



...cool down



High Capacity IKN Clinker Coolers
13.-14.05.2010
Green Cementech 2010, Hyderabad

Agenda

- Introduction of IKN
- Case studies of recent and upcoming IKN Pendulum Cooler projects
 - Union Cement Ras Al Khaimah UAE #4 case
 - Saudi Cement #5 and #6 case
 - 3 x 13.000 t/d IKN Pendulum Coolers at Conch
- References
 - References of high capacity IKN Pendulum Coolers
 - List of clinker cooler projects in Germany 1995 - 2010
 - References in the Middle East Region from 2005 - 2010
- Performance of IKN Pendulum Coolers at SCCTung Song 6 and Qinghuangdao
- Facts about IKN standing in the cement world



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Agenda

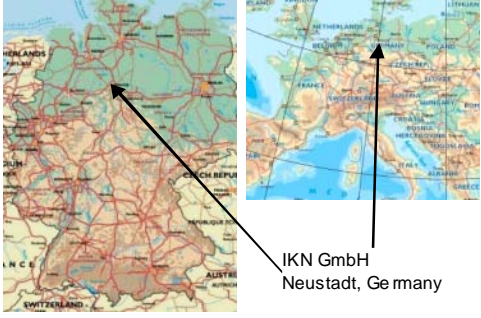


1983: Karl von Wedel starts IKN
1984: First order for cooler modification with IKN fixed inlet (KIDS)
1989: First Pendulum Cooler
1997: Sales exceeding EUR 30 Mio.
1998: Start-up largest IKN Pendulum Cooler 9100t/d in Korea
2010: 28 years - more than 58 installations worldwide giving IKN a leading position in the market.




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IKN Timeline



IKN GmbH
Neustadt, Germany



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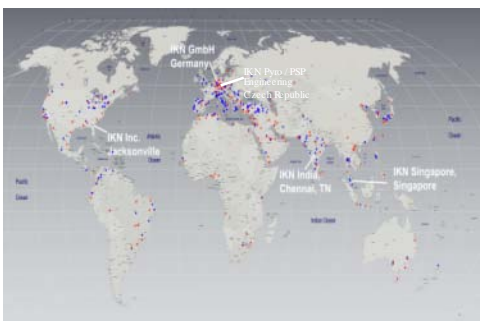
Location






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IKN premises






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IKN worldwide

IKN invents the KIDS fixed inlet
 Coanda Effect horizontal aeration
 LPS® – wearless grate suspension
 with highest precision
 Hydraulic drive with single cylinder



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Technical highlights

Agenda

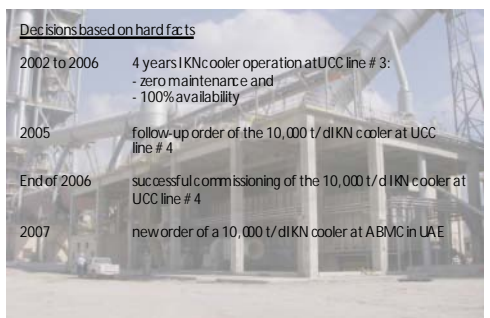
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Agenda


Decisions based on hard facts

2002 to 2006	4 years IKN cooler operation at UCC line # 3: - zero maintenance and - 100% availability
2005	follow-up order of the 10,000 t/d IKN cooler at UCC line # 4
End of 2006	successful commissioning of the 10,000 t/d IKN cooler at UCC line # 4
2007	new order of a 10,000 t/d IKN cooler at ABMC in UAE



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Story of success for high capacity IKN Pendulum Coolers started in UAE




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3D Model of the 10,000 t/d IKN Pendulum Cooler at UCC line #4

Union Cement 10.000 t/d IKN Pendulum Cooler design data

Production:	10.000 t/d
Grate Width:	6,8 m
Grate Length:	34 m / 95 rows
Grate Area:	229 m ²
Specific Loading:	43,6 t/m ² d
Installed Electrical Power:	5,2 kW/t
Clinker Outlet Temperature:	65 °C + Ambient



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Design data



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Pre-installed mobile frame of the 10.000 t/d IKN Pendulum Cooler for UCC at IKN workshop



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Installation of mobile frame on site in UAE



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Installing the air beams on a width of 6.8 m



