



HOT KILN (dryer) ALIGNMENT ANALYSIS

Sample report of hot kiln alignment in

- **cement factories**
- **steel factories**
- **chemical factories**

We have on site grinding machines and also on site lathing machine and belt sanding for kiln rollers , tires , thrust rollers and ball mill slide ring or trunnion .





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Page :

Plant ----- Cement Co

Kiln No : 1 (4 pier)





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Hot kiln alignment program

Diameter of the Tire & Rollers in (mm)			
Tier	5160	5160	5160
Left Roller	1500	1500	1500
inlet	3	2	1
Right Roller	1500	1500	1500

We aligned many kind of kilns :

FLSmidth kilns with 3 piers

Old 6 pier kiln and biggest kilns in the world

Flsmidth rotax 2

KHD kilns

Polysius Kiln

IHI kilns

Cemag kiln

China steel factory kilns

Dryers and



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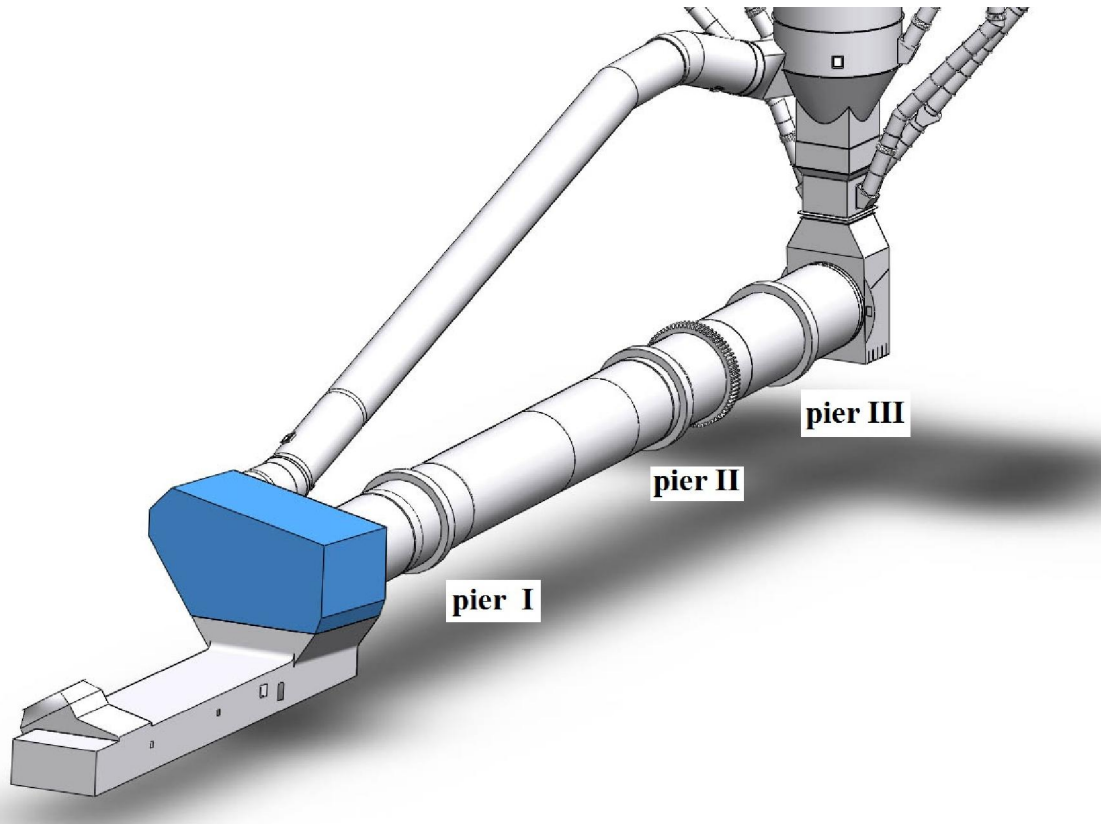
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Kiln piers name :



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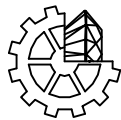
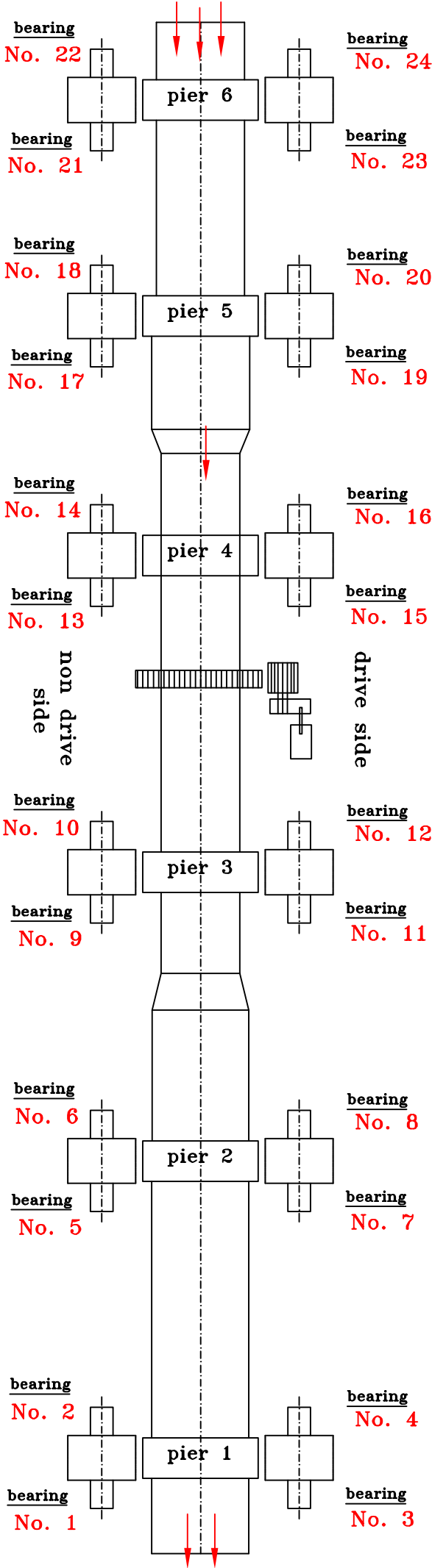
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kiln tyres and housings numbers



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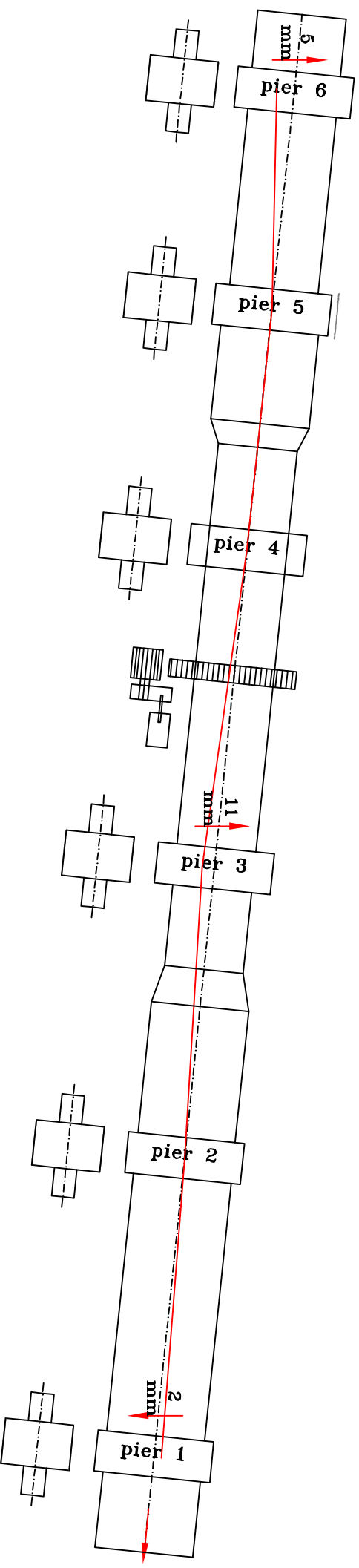
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Vertical hot kiln Alignment

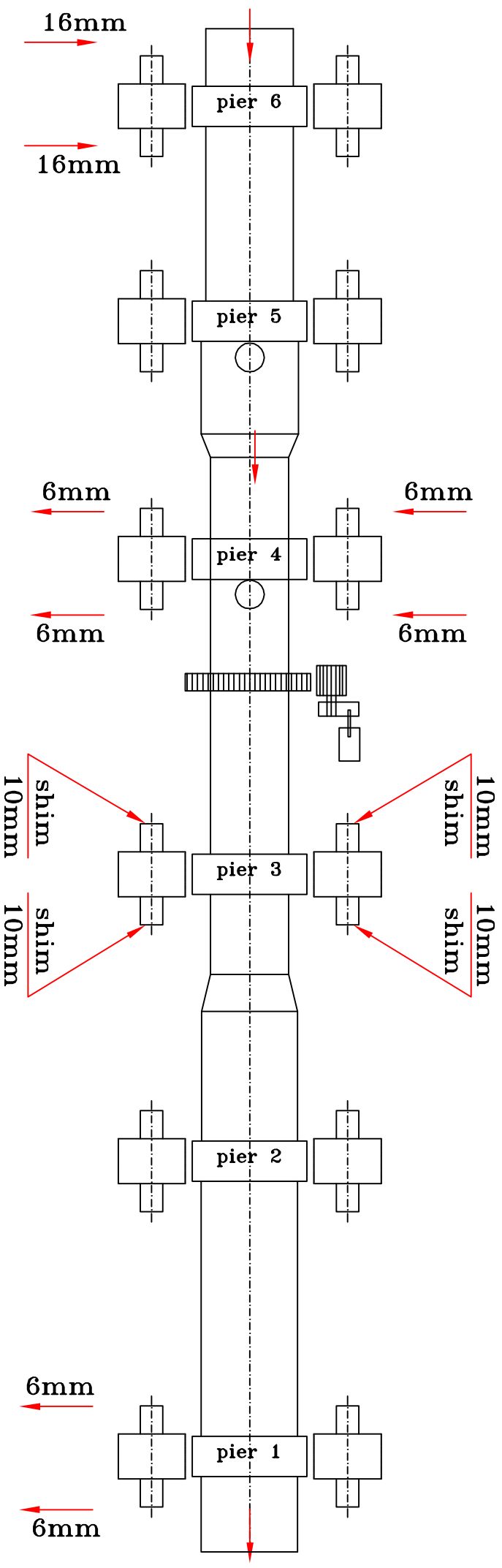


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roller movement to adjust the kiln alignment



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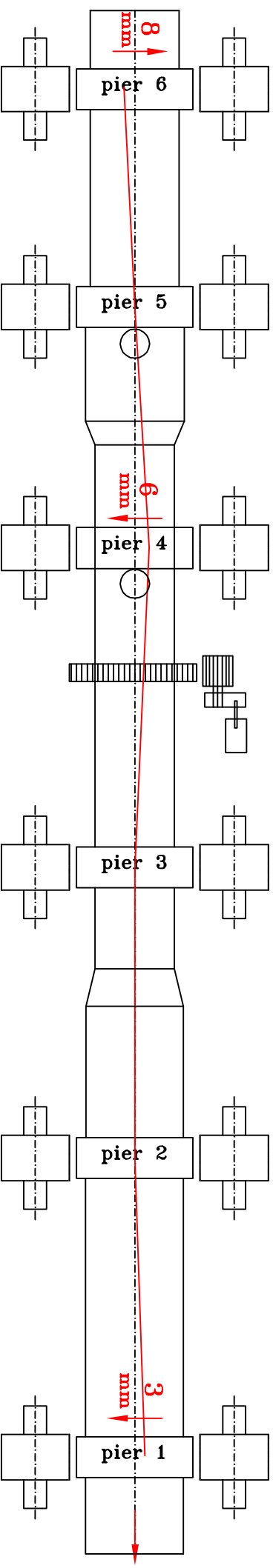
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Horizontal hot kiln Alignment



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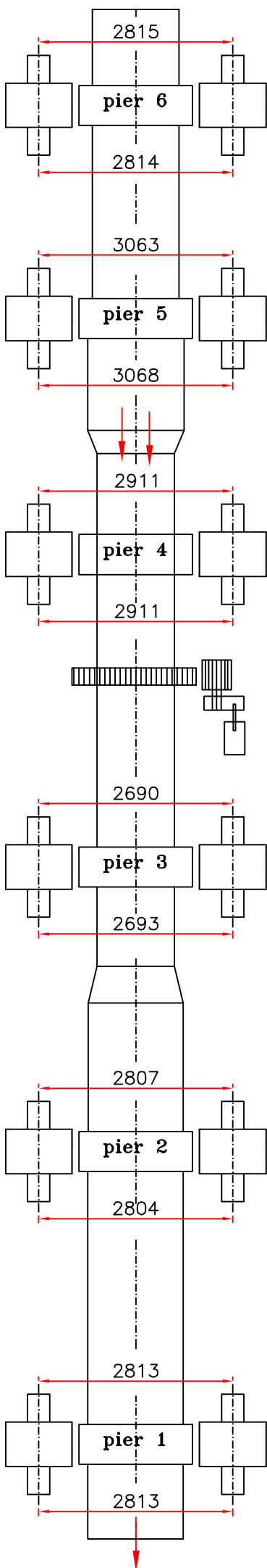
Kiln No : 1



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rollers C-C distances

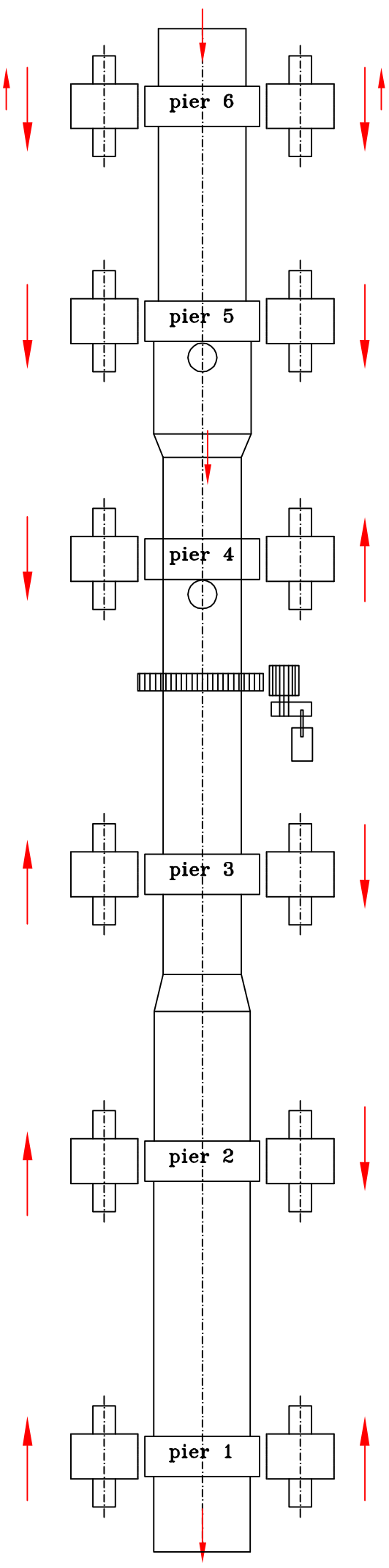


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rollers force direction toward tyres



