FULLER®

TIRE AND SUPPORT ROLLER RESURFACING SERVICES

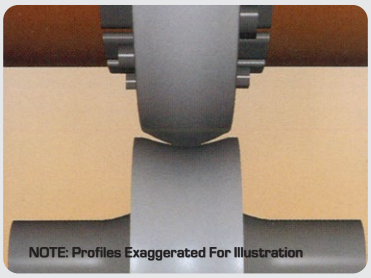
Our resurfacing process greatly improves mechanical stability resulting in extended equipment life and decreased operating costs.

WHY RESURFACE?

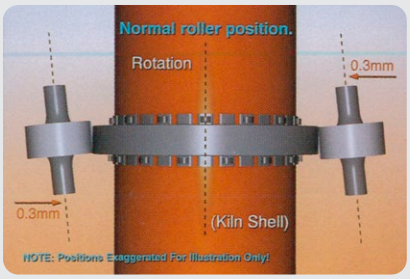
Fuller can correct these problems

- Concave/convex wear
- Rolled over edges
- Timing marks
- Taper wear
- Spalling
- Circumferential grooving

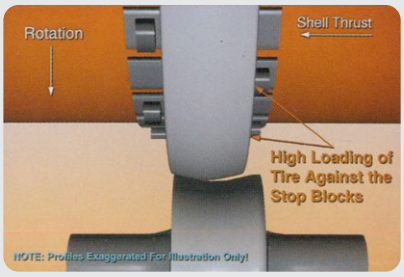
Concave and convex wear



Convex wear and concave wear on rollers and tire



Normal adjustment of rollers causes convex wear on tires and concave wear on rollers



Uphill or downhill kiln movement can cause hot bearing temperatures

As a kiln ages, various types of wear problems occur. Tire and roller surfaces may show pitting, spalling, cracking, marking, irregular face profiles and rolled over edges. As the wear continues, these conditions can result in vibration, high power consumption, alignment problems and short bearing life. If allowed to continue, not only premature bearing failures but damage to tire retaining components, bases, drive components, piers and footings, can result.

Resurfacing allows proper adjustment of support rollers. Resurfacing reduces power consumption. Rolled over edges lead to edge cracks which can propagate into the tire causing large pieces of metal to fall out or the entire face of the tire to crack. Fuller's resurfacing process improves mechanical stability while decreasing the cost of operating the equipment.

Fuller resurfaces the worn faces of support rollers and tires by grinding, in-situ, while the kiln is in normal production.

The Benefits

Energy required to turn the kiln is reduced. Case studies show that energy savings of up to 42% have been made on the running of rotary kilns. We accurately measure and report the diameters before and after the resurfacing process. This makes it possible to hold a machining tolerance of 0.3 mm on the radius.

Surfaces are finished to 125 RMS or better. This allows for setting the final thrust on the rollers during the process.

Fuller's method uses a cup grinding stone allowing the machine to sense the highs and lows as it traverses the face. In this way, difficult problems such as timing marks or other highs and lows are eliminated with minimal material loss and without risk of machine chatter.

Resurfaced components improve the mechanical efficiency of your kiln.

The process is performed during normal production; there is no costly downtime and plant operation is uninterrupted.

The ability to adjust rollers with reduced danger of causing hot bearings is significantly improved. The remaining service life of the equipment is maximized.

Operating costs and energy consumption are reduced.

TYPES OF PROBLEMS

Concave and convex wear

Concave and convex wear results from the skewing of the roller shafts sometimes used to control axial thrust. As this type of wear continues, the contact between tire and support rollers decreases. Therefore even more skew is required to maintain the desired thrust. This causes even more wear and, as the cycle continues, the kiln becomes more and more difficult to control. Bearing failures or serious thrust roller problems can result. Thermal expansion and contraction during normal operation causes the tires to move axially up hill and down hill on the rollers, forcing the tire to ride high on the edges of the support rollers. This increases the loads and stresses on the metal and will cause surface spalling or lead to metal fatigue and cracking. Concave and convex face profiles prevent free axial movement of the tire on the rollers. The tire will therefore force the roller to move in the direction of the thrust causing high bearing temperatures. Bearing failures eventually result.

Rolled over edges

Sometimes referred to as “mushrooming”, this problem may have a variety of causes. Typically, badly skewed rollers are to blame although slope errors, pier-to-pier misalignment, material hardness and excessive loads can also produce these symptoms. The thin edge of the rolled over rim is full of cracks which, when left unattended, persistently work their way deeper into the side of the tire. Serious metal failure or entire cracked tire faces often results.