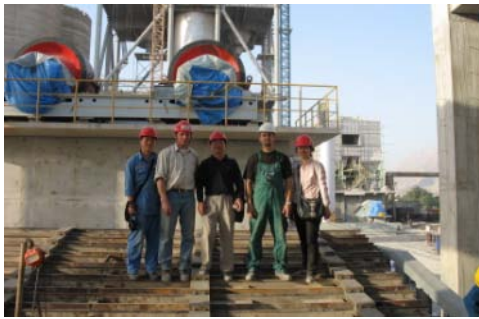
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Mobile frame with lower cooler housing



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Installation of the KDS section



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Good technology joins nations



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Covering the air beams with gate plates



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229 m² grate surface paved – twin TA offtake



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Same twin off-take, different view



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KN Roll Rusher – 6 Rolls of 4.8 m width (retractable for maintenance) for 10,000 t/d and more...



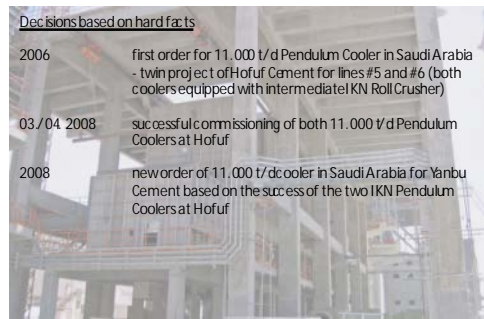
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Two hydraulic drives in total, located with free access in the front



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Ready for commissioning



Decisions based on hard facts

- 2006 first order for 11,000 t/d Pendulum Cooler in Saudi Arabia - twin project of Hofuf Cement for lines #5 and #6 (both coolers equipped with intermediate KN Roll Crusher)
- 03/04 2008 successful commissioning of both 11,000 t/d Pendulum Coolers at Hofuf
- 2008 new order of 11,000 t/d cooler in Saudi Arabia for Yanbu Cement based on the success of the two IKN Pendulum Coolers at Hofuf

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Story of success for high capacity IKN Pendulum Coolers preceded in Saudi



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Layout for both identical 11.000 t/d lines
at Hofuf



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Civil structures for both 11.000 t/d lines
at Hofuf



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View along the ESP onto the 2-stage
mobile structure at Hofuf #5



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Hydraulic power pack in final position –
simple and reliable



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View on the frame for intermediate
crusher and the second stage of the
grate



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Side view on the plant site



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Burner platform with twin TA-offtakes and kiln hood in background



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Rearview of the cooler



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Preparations of crusher installation



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Cooling fans in position – shortly before start-up

New lines for Anhui Conch Cement with production capacity of 3 x 13 000 t/d

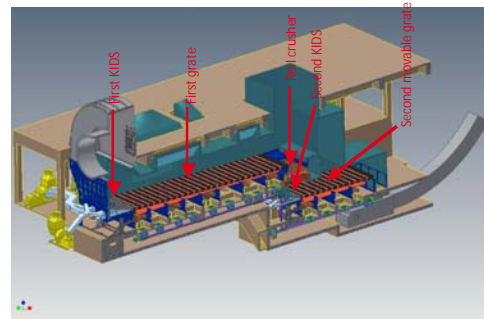
- 2 x 13.000 t/d at Wuhu (kilns by Polysius, both clinker coolers by IKN)
- 1 x 13.000 t/d at Tongling (kiln by PLS, clinker cooler by IKN)

IKN Pendulum Cooler facts

- 302 m² grate surface consisting of 133 rows in total
 - 7200 m m x 11 rows 1st s tatic inlet
 - 7200 m m x 80 rows 1st Pendulum section
 - 6800 m m x 4 rows 2nd s tatic inlet
 - 6800 m m x 38 rows 2nd Pendulum section
- 16 cooling fans with operating air of 1.9 Nm³/kg clinker
- Date of FOB delivery September 2010

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Facts for 13 000 t/d IKN Pendulum Coolers project at Conch Cement China



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Sectional view of 3D model of the three 13.000 t/d IKN Pendulum Coolers at Conch Cement, China

1. First Clinker Inlet Distribution System - KIDS

- Static inlet for even distribution of clinker
- Inclination: 15°
- Width 7200 mm / Length 14000 mm

2. First movable gate

- Cool down the clinker to 200 ° above ambient
- Inclination : 2°
- Width 7200 mm / Length t > 2600 0 mm
- Movable frame suspended from Linear Pendulum Support (LPS)
- Driven by 2 hydraulic cylinders