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shim = 0

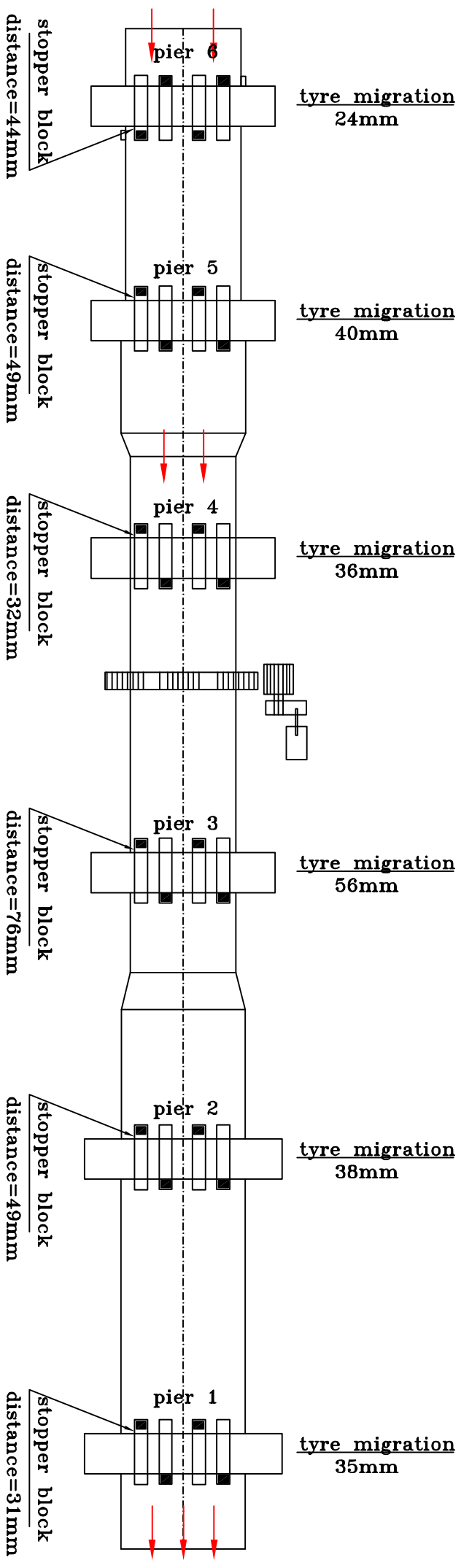
shim = 3.5mm

shim = 3mm

shim = 5.5mm

shim = 3mm

shim = 3mm



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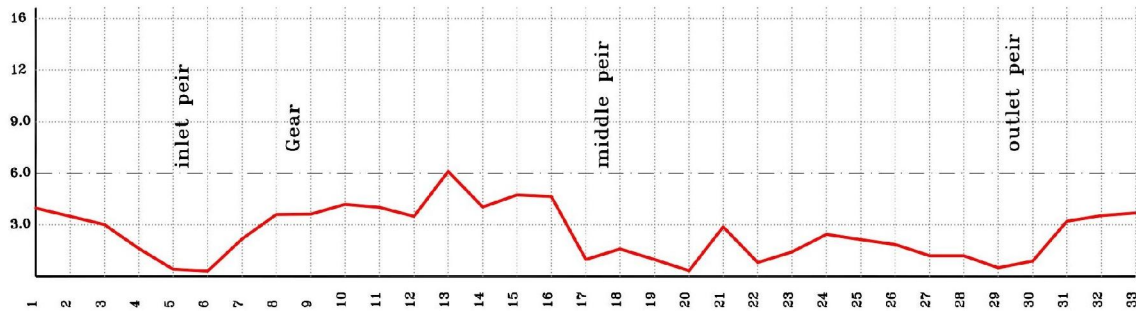
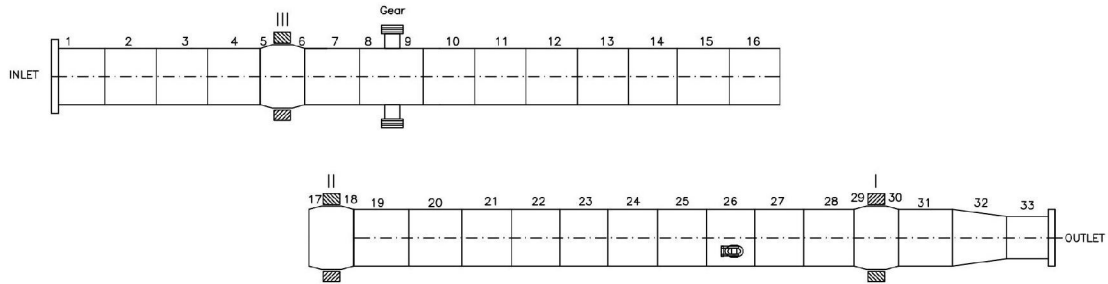
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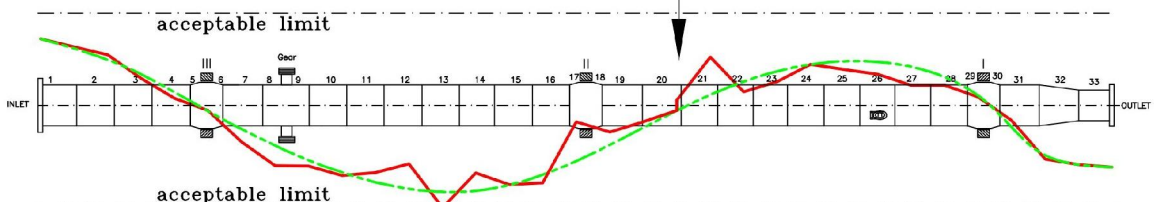
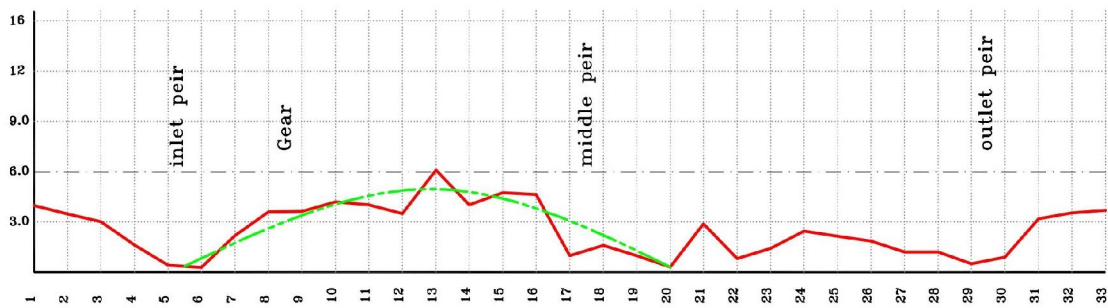
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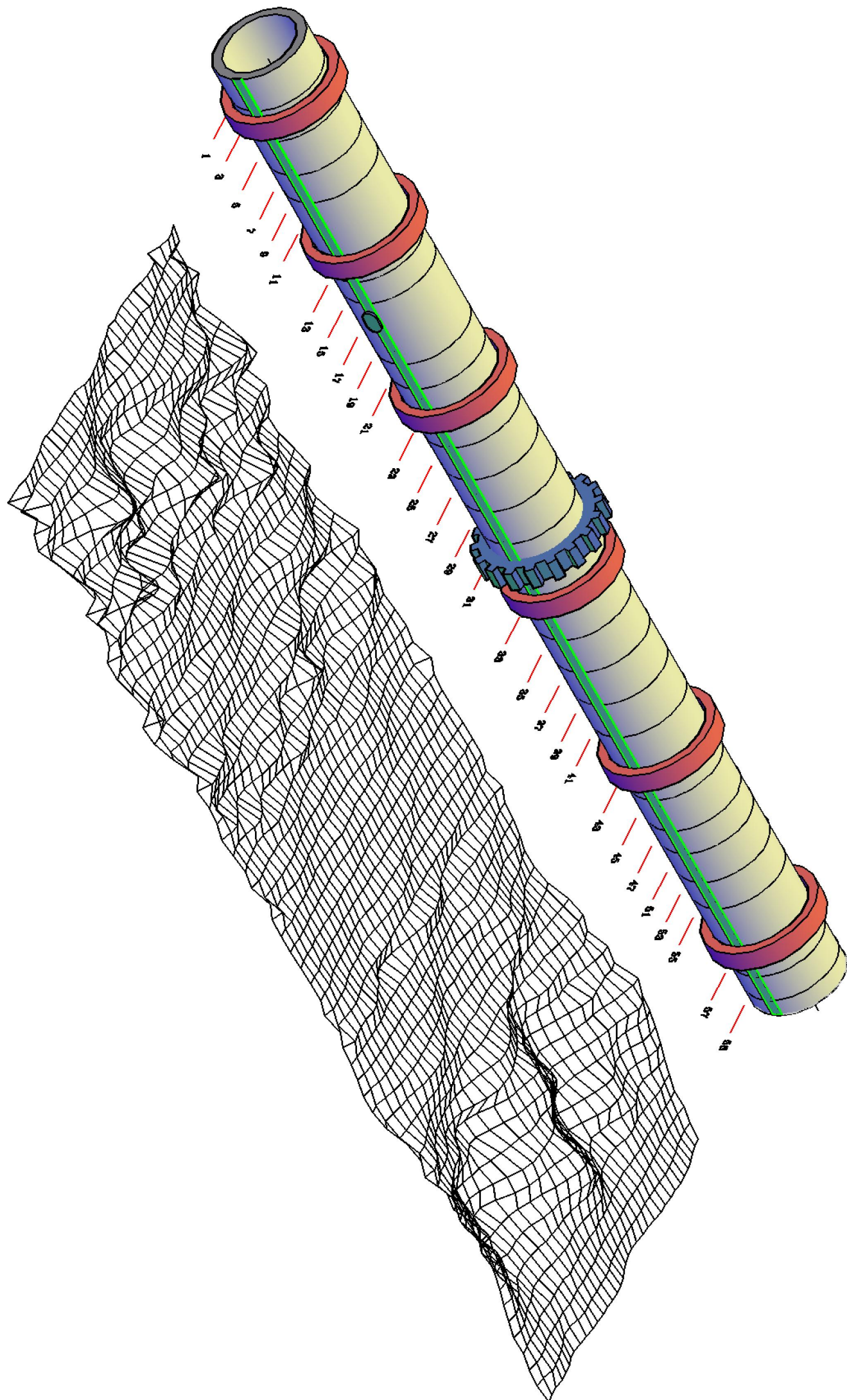
Kiln shell deformation &run-out



In this chart we check kiln shell run out and we understand what had happened .

We also check the temperature and we find out in which shell the problem is starting.







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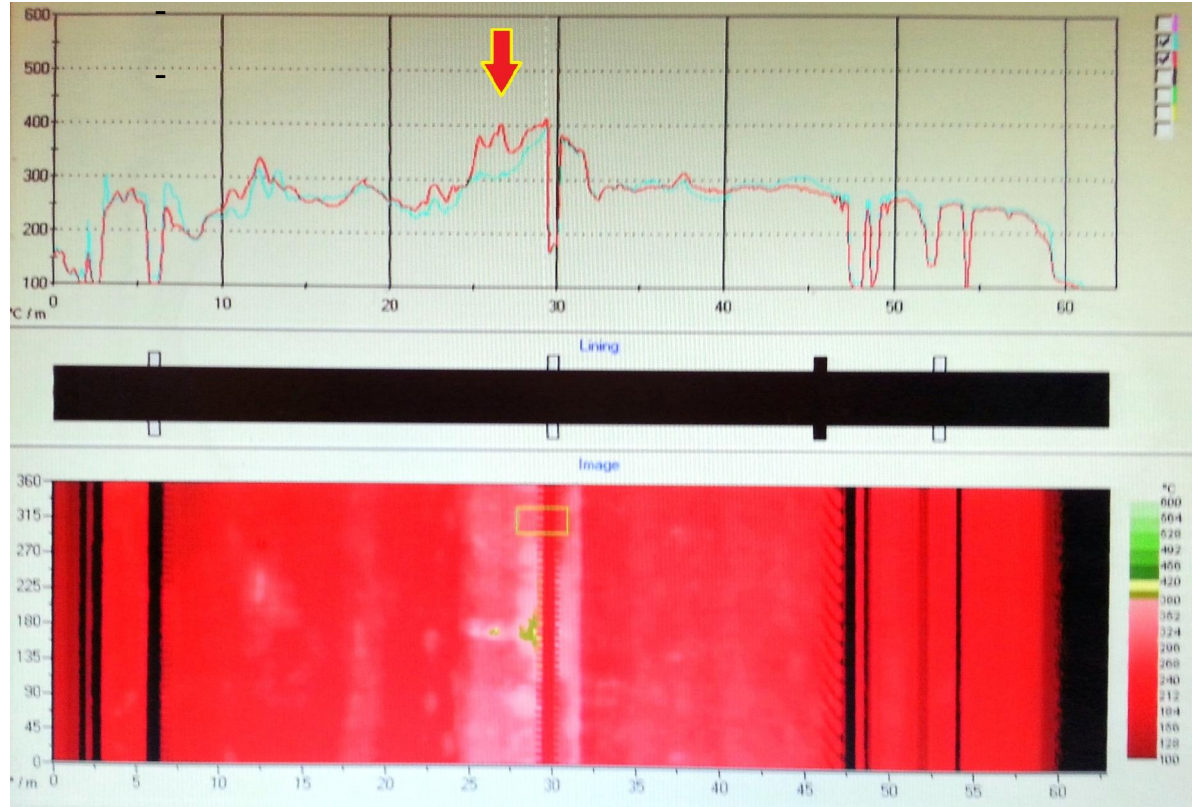
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Kiln shell thermal profile interpretation





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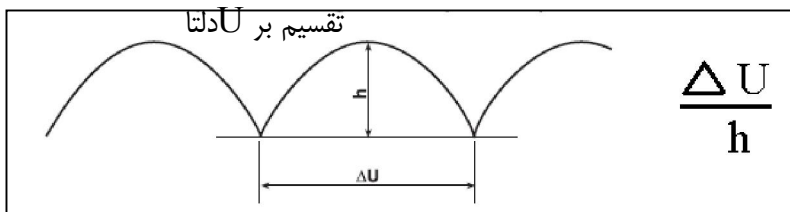
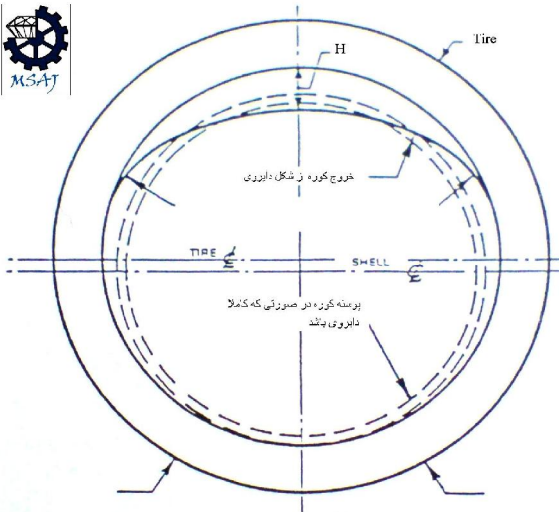
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Creep or tyre (tire) migration



shell & ring	Inlet Pier	mid Pier	outlet Pier
creep	23 mm	15 mm	32 mm



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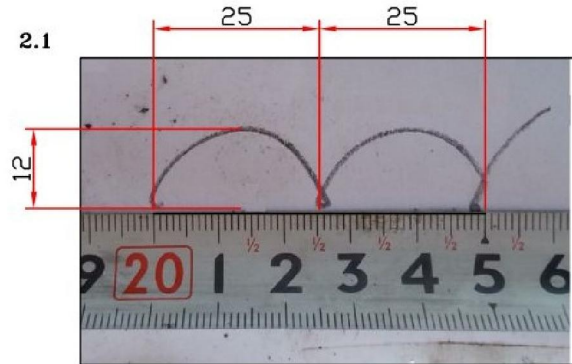
Date : 0000/00/00

Kiln No : -----

Tyre Migration (Creep)

inlet tyre		
Migration = 25 mm		

$$\frac{\Delta U}{h} = 2.1$$

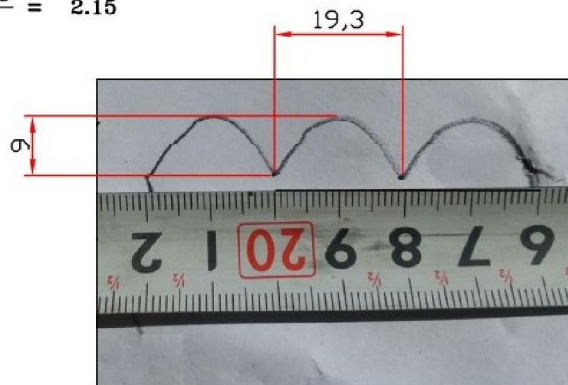


Kiln Shell Temp. Closed to the tyre average		
Shell	130	°C

Tyre Temp.	212	°C
------------	-----	----

Mid tyre		
Migration = 19.3 mm		

$$\frac{\Delta U}{h} = 2.15$$

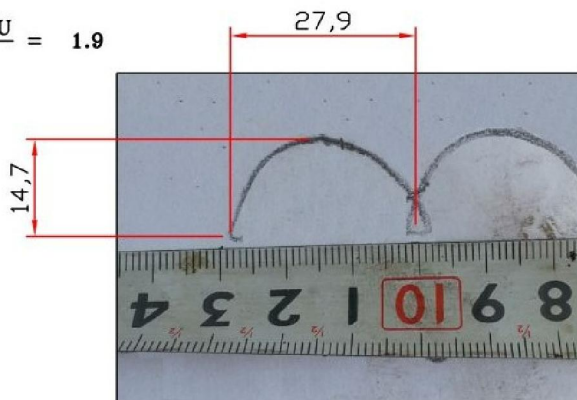


Kiln Shell Temp. Closed to the tyre average		
Shell	179	°C

Tyre Temp.	325	°C
------------	-----	----

outlet tyre		
Migration = 27.9 mm		

$$\frac{\Delta U}{h} = 1.9$$



Kiln Shell Temp. Closed to the tyre average		
Shell	134	°C

Tyre Temp.	231	°C
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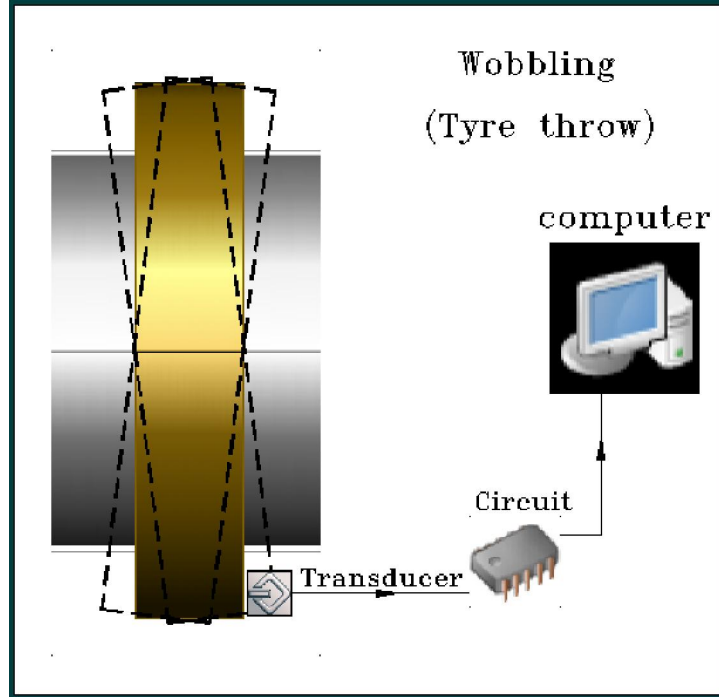
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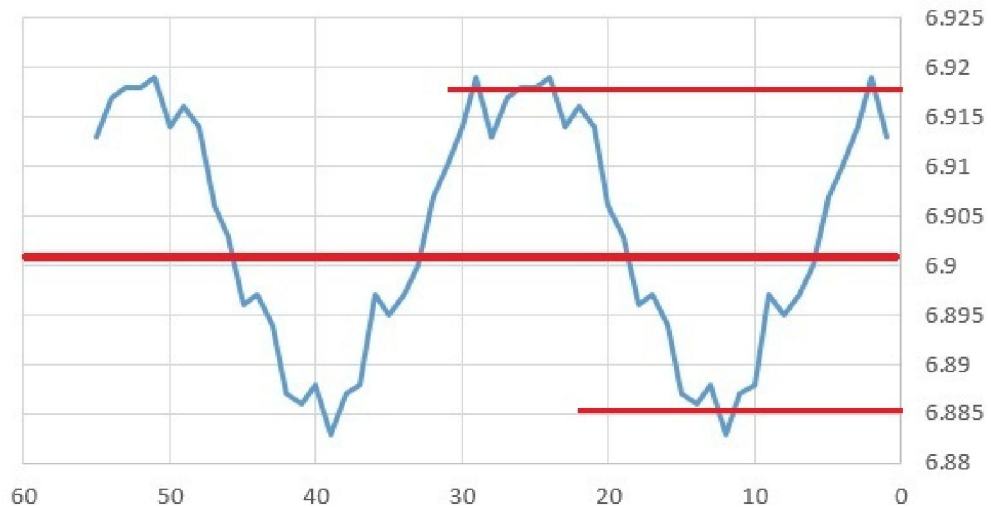
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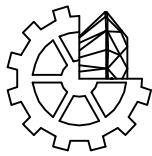
- Tyre Wobbling:



