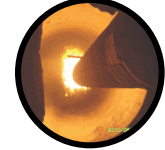


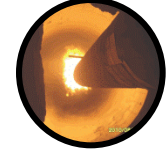
Cement Manufacturing Process Innovation – Equipment Made by TCDRI



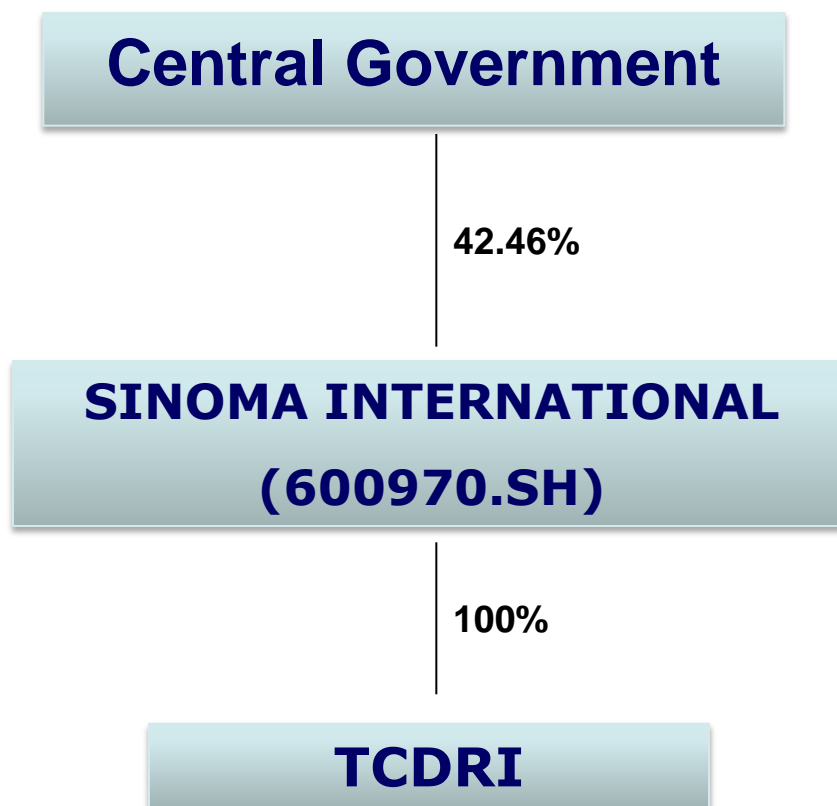


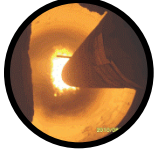
Content

- 1、 Who is TCDRI**
- 2、 TCDRI's Experimental Research Platform**
- 3、 Equipment Made by Sinoma TCDRI**
- 4、 Key Equipment-Walking Floor Cooler**
- 5、 Key Equipment-Vertical Roller Mill**



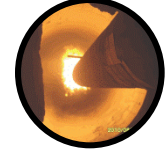
1. Who is TCDRI - Equity Structure





1. Who is TCDRI - Profile

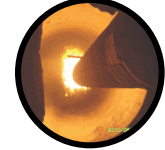
- ★ **Comprise of TCDRI and CBMI in Year 2010**
- ★ **Major engineering company around the world engaged in cement industry.**
- ★ **Human resources:**
 - **Total employees: about 2,500**
 - **Technical staff: about 2,000**
- ★ **2011 sales revenues: 800 Million USD**
- ★ **2012 sales revenues: 1 Billion USD**
- ★ **2012 sales revenues: 1.2 Billion USD**



2. TCDRI's Experimental research platform

a. Kiln and furnace test platform





b. Grinding test platform



TRM3.6辊式磨
TRM3.6 Roller
Mill



TRM5.6辊式磨
TRM5.6 Roller Mill



TRP400-100辊压机试验系统
Roller Press pilot system



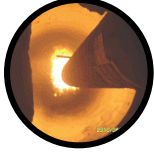
φ0.5m粉煤灰辊磨试验系统
Fly ash roller mill test system



辊式磨试验系统VRM pilot system

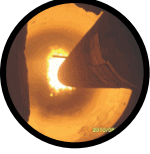


球磨试验系统Ball mill pilot system



c. Clinker cooling pilot system





d. Sludge and junk pilot system



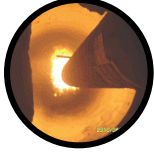
污泥脱水机Sludge spin-drier



污泥烘干机Sludge dryer



垃圾破碎机Junk crusher

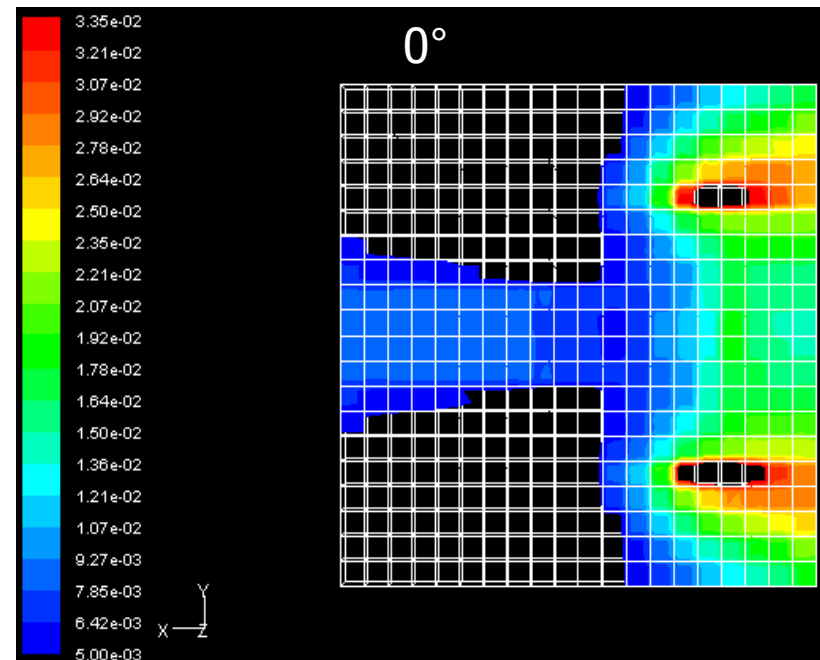
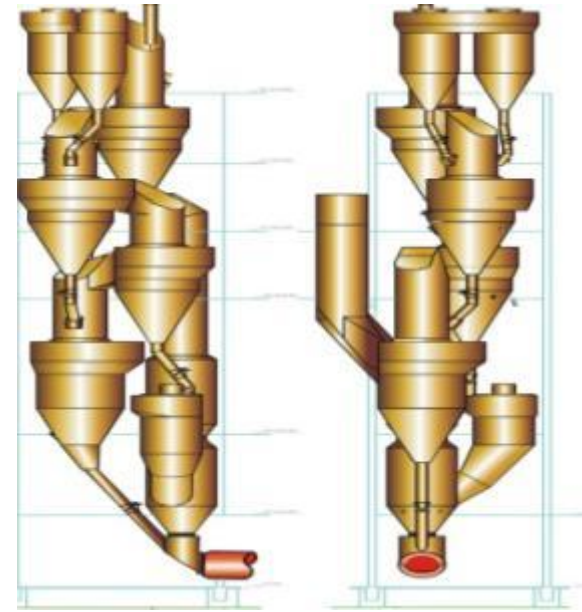


