

REPLACING BURNERS IN A PENNEKAMP LEHR - BELTWIDTH : 2 760 mm - CONSUMPTION 348 Nm³ / day

Annealing Lehr Pennekamp - Belt 2 760 mm - total length 33 800 mm - total capacity 21 ton

flint article - 147 gr - round 55 mm

7 heated : 15 750 / 1 neutral : 2 250 / 1 exhaust : 2 250 / 2 cooled : 4 500 mm

Beltwidth : 2 760 mm**Unused left side :** 170 0 mm 150+190**Unused right side :** 330 60 mm 350+310**Nr of art in width :** 30 pcs**Nr of art in length :** 30 distance : 1 720 mm**Beltspeed (sec) :** 262 distance : 2 250 mm**Dim art (diam) :** 55 mm**Weight art :** 147 gr 160 mm high

Colors :	Data known or measured
machine : 10S-DG	Data calculated
color : Flint	Data estimated

burner :	tg1	75	kW
data measured on site :	GAZ	348	Nm³/24H
		174	kWh / ton

distance between art in width : 21.03 mm

distance between art in length : 2.33 mm

speed of the belt : 515 mm/min

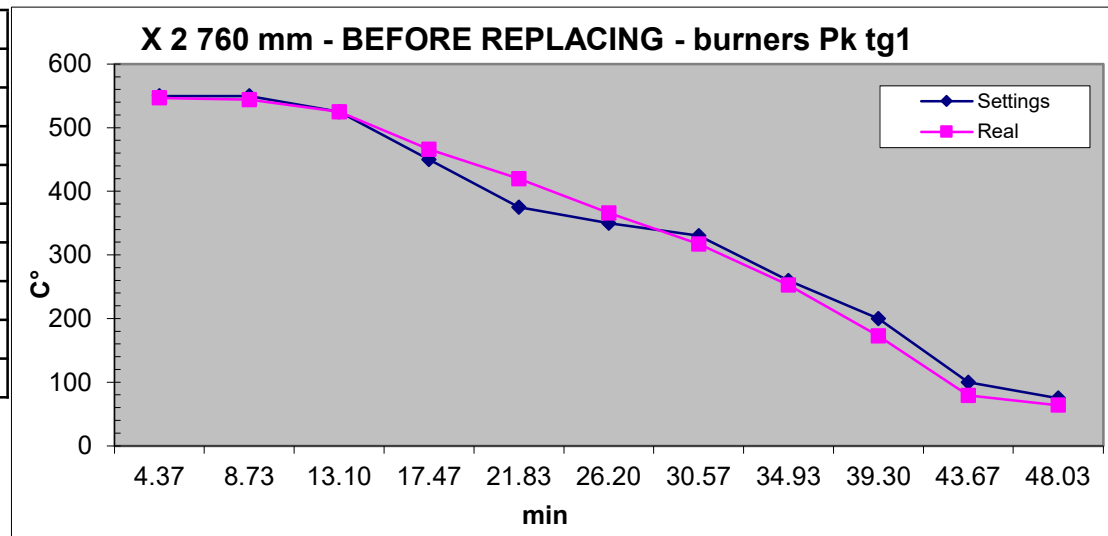
speed of the machine : 100 art / min

production per day : 21 Tons / day

Length	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	8750	33500
Sect nr	Sect 1	Sect 2	Sect 3	Sect 4	Sect 5	Sect 6	Sect 7	Sect 8	Sect 9	Sect 10	Sect 11	open	
Nr contr	1	1	1	1	1	1	1	1	1	1	1	Fan at	
Nr Burners	RF + LB	RF + LB	RB	LB	RB	LB	RB	neutre	Exhaust	Cool	Cool	2000 + 5000	
Nr conv fans	1	1	1	1	1	1	1	1	1	2	2	Spray at	
Temp set	550	550	525	450	375	350	330	260	200	100	75	3500 + 4700	
Temp reached	547	544	525	466	420	366	317	253	173	79	64		
Time (min)	4.37	8.73	13.10	17.47	21.83	26.20	30.57	34.93	39.30	43.67	48.03	65.01	

