



CLAUDIUS PETERS

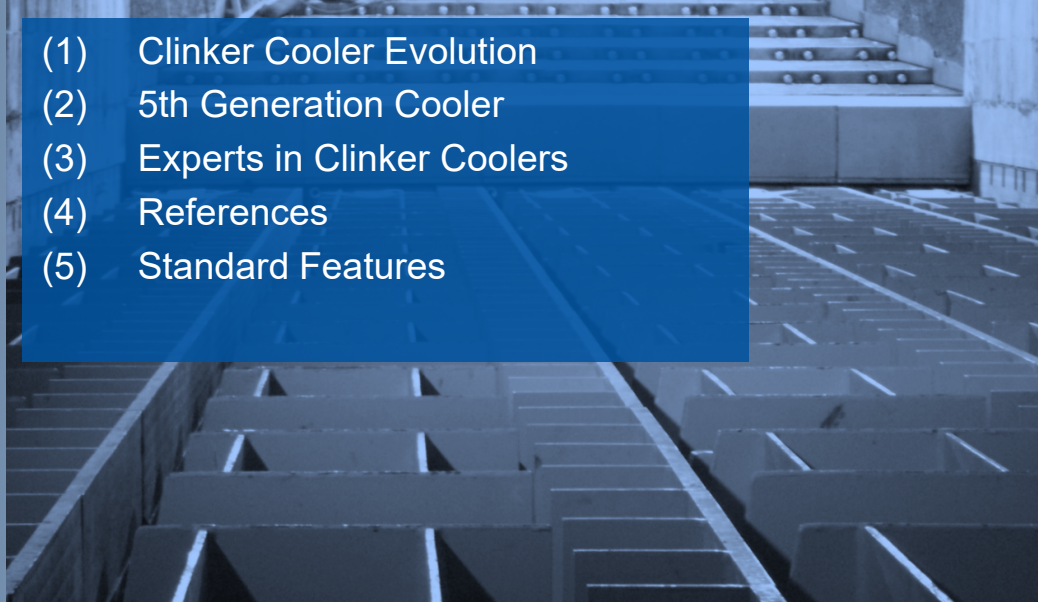
CP ETA Cooler

Jens Garbe, Territory Sales Manager
MPI Cement Seminar-Workshop in Sulaymaniyah
March 7th, 2023

We know how



1. CP Clinker Coolers
2. Working Principle
3. Self Protected Design
4. Project Diversity
5. Line Up: ETA vs Grate
6. References

- 
- (1) Clinker Cooler Evolution
 - (2) 5th Generation Cooler
 - (3) Experts in Clinker Coolers
 - (4) References
 - (5) Standard Features

Claudius Peters

▶ Hydraulic Drive

▶ Roller Crusher

▶ 10.000 tpd Cooler

▶ Compact Swing Support

▶ **ETA Cooler**

▶ 12.000 t/d ETA Cooler

▶ 100 ETA Cooler sold

Originator

1976

1978

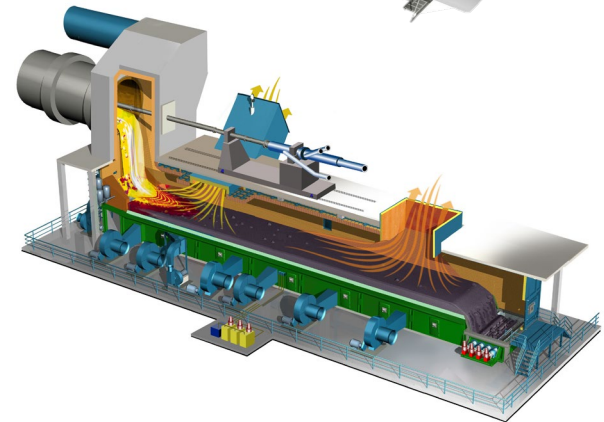
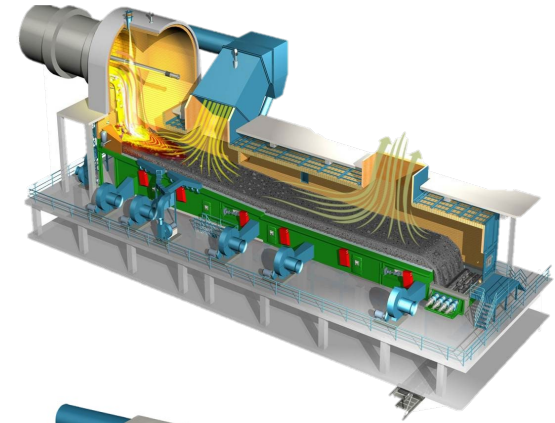
1992