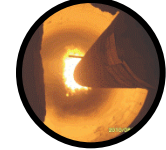
e. Computer simulating lab system



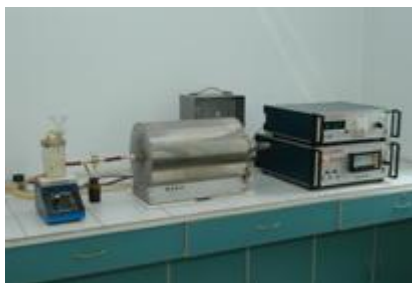
Simulating industrial condition

- Flow field
- Temp. field
- Pressure field
- Bured out ratio
- Calcined ratio





f. material testing lab system



**ZCL-1 Sulfur
analyzer**



**CL-A Automatic CL
analyzer**



Heat analysis system



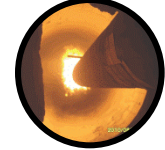
**WGR-1 Caloric value of
coal instrument**



**D/Max-r X diffraction
analyzer**



AAAnalyst200 atomic absorbance spectrometer



3. Equipment Made by SINOMA TCDRI

Preheater

Productivity of 1000t/d ~ 12000t/d

New Technology and New Characteristics

Improve the heat exchange efficiency of the preheater system and reduce the preheater resistance.

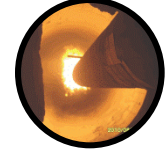
Improve the capability and adaptability of the decomposing furnace and reduce nitrogen oxide emissions.

Rotary kiln tail expansion technique;
Smoke chamber kiln using back feeder

Selective non catalytic reduction for industrial applications;
Precalcining system material screen technology

New efficient material scattering device;
Tertiary air staged combustion





3. Equipment Made by SINOMA TCDRI

Kiln



Two-Pier
Rotary Kiln



Two-pier
Rotary Kiln

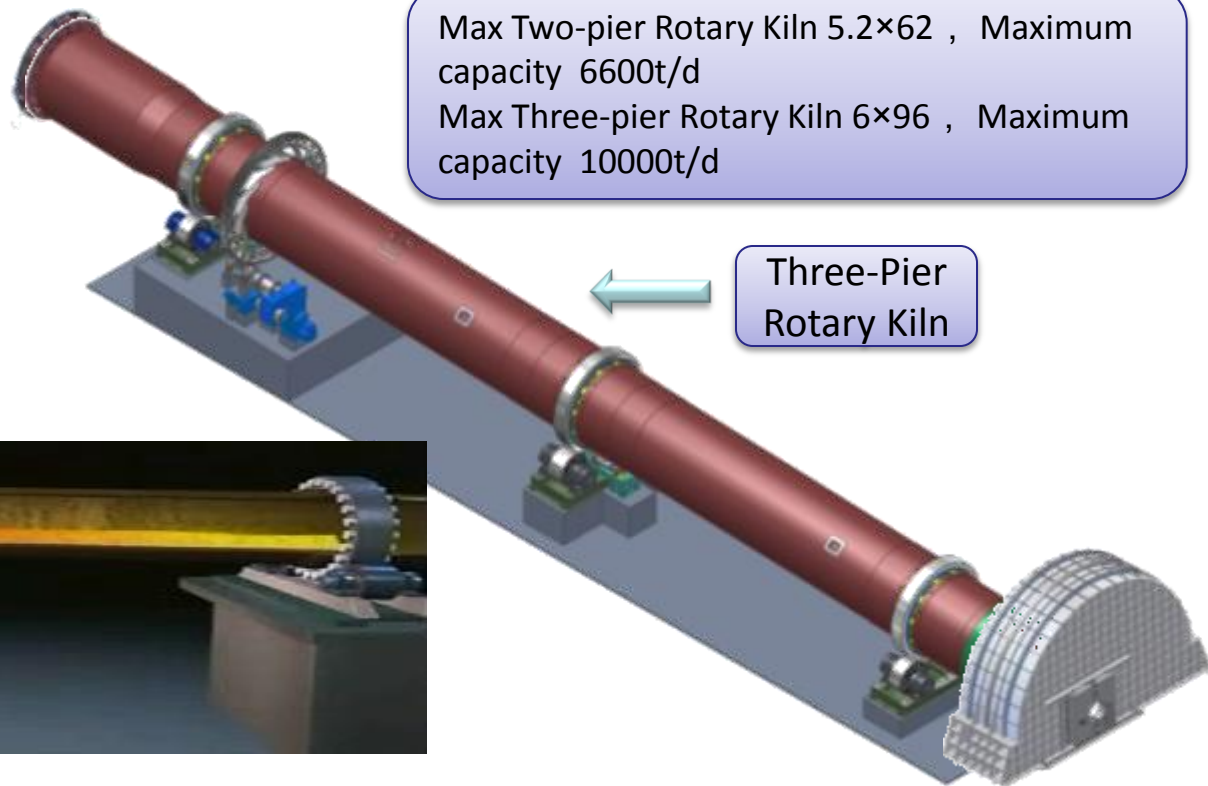
- The surface of the kiln shell heat loss, Weight reduction.
- Reduce investment in infrastructure, Maintenance convenient installation.

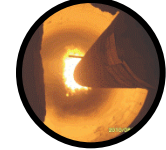
Three-pier
Rotary Kiln

- Using the rigid and elastic support to improve the reliability.
- Using a segmented ring gear to improve the quality of ring gear and reduce the cost of replacing.
- Labyrinth combined with spring lamination forms, sealing increases heat insulation layer.

Max Two-pier Rotary Kiln 5.2×62 , Maximum capacity 6600t/d
Max Three-pier Rotary Kiln 6×96 , Maximum capacity 10000t/d