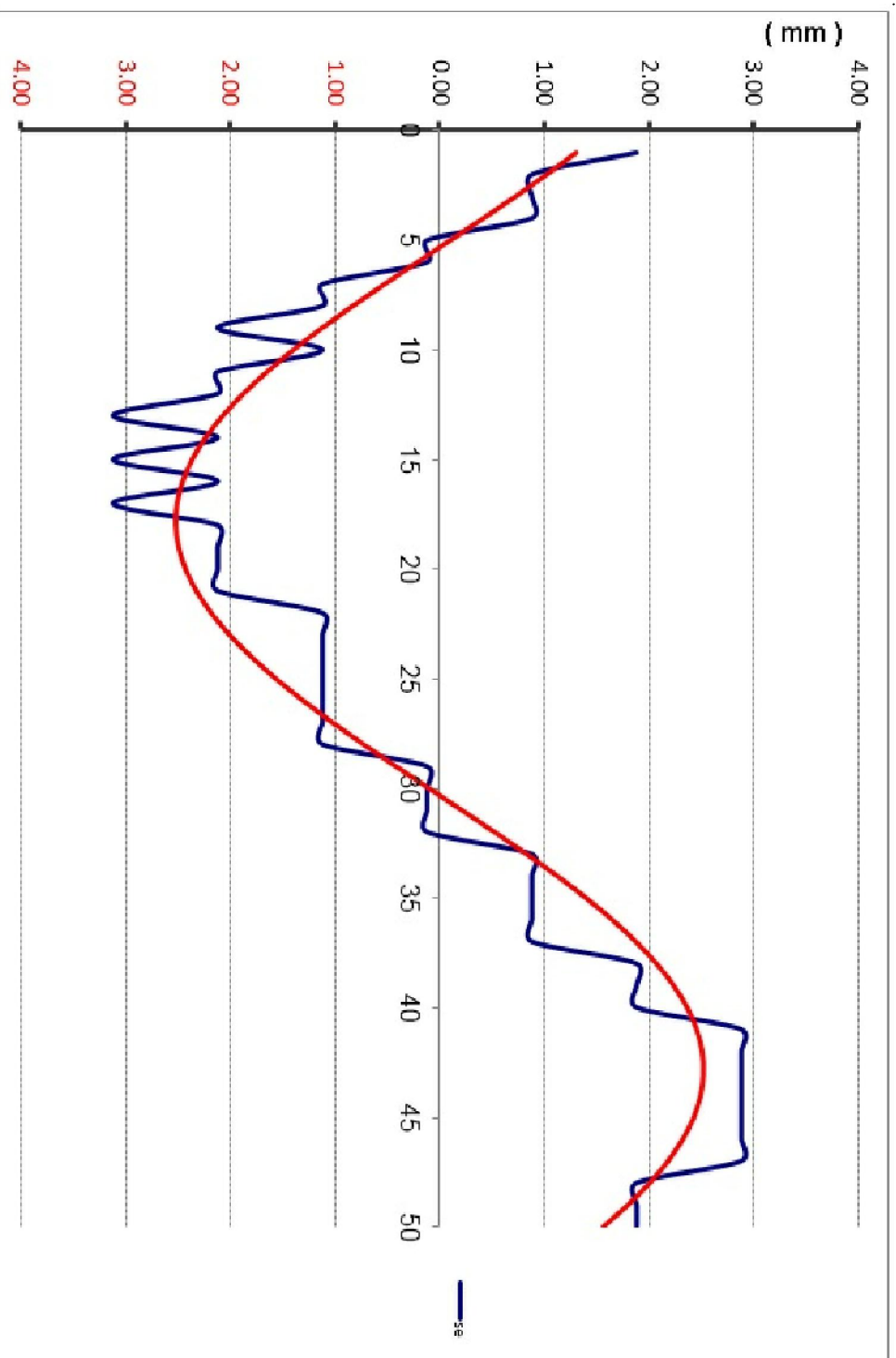
Wobbling [± mm]	
Inlet Pier	8mm
Mid Pier	15mm
Outlet Pier	2mm

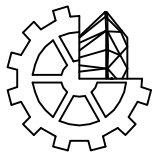
wobbling tyre 2 = $\pm 15\text{mm}$



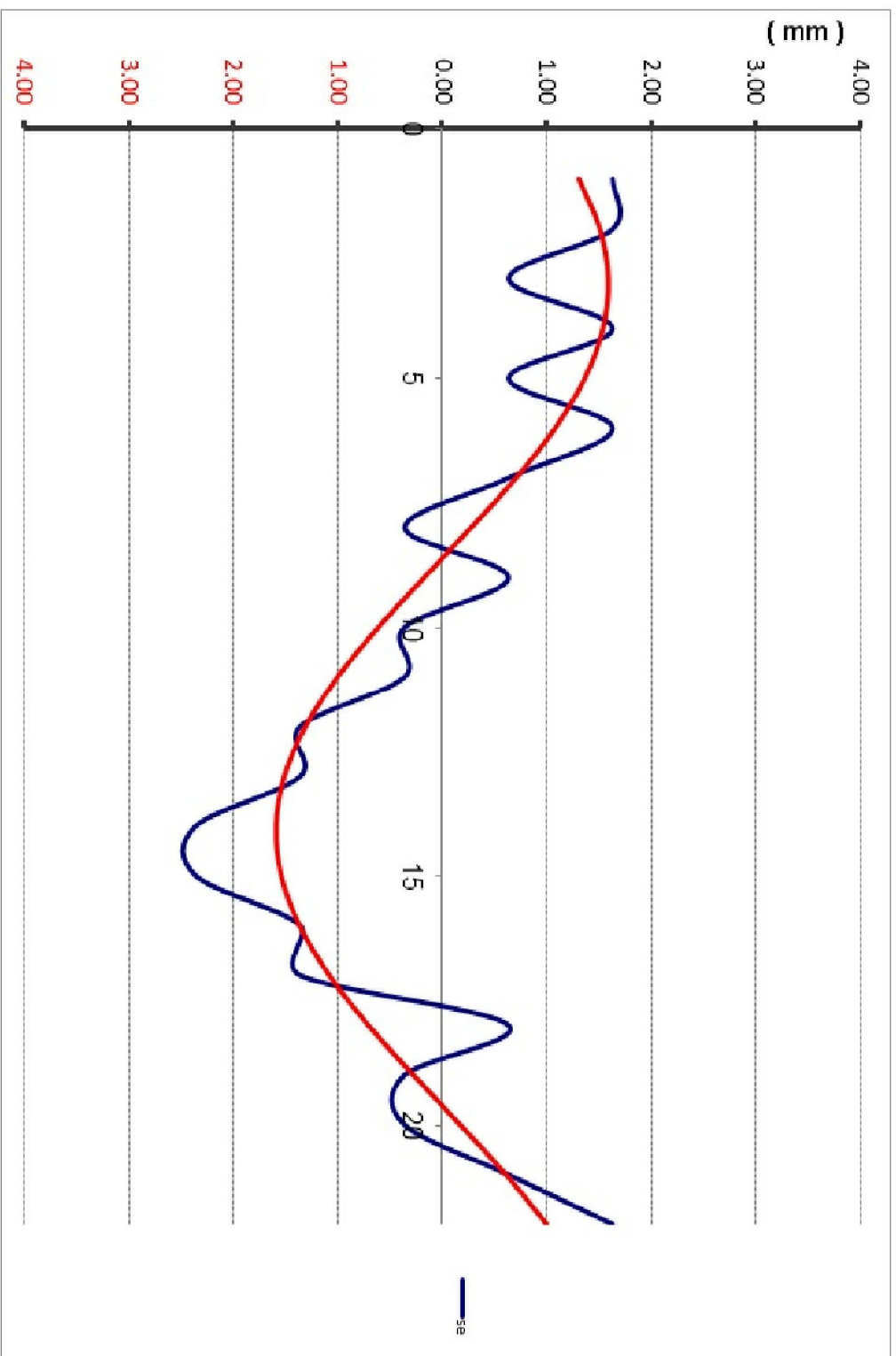


Inlet tyre wobbling = 2.5mm





outlet tyre wobbling = 1.5mm





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Bedslope

pier	left	right	kiln slope
Inlet	% 4.03	% 4.03	% 3.99
Mid	% 4.22	% 3.98	% 3.99
Outlet	% 4.01	% 3.80	% 3.99



In the name of God

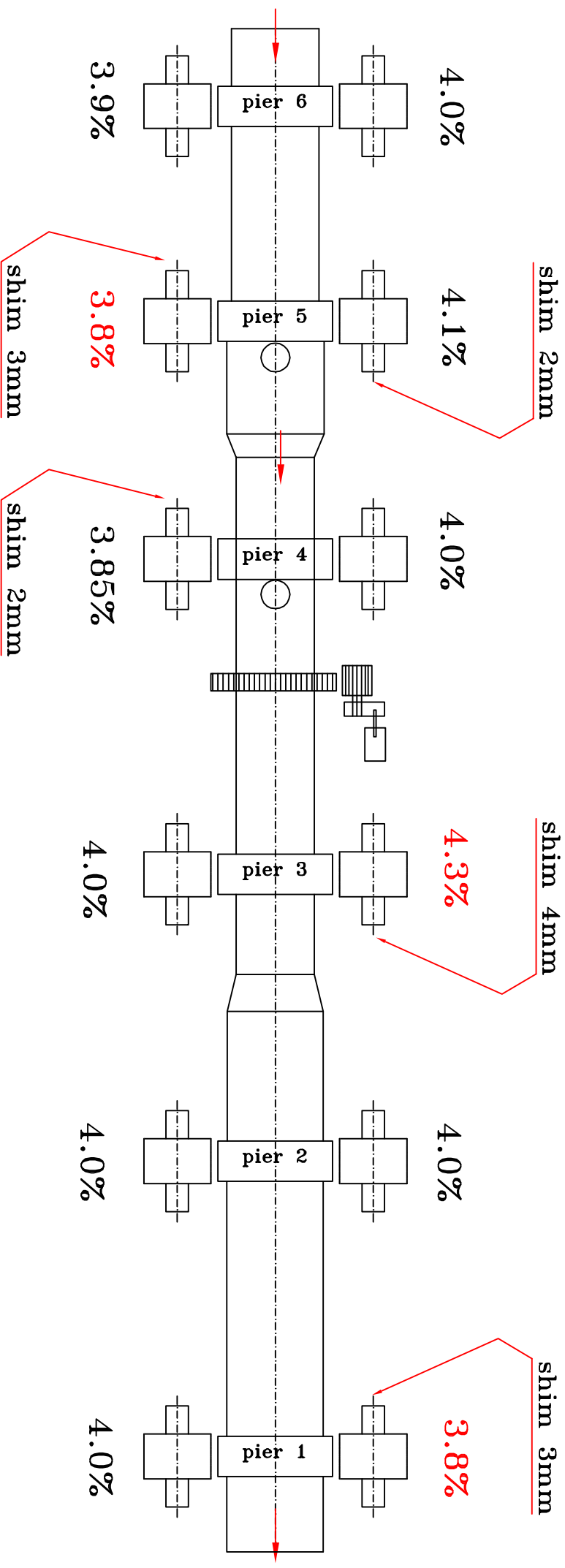
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kiln slop = 3.99% ~ 4.0%



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Measuring gear parameters :

Root clearance :



- Filler between gear and pinion

Stop the kiln for 20 minutes and measure the root clearance in four parts .



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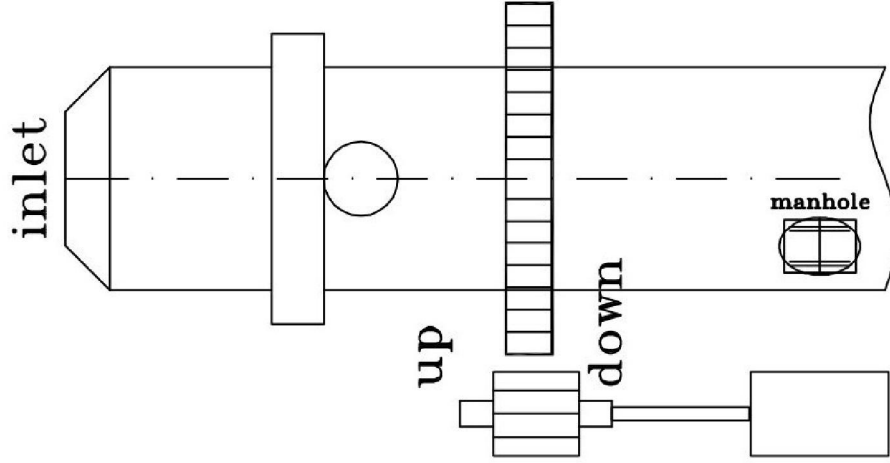
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manhole		up R.C.	down R.C.
look from inlet to outlet		14.5mm	16.5mm
		14.5mm	16.5mm
		15 mm	16 mm
		14.8mm	16 mm

Acceptable range = 9mm to 11mm



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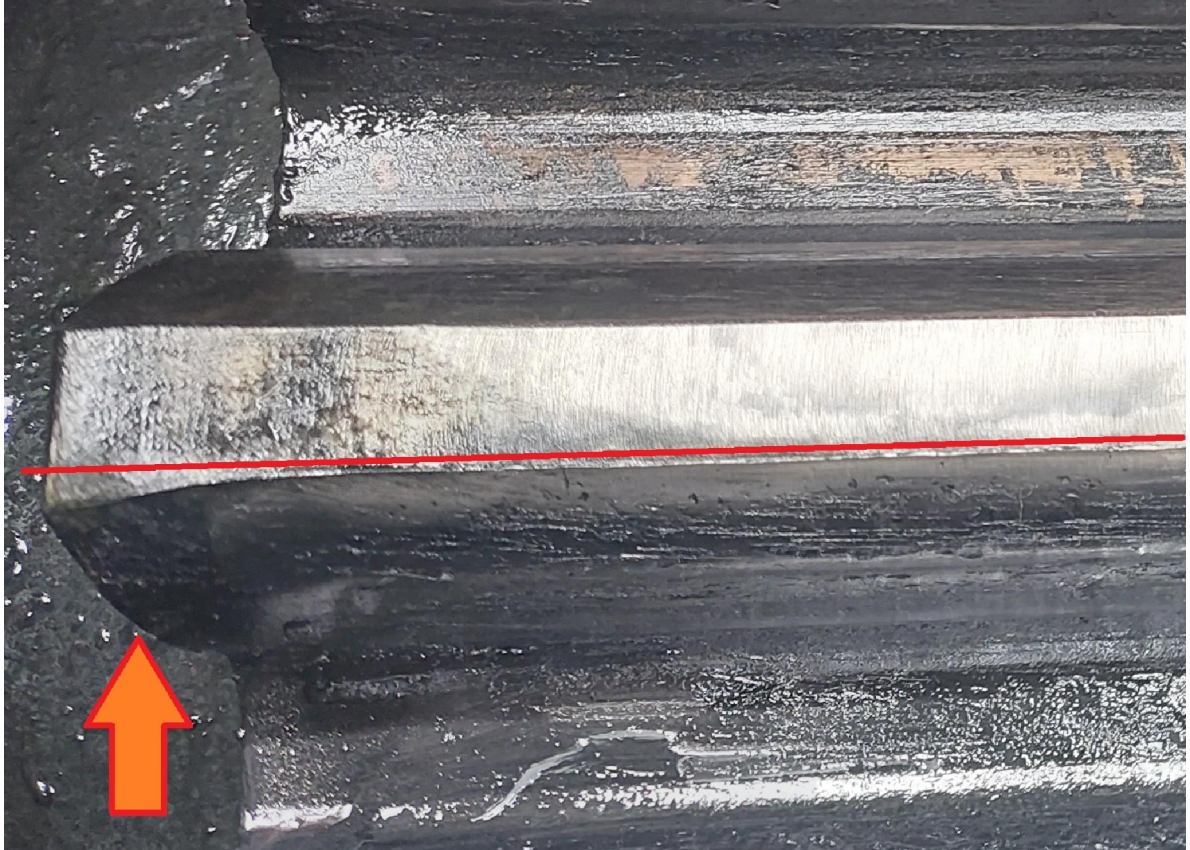
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There is a big problem in pinion teeth



Pinion teeth needs grinding.

You can also use angle grinder to repair the teeth edges .