1998

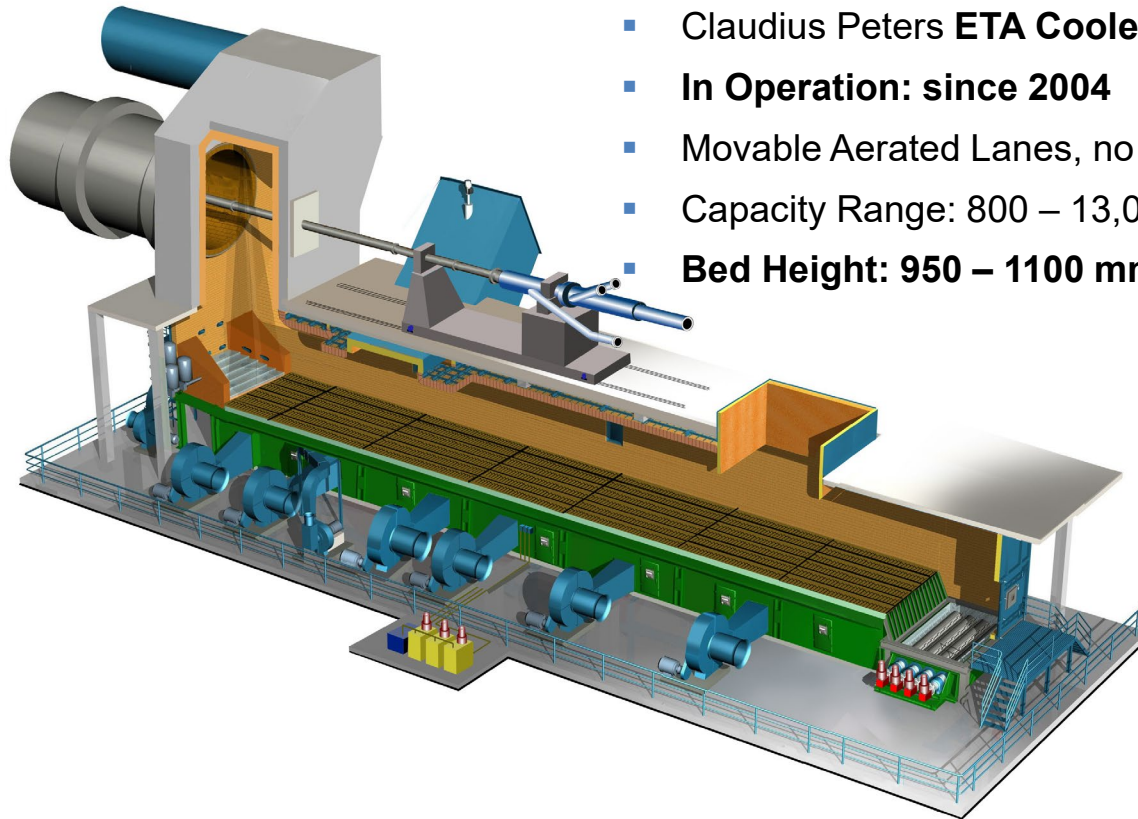
2004

2012

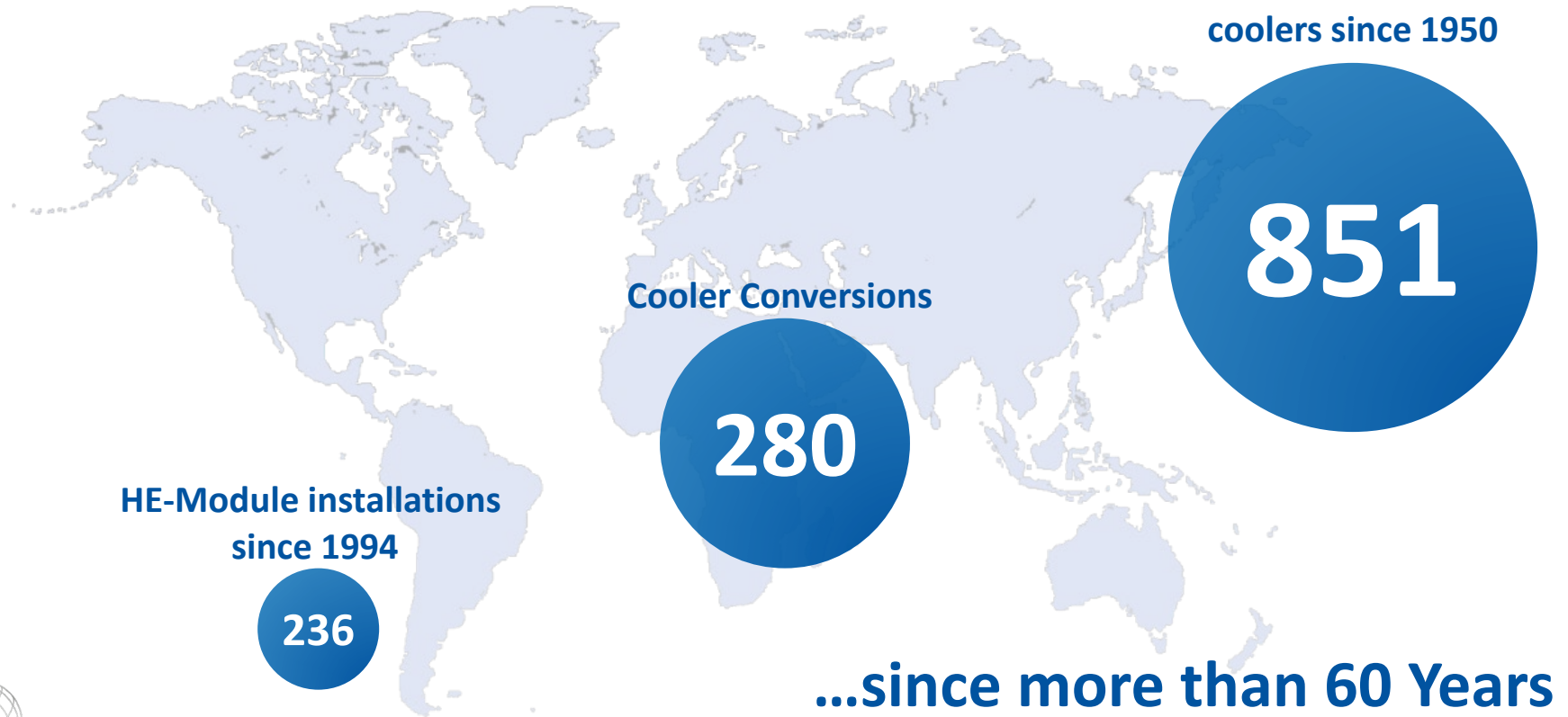
2018



5th Generation Cooler



- Claudius Peters **ETA Cooler**
- **In Operation: since 2004**
- Movable Aerated Lanes, no movable Parts in the Clinker Layer
- Capacity Range: 800 – 13,000 tpd
- **Bed Height: 950 – 1100 mm**