Three-Pier
Rotary Kiln





3. Equipment Made by SINOMA TCDRI

Cooler

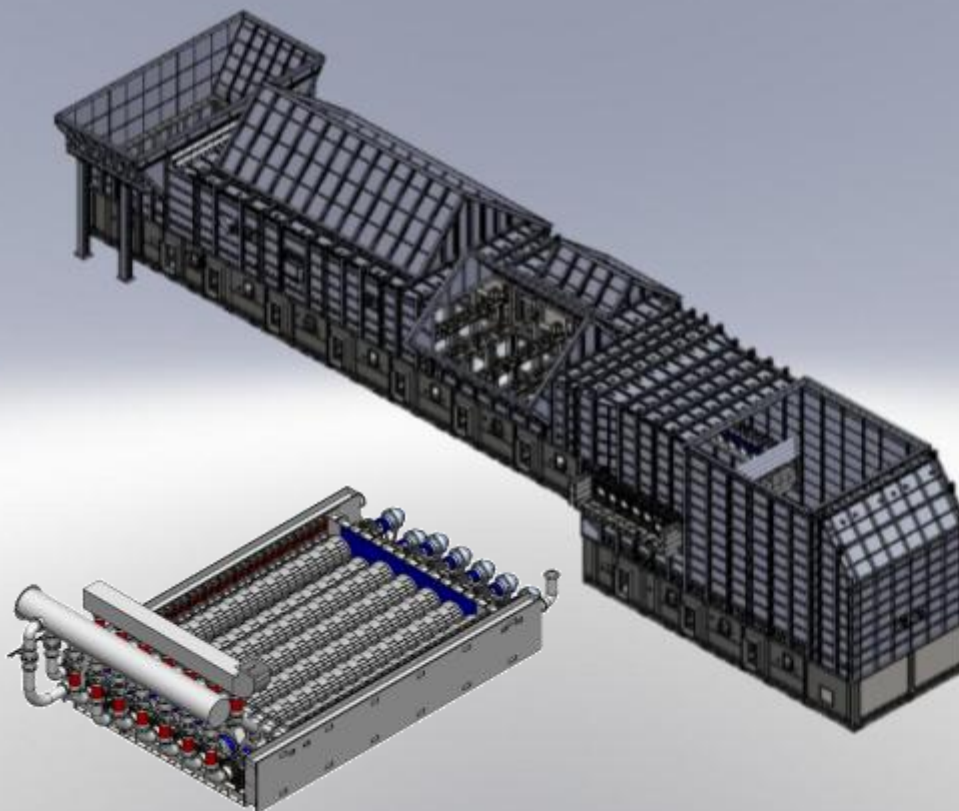
Walking Floor Cooler

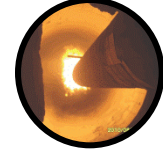
High operation rate

High transmission
efficiency

High cooling efficiency

Super low wear





3. Equipment Made by SINOMA TCDRI

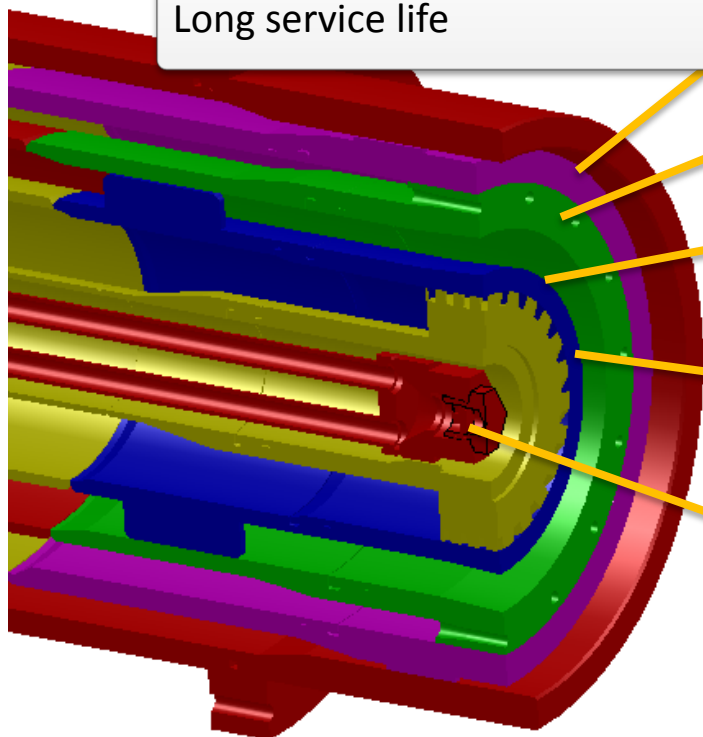
Burner

Primary air 7% ~ 8%

Easy regulation and diversity
for the flame shape

Adaptability of anthracite

Long service life



Cooling air duct

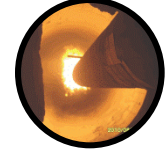
Axial flow air duct

Pulverized coal air duct

Cyclone air duct

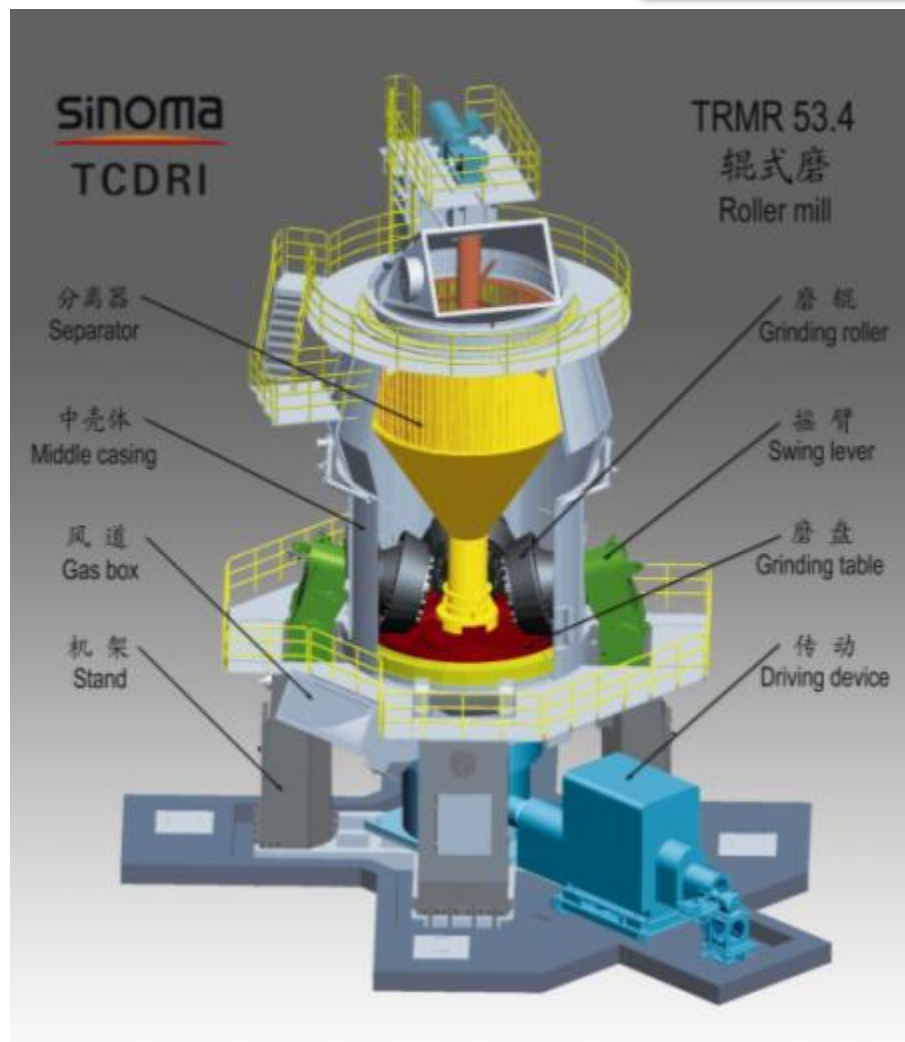
Ignition oil gun



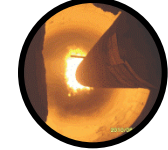


3. Equipment Made by SINOMA TCDRI

Vertical Roller Mill



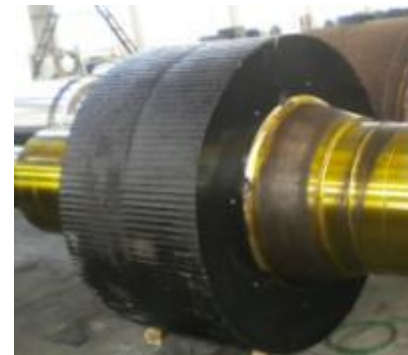
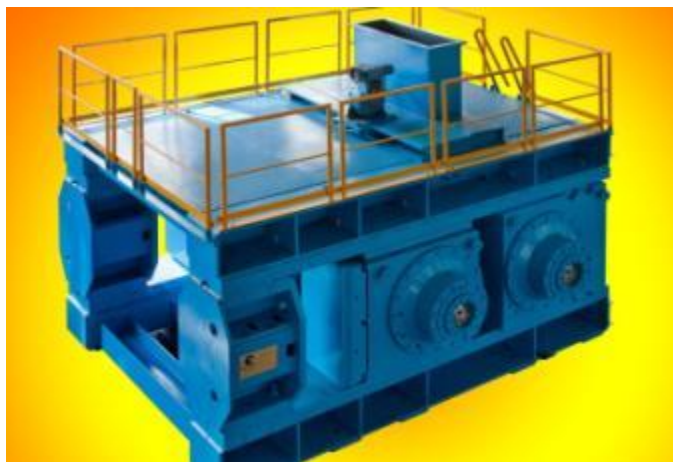
- **Raw Mill** : 1000TPD ~ 7500TPD :
TRM25.5 ~ TRM60.4
- **Slag Mill** : 45T/h ~ 150t/h :
- TRMS31.31, ~ TRMS56.4
- **Coal Mill** : 20T/t ~ 80t/h :
- TRMC20.2 ~ TRMC40.21
- **Cement Mill** : 60T/h ~ 220T/h :
TRMK32.2 ~ TRMK56.4



3. Equipment Made by SINOMA TCDRI

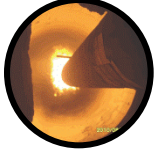
Roller Press

