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## Zig-zag firing

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#### I. Sections of a brick kiln



- Cooling zone = 100 feet
- Combustion zone = 30 feet
- Pre-heating zone = 50-70 feet

#### II. Firing zone



 30 feet to 36 feet length (10 to 12 lines)



> Temperature of subzones:

Subzone 1: 900° C- 1050° C Subzone 2: 900° C- 1050° C Subzone 3: 350° C Firing subzones:
Subzone 1: 3 lines
Subzone 2: 4-5 lines
Subzone 3: 2-3 lines



#### ➤Fuel quantity/spoon size:

Subzone 1: 250-300 gms Subzone 2: 500-650 gms Subzone 3: 250-300 gms



Fuel types: Subzone 1: Coal + biomass fuel (saw dust/briquette) Subzone 2: Coal Subzone 3: saw dust + Briquette +coal/rice husk + coal

Firing zone size:
Height: 8-10 feet
Width: 25-32 feet
Length: 30-36 feet
Volume: 9000 cubic feet approx.
(10'\*30'\*30')

Primary objective of 10'\*30'\*30' firing zone size: To balance the volume of heat (fire) To produce more first-class bricks





#### ≻Shortcomings:

Possible heat loss from the surface

- Ground surface
- Side wall surface
- Top surface

#### ≻Ways of improvement:

Laying single layer of Paatan Increasing the thickness of Raphis Proper drying of green bricks

#### ≻Fuel consumption:

Depends on clay composition and vitrification temperature Generally vitrification starts from 900° C

#### ≻Combustion:

Depends on the volume of air change (oxygen) and draught Oxygen level differs based on the fuel type used

>Fuel feeding pattern:

Single person Z- pattern Continuous feeding



Calculation of fuel consumption: Can be calculated easily using

- Fuel quantity
- Feeding pattern

Can be calculated on:

- Hourly basis
- Chamber basis
- Daily basis
- Round basis

#### III. Fuel consumption calculation

![](_page_11_Figure_1.jpeg)

First line

![](_page_12_Figure_1.jpeg)

![](_page_13_Figure_1.jpeg)

	Feedholes	Time (hours)	Time (minutes)	Rate of feeding (mins)	Amount of fuel added per spoon (gm)	Total quantity of fuel added (kg)
First line	10	3	180	10	300	54
Second line	10	3	180	10	300	54
Third line	10	3	180	10	300	54
Fourth line	10	3	180	10	600	108

	Feedholes	Time (hours)	Time (minutes)	Rate of feeding (mins)	Amount of fuel added per spoon (gm)	Total quantity of fuel added (kg)	Cumulative quantity of fuel	Cumulative time
First line	10	3	180	10	300	54	54	3 hrs
Second line	10	3	180	10	300	54	108	6 hrs
Third line	10	3	180	10	300	54	162	9 hrs
Fourth line	10	3	180	10	600	108	216	12 hrs
Fifth line	10	3	180	10	600	108	324	15 hrs
Sixth line	10	3	180	10	600	108	432	18 hrs
Seventh line	10	3	180	10	600	108	540	21 hrs
Eighth line	10	3	180	10	300	54	648	24 hrs
Ninth line	10	3	180	10	300	54	702	27 hrs
Tenth line	10	3	180	10	300	54	756	30 hrs
		30 hours			Total amount of	1		08

756

	Feedholes	Time (hours)	Time (minutes)	Rate of feeding (mins)	Amount of fuel added per spoon (gm)	Total quantity of fuel added (kg)	Cumulative quantity of fuel	Cumulative time
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Ninth line	10	3	180	10	300	54	702	27 hrs
Tenth line	10	3	180	10	300	54	756	30 hrs
		30 hours		,,	Total amount of coal added per	756		e <sup>2</sup>

line in 30 hours

Coal feeding per line	756	kg
Average coal feeding in a feedhole	75.6	kg
Coal feeding in a chamber	2268	kg
Number of bricks in a chamber	27,000	
Quantity of coal per brick fired	84	gms

## IV. Firing report format

Data	chift / time	Worker	Cham	nber	No of lines	No of lines fired	Domarka
Date	sint / time	worker	Fire starting	Fire ending	No. of filles	No of filles filed	Reilidiks
3/8/2016	12:00 AM-6:00 AM	A1, A2, A3	Ch 1	Ch 5	10	2	
	6:00 AM- 12:00 PM	B1, B2, B3	Ch 2	Ch 6	10	0	
	12:00 PM -6:00 PM	A1, A2, A3	Ch 2	Ch 8	12	4	
	6:00 PM - 12:00 AM	B1, B2, B3	Ch 4	Ch 9	10	2	
						Total = 8 lines	
		12				164	
3/9/2016	12:00 AM-6:00 AM	A1, A2, A3	Ch 5	Ch 11	12	4	
	6:00 AM- 12:00 PM	B1, B2, B3	Ch 7	Ch 12	10	0	
	12:00 PM -6:00 PM	A1, A2, A3	Ch 7	Ch 12	10	2	
	6:00 PM - 12:00 AM	B1, B2, B3	Ch 8	Ch 13	10		

## IV. Firing report format (Contd)

Data shift (time		1. Contract	Chamber		ALC: ALC: ALC: ALC: ALC: ALC: ALC: ALC:	No. of Barry Royal	
Date	snint / time	worker	Fire starting	Fire ending	NO. OF lines	NO OF lines fired	Remarks
3/8/2016	12:00 AM-6:00 AM	A1, A2, A3	Ch 1	Ch 5	10	2	
i venno.	6:00 AM- 12:00 PM	B1, B2, B3	Ch 2	Ch 6	10	0	
	12:00 PM -6:00 PM	A1, A2, A3	Ch 2	Ch 8	12	4	
e 9	6:00 PM - 12:00 AM	B1, B2, B3	Ch 4	Ch 9	10	2	
÷				an construct an		Total = 8 lines	

3/9/2016	12:00 AM-6:00 AM	A1, A2, A3	Ch 5	Ch 11	12	4	
	6:00 AM- 12:00 PM	B1, B2, B3	Ch 7	Ch 12	10	0	
	12:00 PM -6:00 PM	A1, A2, A3	Ch 7	Ch 12	10	2	2
90. 3	6:00 PM - 12:00 AN	B1, B2, B3	Ch 8	Ch 13	10		

3/10/2016 12:00 AM-6:00 AM	A1, A2, A3		Ĩ
6:00 AM- 12:00 PM	B1, B2, B3		
12:00 PM -6:00 PM	A1, A2, A3		0 6 5
6:00 PM - 12:00 AM	B1, B2, B3		

3/11/2016 12:00 AM-6:00 AM A1, A2, A3		
6:00 AM- 12:00 PM B1, B2, B3	x.	1) 4):
12:00 PM -6:00 PM A1, A2, A3		
6:00 PM - 12:00 AM B1, B2, B3		

![](_page_18_Picture_0.jpeg)

➢Production can be optimised and quality products can be achieved by using scientific practices

➤The target is to move 10-12 lines per day, which will result in higher production of bricks

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#### Thank you

# Let's protect the pulse.