...since more than 60 Years

References Overview

ETA Cooler sold	130
New Lines	69
Modifications	61
With WHR System	78
In Operation	109
Min. Capacity	700 t/d
Max. Capacity	13,000 t/d



Standard Features



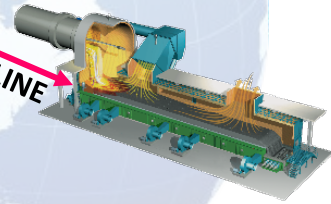
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- CP Smart Device (since 2017)
 - Local WIFI Access
 - Storage / Data Logging
 - Remote Access
After Client Release via Hardware Switch

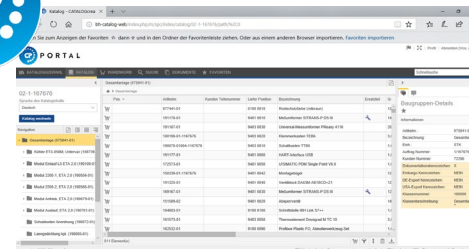


CP Headquarter

CP SUPPORT LINE



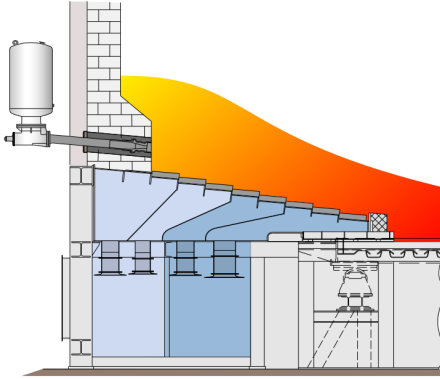
- CP Portal Access
 - Project Information Web-Access during Delivery
 - Equipment incl. QR Code Tags
 - Easy Spare Part identification



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The Inlet – High Efficiency Module



HEM features:

- Modular Design
- Static layer protects the grate plates
- Small Field Aeration, controllable

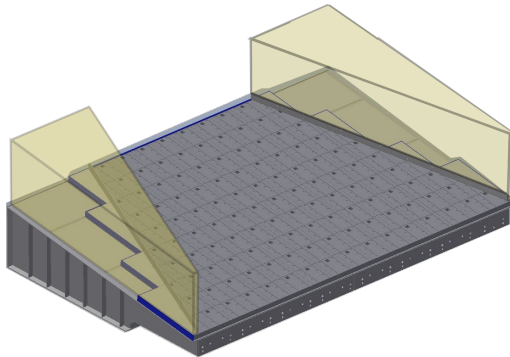
Simple

Effective

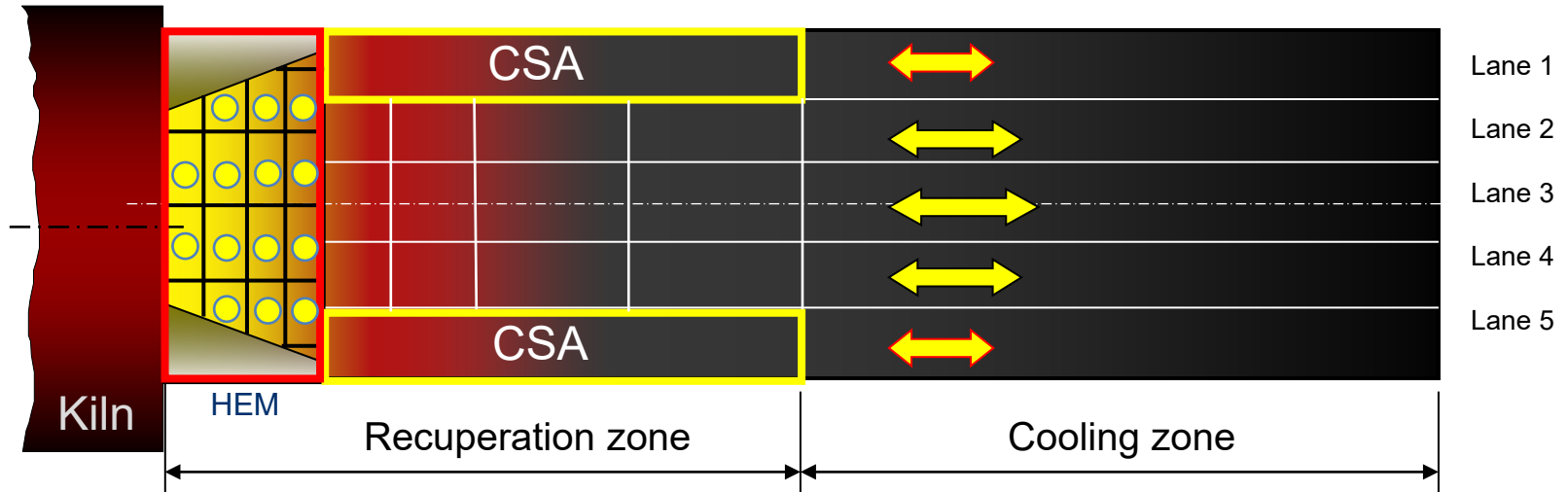
Robust

Technology you can trust

5 year guarantee



Aeration Scheme



1. **H**igh **E**fficiency – Module (HEM)
2. **C**ontrolled **S**ide **A**eration (CSA)
3. Individual Stroke Length