Capacity of Roller Press from 100t/h to 1550t/h , suitable for Cement , Raw material , Iron ore grinding system.



Performance of Roller Press

TRP220-160 (1400t/h)	TRP180-170	TRP180-140	TRP160-140	TRP140 series	TRP120 series	Total
2	4	6	41	93	12	158



3. Equipment Made by SINOMA TCDRI



Crusher



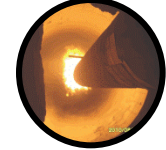
Roller Crusher



Semi-Mobile Crushing Plant



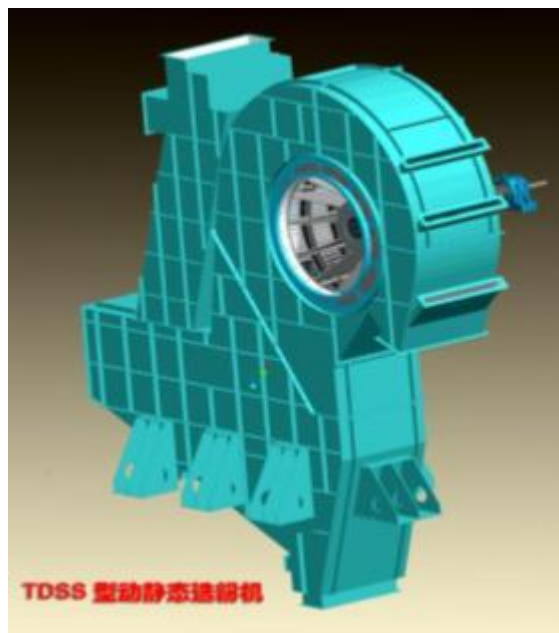
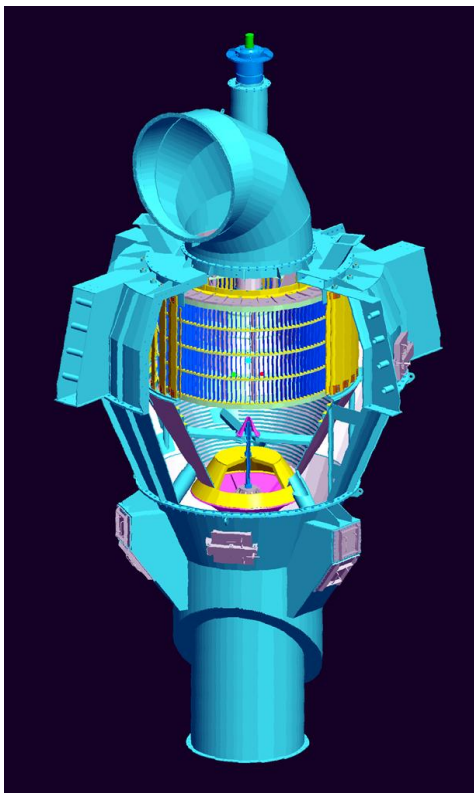
Apron Feeder

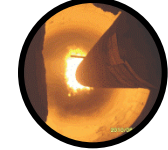


3. Equipment Made by SINOMA TCDRI

Separator

We provide many types of separator with outstanding performance and high classifying effects for different kind of raw material grinding and cement grinding system.



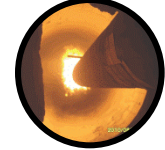


3. Equipment Made by SINOMA TCDRI

Ball Mill

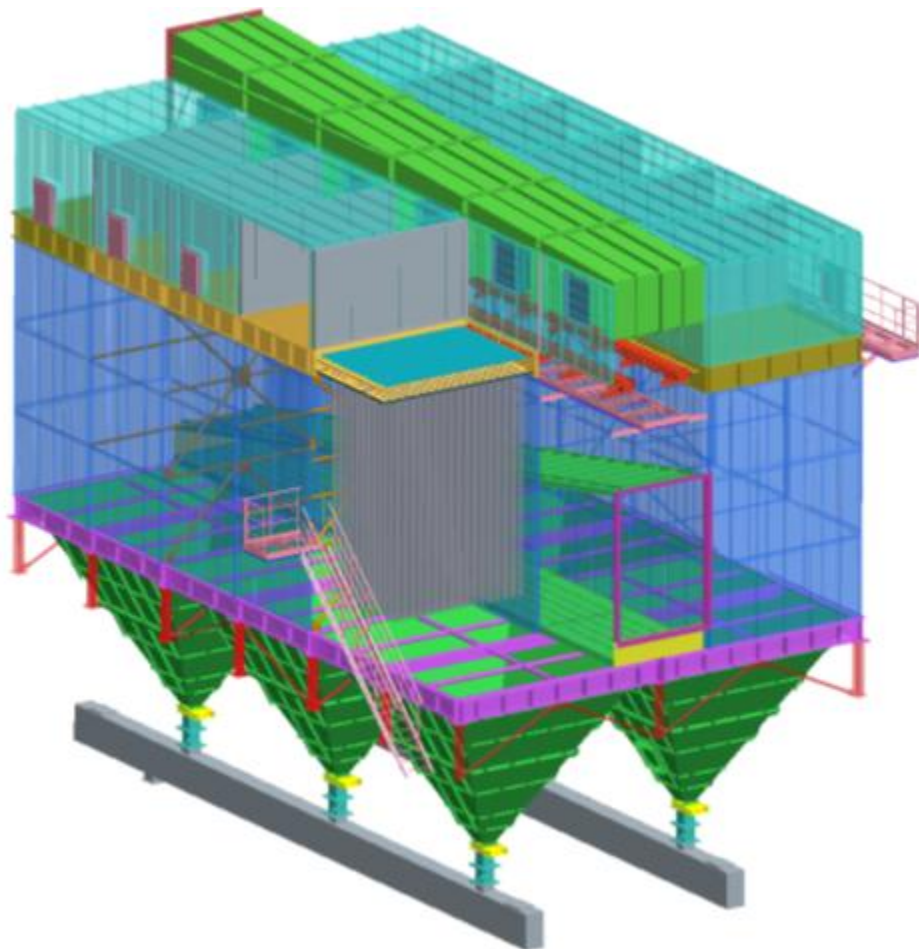


Type	specification (m)	Grinding Type	Capability (t/h)
Raw Mill	$\Phi 3.8 \times 8.5 \sim \Phi 5 \times 14$	Close circle	90 ~ 225
Cement Mill	$\Phi 2.4 \times 13 \sim \Phi 5 \times 15$	Close circle and open circle	23 ~ 200
Coal Mill	$\Phi 2.8 \times 5.75 \sim \Phi 4 \times 8.25$	Air swept	16 ~ 60