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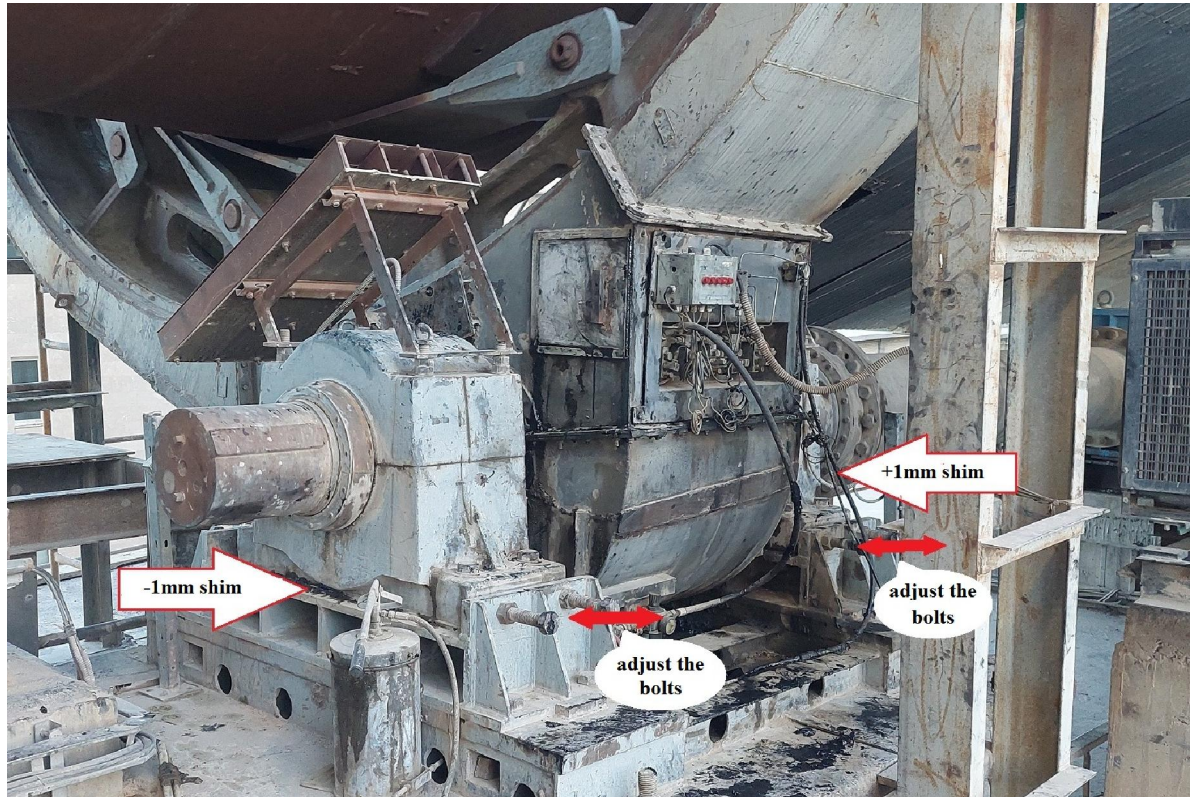
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Adjusting pinion slope :





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Check big gear teeth surface :





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More contact upstream of the pinion and also more pitting.

Low contact downstream of the pinion and also low pitting.





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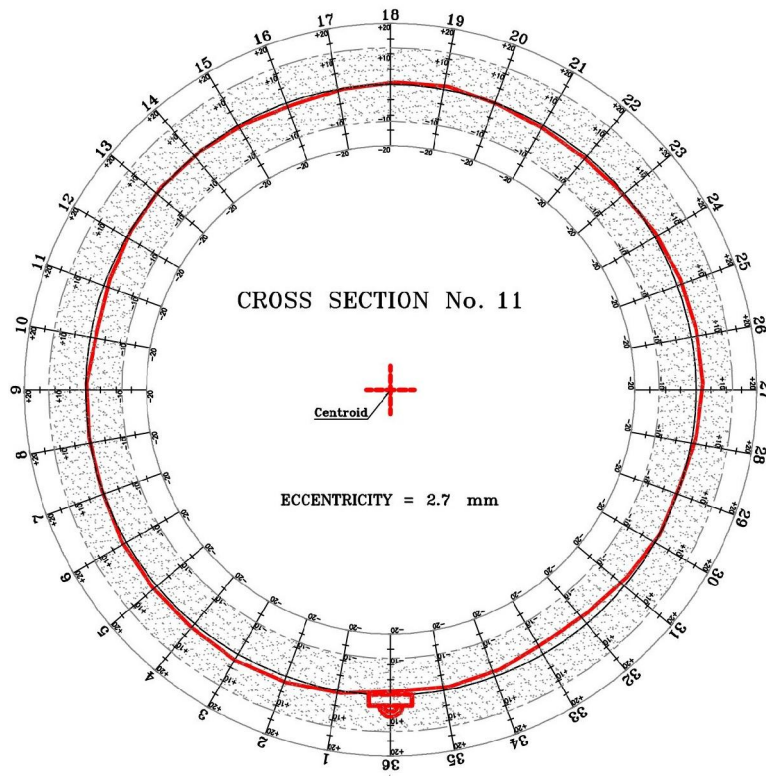
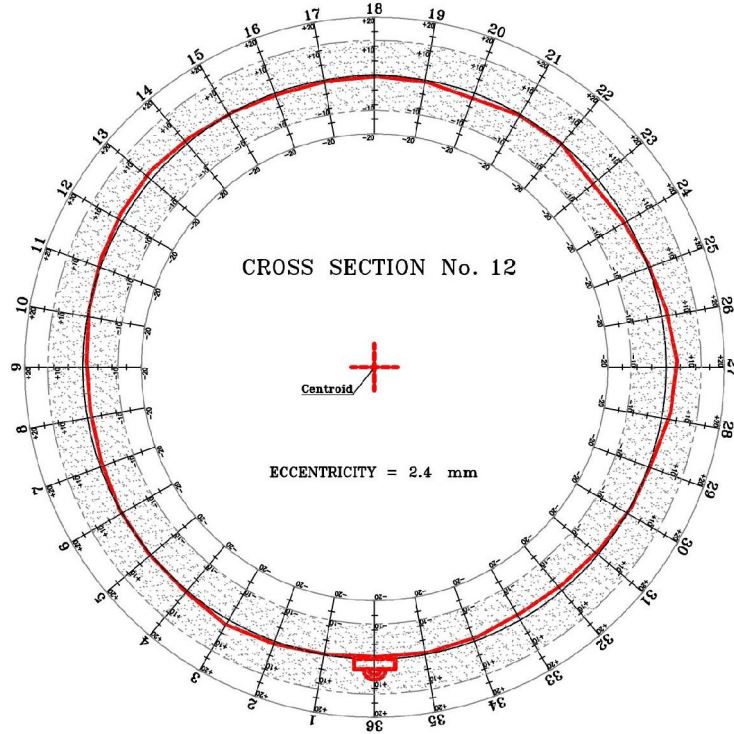
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kin shell under the gear deformation and run our





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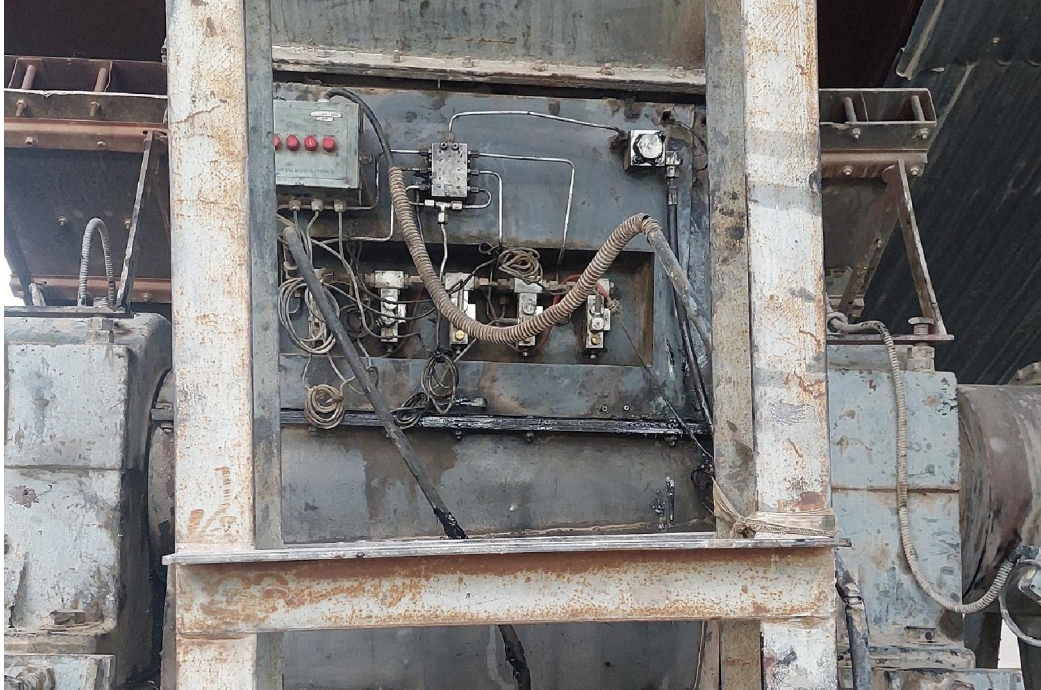
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Grease injector





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Grease pump and controller





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Plant : ----- Cement co

Kiln No : 1

We measure and align ----- cement company
kiln No. 1 with six piers .

Total kiln condition :

- Rollers temperatures in pier 1 and 3 and 4 are more than 70 degree .
- Kiln goes up and it doesn't have upper thrust roller .
- Kiln shell between pier 1 and 3 is in bad condition , highly run out and deformed . (in some parts shell needs to be changed)
- Kiln shell between pier 3 and 5 is in good condition.
- Kiln shell between pier 5 and 6 is in bad condition , highly run out and deformed. (in some parts shell needs to be changed)
- Rollers shafts on pier 3 and 4 have very bad scratches and must be repaired or changed .





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Kiln No : 1

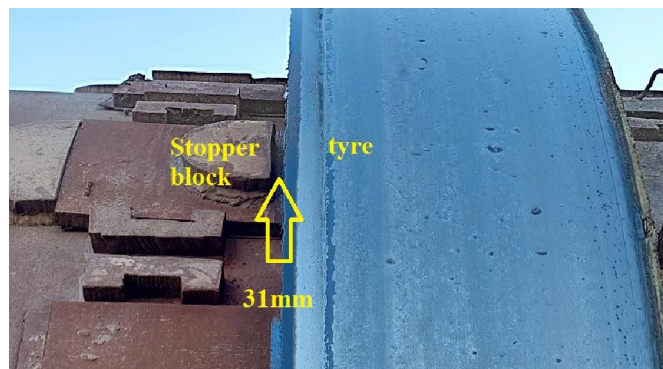
Visual inspection :

Pier No 1 :

Tyre



- Tyre surface is in good condition .it doesn't need grinding or resurfacing
- Migration of this tyre is 35mm per revolution . (standard creep is 10mm to 25mm in one revolution)
- It need 3mm shim between tyre and shell to improve migration .
- Distance between tyre and the upper stopper block is 31 mm (standard is 2 mm to 5 mm)





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Plant : ----- Cement co

Kiln No : 1

Visual inspection :

Pier No 1 : Left roller (non motor side)



- roller surface is in good condition .it doesn't need grinding or resurfacing
- bearing temperature is 60 to 80 degree (maximum acceptable temperature is 70 degree)
- roller shaft is in good condition .
- roller thrust collar is scratched .
- roller slope is 4.0% and it is good.
- V gap between roller and tyre is 25 % (contact 75 %)



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Kiln No : 1

Visual inspection :

Pier No 1 : right roller (motor side)



- roller surface is in good condition .it doesn't need grinding or resurfacing
- bearing temperature is 75 to 100 degree (maximum acceptable temperature is 70 degree)dangers
- roller shaft is in good condition .
- roller thrust collar is scratched .
- roller slope is 3.8% it need 3mm shim for upper bearing housing
- V gap between roller and tyre is 50 % (contact 50 %)



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Kiln No : 1

Visual inspection :

Pier No 2 :

Tyre



- Tyre surface is in good condition .it doesn't need grinding or resurfacing
- Migration of this tyre is 38mm per revolution . (standard creep is 10mm to 25mm in one revolution)
- It need 3mm shim between tyre and shell to improve migration .
- Distance between tyre and the upper stopper block is 49 mm (standard is 2 mm to 5 mm)



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Kiln No : 1

Visual inspection :

Pier No 2 : Left roller (non motor side)



- roller surface is in good condition .it doesn't need grinding or resurfacing.
- bearing temperature is 60 to 80 degree (maximum acceptable temperature is 70 degree) temperature is ok .
- roller shaft is in good condition .
- roller thrust collar is scratched.
- roller slope is 4.0% (it's ok)
- V gap between roller and tyre is 50 % (contact 50 %)



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Visual inspection :

Pier No 2 : right roller (motor side)



- roller surface is in good condition .it doesn't need grinding or resurfacing
- bearing temperature is 60 to 75 degree (maximum acceptable temperature is 70 degree)
- roller shaft is in good condition .
- roller thrust collar is in good condition .
- roller slope is 4.0% and it is ok .
- V gap between roller and tyre is 65 % (contact 35 %)



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Visual inspection :

Pier No 4 : right roller (motor side)

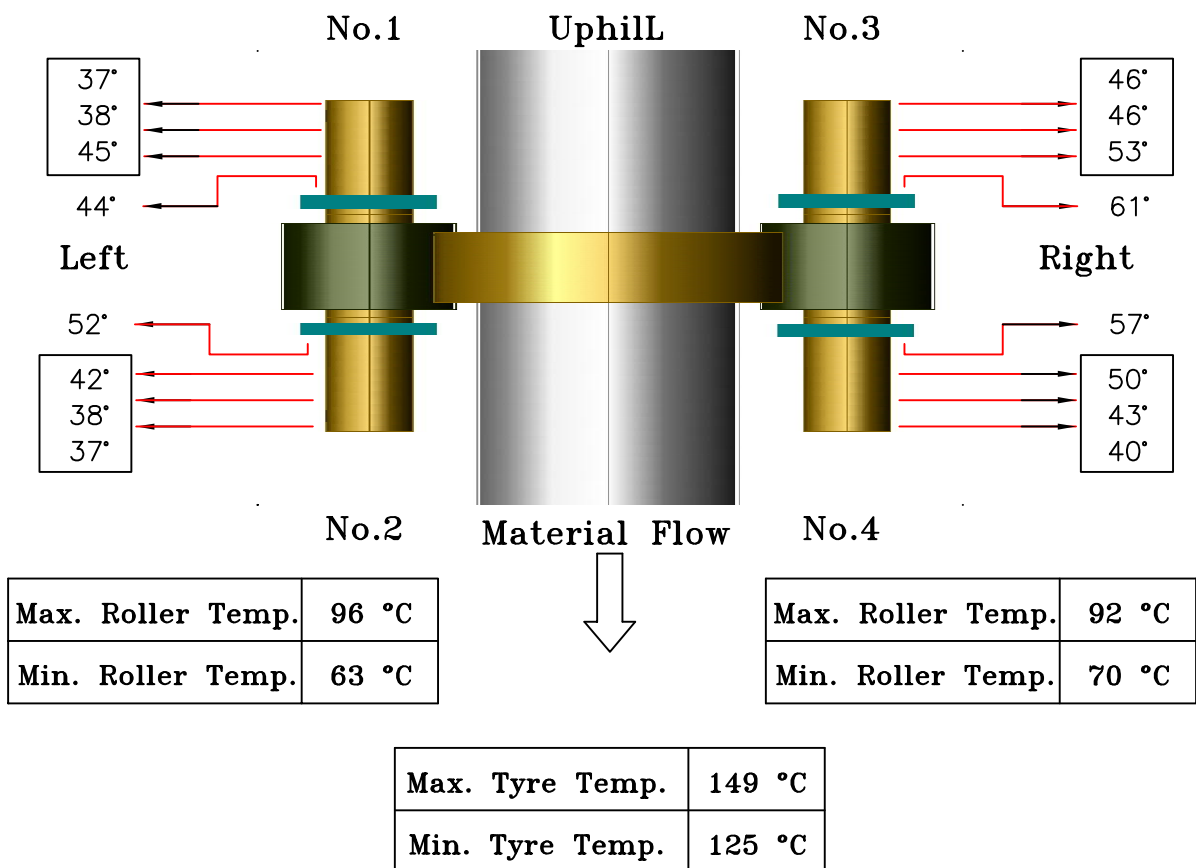


- roller surface is in good condition .it doesn't need grinding or resurfacing
- bearing temperature is 70 to 120 degree (maximum acceptable temperature is 70 degree) dangers
- roller shaft is fully scratched , it needs to be changed or repaired .
- roller thrust collar has scratched .
- roller slope is 4.0% and it is ok .



