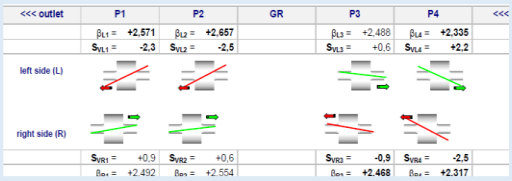
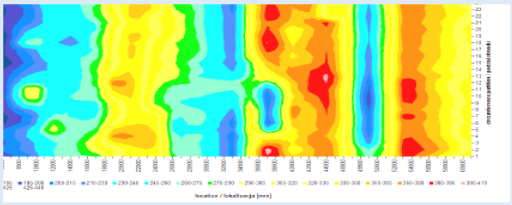
KILN PREDICTIVE ANALYTICS - *"solution-oriented services"*

1. **Hot Kiln Alignment** - *kiln load optimization on support roller instead of the straight line approach*

   a. Analysis of the kiln load on support roller *(radial load, in MT)*
   b. Analysis of the axial load on the support roller *(axial load, in mm and MT)*
   c. Optimise load on support rollers.
   d. Alignment adjustment at each bearing housings.



2. **Kiln Shell Profile Analysis** – hidden crank detection, *segregating thermal and permanent shell bend*

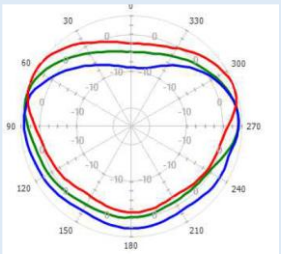


   a. Precautionary measures to reduce the crank.
   b. Prepare polar graph, eccentricity, runout,
   c. Analysis of the graph using FFT Analysis.
   d. Analysis of shell crank for the thermal and permanent bend.

   (The conclusion is drawn on the profile for the cut line and shell replacement as good as the measurement carried out during cold conditions)

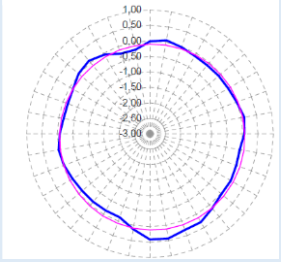
3. **Kiln Shell Strength Analysis *(at tire section shell)*** – *suitability of the operation and reliability*

4. **Kiln shell flexing:**



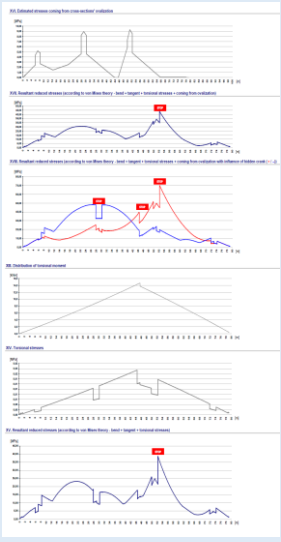
   a. Measurement using advanced strain gauge
   b. Analysis of the flex curve and shell stress in MPa.
   c. Predict shell operational reliability and ensure mitigation of occurrence of any crack.

5. **Supports roller deflection:**

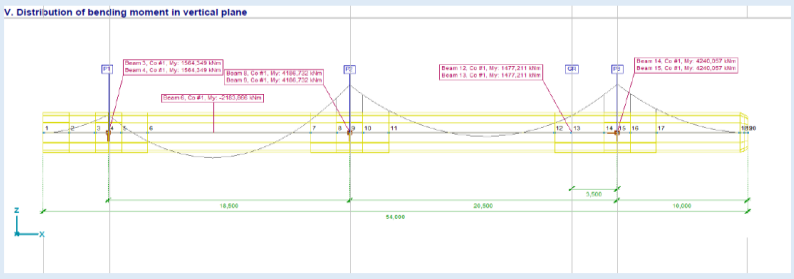


   a. Carry out a design review of the roller shaft.
   b. Carry out Hertz Pressure analysis on the roller surface.
   c. Ensure the shaft reliability to mitigate the occurrence of shaft failure.
   d. Analysis of the bending stress on the roller shaft.
   e. Analysis supports roller raceways profile and its effect on the kiln operation.