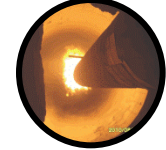
3. Equipment Made by SINOMA TCDRI

Bag Filter TDM Jet Pulse Filter



Features:

- Low air leakage due to exchanging bags inside (walk-in), dew prevention
- Low resistance
- High efficiency
- Monitor on broken bags for each chamber
- Monitor on ΔP for each chamber
- Monitor & Control total ΔP
- Monitor on pressure of compressed air
- Tendency chart & Alarm

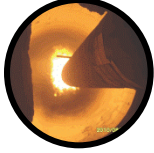


3. Equipment Made by SINOMA TCDRI

12 Manufacture Workshops in China



1. SINOMA-Tangshan
2. SINOMA-Liyang
3. SINOMA-Yangzhou
4. SINOMA-Tianjin
5. SINOMA-Zibo
6. SINOMA-Changshu
7. SINOMA-Tangshan Port
8. SINOMA-Pingdingshan
9. SINOMA-Shangrao
10. SINOMA-Chengdu
11. SINOMA-Changshu
Environment Protection
12. SINOMA-Xuzhou



3. Equipment Made by SINOMA TCDRI

Professional Manufacture



Numerically Controlled Large Lathe



Numerically Controlled Vertical Lathe



Laser Cutting Machine



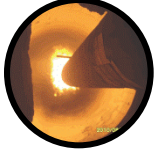
Numerically Controlled Cutting Machine



H Beam Production Line



Large Scale Plate Bending Machine



3. Equipment Made by SINOMA TCDRI

High Quality Control



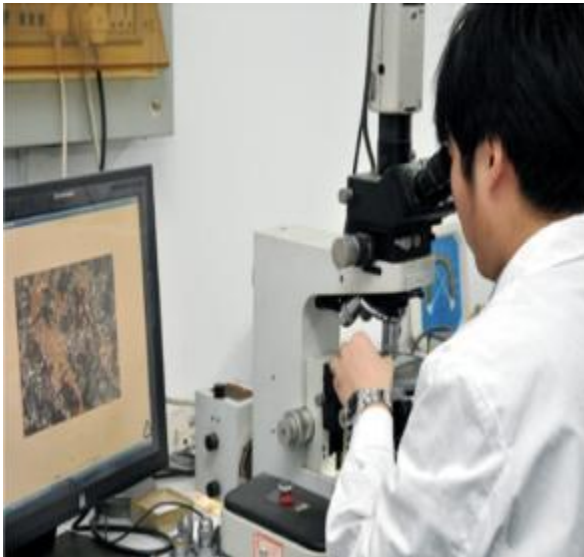
Magnetic Particle Inspection



Ultrasonic Inspection

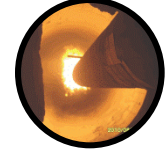


Metal Physics Test



Metallographic Analysis





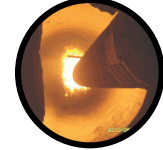
4. Key Equipment- Walking Floor Cooler



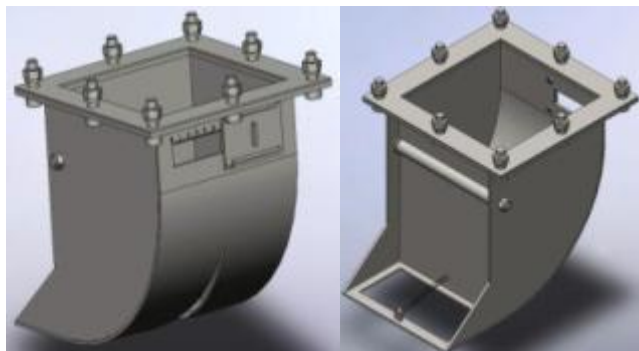
Characters :

- High heat exchange efficiency ;
- High transport efficiency ;
- High availability, low wear ;
- Standard modular design ;
- Zero clinker leakage ;
- Roller Crusher in middle



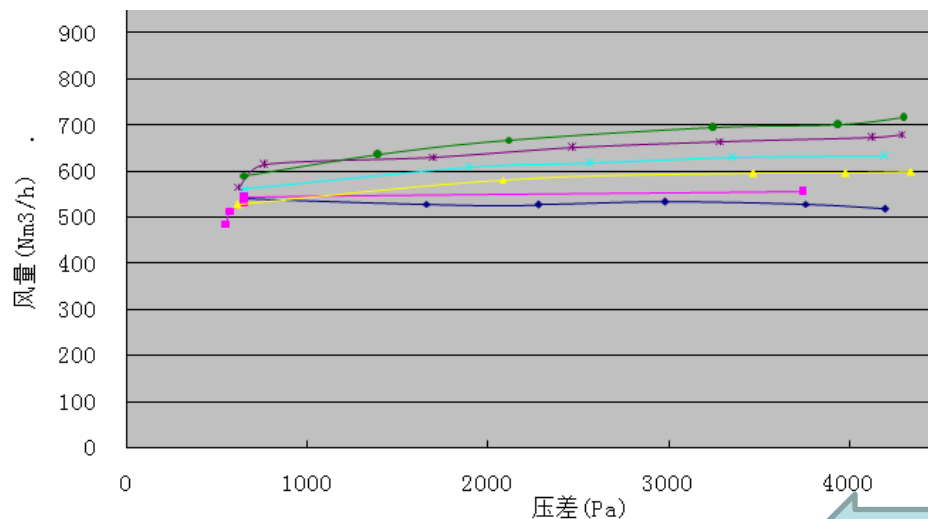
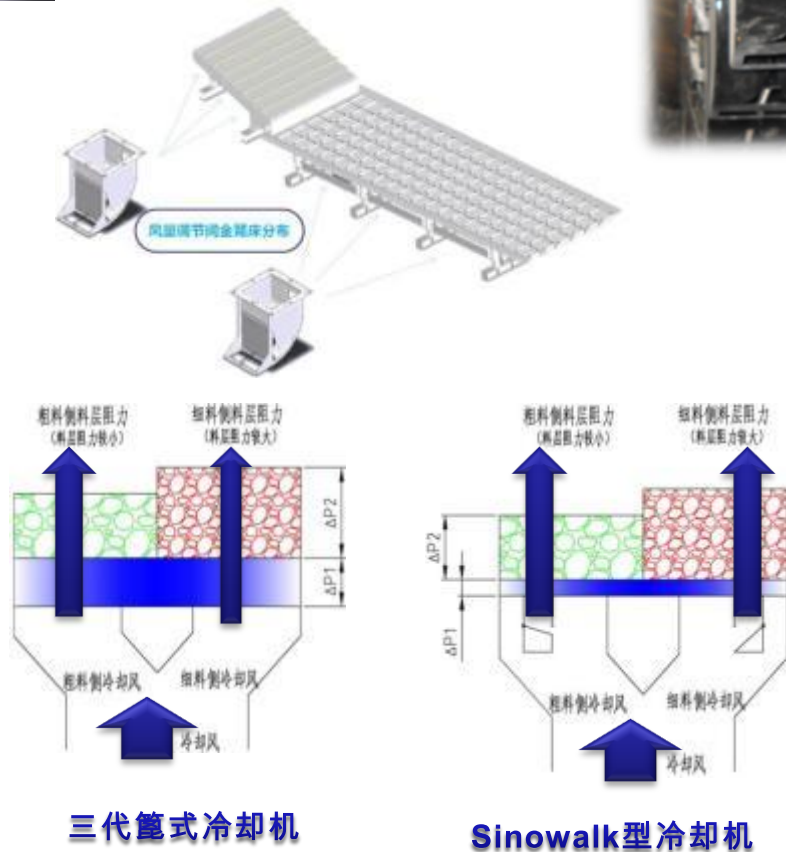