Efficient Heat Recuperation



Controlled Zone Cooling



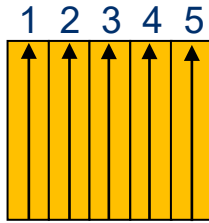
Flexible Retention Time

The Transport System



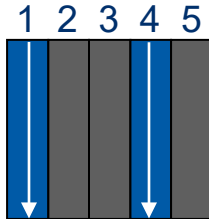
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Forward stroke

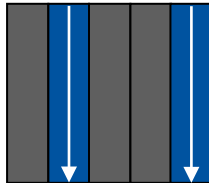


Step 1

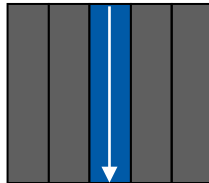
Backward sequence



Step 2



Step 3

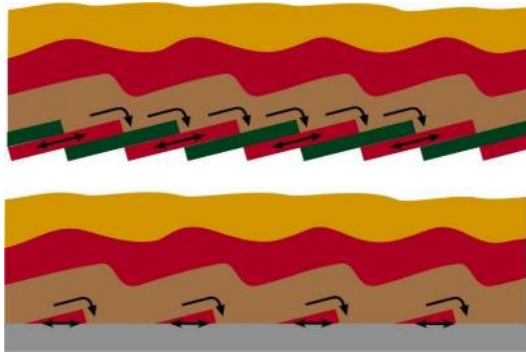


Step 4



The design speed of aerated lanes is only 3-4 cycles / min due to highest transport efficiency.

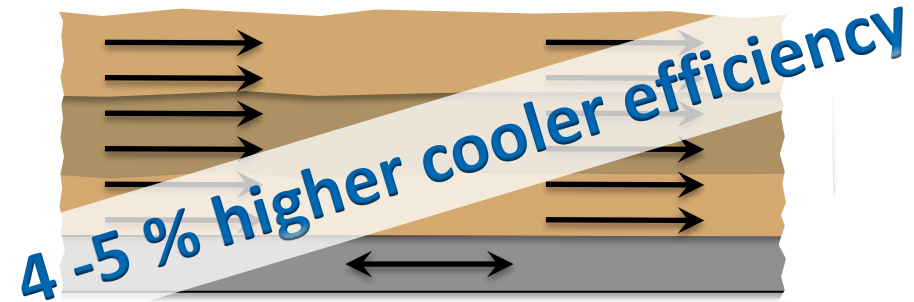
Reciprocating- grate, track and beam coolers



Unstable Clinker Bed due to grate movement:

- Vertical mixing of clinker
- Disturbed temperature gradient
- No optimum heating of air due to mixed layers
- Increased wear due to permanent hot clinker contact

Claudius Peters ETA Cooler



Plug – Flow Transport:

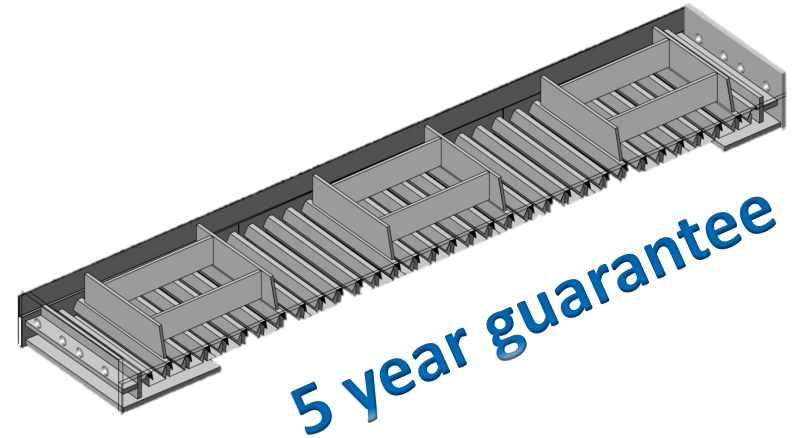
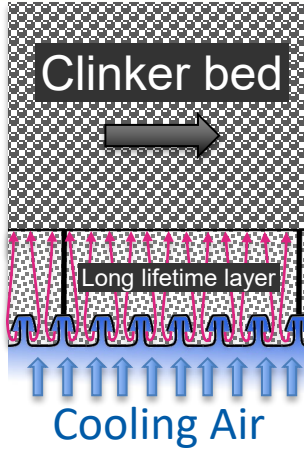
- No vertical mixing
- Undisturbed temperature gradient
- Steady heating of air, due to homogeneous layers

Slight compression in backward stroke:

- Improved heat transfer due to low void volume

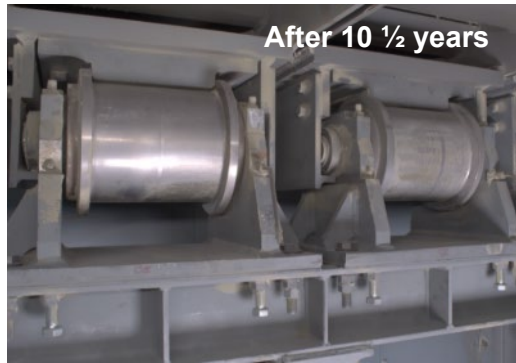
1. CP Clinker Coolers
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- 95 % of shear area protected by ordinary pebbles
- 5% exposed area is partly hardfaced
- Protective pebbles layer with < 3,5 mbar pressure loss, incl. aeration system < 7 mbar
- Never exchanged a lane since first start in 2004

Lowest Maintenance



No roller (+2500 pcs.) or lane (+2000 pcs.) exchanged since 2004 (+16 years!)