6. **Kiln shell design review:**



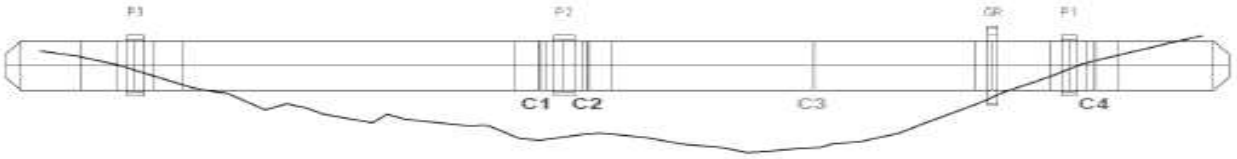
   a. Analysis of various loads on the shell and its effect on the operation.
   b. Bending moment, bending stress, Tangent stress, Torsion Stress, Torsional moment etc



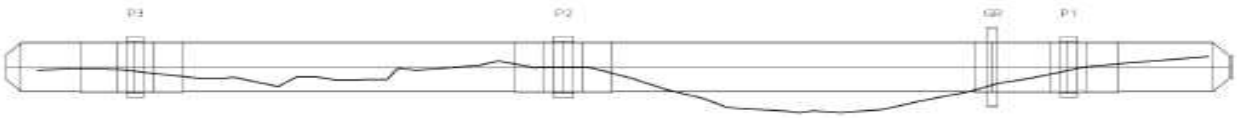
At many places we have observed the Problems of Shell Profile Measurement, A high thermal difference observed at a measurement position. The difference observed was because of coating formation or difference in refractive thickness or both. The condition becomes critical when we want to make a decision for the clients for shell replacement, as the decision could be biased when the temperature condition changes and the made decision is no longer applicable.

To overcome the above situation, shell profile measurement during cold conditions is suggested. Rotating the Kiln on the main drive could pose a problem of refractory failure due to high clearance between refractory base and shell or due to high air gap between chair pad and tyre ID.

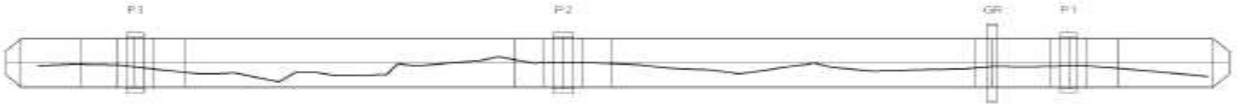
To overcome the physical limitations of the cold measurement, we had developed a methodology to separate thermal and permanent bend from the measurement made on the Kiln operating under normal operation. Thus, the component representing the permanent bend is more or less the bend Kiln Shell Profile, measured in the cold conditions.



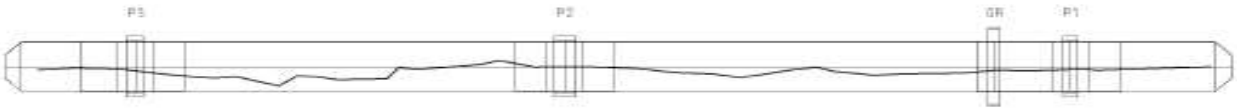
Sketch_1: present state and locations of corrective cuts.



Sketch_2: state after implementation of corrective cuts C1 and C2.



Sketch_3: state after implementation of corrective cuts C1, C2 and C3.



Sketch_4: state after implementation of corrective cuts C1, C2, C3 and C4.

Note: above sketches are shown only in one plane in which the crank is dominating.

3.4 WE SUGGEST TAKING INTO CONSIDERATION AS WELL

3. legitimacy of **resurfacing rings and support rollers raceways - in the light of suspicions of irregularities in the quality of contacts after restoring the axially symmetric relations of rings and support rollers (especially on pier P3 and P2)**
   / for this services – contact Eurokiln local partner - ASE /.