TC Air Flow Control Valve

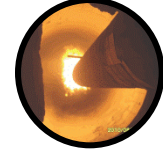


Target : Air flow is relatively even in the whole grate of each chamber.

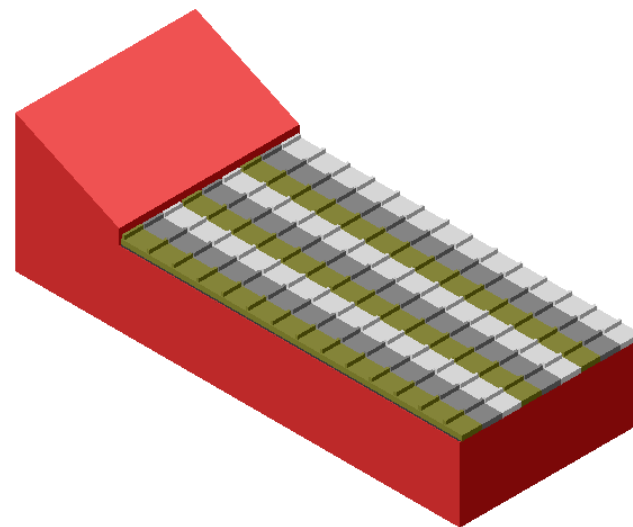
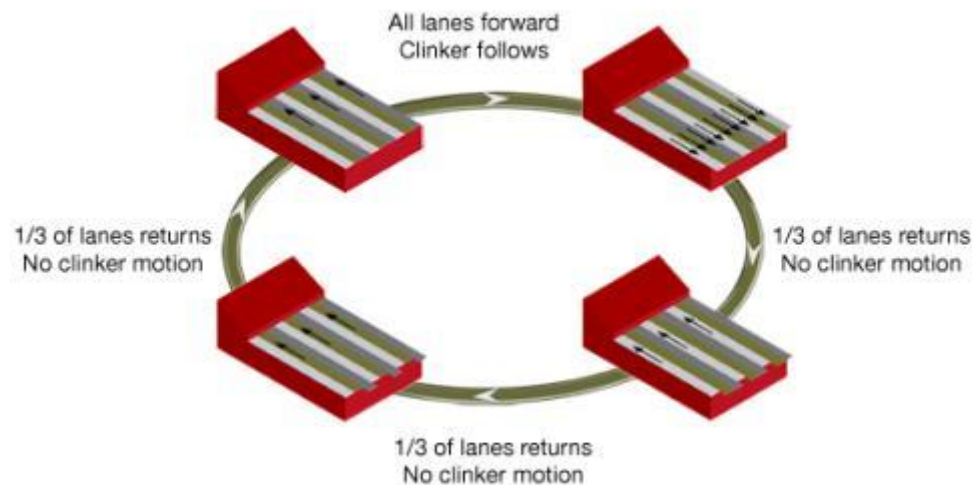
Method : keep air flow constant by stabilize pressure difference of each grate unit.



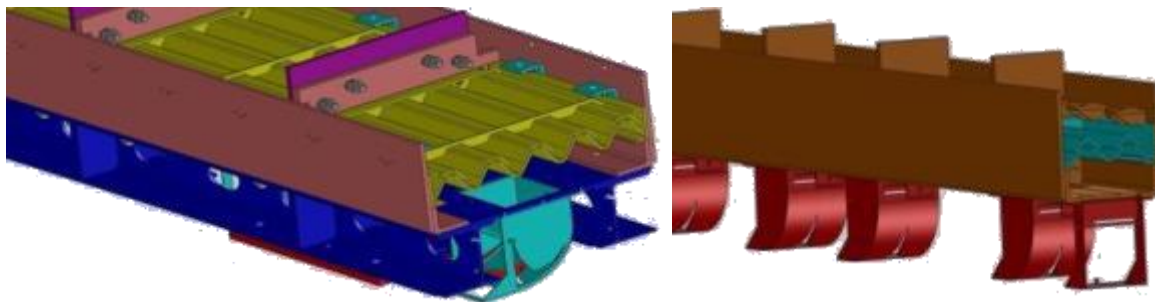
TC air flow control valves distribute on whole grate,
for Auto-Controlling of Constant Flow

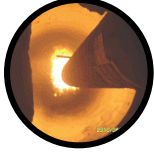


Working Principle of The Cooler : Walking Floor

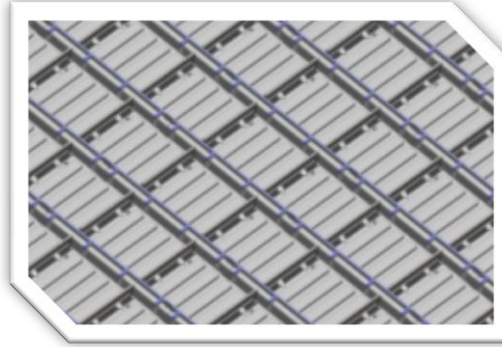


Standard Modularization Design





New grate design



◆ Low wear : special trough to make the grate only touch the cool clinker to avoid grates wear.

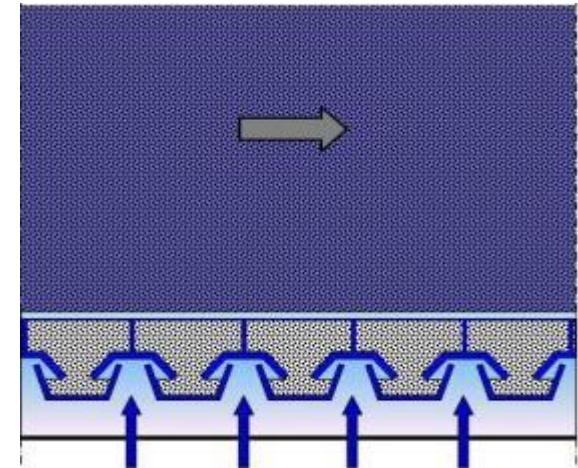
◆ Easy maintenance: wore out parts can be replaced easily and independently.

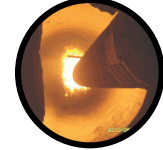
◆ Standardization : modular design and less spare parts.



Low abrasion , Less maintenance

Grate plate is covered under the cold Clinker, Wear area throughout the grate is only 8% of the total area.