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Cooler Modifications

- Laser Scan (if required)
- 60 years Cooler Database

→ Tailor made fit



Greenfield Installation

- New Plant
- up to 13.000 t/d

→ Standard Supply

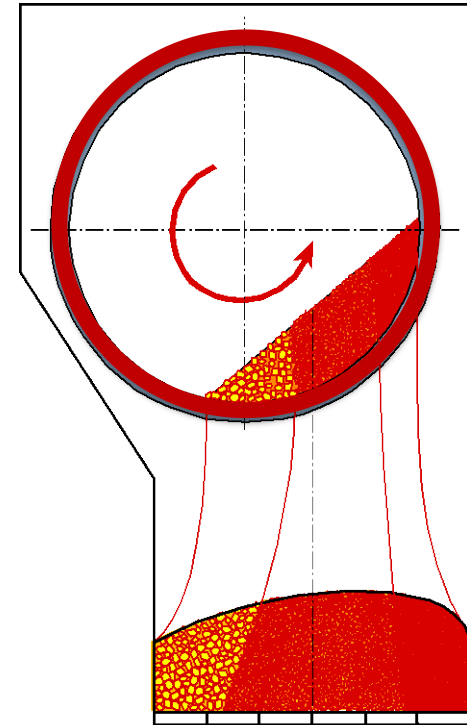
1. CP Clinker Coolers
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Typical Clinker Production Issues:

- Segregation of FINE & COARSE material
- Hot and Highly Abrasive Product
- Uneven Material Distribution

Okt 16 2007

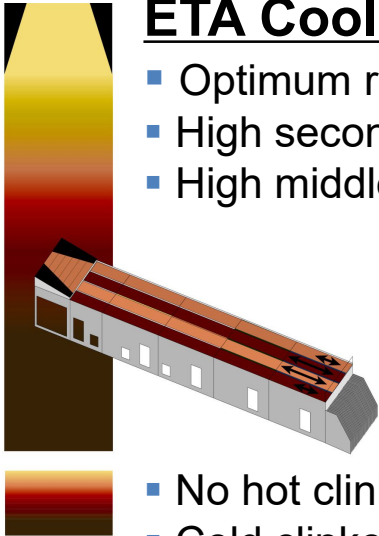


Coarse
clinker

Fine
clinker

ETA Cooler

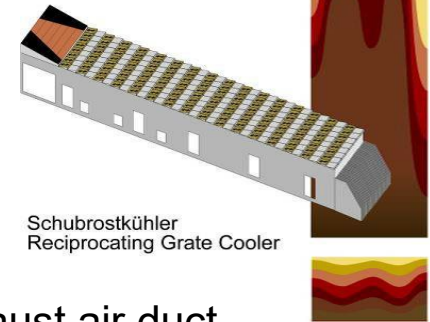
- Optimum recuperation
- High secondary and tertiary air temperature
- High middle air for WHR or drying purposes



- No hot clinker at grate surface
- Cold clinker at the end of the cooler

Grate Cooler

- Recuperation Heat Loss
- High wear on grate plates
- Fine hot clinker at cooler end



Schubrostkühler
Reciprocating Grate Cooler

- Hot air in exhaust air duct
- High clinker outlet temperature peaks

**NO Grate cooler can influence
the Clinker flow over the cooler width!**

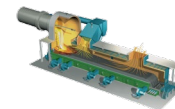
Bed Height & Retention Times



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Generation	Type	Clinker Bed Height [mm]	Specific Grate Load [tpd/m ²]	Retention Time [min]
5	CP ETA	950	45	43
4	Crossbar/ Polytrack	800	45	36
3	Grate	600	45	27
2	3° Combi Grate	400	35	23
1	10° Single Grate	200	25	16

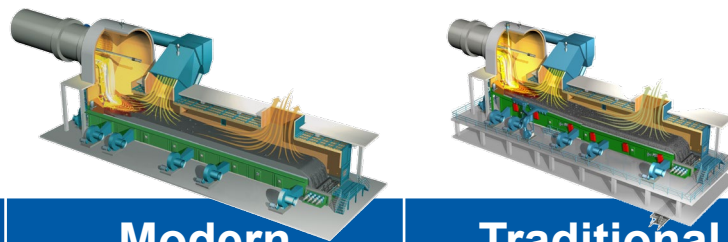
↑
Increased Thermal Efficiency



Basis: Specific Gravity 1,4 t/m³; Specific Grate Load 45 tpd/m²



A Larsley Historical Company



	Modern ETA Cooler	Traditional Grate cooler
Bed height	950 mm	600 mm
Retention Time @ 45 t/d/m ²	42,6 min	26,9 min
Power consumption	4,3 kWh/tclinker	4 kWh/tclinker
Cooler Efficiency	77,7%	75,8%