Bearings – Temperature & visual inspection

Support (inlet side) :



Visual observation for bearing at inlet support

Bearing No.	Journal	roller shaft surface	Lubricant	Oil tray distributor	Felt seal	Oil level	Water cooling
1	OK	OK	dirty	None	OK	OK	OK
2	OK	OK	dirty	not adjust	OK	OK	OK
3	OK	OK	OK	None	OK	OK	OK
4	OK	OK	OK	None	OK	OK	OK



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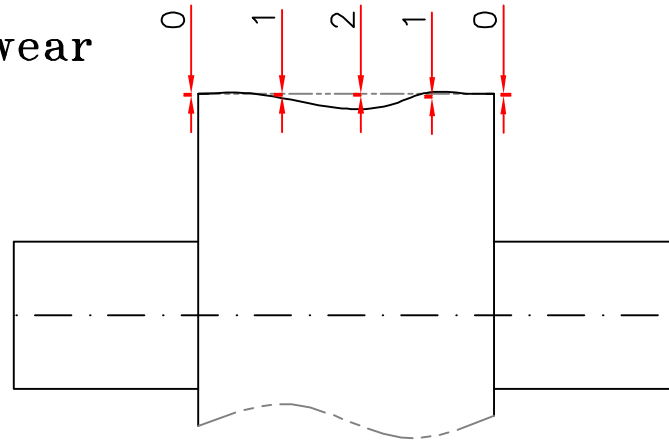
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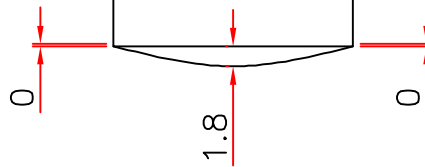
rollers & tire
mechanical wear

up

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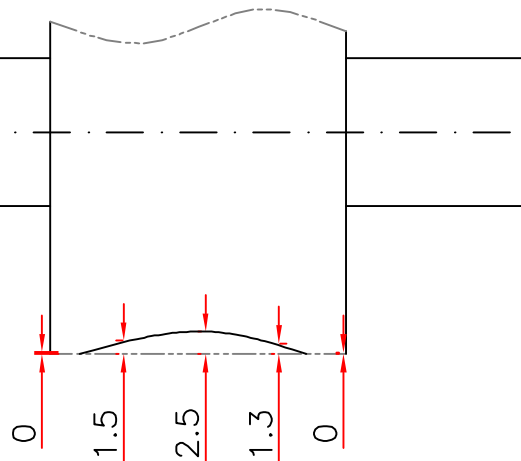


pier 6



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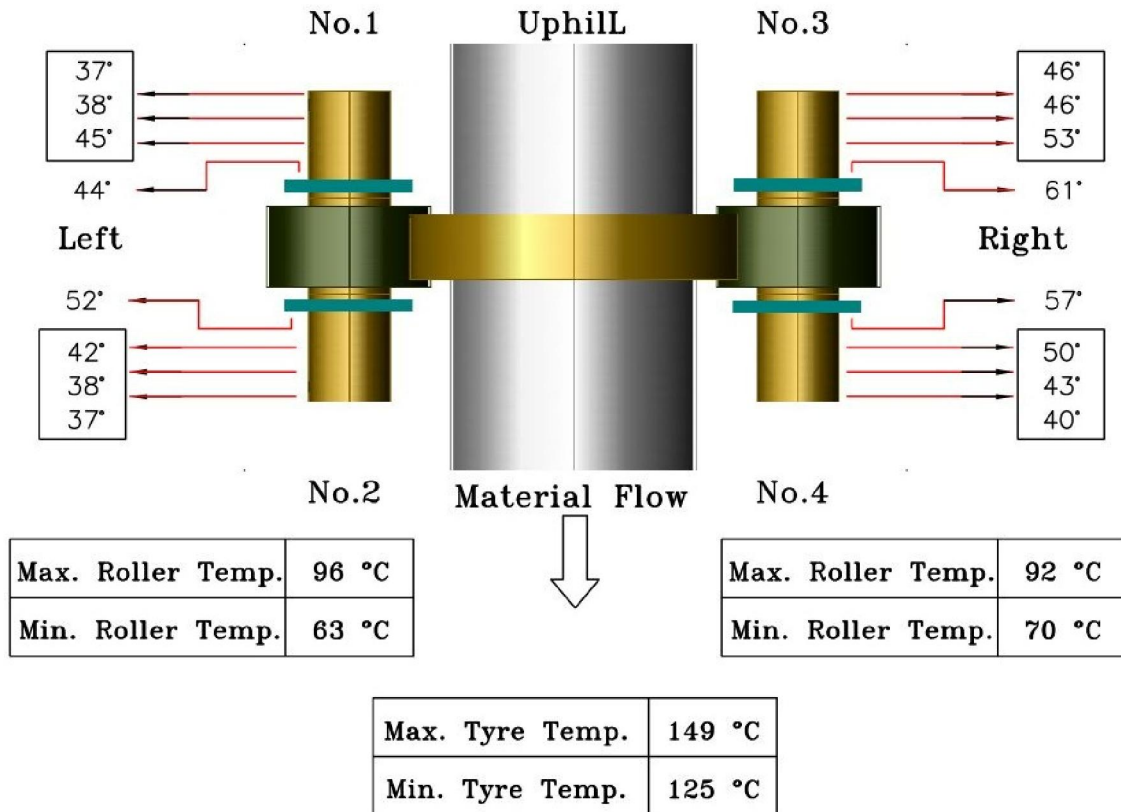
down





Bearings - Temperature & visual inspection

Support (inlet side) :



Visual observation for bearing at inlet support

Bearing No.	Journal	roller shaft surface	Lubricant	Oil tray distributor	Felt seal	Oil level	Water cooling
1	OK	OK	dirty	None	OK	OK	OK
2	OK	OK	dirty	not adjust	OK	OK	OK
3	OK	OK	OK	None	OK	OK	OK
4	OK	OK	OK	None	OK	OK	OK



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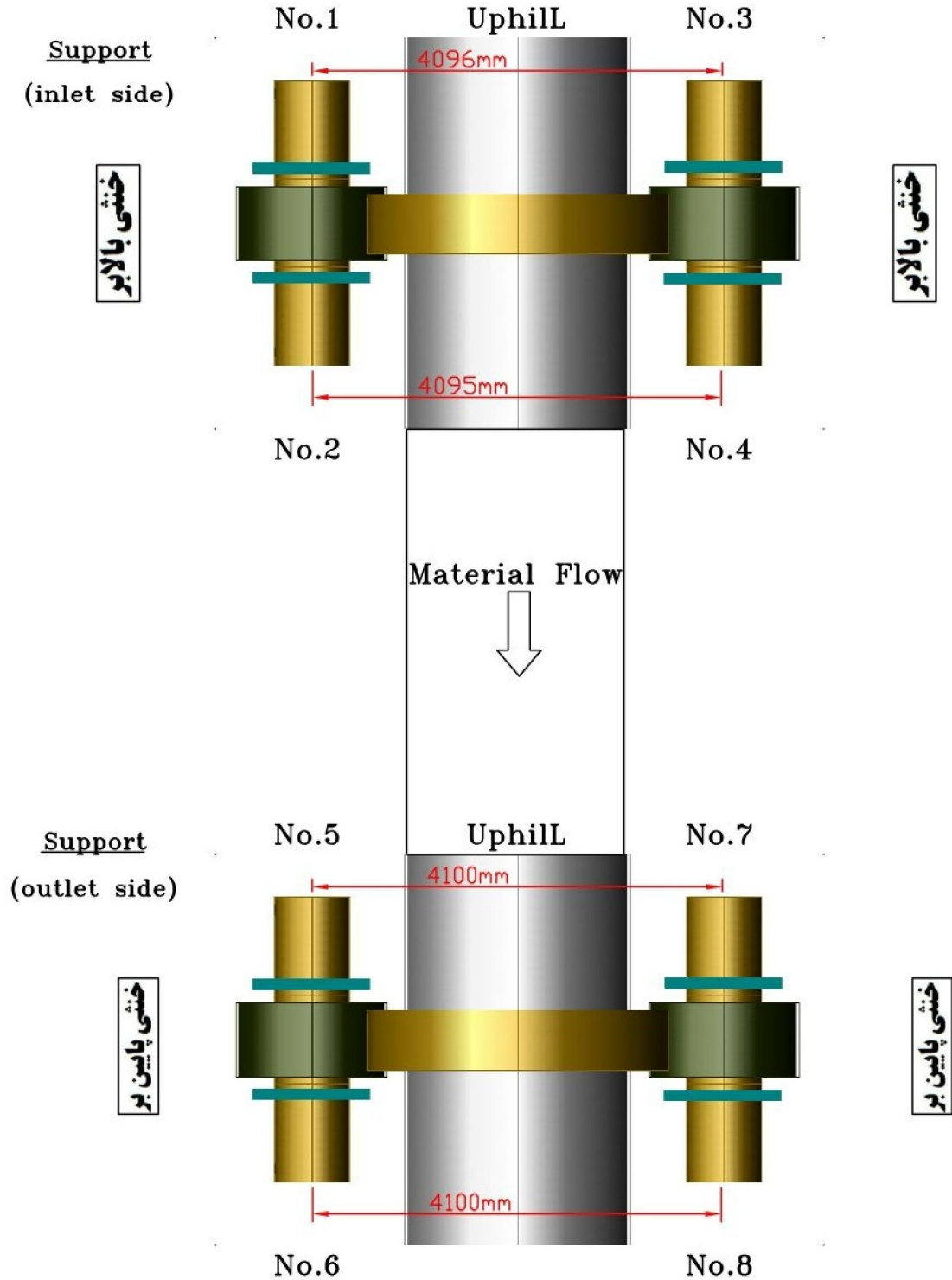
Plant : ----- Cement Co

Date : 0000/00/00

Kiln No : -----

rollers span and skewing

standard span in CEMAG drawing is 4100mm





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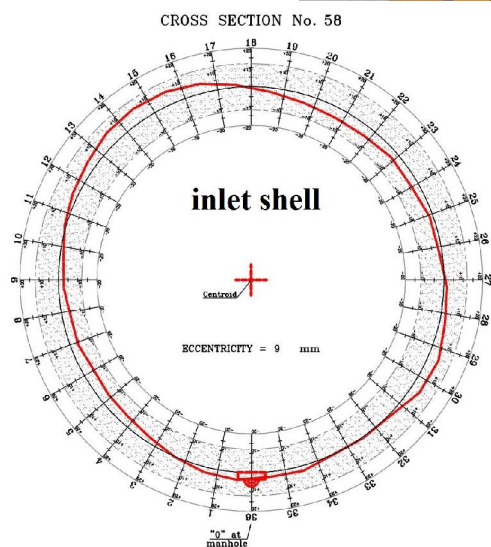
Msajco Office

Plant : ----- Cement co

Kiln No : 1

Visual inspection :

Inlet seal :



- Inlet seal is ok . it is in good condition .



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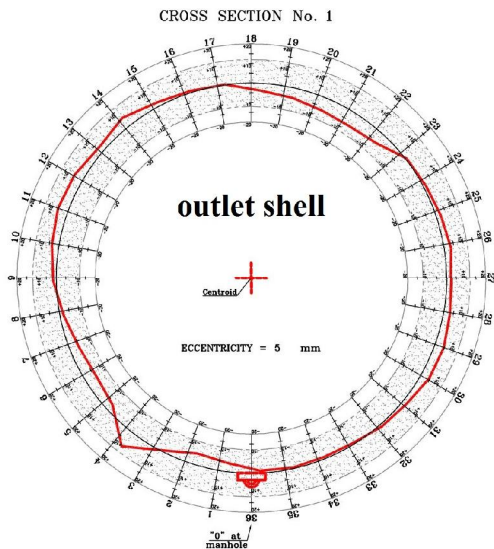
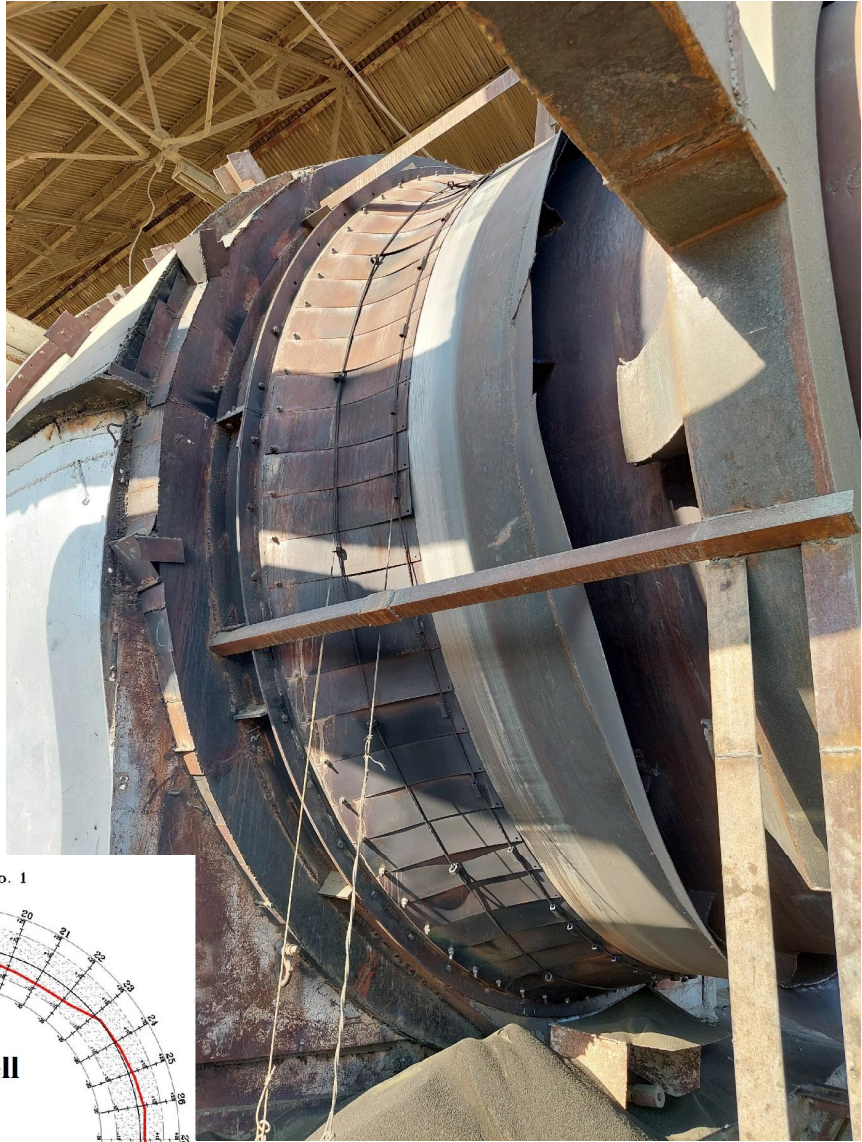
Msajco Office

Plant : ----- Cement co

Kiln No : 1

Visual inspection :

Outlet seal :



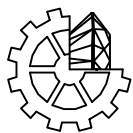
- outlet seal is ok . it is in good condition .
- because of high run run out few material pure out of the seal



Kiln shell crack increases between the tires , as we checked it , the problem was not in shells connection (shell welds) .

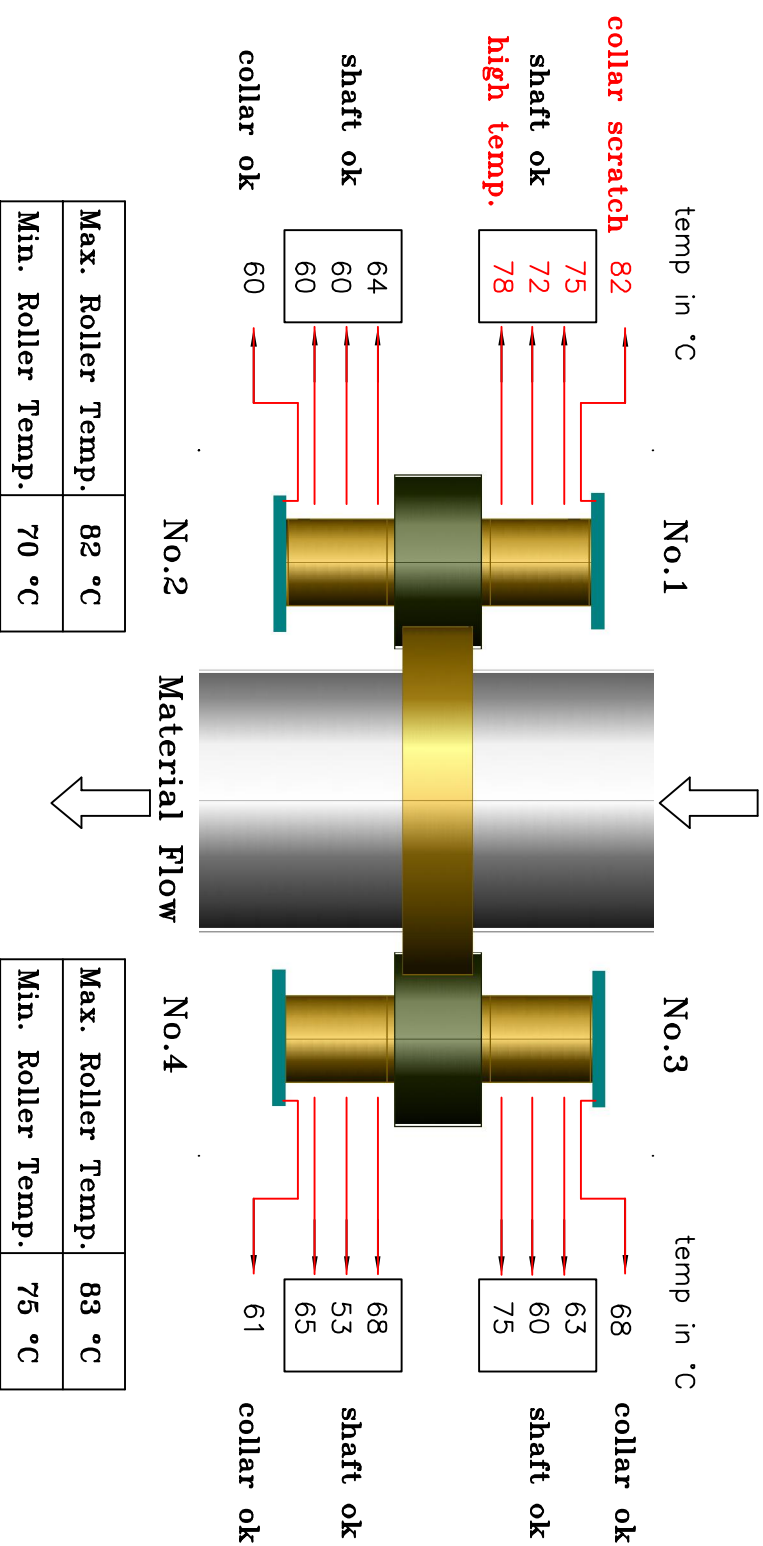
Maybe the shell has become thinner than standard and also it has burned in different parts .