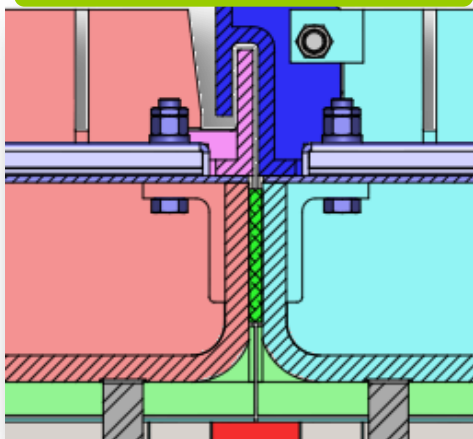


Seals Between Rows , for Zero Material Leakage



precision
casting

double seal

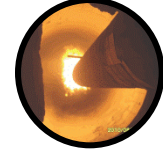


Special labyrinth sealing between the grates to ensure no clinker leakage.

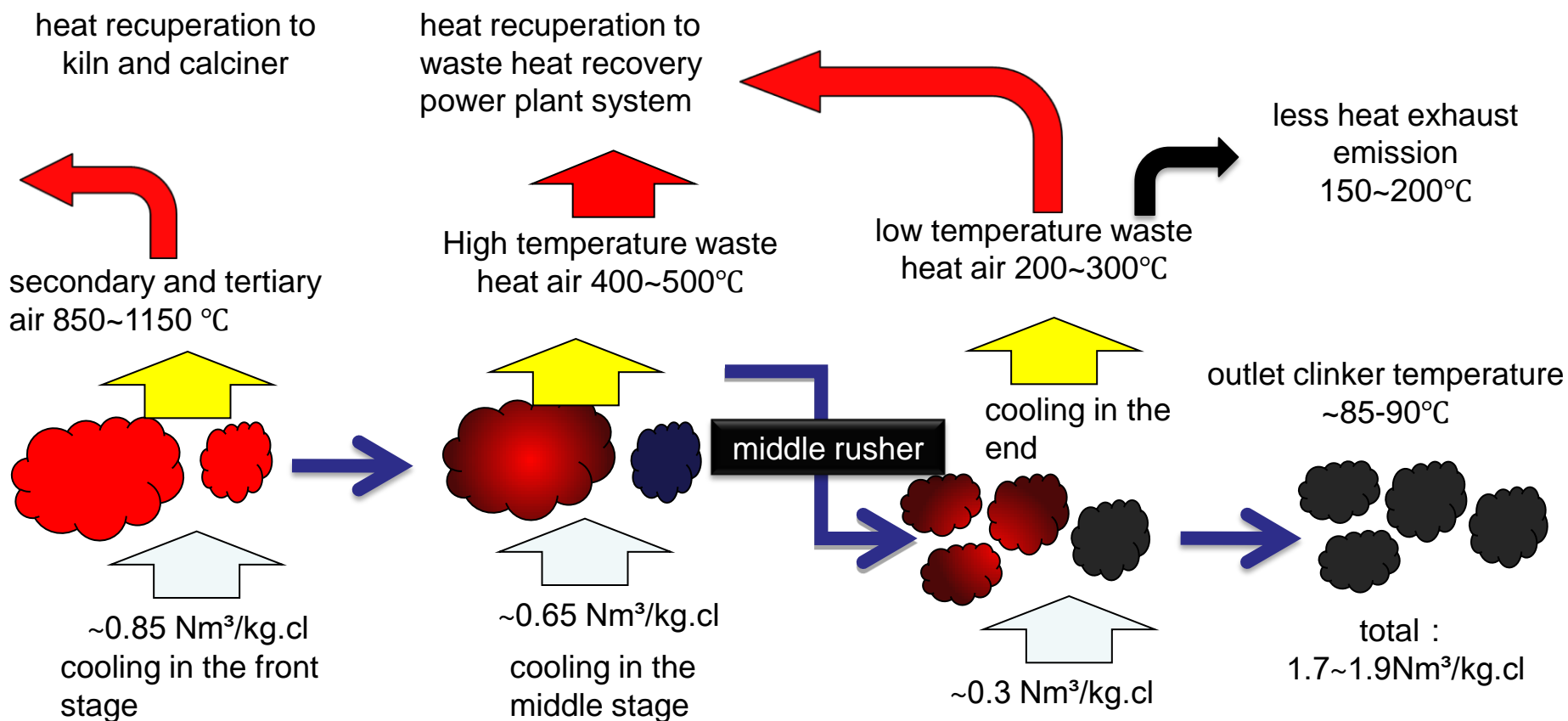


after 32 months
operation

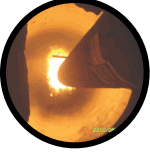




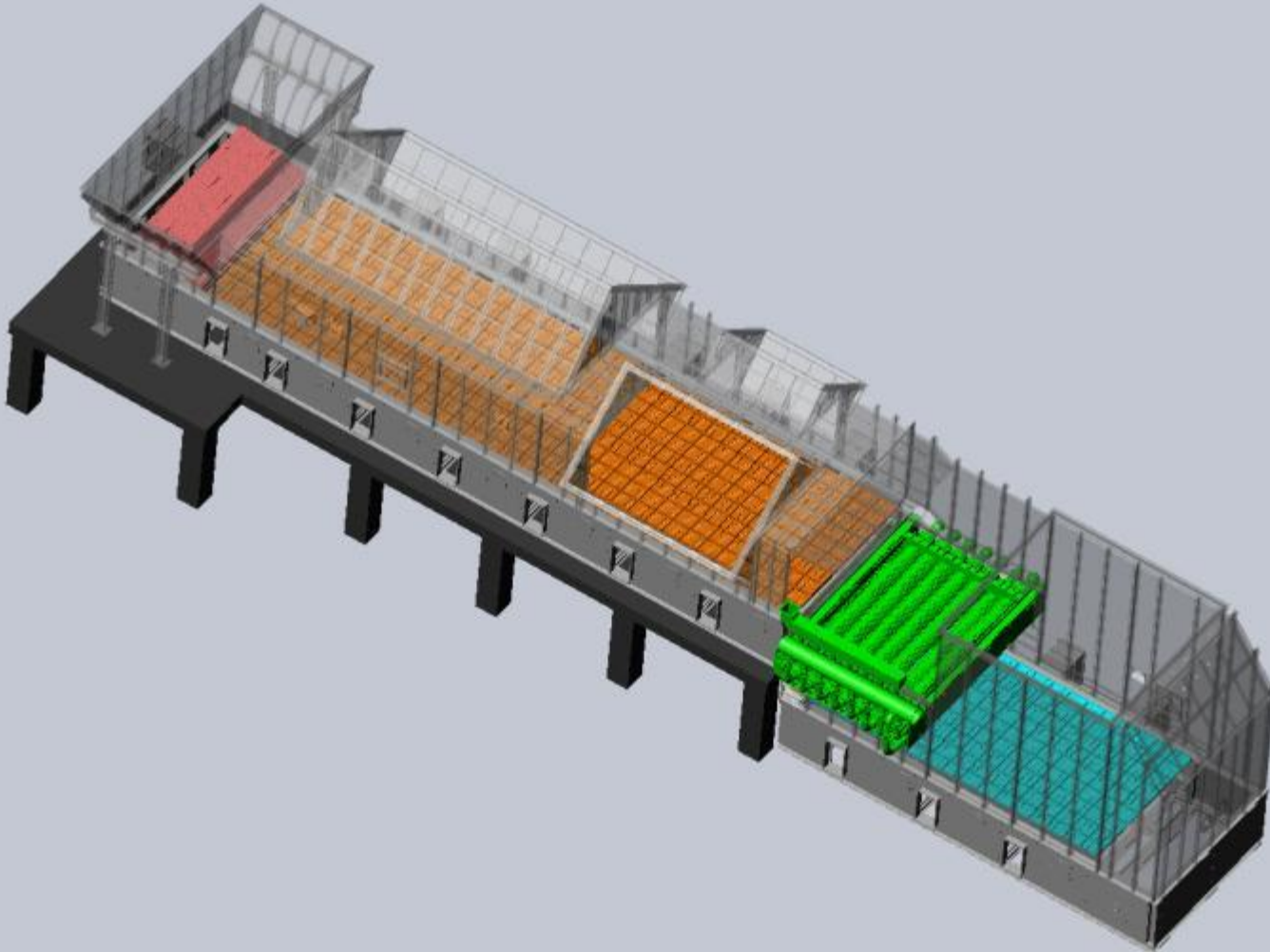
Clinker Cooling after middle crusher

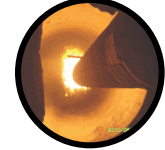


Large clinker is crushed by the middle crusher and cooled in the Second grate bed, Cooling efficiency of air is improved. Less air used. The temperature of waste air increased and it's good to waste heat utilization system.

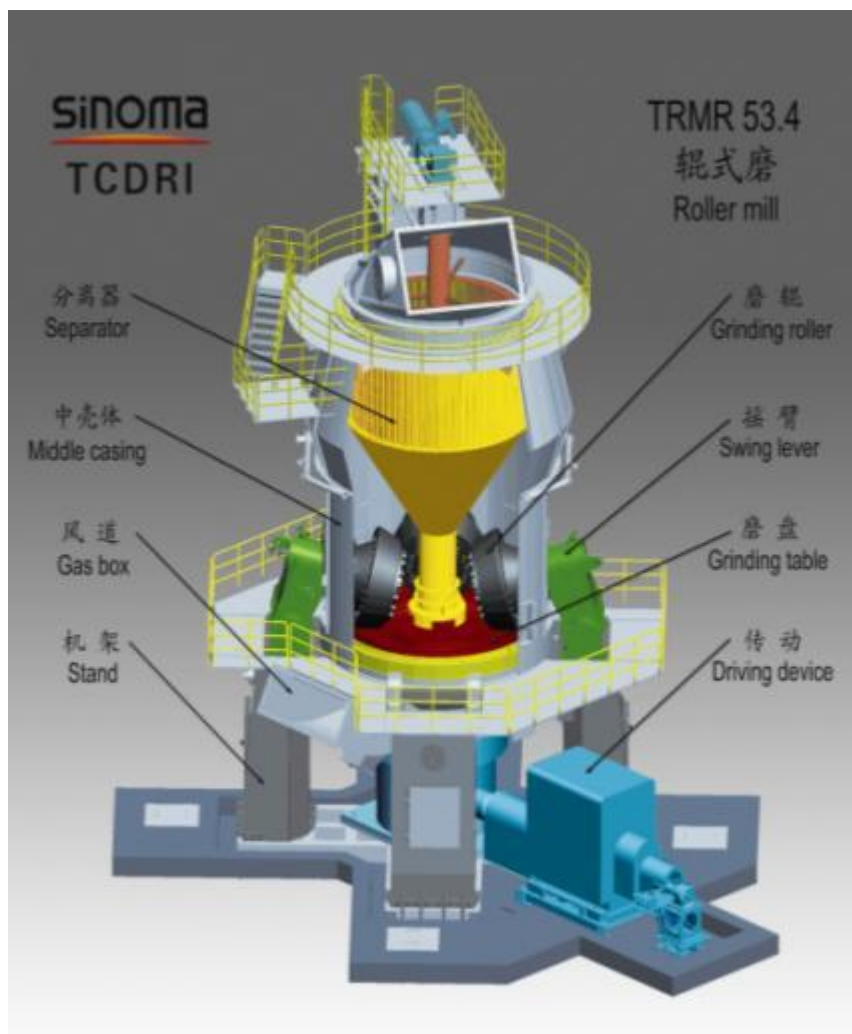


Clinker Cooler with Middle Crusher

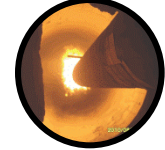




4. Key Equipment- Vertical Roller Mill

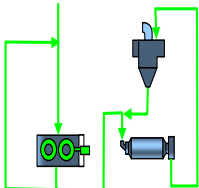
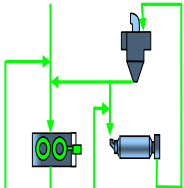
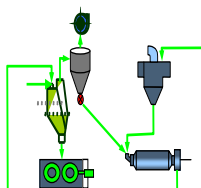
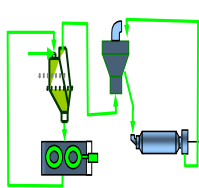


- **Raw Mill** : 1000TPD ~ 7500TPD :
- TRM25.5 ~ TRM60.4
- **Slag Mill** : 45T/h ~ 150t/h :
- TRMS31.31, ~ TRMS56.4
- **Coal Mill** : 20T/t ~ 80t/h :
- TRMC20.2 ~ TRMC40.21
- **Cement Mill** : 60T/h ~ 220T/h :
- TRMK32.2 ~ TRMK56.4