3. Intermediate Crusher

- 6 Roll Crusher
- Width 6800 mm
- Water cooled shafts and air cooled housing

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Technical Concept of the three 13 000 t/d IKN Pendulum Coolers at Conch Cement, China

4. Second Clinker Inlet Distribution System - KIDS

- Static inlet for even distribution of clinker
- Inclination: 15°
- Width 6800 mm / Length 11500 mm

5. Second movable gate

- Cool down the clinker to 65 ° above ambient
- Inclination : 2°
- Width 6800 mm / Length t > 1200 0 mm
- Movable frame suspended from Linear Pendulum Support (LPS)
- Driven by 2 hydraulic cylinders

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References of IKN Pendulum Coolers > 8.000 t/d

Country	Customer	Plant	Size	Start-up
Korea	Sung Shin Cement	Sung Shin #5	9,100 t/d	05/1998
Thailand	Siam Cement	Trung Song #6	8,500 t/d	01/1999
UAE	CBMEC	LCC #4	10,000 t/d	01/2007
Turkey	AS Cimento	Kizilkaya	9,000 t/d	03/2008
KSA	Sinoma for Saudi C.	Hofuf #5	11,000 t/d	03/2008
KSA	Sinoma for Saudi C.	Hofuf #6	11,000 t/d	04/2008
UAE	CBMEC	ABMC	10,000 t/d	06/2010
KSA	Sinoma	Yanbu	11,000 t/d	
China	Conch	Wuhu	13,000 t/d	
China	Conch	Wuhu	13,000 t/d	
China	Conch	Tongling	13,000 t/d	

Existing 10,000 t/d CPA Coolers in Thailand have successfully been modified with IKN KIDS.

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References of IKN Pendulum Coolers with a capacity of more than 8 000 t/d

List of clinker cooler projects in Germany 1995 - 2010

Customer	Plant	Supplier	Type	Project	Year
Teutonia Zement	Hannover kiln #7	IKN	2900	for new KHD kiln	1997
Dyckerhoff Zement	Lengerich kiln #8	IKN	3700	for new FLS kiln	2001
Solnhofen Zement	Solnhofen	Pöyry	1800	retrofit of Pöyry cooler	2003
Heidelberger Group	Burgengenfeld	IKN	2000	retrofit of Clausius Pater cooler	2003
Spanner Zement	E Witt	IKN	2800	replacement of rotary cooler	2007
Höricum	Höver	IKN	3000	replacement of satellite cooler	2007
Schwerk	Almendingen	Pöyry	4000	replacement of satellite cooler	2007
Lafarge	Wörsingen	IKN	2200	new line	2007
Rohrdorf Zement	Rohrdorf	IKN	4500	replacement of satellite cooler	2010
Miebach & Söhne	Wittkind	IKN	2500	replacement of rotary cooler	2010

Market share of IKN: 80% of clinker coolers in Germany over the last 15 years

Germany has 4 clinker cooler suppliers: Clausius Peters, IKN, KHD and Krupp Pöyry.

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Cooler projects in Germany over last 15 years

References of IKN Pendulum Coolers in Arabian Peninsula from 2002 - 2010

Country	Customer	Plant	Size	Start-up
Saudi Arabia	Sinoma	SPCC Tahamah	6000	08/07
UAE	Sinoma	LCC #4	10000	01/07
Saudi Arabia	Sinoma	Muzamijah	6000	06/07
Saudi Arabia	Sinoma	City Cement	6000	08/07
Yemen	CBMEC	National Cement	3400	07/08
Saudi Arabia	Sinoma	Hofuf #5	11000	08/08
Saudi Arabia	Sinoma	Hofuf #6	11000	04/08
Saudi Arabia	CNSM	Northern Region	5300	02/08
Saudi Arabia	Nanjing Triumph	Al-Jad Cement	5000	01/10
Saudi Arabia	IHI	Gasim Cement #3	4700	01/07
UAE	CBMEC	ABMC/Abu Dhabi	10000	06/10
Jordan	CNSM	AMCP	6300	07/09
Yemen	CBMEC	YSCC	4000	
KSA	Sinoma	Riyadh Cement	6000	
Oman	CBMEC	Rusayl #3	4500	
Syria	CBMI	ABC C1	5000	
Syria	CBMI	ABC C2	5000	
KSA	Sinoma	Yanbu	11000	
KSA	SPOC	Tahamah #2	6000	
UAE	IHI	Shajrah Cement	4000	08/02

