GET IN LINE

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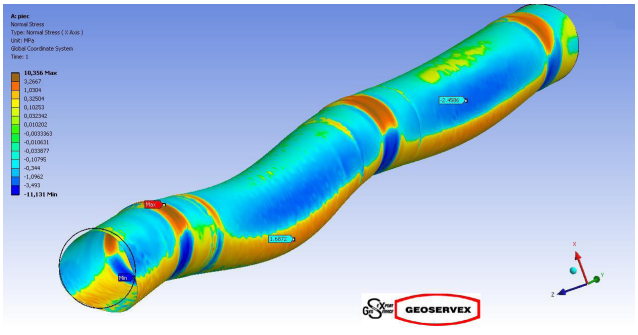
ADDRESSES THE BENEFITS OF CHOOSING TO USE A HOT KILN ALIGNMENT SERVICE.

Introduction

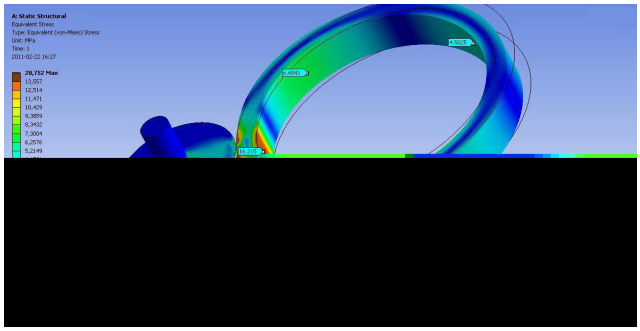
A lot has been written about the alignment of rotary kilns, as well as about energy saving, efficiency, emissions reduction, and component life extension. But are these issues interrelated? The answer is, firmly, yes, and to such an extent that you can write a formula:

alignment + adjustment + balancing = reliability + efficiency = savings

Hot kiln alignment service, if performed as a complete solution, can improve the operation of the kiln and meet the above formula. Moreover, this is the least expensive way to extend component life, reduce forces in the supports and the drive system, and thus postpone high expenses.



Kiln stress analysis.



Rollers and tyre stress analysis.

A Geoservex expert at work, checking for roller profile.

For 40 yr, Geoservex has been dealing with rotary kiln alignment across the whole world, having pioneered the hot kiln alignment method. The kiln inspection must be considered as a service for improving the mechanical condition of the running kiln, meaning that alignment, adjustment, and balancing are inseperable.

What should a detailed kiln inspection include?

The service should begin by measuring the alignment and the other kiln parameters, but it should also extend beyond this. True kiln alignment takes place in the plant, jointly with the maintenance team, under the supervision of experts, and consists of adjusting the position of the rollers and their skewing, observing axial thrusts, and eventually adjusting (balancing) the thrust forces and the pressure of the hydraulic thrust system. The thrust balancing stage is just as important as the measurements and alignment. This is because there is an unused potential in these actions. When adjusting kiln alignment, the shift of the rollers and the axial thrusts influence a better distribution of support loads, reduce stress on the shell, decrease the load on the bearings, reduce wear on the rings and rollers, decrease the drive torque, and decrease the energy consumption. In the long term, savings will be made due to extensive component life and the postponement of replacement parts, sometimes for years. Kilns that had been exploited and had to be stopped, could be temporarily activated in a time of increased need, and, following a complex service of alignment and adjustment, continue producing for the next 5 yr.

Kiln inspection should not end here. It is essential to include measurements of any changes to the kiln shell geometry, any permanent and flexible deformations (shell profile, shell ovality), any radial run-outs and any wobbling of tyres and a verification of cyclical change of loads (the so-called crank formation). A detailed check of these parameters allows for an assessment of the kiln shell's condition, the influence of deformation on the condition of the refractory lining, and its lifespan. If an excessive undertyre clearance – and thus excessive shell ovality – are detected during the inspection, this can be corrected relatively easily using shimming during the closest scheduled kiln stoppage. Again, a simple measurement, proper conclusions, and implentation of any recommendations by a client can protect the kiln from failure, the refractory lining from falling out, and, in extreme cases, can prevent superheating and permanent shell deformation. The results of such an event are disastrous; however, prevention is simple and relatively inexpensive. The facts speak for themselves.

When a kiln frequently has bearing overloads (hot bearings), shell cracks, roller shaft cracks or frame cracks, in spite of measuring alignment and adjustment, then the kiln should again be mechanically verified. This process is the reverse of the design stage: the same parameters are checked but the kiln is real, and the process is based on real dimensions and production parameters. There are cases of an uneven distribution of support loads, with simultaneous dimensional overdesign, that stress the kiln shell, but can be fixed if the kiln axis position is optimised. This technique has been known by producers for many decades but it is not widely offered.

Here, there are various opportunities. Optimisation of the load distribution can prevent the shell from frequent cracks, if they occur, as well as reducing the number of unscheduled stoppages, overheated bearings, expensive exchanges, and losses in production. The calculation process itself is a task for professionals, but the implementation of corrections is quite simple and is performed in the same way as a regular axis adjustment: through the adjustment of the position of the rollers, while the kiln is in operation, with no losses to production, during the same visit as the kiln inspection. Moreover, the cost of these treatments is lower than one emergency stoppage, not to mention

- Shell ovality to return to its regular limit, extending the life of the refractory lining.

Benefits of this action

- Prevention against uneven load of the supports.
- Elimination of excess longitudinal stress in the shell, meaning no more cracks on the shell.
- Elimination of high thrust forces for the rollers and tyres, and side guidance for the thrust rollers.
    - Elimination of hot bearings and hot thrust collars.
    - Prevention against refractory loss and excess ovality.
    - Reduction of the heavy torque on the kiln drive that was caused by misalignment and unbalanced opposite thrust forces.
    - Reduction of energy consumption.
    - Protection of the components against high wear, which shortens production life.
    - Prevention against unexpected stoppages in the middle of the production season.

Conclusion

Long-term experience shows that a detailed kiln inspection should include specified elements in order to give a kiln user and ordering party calculable benefit. This includes measurements of the kiln axis, geometry of rollers skewing, inclination, profile, checks of the kiln shell deformation and ovality, and checks for crank formation, tyre wobbling, and gear run-out. Also necessary is the preparation and skillful presentation of the adjustment programme and, eventually, supervision of the suggested adjustment, as well as the balancing of the axial thrust. The above-mentioned activities are sometimes time consuming. Thrust balancing takes place through the iterative implementation of corrections with the simultaneous observation of the kiln's reaction to particular supports, bearing temperatures, and thrust collars, as well as hydraulic system operation and its pressure. The issue is, by nature, not seen in time.

So, is the formula given at the beginning practically applied? Certainly, but on the condition that it is performed comprehensively, with emphasis on the performance of adjusting and balancing activities. The potential that this preventive service gives to a kiln client is not used even in part, and hot kiln alignment is often associated with measurements that are made remotely and collated in a paper report, rather than with preventive work performed on the kiln. A change in the perception of this service is key for attaining the above-specified effects and savings. It is significant that the maintenance manager, who best understands the above-mentioned benefits, should have a greater influence on the choice of service supplier. The devil is in the details: choosing the wrong supplier of such a sensitive service may provide tiny savings at the time of the order, but will cause large savings to be lost in the longer term, in contrast to the preventive actions described above.