4. Key Equipment- Vertical Roller Mill

Comparison with ball mill system

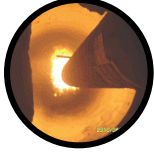
System	Pre grinding	Mixed grinding	Combined grinding	Semi-finish grinding
Flow sheet				
Capacity upgrade	30 ~ 70%		70 ~ 200%	
Energy saving	10 ~ 20%		20 ~ 30%	



**Power
Consumption
Comparison**

RP+ball mill
power consumption
30kWh/t ~ 34kWh/t

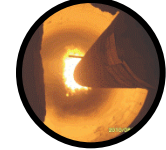
TRMK Roller mill
power consumption
26kWh/t ~ 30kWh/t



Reference of Cement vertical roller mill



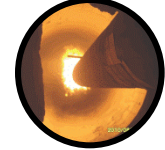
First and largest domestic VRM
slag/cement mill TRMKS56.4 was designed
and sell to Weifang Steel Groups in China,
which capacity is 150t/h for slag (fineness
 $\geq 420 \text{ m}^2/\text{kg}$) ; 220~240t/h for cement
(fineness 330~360 m^2/kg) .



Supply in 2013

- Total Production of Main & Auxiliary Equipments in 2012: **1733** Sets
- Total Weight of Production in 2012: **274961** Ton

Rotary Kiln 35 Sets;	Vertical Roller Mill 90 Sets;
Preheater 25 Sets;	Tube Mill 51 Sets;
Roller Press 36 Sets;	Cooler 74 Sets;
Crusher 276 Sets;	Stacker & Reclaimer 88 Sets;
Separator 140 Sets;	Process Filter 299 Sets;
Pan Conveyor 104 Sets;	Burner 62 Sets;
Steel Structure 50143 Ton	



Thank You !



Sun Hai Quan

e-mail: sunhaiquan@tcdri.cn