



Kiln Loading, Burner and Condition · is the kiln working in its band

Filling, residence time and loads against kilns of the same type, the flame of the main burner, and what to do for today's condition.

Licensed to: Sample file · worked example on a demonstration plant

RESIDENCE TIME	FILLING
21.6 minutes	13.4 % · usual 13 to 17

YOUR FIGURES

	Today	What if	
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The kiln

Kiln type	With a calciner		
Diameter inside the bricks	4.40		m
Length	68.0		m
Slope	3.5		%
Kiln speed	4.00	4.30	rpm
Clinker made	5,000		t/day
Hours the kiln ran	24.0		h
Cooler grate area (optional)	120.0		m²
Kiln drive power (optional)	512		kW

The main burner

Main burner fuel	9.80		t/h
Its calorific value	27.5		GJ/t
Carbon in the fuel	70.86		%
Hydrogen	3.87		%
Oxygen	6.08		%
Sulfur	0.58		%
Ash	14.99		%
Moisture	1.93		%
Primary air	2.90	3.60	kg/s
Axial air static pressure	1800		mmWG

Today's condition

Preheater exit O2	2.48		%
Burning zone temperature	1452		°C
Preheater exit (back-end) temperature	308		°C
O2 band from	3.0		%

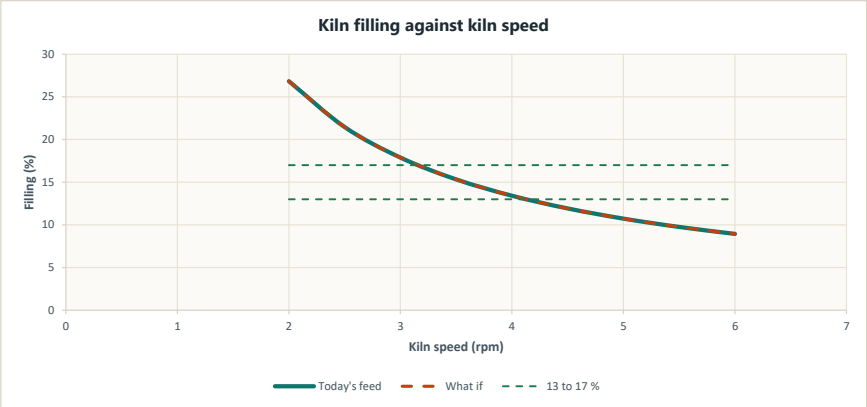
THERMAL LOAD	FLAME MOMENTUM
4.23 Gcal/h per m²	1,939 %·m/s

RESULTS

	Today		What if	Change	What it means
Residence time (min)	21.6	GOOD	20.1	-1.5	20 to 25 min with a calciner, 40 to 45 min preheater only.
Kiln filling (%)	13.4	GOOD	12.5	-0.9	13 to 17 %.
Volumetric load (t/d per m³)	4.84	GOOD	4.84	0	4.5 to 6.5.
Specific capacity (kg/h per m³)	201	WATCH	201	0	125 to 165 with a calciner, 65 to 85 preheater only.
Burning zone thermal load (Gcal/h per m²)	4.23	WATCH	4.23	0	2.5 to 3.5 with a calciner, 4.0 to 5.0 preheater only.
Cooler grate load (t/d per m²)	41.7		41.7	0	
Kiln drive energy (kWh/t clinker)	2.46		2.46	0	
Burner fuel NCV from its analysis (kcal/kg)	6,619		6,619	0	
Combustion air of the fuel (kg/kg fuel)	9.32		9.32	0	
Primary air (% of combustion air)	11.4		14.2	+2.8	
Burner tip velocity (m/s)	170		170	0	
Flame momentum (%·m/s)	1,939	GOOD	2,407	+468	1000 to 2000 %·m/s: below it a lazy flame, above it a harsh one.
Condition map case (of 27)	5		5	0	

O2 band to	6.0		%
Burning zone band from	1400		°C
Burning zone band to	1500		°C
Back-end band from	280		°C
Back-end band to	320		°C

Yellow cells are yours. Leave a What-if cell empty to keep today's figure; type a new one to see what changes, before anything is changed in the plant.



WHAT TO DO FIRST

READ	TODAY'S CONDITION: CASE 5 OF 27 O2 low · burning zone normal · back end normal. 1) Reduce the fuel rate slightly, to raise O2. Do: Act in the order given, one step at a time, and let the kiln answer before the next. Why: Three readings together tell more than any one alone: the same O2 means different things with a hot or a cold burning zone.
WATCH	BURNING ZONE THERMAL LOAD 4.23 Above 3.5 Gcal/h per m² for kilns of this type: the refractory of the burning zone works hard. Do: Check the shell temperatures and the coating. Why: A burning zone loaded beyond its band shortens the life of the bricks.