Timing marks

These horizontal or diagonal “wash board” patterns are imprinted on the rolling surfaces over a period of time by a poorly aligned gear and pinion. Too much root clearance or, in most cases, too little clearance, causes the teeth to “bottom out” and a jerky drive action results. This cycle of tooth engagement, or a harmonic of it, is the cause of imprinting the rolling faces with a “washboard” pattern.

The pattern once established, causes more vibrations and the cycle accelerates and is repeated on adjacent piers. The subsequent pounding action then quickly leads to mechanical failures. Similar “wash board” wear patterns can be caused by other drive-related causes such as torsional stiffness problems in the drive train, dual drive load sharing problems or misadjustment of support rollers.

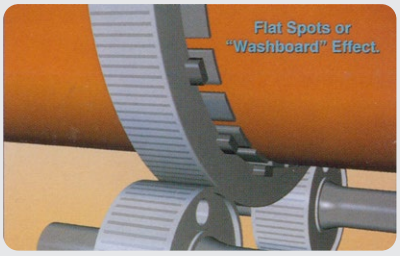
Taper wear

Conical wear, or radial taper, occurs when the diameter of the tire and roller decreases faster on one side of the face. This is typically caused by the support rollers not sitting parallel to each other, or by slope errors in either the rollers or the kiln shell itself.

Spalling

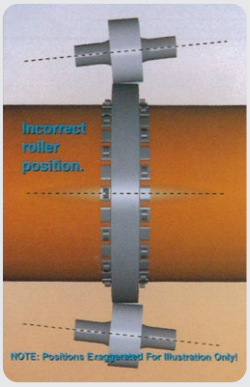
This occurs when the face contact between the rolling elements has reduced to a point where the hertz pressures exceed the elastic limit of the metal. Material peels off forming spalls, or the material work hardens, cracks and falls out in chunks. Both cases left unattended, rapidly reduce the service life of the components.

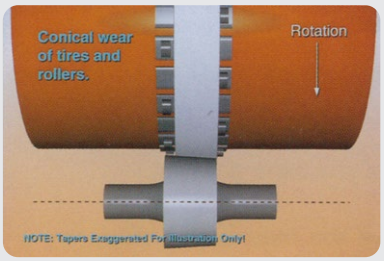
Timing marks

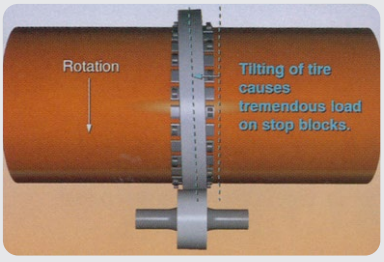


“Washboard patterns” on the tire and roller

Taper wear







Conical wear cuased by incorrect slope or out of parrellel rollers

WHY FULLER?

Support roller grinding with electronic circumferential measurement

The process

All work can be performed while the kiln is in normal production. Resurfacing is a unique process that restores the rolling surfaces of tires and support rollers. The work is done by an experienced crew with portable equipment to carry out the work in-situ and with minimal involvement by the host facility.

Two machines are used simultaneously, one on the support rollers and one on the tires. This effectively eliminates impressing a bad surface of one component into the newly finished surface of the other.

The crew is experienced in dealing with kiln reactions. Resurfacing exposes fresh metal which significantly changes the thrust characteristics of the support rollers. These changes are continuously monitored during the process and adjustments are made to control the position of the kiln. At the completion of the process, the support rollers are left well adjusted for thrust, minimizing risk of future problems. Fuller pioneered this process and therefore has the greatest experience in its use. We have specifically designed machines for this purpose and provide knowledgeable supervisors who understand and control the changing behavior of the kiln during this process.

Simultaneously resurfacing the roller and tire surfaces produces the required results with a minimum of material removal and, therefore, at lowest cost.

We measure and report dimensions before and after resurfacing to provide quality assurance. We can therefore guarantee surface finishes by flatness, lack of taper and smoothness.

We have a variety of machines to accommodate different face widths of tires and rollers and special situations.

Our crews work exclusively on rotary kilns, dryers and similar equipment.

We are experienced with all makes and sizes of rotary equipment.
Our resurfacing service maximizes the remaining service life of your equipment
Ignoring the effects of badly surfaced or improperly resurfaced tires and rollers can be disastrous. Our extensive customer list is your assurance that only Fuller can be entrusted to resurface your equipment effectively.

Categories of equipment we have serviced:

- Rotary kilns
- Delacquerers
- Rotary coolers
- Washers
- Rotary dryers
- Debarking drums
- Rotary furnaces
- Pelletizers
- Rotating reactors
- Coal breakers
- Rotary filters
- Granulators
- Bean conditioners
- Incinerators
- Rotary ash cylinders
- Shakeout drums
- Mill shell bearing surfaces
- Mine hoist brake drums

FULLER® TECHNOLOGIES

03-22 000-113- ENG

fuller-technologies.com