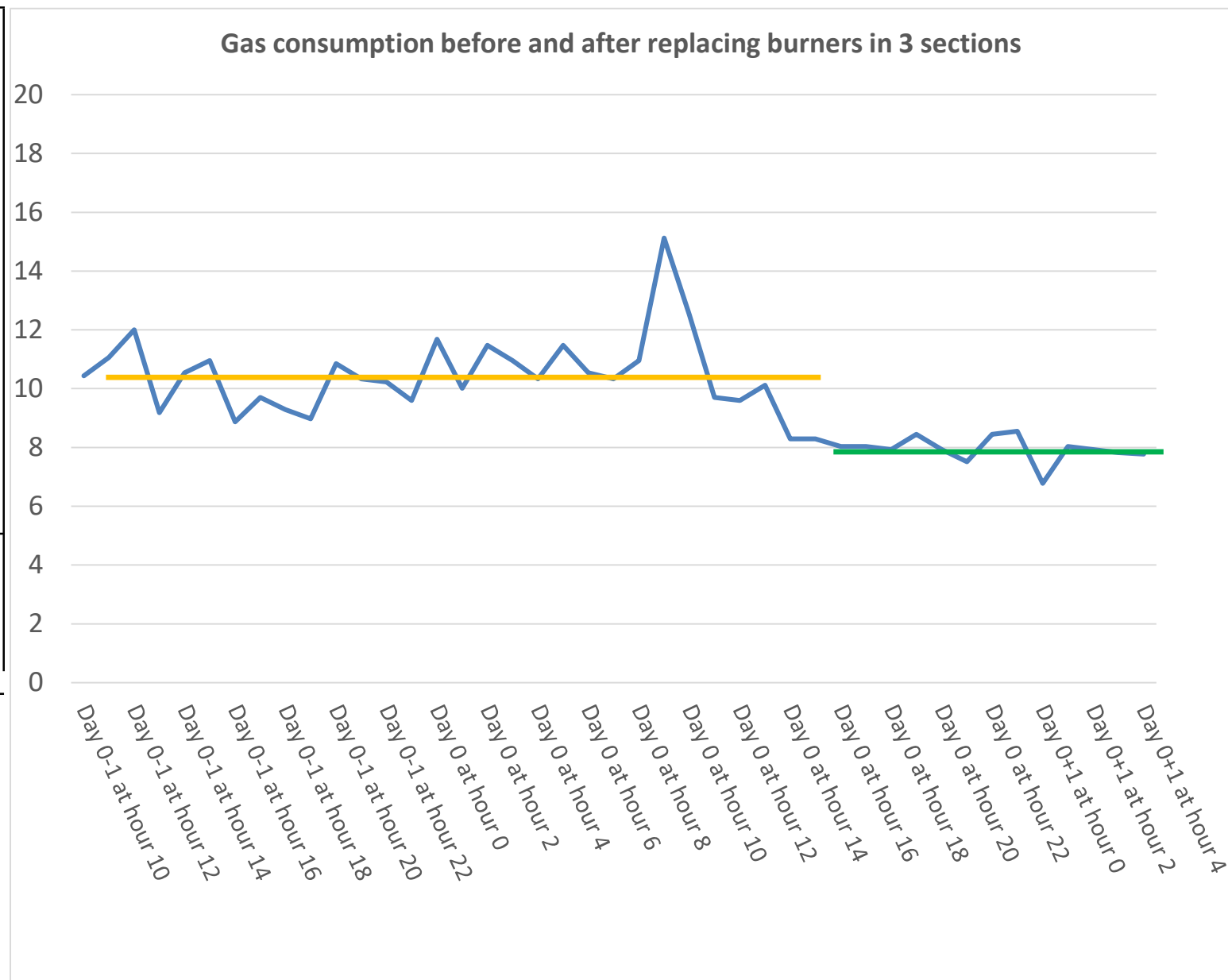
Direction cross conveyor :	Left > Right				avg
C° IN L :	551	556	546	567	555
C° IN R :	534	524	525	542	531
C° tunnel out L :	103	98	104	111	104
C° tunnel out R :	100	100	95	93	97
C° spray 1 L :	38	36	38	38	38
C° spray 1 R :	50	40	40	39	42
C° spray 2 L :	34	34	33	33	34
C° spray 2 R :	39	35	35	35	36
C° end lehr :	31	32	32	31	32

Result Anneal Time above 540 C° : 8.7 min Total time
 not measured Time in tunnel : 48.0 min 65.0
 Cool speed 540 > 400 C° : 9.9 C° / min
 Cool speed 400 > 200 C° : 13.7 C° / min