Bearings – Temperature & visual inspection

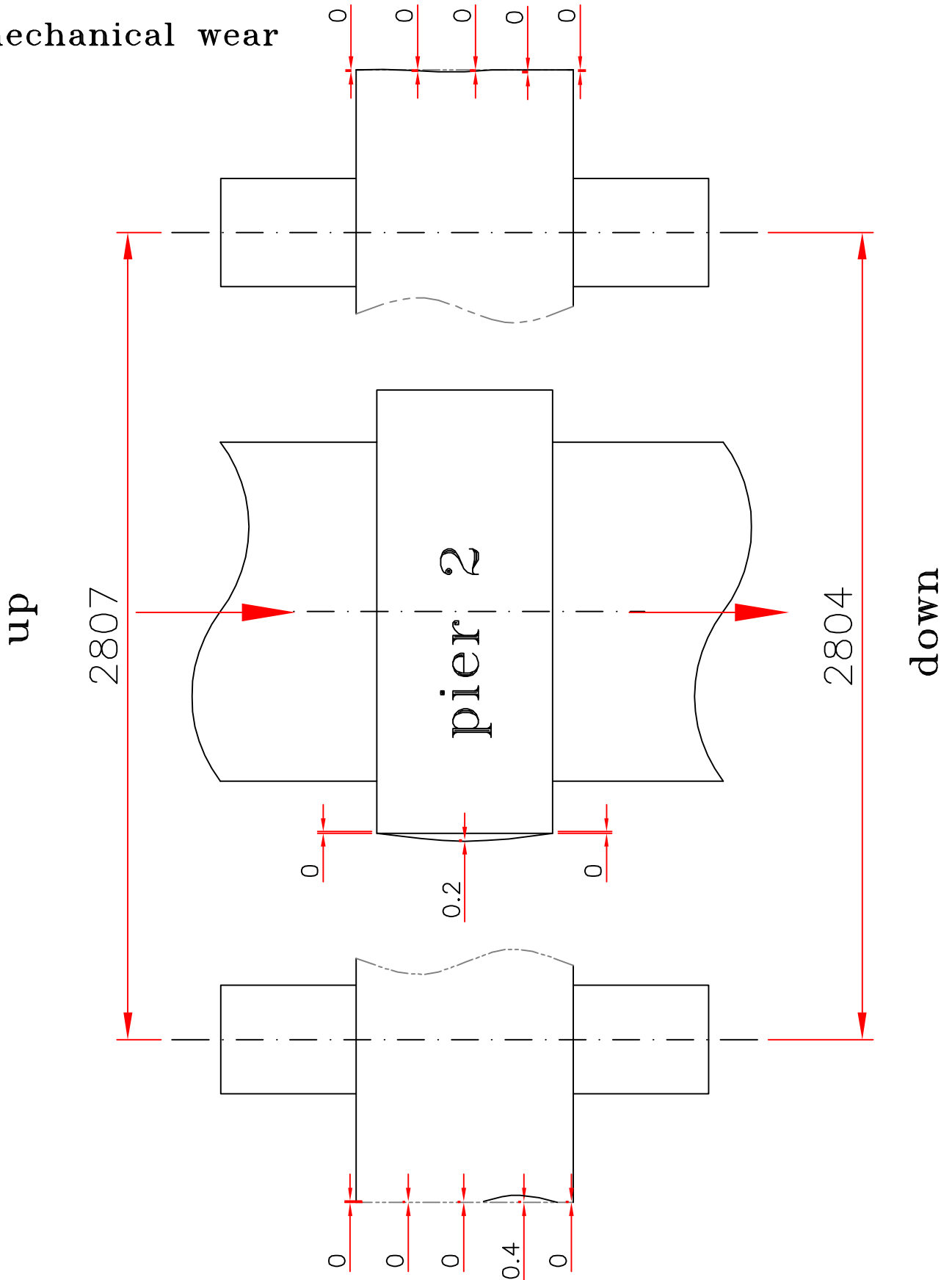
Support 2:



Max. Tyre Temp.	141 °C
Min. Tyre Temp.	90 °C



rollers & tire
mechanical wear





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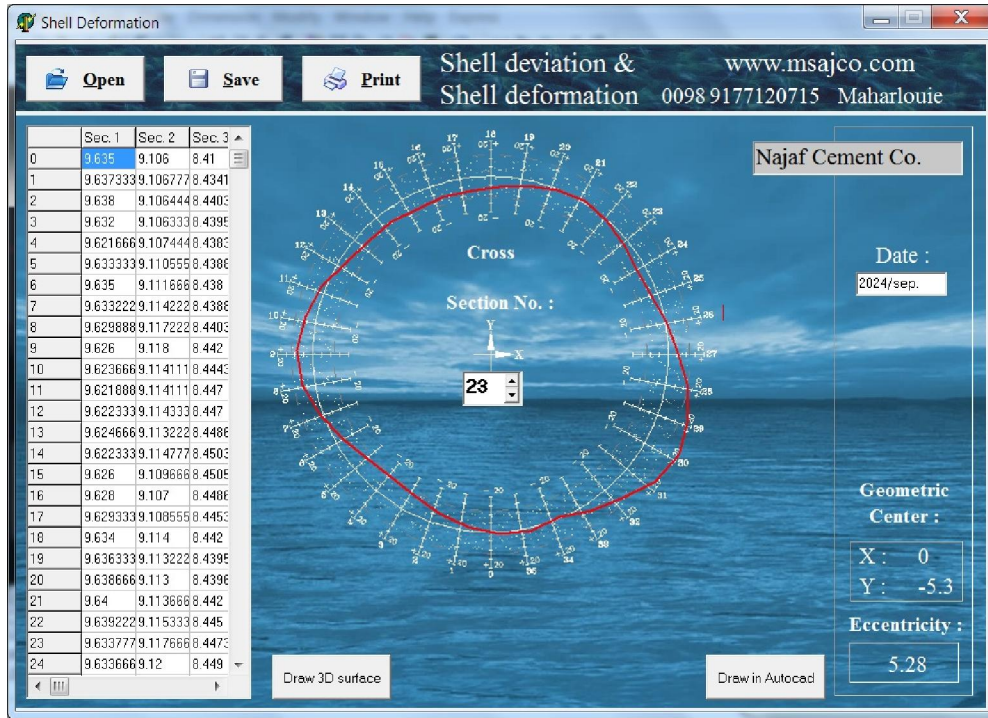
Date : 2024/ Sep.

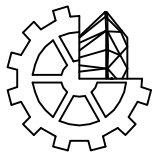
Msajco Office

Plant : ----- Cement co

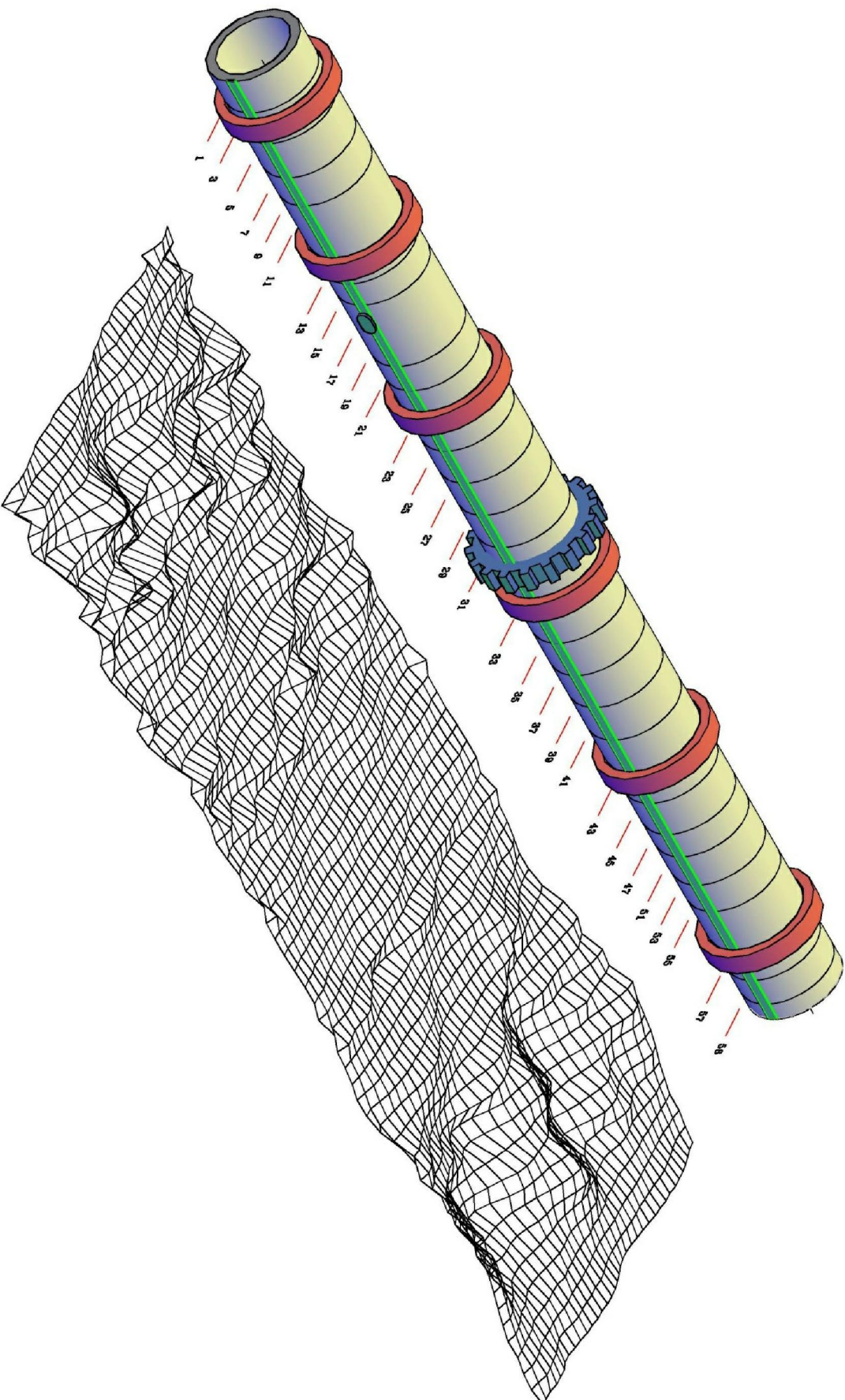
Kiln No : 1

shell profile





Kiln Shell deformation





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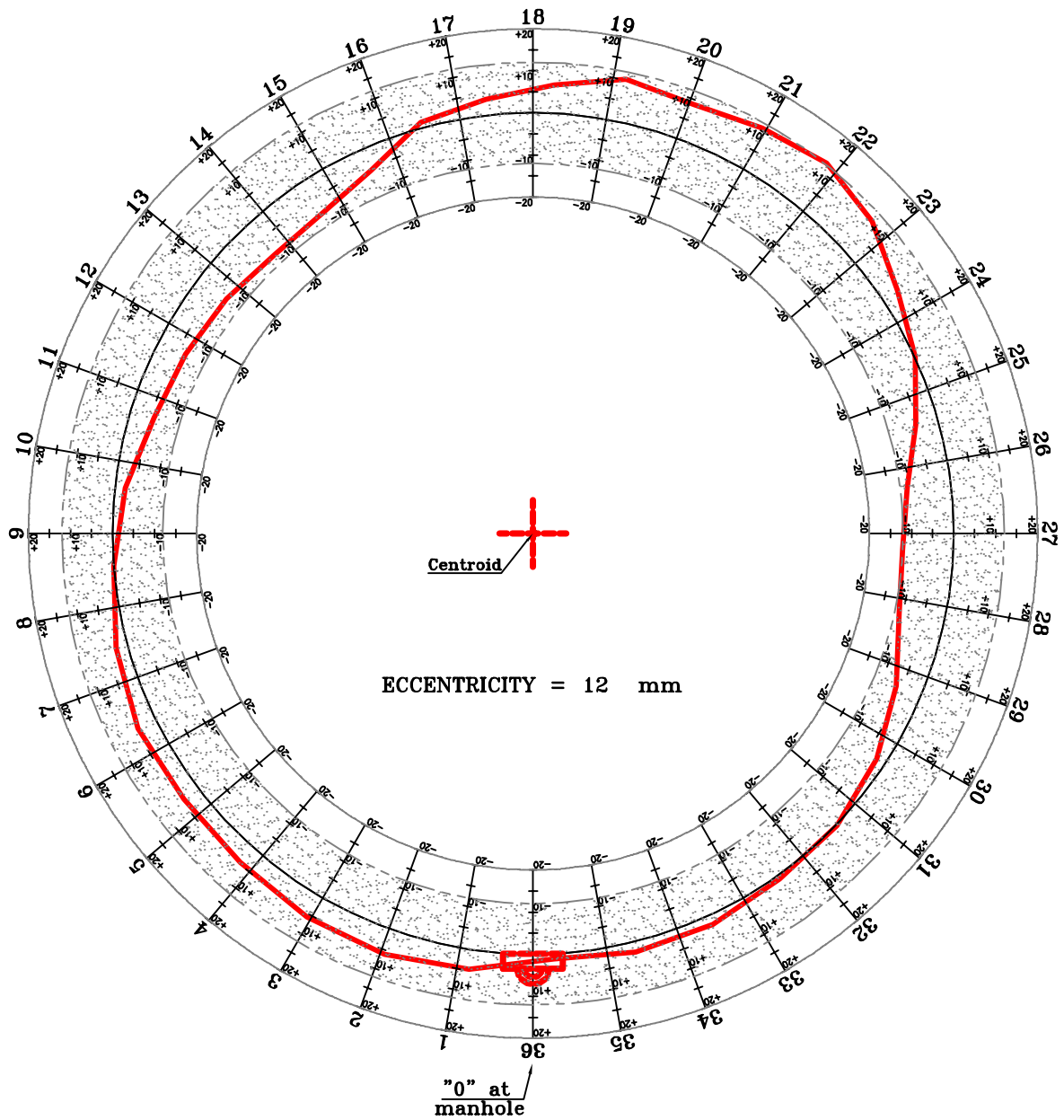
Page :

Plant : Najaf Cement Co.

Kiln :

RUN OUT & SHELL DEFORMATION

CROSS SECTION No. 4



VIEW TOWARDS FEED END



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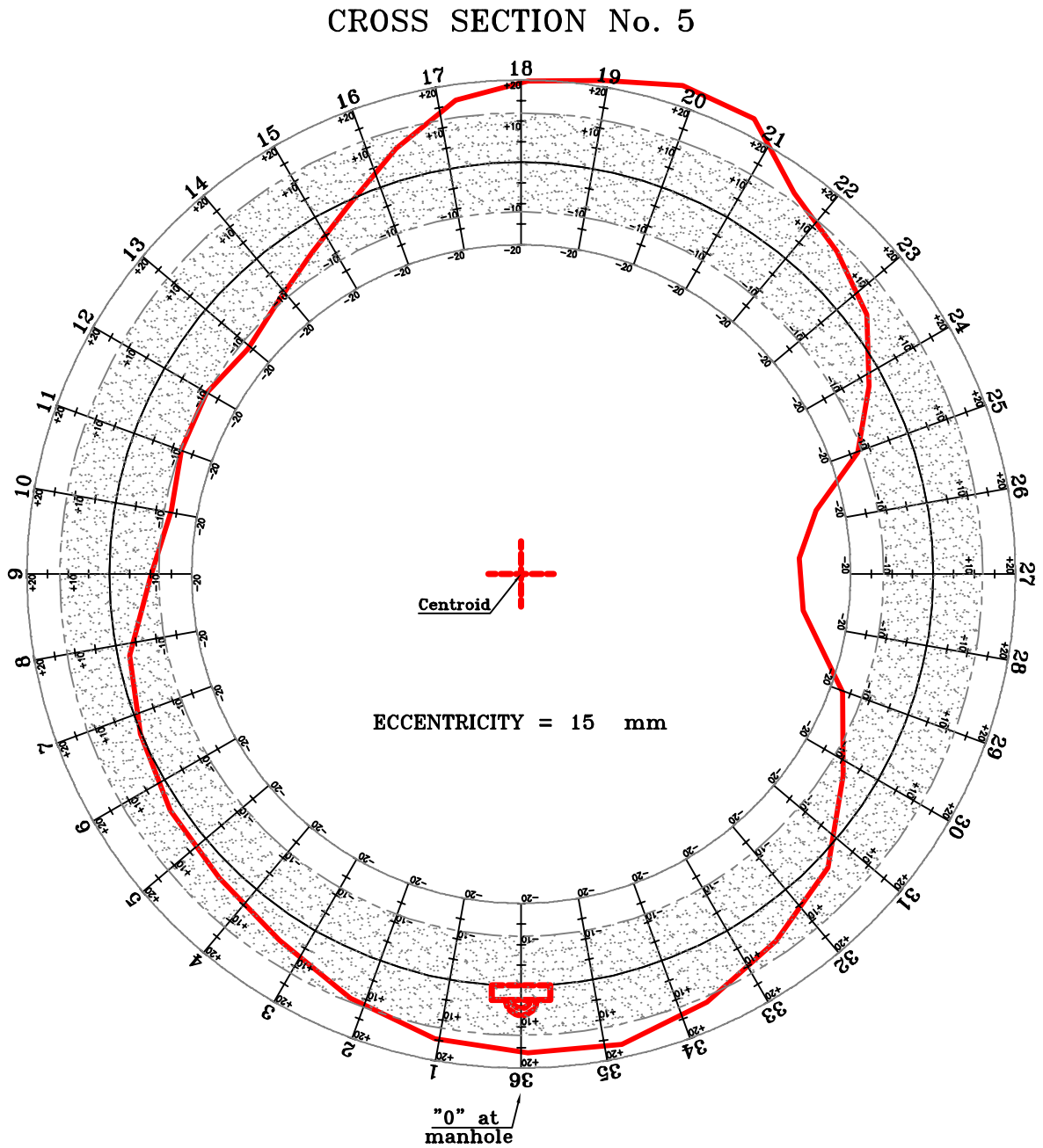
Date : 2024/sep.

Page :

Plant : Najaf Cement Co.

