterns.

The only real solution to excessive tire thrust is to correct the wear condition and align the unit correctly. This can be a matter of simply removing conical wear patterns or can be as extensive as re-setting or replacing the structural steel bases under the rollers.

Q. When replacing a roller, is it a good idea to adjust it for contact?

J.R. At IKD, we advise to correct the alignment issues first, before adjusting for contact. It is not uncommon for the structural steel bases that support the rollers to settle or become twisted over time. In order to provide correct alignment of the rollers it may be necessary to shim under pillow-block style bearings or correct the base slope issues. This will insure the rollers are aligned properly and that loads are distributed proportionally.

Q. Should we train all of our maintenance people to adjust rollers?

J.R. Too many people having access to adjusting rollers has historically been a major problem with maintaining correct roller alignment. It is extremely difficult to keep reliable records when too many hands get involved and misalignment will occur as a result. It is best to have only a few key maintenance personnel who have access to making the actual moves on the rollers.

Q. How important is it to keep a logbook for documenting the roller adjustments?

J.R. This is very important as it allows for continuity of information and record keeping of what has been adjusted and under what conditions. To minimize errors, provide continuity and have a planned approach to maintaining desired alignment, kiln users can avoid costly repairs, minimize downtime and reduce energy costs. This can make it possible to save tens of thousands of dollars in unnecessary maintenance expense over an extended period of time. It all starts with knowing the equipment and establishing trends that enable predictive maintenance possible.

INDUSTRIAL KILN & DRYER GROUP™ VISION STATEMENT

We will be a solution provider that adds measurable value to our customer's operation. To enable us to accomplish this, Industrial Kiln & Dryer Group will become the leading parts provider to all markets served, while growing our service capability to cover all processing equipment markets in North America. While driving toward these goals, we will develop and leverage a zero incident safety culture and an expanding learning environment that will result in sustainable growth for our company.