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References of IKN Pendulum Coolers in the Middle East from 2002 - 2010

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Operating data before and after Retrofit installation by IKN at UCC #3, UAE

	Before	October 2002
Clinker temperature [°C + amb]	148	85
Kiln capacity [tpd]	1850	2130
Cooling air [Nm ³ /kg]	2.50	1.70
Tertiary air [°C]	760	939
Secondary air [°C]	893	1004
Cooler efficiency [%]	60.8	76.2
Heat consumption [kcal/kg]	915	858
Vent air [°C]	255	259

Efficient IKN cooler: Reduction in kiln fuel usage 57 kcal/kg

Guaranteed and actual operating values for UCC #4, UAE

	Guaranteed value	Actual value
Clinker temperature [above A]	< 65	< 50
Kiln capacity [tpd]	10,000	10,500
Cooling air [Nm ³ /kg]	1.95	1.95
Tertiary air [°C]	880	887
Secondary air [°C]	1119	1134
Cooler efficiency [%]	74.4	74.5
Heat consumption [kcal/kg]	720	720
Vent air [°C]	257	259

Guaranteed and actual operating values of the IKN Pendulum Cooler 11,000 tpd at Saudi Cement, Hofuf Saudi Arabia.

	Guaranteed values	Actual values
Clinker temperature [Above A]	65	57
Cooling air [Nm ³ /kg]	2.0	1.90
Tertiary air [°C]	-	780
Secondary air [°C]	1067	1135
Cooler efficiency [%]	73.7	75.21
Vent air [°C]	292	172

NB: Customer data.

Guaranteed and actual operating values of the IKN Pendulum Cooler at Thung Song Cement, Thailand

	Guaranteed values	Actual values
Clinker temperature [above A]	71	79
Kiln capacity [tpd]	7,500	7875
Cooling air [Nm ³ /kg]	-	1.9
Tertiary air [°C]	-	1040
Secondary air [°C]	-	1090
Cooler efficiency [%]	75.6	78.7
Power consumption [kWh/t]	4.0	3.96

Guaranteed and actual operating values of the IKN Pendulum Cooler at Qinhuangdao Cement, China

	Guaranteed values	Actual values
Clinker temperature [above A]	75	40
Kiln capacity [tpd]	4000	4220
Cooling air [Nm ³ /kg]	1.85	1.46
Tertiary air [°C]	-	942
Secondary air [°C]	976	1053
Cooler efficiency [%]	81	81.5
Power consumption fans [kWh/t]	4.0	3.52
Vent air [°C]	250	266

* actual values of performance test executed by customer.

To our knowledge no other type of cooler reaches such performance.

IKN performance at Qinhuangdao Cement, China

'Greenest' clinker cooler in operation?

Clinker temperature	63 deg C including A
Cooler load	53 tons/m2 day
Cooling air	1,46 Nm3/kg
Cooler efficiency	81,5%
Power consumption	3,82 kWh/t total

Data from cooler performance test by customer.

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Market Share and acceptance

- IKN has the largest market share in clinker coolers sold in 2007-2010 worldwide (excluding P.R. China)
- IKN is fully approved by the largest 6 cement groups.
- IKN has supplied and commissioned successfully coolers in the last three years to Lafarge, Hobit, Cemex, Heidelberg, Italcementi and Taiyheyo and CONCH
- 8 of 10 cooler decisions in the last 10 years in Germany were in favour of IKN

Position amongst Chinese equipment suppliers

- IKN is fully approved and being selling coolers to the most important Chinese EPC suppliers as Sinoma International, ONBM, CBMEC, TCDRI, NCDRI, CDI, CBMI and HCDR
- IKN has sold more than 36 coolers to above mentioned EPC suppliers in the range from 2.000 t/d to 11.000 t/d; more than 25 of these sold coolers have a capacity between 5.000 t/d and 11.000 t/d

IKN has a leading position in the field of high capacity clinker coolers

- IKN has successfully performed process guarantees for 10.000 t/d and 11.000 t/d clinker coolers at Saudi Cement and Union Cement, UAE
 - IKN has sold and successfully commissioned the largest clinker cooler in Europe (AS Cimento, Turkey with 9.000 t/d capacity)
 - IKN will supply 3 coolers with design capacity of 13.000 tpd
- IKN has agreement for the largest clinker cooler of 15.000 t/d capacity



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