Kiln :

RUN OUT & SHELL DEFORMATION



VIEW TOWARDS FEED END



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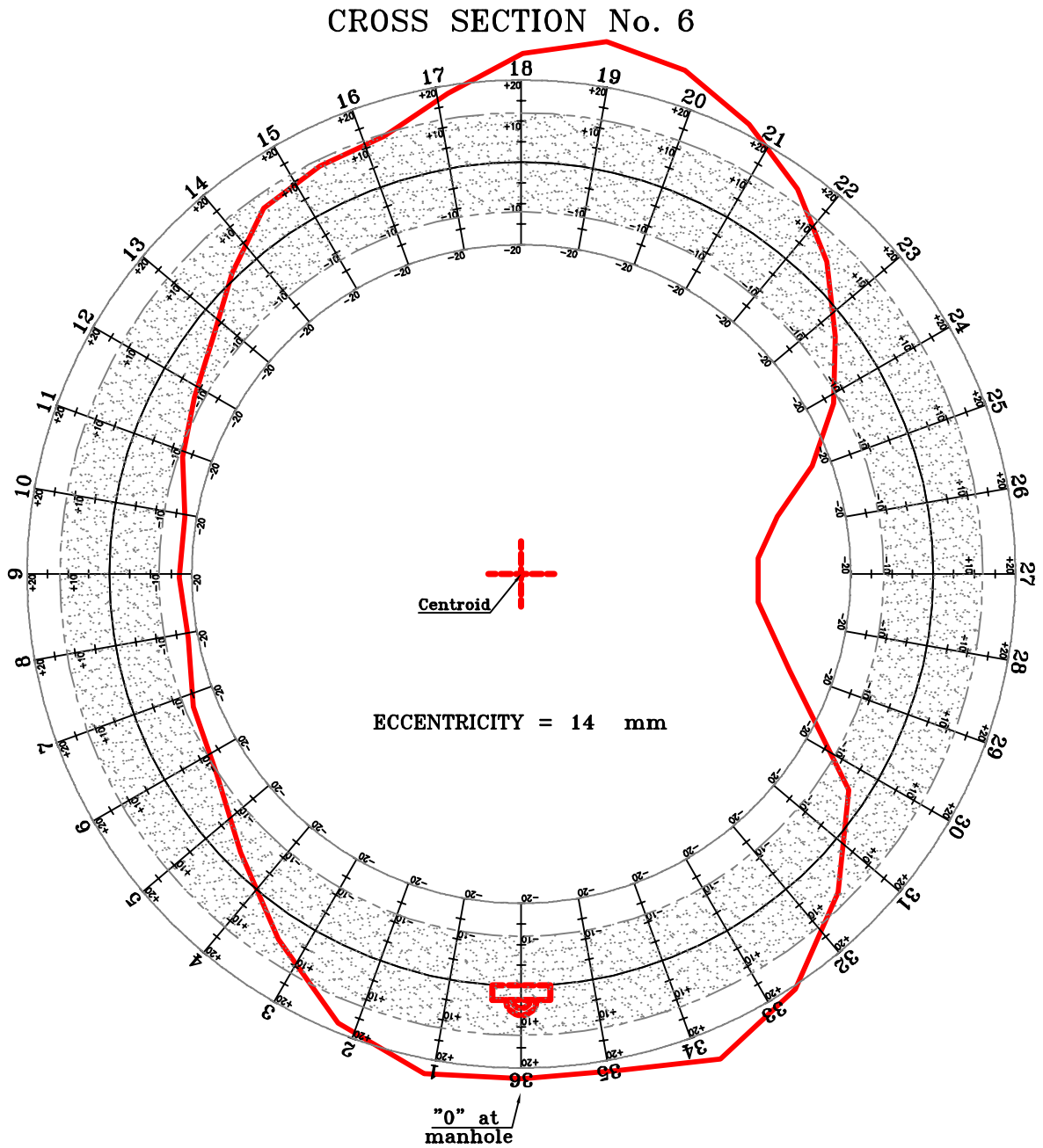
Date : 2024/sep.

Page :

Plant : Najaf Cement Co.

Kiln :

RUN OUT & SHELL DEFORMATION



VIEW TOWARDS FEED END



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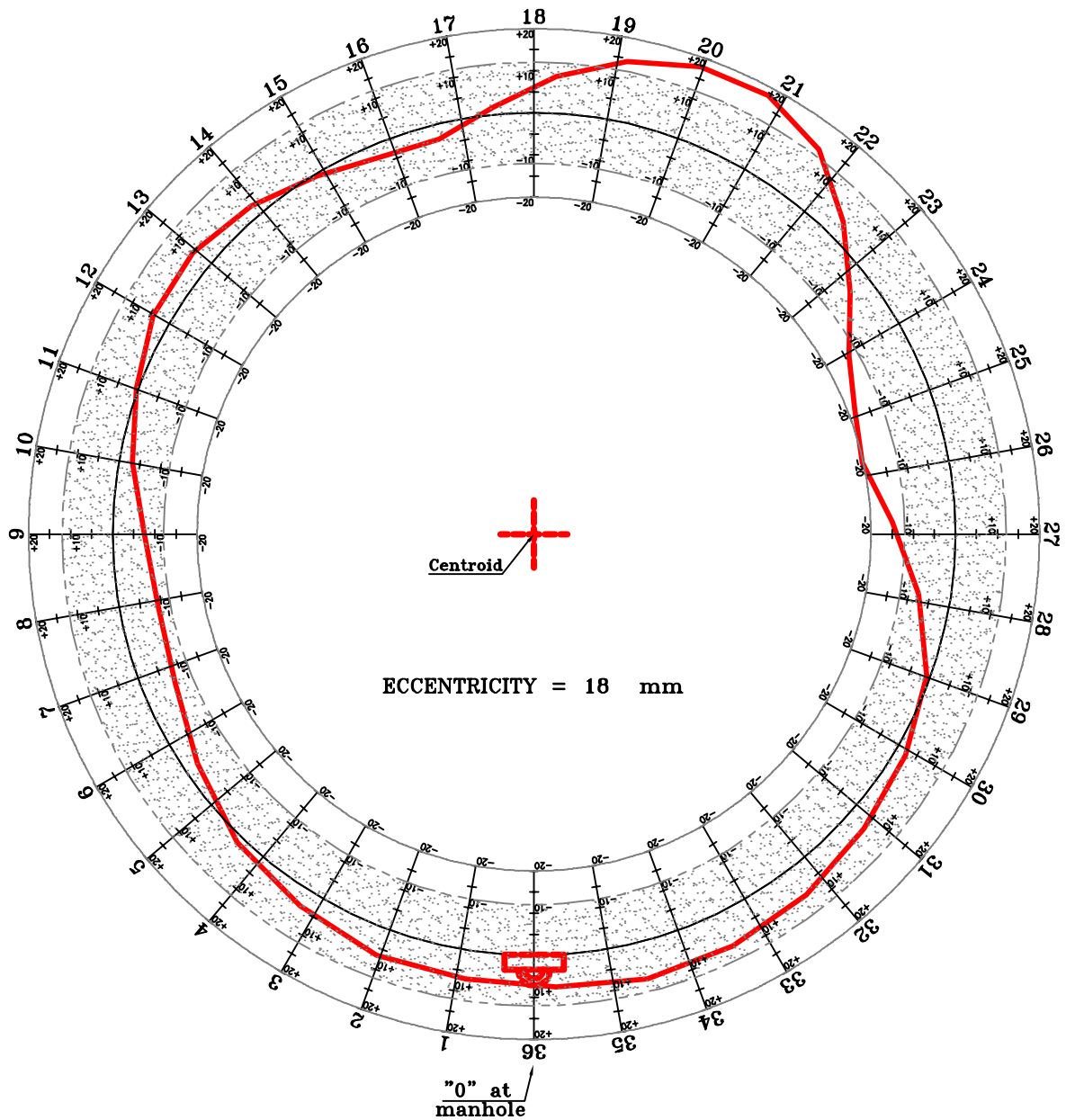
Page :

Plant : Najaf Cement Co.

Kiln :

RUN OUT & SHELL DEFORMATION

CROSS SECTION No. 7



VIEW TOWARDS FEED END



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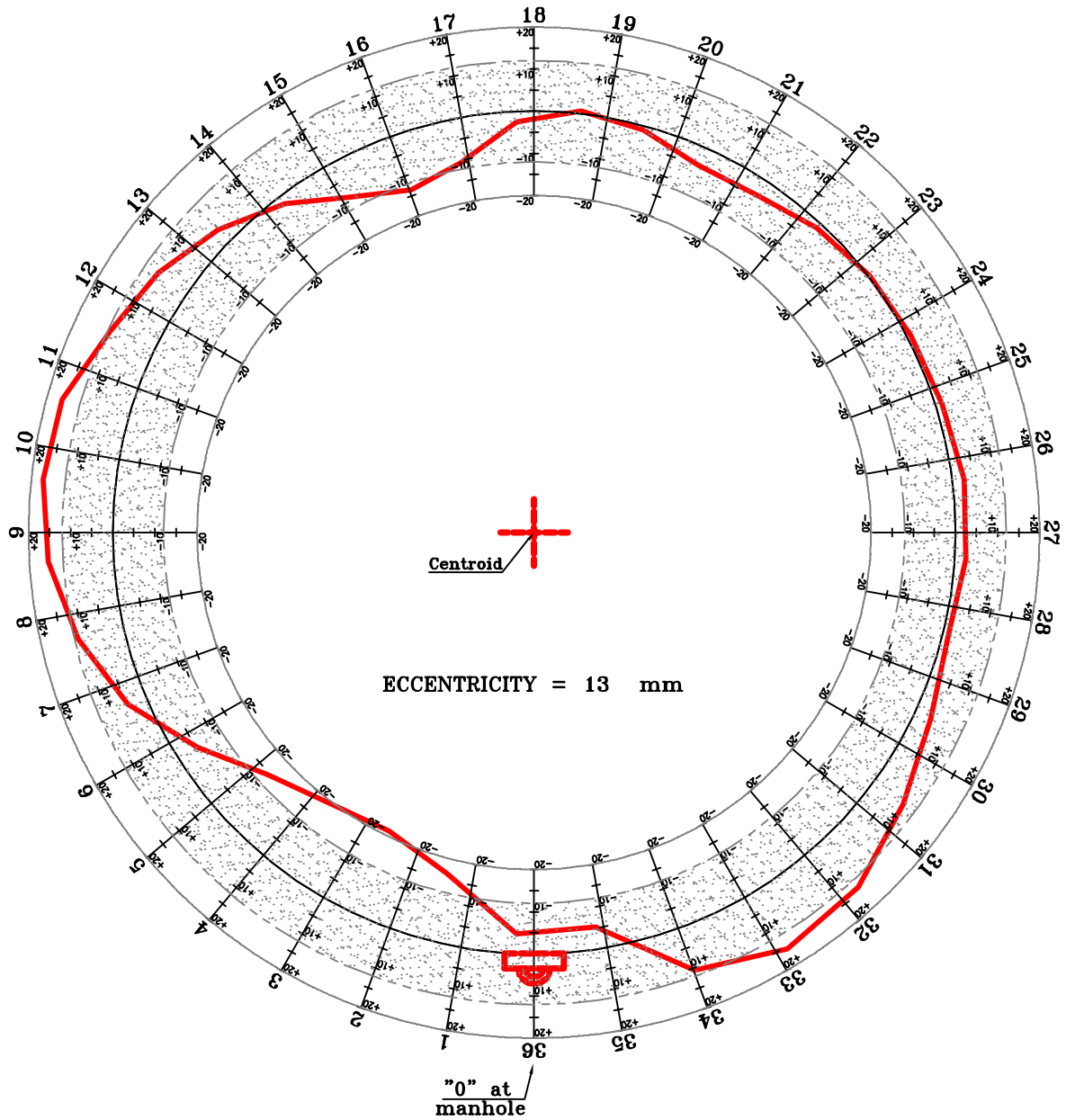
Page :

Plant : Najaf Cement Co.

Kiln :

RUN OUT & SHELL DEFORMATION

CROSS SECTION No. 8



VIEW TOWARDS FEED END



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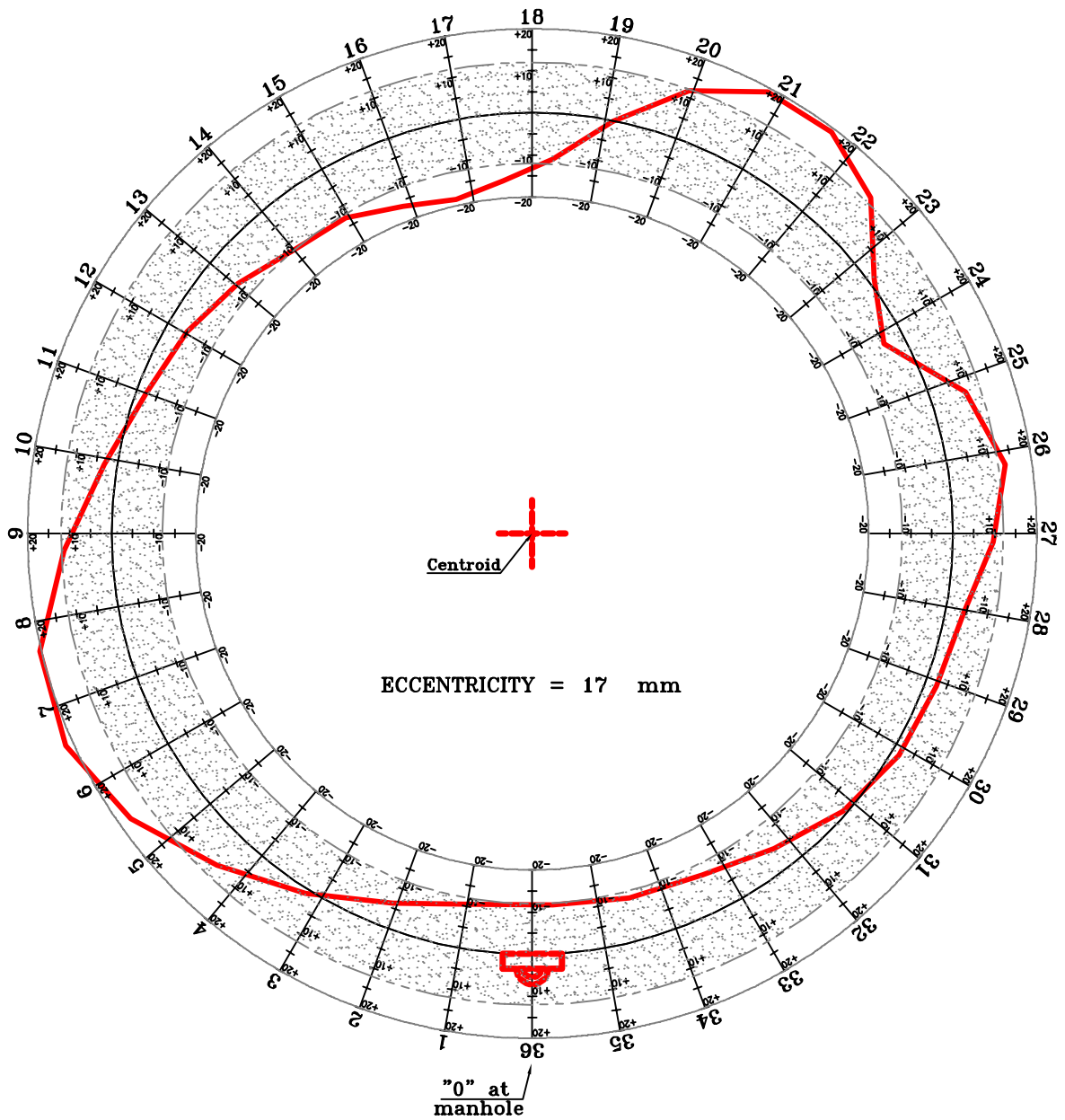
Page :

Plant : Najaf Cement Co.

Kiln :

RUN OUT & SHELL DEFORMATION

CROSS SECTION No. 9



VIEW TOWARDS FEED END



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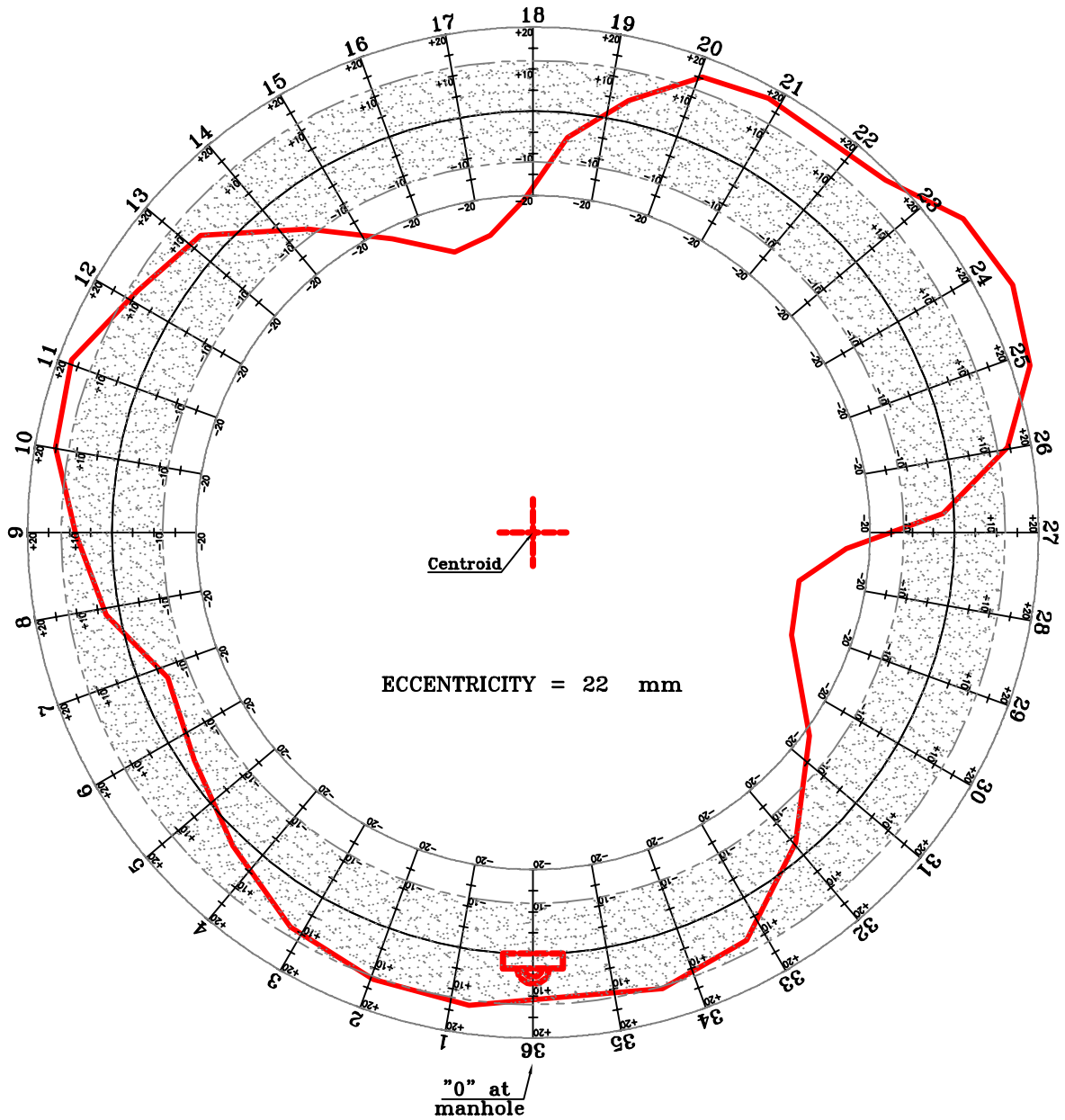
Page :

Plant : Najaf Cement Co.