Clinker capacity	5000	t/d
Plant altitude	100	m
Clinker contribution to cement profit	10	Euro/t _{clinker}
Fuel	Coal	
Fuel lower heat value net	5800	kcal/kg _{fuel}
Fuel price	80	Euro/ t _{fuel}
Kiln heat consumption	740	kcal/kg _{clinker}
Power cost	0,07	Euro/kWh

Operation Cost comparison	ETA Cooler		3rd Generation Grate Cooler	
		Advantage		Advantage
1: Cooler availability	99,9%		98,5%	
Additional cement sales earning		231.000 €/a		0 €/a
2: Cooler efficiency	77,7%		75,0%	
kiln heat consumption [kcal/kg _{clinker}]	726		740	
Fuel cost saving		322.600 €/a		0 €/a
3: Power con. cooler [kwh/t _{clinker}]	4,3		4,0	
Power cost saving		0 €/a		34.700 €/a
4: Maintenance cost [Eur/a]*	10.000		50.000	
Maintenance cost saving		40.000 €/a		
5: Exhaust air volume [Nm³/kg]	0,87		1,17	
Power cost saving		159.200 €/a		0 €/a
6: Preheater exit gas volume [Nm³/kg]	1,43		1,45	
Power cost saving		40.400 €/a		0 €/a
Grand Total		793.200 €/a		34.700 €/a
Total ETA Saving Advantage		758.500 €/a		0 €/a

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6. **References**



References #1

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
1	2003	HOLCIM Siggenthal	Switzerland	ETA 745	2300	KB Existing
2	2005	Adra Company Adra	Syria	ETA 636	1500	KB1-183
3	2005	HOLCIM Beli Izvor	Bulgaria	ETA 956	2500 (Design 3000)	RB 305-4 EM
4	2005	Technip for Lafarge Sagunto	Spain	ETA 875	3300	RB 426-3 EM
5	2005	CBMI for HOLCIM	Morocco	ETA 759	4000	RB 305-4 EH
6	2006	Italcementi SpA Scafa	Italy	ETA 544S	1100	RB 244-2 EM
7	2006	LAFARGE Le Teil	France	ETA 646	1930	KB
8	2006	CIMSA Eskisehir	Turkey	ETA 746	2000	RB 244-3 EM
9	2006	HOLCIM Eclepens	Switzerland	ETA 755 S	2200	RB 305-3 EM
10	2006	Elazig Cimento Elazig	Turkey	ETA 855 S	2500	KB1-305

 Cooler Modifications

 Greenfield Plants

 ETA cooler in Operation

References #2

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
11	2006	LAFARGE Meknes	Morocco	ETA 655	1900	KB1-305
12	2006	HCRDI Berber	Sudan	ETA 969	5050	KB1-366
13	2006	Larsen & Toubro Jaypee Sidhi	India	ETA 977	4200	KB
14	2006	HCRDI Najran Line #2	Saudi Arabia	ETA 757	3150	KB1-305
15	2006	TCDRI Tay Ninh	Vietnam	ETA 859	4000	RB 366-5 EM
16	2006	TCDRI Tracim	Turkey	ETA 11610	6500	RB 366-4 EM
17	2007	Drake Cement Yavapai County, Arizona	USA	ETA 746	2000	RB 244-3(4) EM
18	2007	HOLCIM Clarksville	USA	ETA 969	4400	RB 366-2 EM
19	2007	CDRI Mugher	Ethiopia	ETA 857	3000	KB1-305
20	2007	CDRI Atbara	Sudan	ETA 10610	6000	KB1-366

 Cooler Modifications

 Greenfield Plants

 ETA cooler in Operation

References #3

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
21	2007	CBMI Heidelberger Cement	Tanzania	ETA 856	2500	KB1-305
22	2007	CNBM Derba	Ethiopia	ETA 10610	5600	KB1-366
23	2007	Topkinski	Russia	ETA 746	2000	KB1-244
24	2007	Adra Company Adra #1	Syria	ETA 636	1200	KB1-183
25	2007	Adra Company Adra #2	Syria	ETA 636	1200	KB1-183
26	2007	Ckoramaandel Cement Andhra Pradesh	India	ETA 636	1600	KB1-183
27	2007	CBMI Titan Cement	Albania	ETA 858	3300	RB 305-3(4) EM
28	2008	Government of Egypt El Arish #1	Egypt	ETA 10610	5000	KB1-366
29	2008	Government of Egypt El Arish #2	Egypt	ETA 10610	5000	KB1-366
30	2008	Al Cahhba Cement Aleppo	Syria	ETA 636	1400	KB1-183

 Cooler Modifications

 Greenfield Plants

 ETA cooler in Operation

References #4

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
31	2008	Tartous Cement Tartous	Syria	ETA 646	1800	RB 244-3 EM
32	2008	OAO Sucholoshskzement Dyckerhoff / Buzzi Unicem	Russia	ETA 848 S	2200	KB1-244
33	2009	Conch Group Sichuen Dazhou	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM
34	2009	CBMEC UCG	Syria	ETA 10710 S	6500	RB 426-4(5) EM
35	2009	Conch Group Congqing #1	P.R. China	ETA 1067E//64E	6500	RB 366-5 EM
36	2009	Conch Group Congqing #2	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM
37	2009	Conch Group Sichuen Guangyuan	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM
38	2009	Conch Group Qianyang	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM
39	2009	Conch Group Liquan #1	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM
40	2009	Conch Group Liquan #2	P.R. China	ETA 1067E//64E	6500	RB 366-5 EM