LINE X : REPLACING BURNERS IN SECTIONS 1, 2 and 3**Date/time** **m3 (no Nm3)**

Day 0-1 at hour 10	10.433	original Pennekamp burners
Day 0-1 at hour 11	11.059	
Day 0-1 at hour 12	11.998	
Day 0-1 at hour 13	9.181	
Day 0-1 at hour 14	10.537	
Day 0-1 at hour 15	10.954	
Day 0-1 at hour 16	8.868	
Day 0-1 at hour 17	9.702	
Day 0-1 at hour 18	9.285	
Day 0-1 at hour 19	8.972	
Day 0-1 at hour 20	10.85	
Day 0-1 at hour 21	10.328	
Day 0-1 at hour 22	10.224	
Day 0-1 at hour 23	9.598	
Day 0 at hour 0	11.685	
Day 0 at hour 1	10.015	
Day 0 at hour 2	11.476	
Day 0 at hour 3	10.954	
Day 0 at hour 4	10.328	
Day 0 at hour 5	11.476	
Day 0 at hour 6	10.537	
Day 0 at hour 7	10.328	
Day 0 at hour 8	10.954	
Day 0 at hour 9	15.127	REPLACING
Day 0 at hour 10	12.519	
Day 0 at hour 11	9.702	
Day 0 at hour 12	9.598	
Day 0 at hour 13	10.12	
Day 0 at hour 14	8.294	
Day 0 at hour 15	8.294	
Day 0 at hour 16	8.033	Section 1
Day 0 at hour 17	8.033	2 x G5
Day 0 at hour 18	7.929	Section 2
Day 0 at hour 19	8.45	
Day 0 at hour 20	7.929	2 x G5
Day 0 at hour 21	7.511	Section 3
Day 0 at hour 22	8.45	
Day 0 at hour 23	8.555	1 x G5
Day 0+1 at hour 0	6.781	Sections 4 - 7 original
Day 0+1 at hour 1	8.033	
Day 0+1 at hour 2	7.929	
Day 0+1 at hour 3	7.824	
Day 0+1 at hour 4	7.772	



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old configuration		new configuration	
Section 1 :	2 Burners tg1	replaced by	2 Burners G-Lehrs G5
Section 2 :	2 Burners tg1	replaced by	2 Burners G-Lehrs G5
Section 3 :	1 Burner tg1	replaced by	1 Burner G-Lehrs G5
Section 4 :	1 Burner tg1	unchanged	1 Burner tg1
Section 5 :	1 Burner tg1	unchanged	1 Burner tg1
Section 6 :	1 Burner tg1	unchanged	1 Burner tg1
Section 7 :	1 Burner tg1	unchanged	1 Burner tg1

RESULT OF REPLACING BURNERS IN SECTIONS 1, 2 AND 3

Begin calcul		End calcul
The average gas consumption within all sections original Pennekamp burners tg1		
Day 0-1 at hour 10		Day 0 at hour 8
Avg (m ³) :	10.42	m ³ /H
The average gas consumption during replacing		
Day 0 at hour 9		Day 0 at hour 15
Avg (m ³) :	not taken in account	m ³ /H
The average gas consumption with G-Lehrs burners in sections 1,2,3		
Day 0 at hour 16		Day 0+1 at hour 4
Avg (m ³) :	7.94	m ³ /H
RESULT	-23.8%	

Replacing 5 burners started on 'Day 0' at 09H00 and took 4 hours : 1 hour for the first one, 2 hours for the 4 following + 1 hour for fine tuning.

The production was never interrupted - burners were replaced one by one.

The job was done by the factory's personnel : 1 electrician and 1 mechanic.

Our engineer supervised the job, the consumption figures come from the central registration system.

For every new client we make a study (for free) of the client's situation and calculate the possible gain in consumption for the running article.

We visited this factory 2 months before 'Day 0' (day of replacement) and our study calculated a possible gain of 21 %, but a different article and settings.

In reality the gain is 24 %.

The difference is due to the article and the lehr settings.

Our burners are equipped with a device that makes it possible to easily regulate the air/gas ratio, which also results in lower consumption.

When calculating the payback time of the investment, the price of the CO2 rights should also be taken in account.

If the payback time is less than 2 years we (normally) give the possibility to 'pay in consumption'.