Kiln :

RUN OUT & SHELL DEFORMATION

CROSS SECTION No. 10





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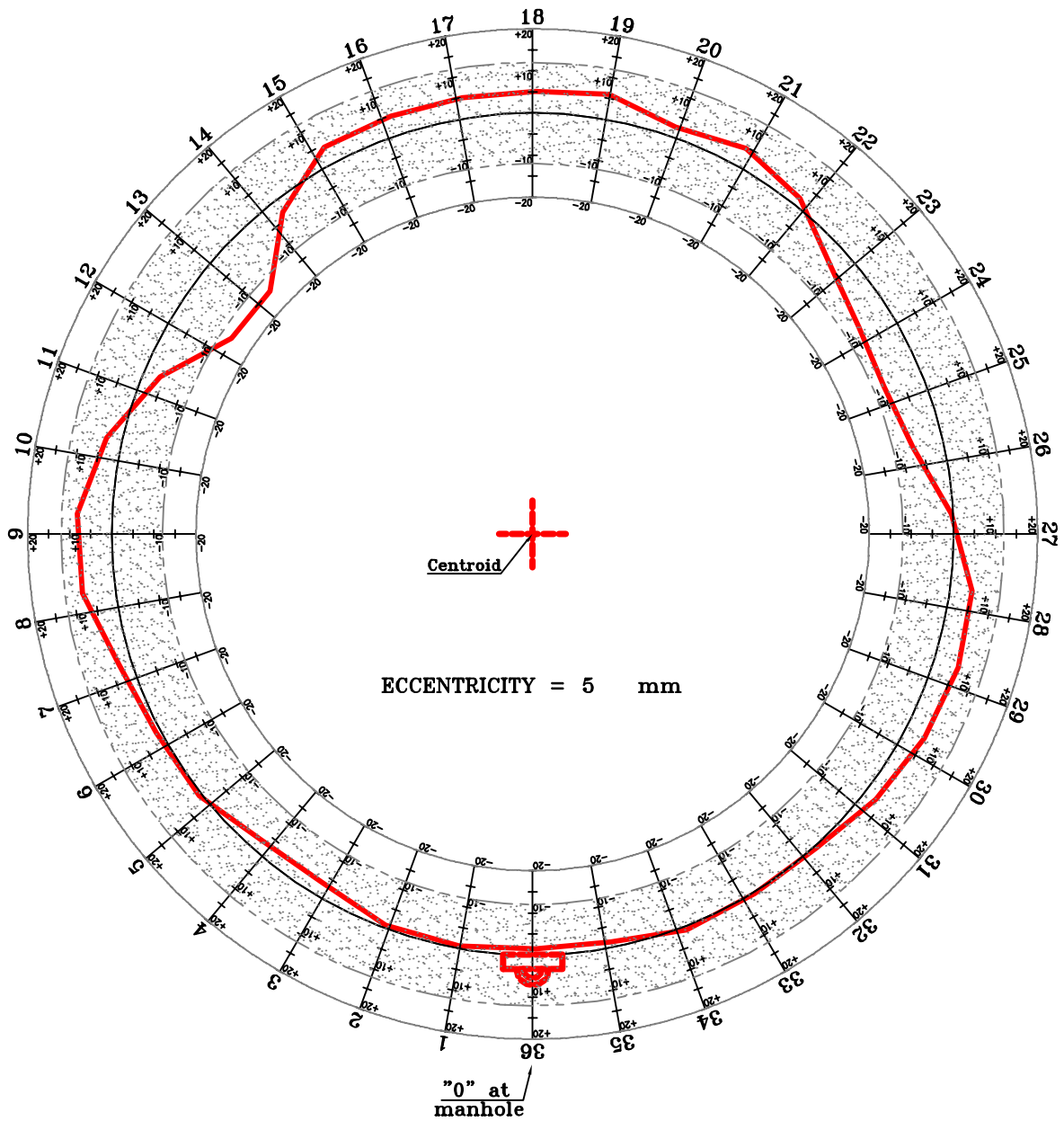
Page :

Plant : Najaf Cement Co.

Kiln :

RUN OUT & SHELL DEFORMATION

CROSS SECTION No. 11



VIEW TOWARDS FEED END



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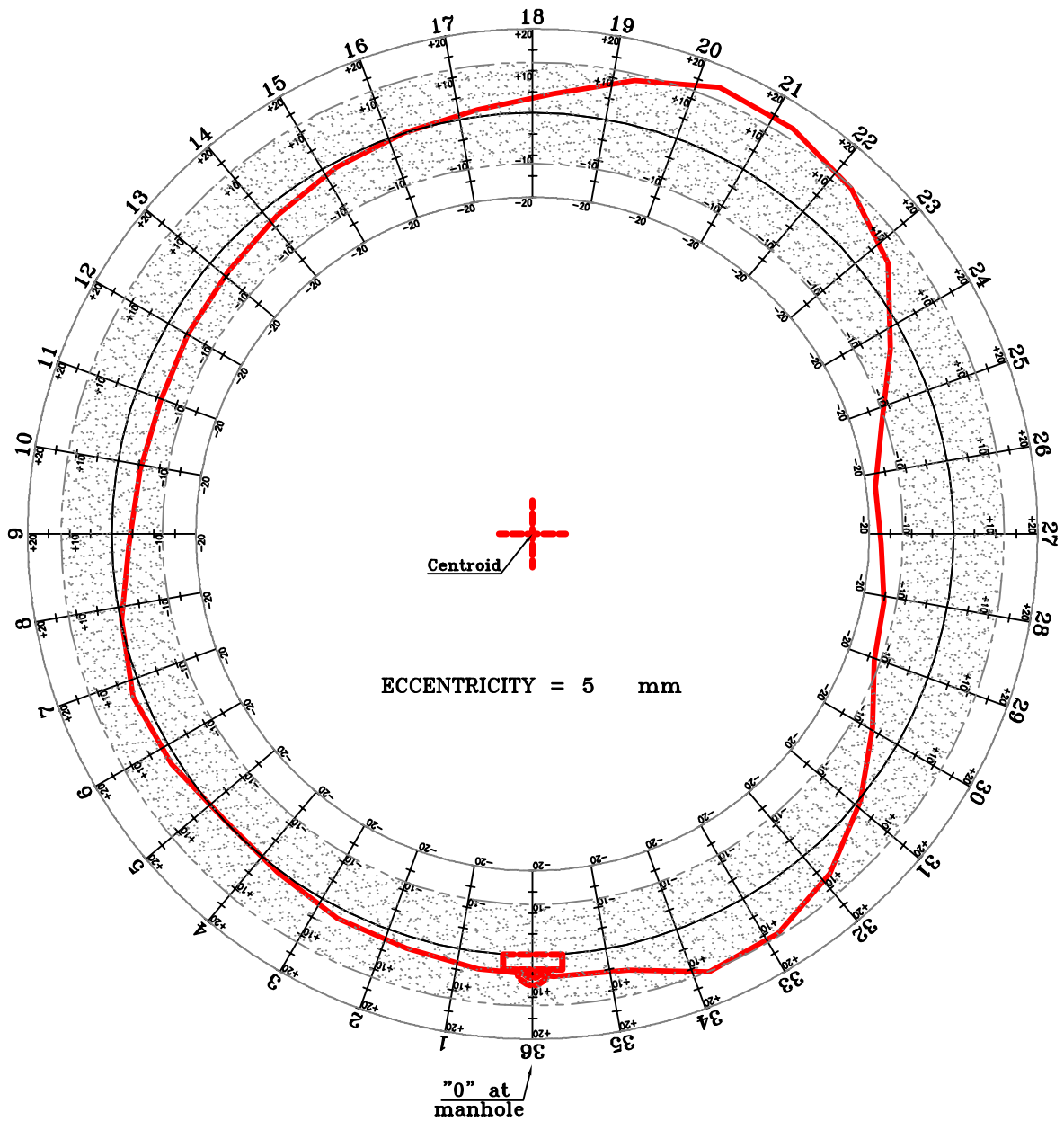
Page :

Plant : Najaf Cement Co.

Kiln :

RUN OUT & SHELL DEFORMATION

CROSS SECTION No. 12



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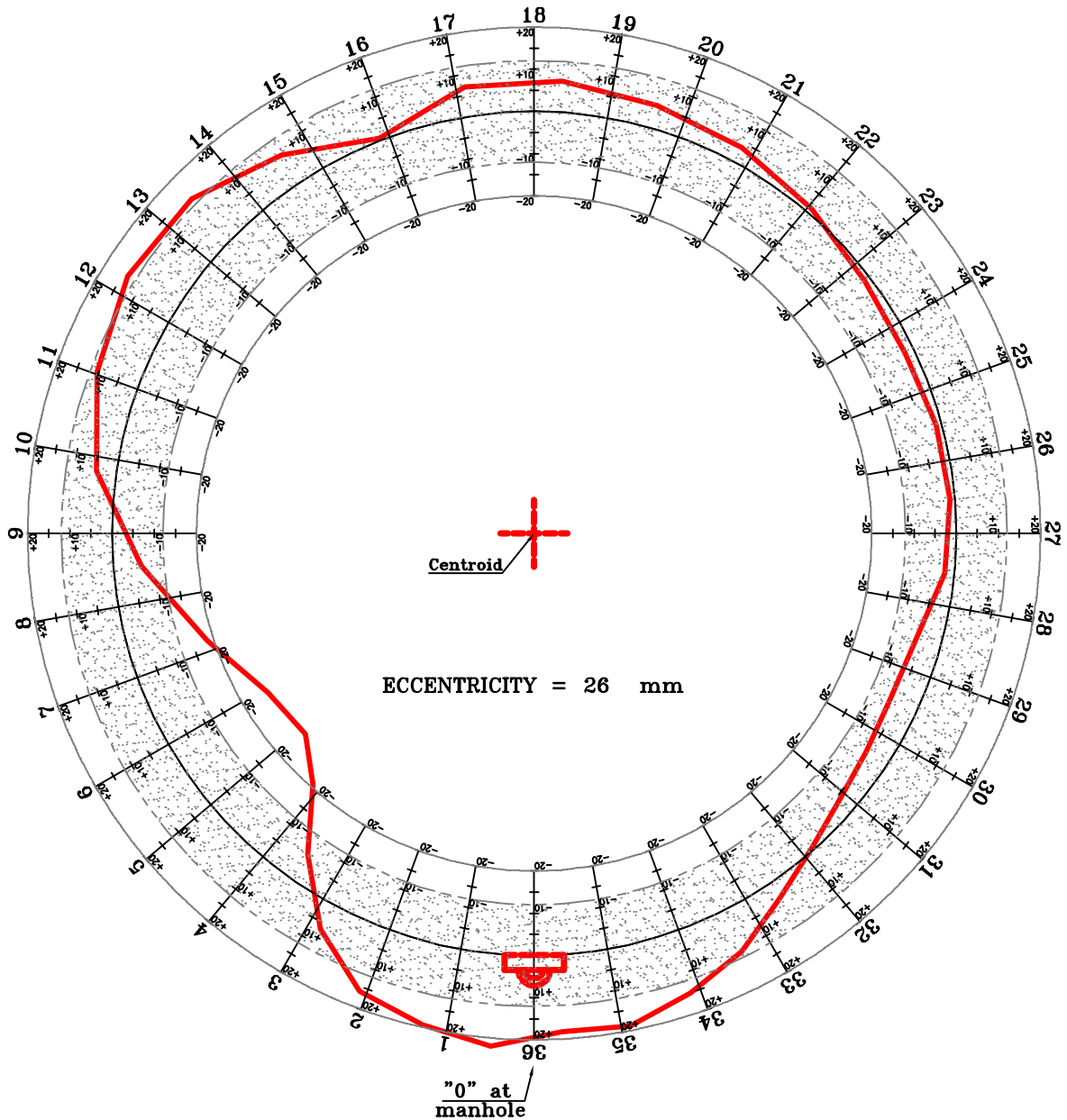
Page :

Plant : Najaf Cement Co.

Kiln :

RUN OUT & SHELL DEFORMATION

CROSS SECTION No. 13



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Date : 2024/sep.

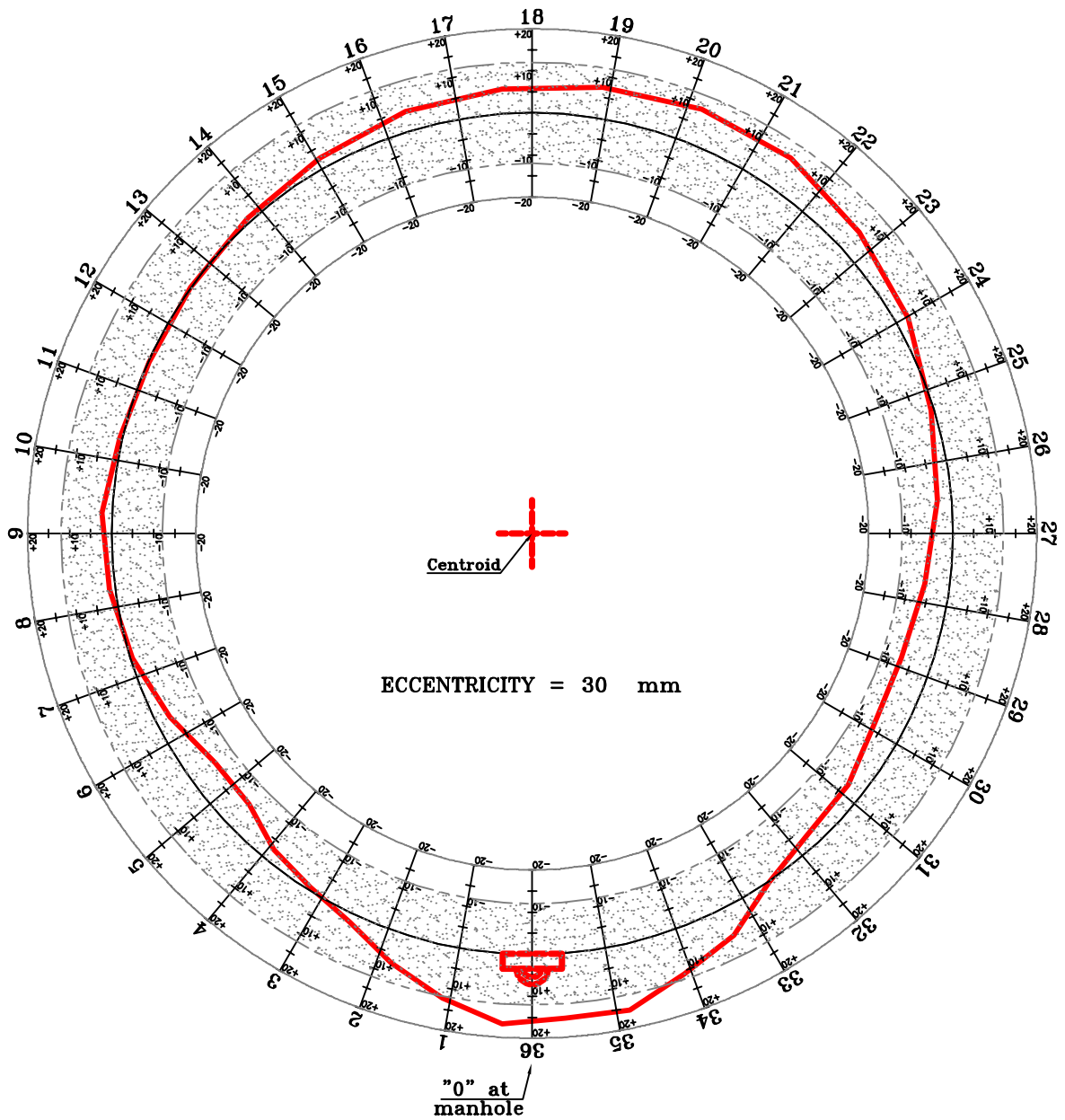
Page :

Plant : Najaf Cement Co.

Kiln :

RUN OUT & SHELL DEFORMATION

CROSS SECTION No. 14



VIEW TOWARDS FEED END