 Cooler Modifications

 Greenfield Plants

 ETA cooler in Operation

References #5

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
41	2010	Conch Group Sichuen Dazhou #2	P.R. China	ETA 1067E//64E	6500	RB 366-5 EM
42	2010	Conch Group Sichuen Guangyuan #2	P.R. China	ETA 1067E//64E	6500	RB 366-5 EM
43	2010	Conch Group Pingliang #2	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM
44	2010	Conch Group Suzhou #2	P.R. China	ETA 1067E//64E	6500	RB 366-5 EM
45	2010	Conch Group Xingye Kiayang	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM
46	2011	HOLCIM Untervaz	Switzerland	ETA 856 M	2100	RB 305-3 EM
47	2011	IMSACOL CEMCOLSA	Colombia	525 S	700	RB 122-2(3) EM
48	2011	HZIT Sichuan Langfeng	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM
49	2011	Conch Group Anhui Chaodong	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM
50	2011	Guizhou Qiangui Guizhou	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM

 Cooler Modifications

 Greenfield Plants

 ETA cooler in Operation

References #6

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
51	2011	HOLCIM La Union	Philippines	ETA 857 M	2800	RB 305-4 EM
52	2011	CTIEC Qizlidar Cement	Azerbaijan	ETA 10610 S	5500	RB 366-4(5) EM
53	2011	Conch Group Yangchun	P.R. China	ETA 13127E//125E	13000	RB 671-5 EM
54	2012	CEIEC Najran Line #3	Saudi Arabia	ETA 1079 S	6500	KB1-426
55	2013	TCDRI Bosowa Maros Line #2	Indonesia	ETA 1087//84 S	7500	RB 488-5 EM
56	2013	NCDRI Pangu Cement	P.R. China	ETA 1076//75 S	6500	RB 426-4(5) EM
57	2013	Conch Group Linxia	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM
58	2013	Conch Group Liangping #1	P.R. China	ETA 1067E//64E	6500	RB 366-5 EM
59	2013	Conch Group Bazhong #1	P.R. China	ETA 1067E//64E	5500	RB 366-4(5) EM
60	2013	Conch Group Liuzhu #2	P.R. China	ETA 1067E//64E	6500	RB 366-5 EM

 Cooler Modifications

 Greenfield Plants

 ETA cooler in Operation

References #7

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
61	2013	Conch Group Hunan Yiyang	P.R. China	ETA 1067//64 S	5500	RB 366-4(5) EM
62	2013	CBMI Tanga Cement	Tanzania	ETA 848 S	2500	RB 244-4 EM
63	2013	Conch Group Shengta #1	P.R. China	ETA 1067//64 S	5500	RB 366-4(5) EM
64	2013	CBMI Sokoto Cement	Nigeria	ETA 858 S	3300	RB 305-3(4) EM
65	2014	Conch Group Shengta #2	P.R. China	ETA 1067//64 S	5500	RB 366-4(5) EM
66	2014	TCC Cement Co. Ltd. Chongqing #1	P.R. China	ETA 1078 S	5500	---
67	2014	Government of Egypt El Arish #3	Egypt	ETA 10611 S	6000	KB1-366
68	2014	Government of Egypt El Arish #4	Egypt	ETA 10611 S	6000	KB1-366
69	2014	Fives FCB Qatar National Cement Co. #5	Qatar	ETA 10610 S	5000	KB1-366
70	2014	Conch Group Myanmar Kyaukse	Myanmar	ETA 1067//64 S	5500	RB 366-4(5) EM

 Cooler Modifications

 Greenfield Plants

 ETA cooler in Operation

References #8



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Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
71	2015	Conch Group Khammouane Cement	Laos	ETA 10610 S	5500	RB 366-4 EM
72	2015	Conch Group Huabei	P.R. China	ETA 1067//64 S	5500	RB 366-4(5) EM
73	2015	Conch Group Yingjiang #1	P.R. China	ETA 1067//64 S	6500	RB 366-5 EM
74	2015	CBMEC Nova Cimangola	Angola	ETA 10610 S	5500	RB 366-4 EM
75	2015	Conch Group Wenshan	P.R. China	ETA 1067//64 S	4500	RB 366-4(5) EM
76	2016	Quantou Group Zaozhuang	P.R. China	ETA 1176//75 S	6500	RB 426-4 EM
77	2016	CITIC Heavy Industries Chip Mong Insee Cement	Cambodia	ETA 10610 S	5500	RB 366-4 EM
78	2016	Conch Group Baisu	Indonesia	ETA 1067/64 S	5500	RB 366-4(5) EM
79	2016	TCC Cement Co. Ltd. Chongqing #2	P.R. China	ETA 1078 S	5500	---
80	2016	TCC Cement Co. Ltd. Anshun #2	P.R. China	ETA 1078 S	5500	---

 Cooler Modifications

 Greenfield Plants

 ETA cooler in Operation

References #9

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
81	2016	Ssangyong Donghae	South Korea	ETA 1089 U	7600	---
82	2017	NCDRI Askari Nizampur #1	Pakistan	ETA 856 S	2700	RB 305-3 EM
83	2017	NCDRI Askari Nizampur #2	Pakistan	ETA 856 S	2700	RB 305-3 EM
84	2017	CDRI Pioneer	Pakistan	ETA 1086//85 S	7700	RB 488-4 EM
85	2017	Conch Group Lianyuan	P.R. China	ETA 10710 U	6500	---
86	2017	Conch Group Chaohu	P.R. China	ETA 10610 U	5900	RB 366-4(5) EM
87	2017	Conch Group Shuangfeng	P.R. China	ETA 10610 U	5900	RB 366-4(5) EM
88	2017	Conch Group Shimen #1	P.R. China	ETA 10610 U	6500	RB 366-5 EM
89	2017	Conch Group Digang #3	P.R. China	ETA 1067//64 S	5900	RB 366-4(5) EM
90	2017	Conch Group Zongyang #3	P.R. China	ETA 1067//64 S	6500	RB 366-5 EM

 Cooler Modifications

 Greenfield Plants

 ETA cooler in Operation

References #10

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
91	2018	Conch Group Mandalay	Myanmar	ETA 1067//64 S	5900	RB 366-4(5) EM
92	2018	Conch Group Jiande #1	P.R. China	ETA 10610 U	6500	RB 366-5 EM
93	2018	Conch Group Pingliang #1	P.R. China	ETA 10610 U	6500	RB 366-5 EM
94	2018	Conch Group Yingde #3	P.R. China	ETA 1067//64 S	5900	RB 366-4(5) EM
95	2018	Conch Group Ningguo #1	P.R. China	ETA 1067//64 S	5900	RB 366-4(5) EM
96	2018	Conch Group Yingde #2	P.R. China	ETA 1067//64 S	5900	RB 366-4(5) EM
97	2018	Conch Group Guizhou Shuicheng	P.R. China	ETA 1067//64 S	5900	RB 366-4(5) EM
98	2018	Conch Group Qingxin #3	P.R. China	ETA 1387//85 S	8000	RB 488-4 EM
99	2018	ASK Cement	Russia	ETA 637 U	1320	KB 1-183
100	2018	Conch Group Basu Tibet	P.R. China	ETA 855//54 S	3500	RB 305-3(4) EM

 Cooler Modifications

 Greenfield Plants

 ETA cooler in Operation

References #11

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
101	2019	TCC Cement Co. Ltd. Shaoguan	P.R. China	ETA 1076//75 S	6500	RB 426-4(5) EM
102	2019	Conch Group Qarshi	Uzbekistan	ETA 955//54 S	3800	RB 305-3(4) EM
103	2019	Shanshui Cement Group Pingyin #1	P.R. China	ETA 1077//75 S	6500	RB 426-4 EM
104	2019	Shanshui Cement Group Pingyin #2	P.R. China	ETA 1077//74 S	6500	RB 426-4 EM
105	2019	Shanxi Xingyuan	P.R. China	ETA 975//73 S	5000	RB 426-3(4) EM
106	2019	Conch Group Yingde #3	P.R. China	ETA 1077//74 S	6300	RB 426-4 EM
107	2019	Conch Group Chizhou #3	P.R. China	ETA 1077//74 S	6300	RB 426-4 EM
108	2020	Conch Group Wugang #2	P.R. China	ETA 1177//74 S	6300	RB 426-4 EM
109	2020	Conch Group Digang #3	P.R. China	ETA 11710 S	6300	RB 426-4 EM
110	2020	Conch Group Xuancheng #1	P.R. China	ETA 11710 S	6300	RB 426-4 EM

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References #12

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
111	2020	Conch Group Hunan #1	P.R. China	ETA 11710 S	6300	RB 426-4 EM
112	2020	Conch Group Tongling #2	P.R. China	ETA 11710 S	6300	RB 426-4 EM
113	2020	Conch Group Fusui #2	P.R. China	ETA 11710 S	6300	RB 426-4 EM
114	2020	Mokra #2	Czech Republic	ETA 756 U	1950	---
115	2021	Conch Group Wuhu #2	P.R. China	ETA 1177//74 S	6500	RB 426-4 EM
116	2021	Conch Group Chaohu #2	P.R. China	ETA 1177//74 S	6500	RB 426-4 EM
117	2021	Shanshui Cement Group Pingyin #3	P.R. China	ETA 1287//85 S	7500	RB 488-4 EM
118	2021	OPTERRA Karsdorf #3	Germany	ETA 848 U	2000	RB 244-3(4) EM
119	2021	OPTERRA Karsdorf #4	Germany	ETA 848 U	2000	RB 244-3(4) EM
120	2021	HCDRI Askari Nizampur #3	Pakistan	ETA 1177//75 S	6500	RB 426-4 EM

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References #13

Ref no	Order Date	Customer	Country	Cooler Size	Production t/d	Crusher
121	2021	Conch Group Yingde #5	P.R. China	ETA 11710 S	6500	RB 426-4 EM
122	2021	Conch Group Chizhou #2	P.R. China	ETA 1177//74 S	6500	RB 426-4 EM
123	2021	Conch Group Digang #5	P.R. China	ETA 1177//74 S	6500	RB 426-4 EM
124	2021	Colacem Group Domicem	Dominican Republic	ETA 958 S	3500	RB 305-4 EM
125	2021	TCC Cement Co. Ltd. Hoping #1	Taiwan	ETA 131010 U	9000	---
126	2021	TCC Cement Co. Ltd. Hoping #2	Taiwan	ETA 131010 U	9000	---
127	2022	TCC Cement Co. Ltd. Suao #6	Taiwan	ETA 10511 U	4800	RB 305-4 EM
128	2022	Conch Group Tashkent	Uzbekistan	ETA 1177//74 S	6500	RB 426-4 EM
129	2022	HCDRI Fauji Cement	Pakistan	ETA 1177//75 S	6500	RB 426-4 EM
130	2022	Conch Group Andijan	Uzbekistan	ETA 1177//745S	6500	RB 426-4 EM

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