

Installation and Commissioning of a prepol© SC at Sungshin Cement, South Korea

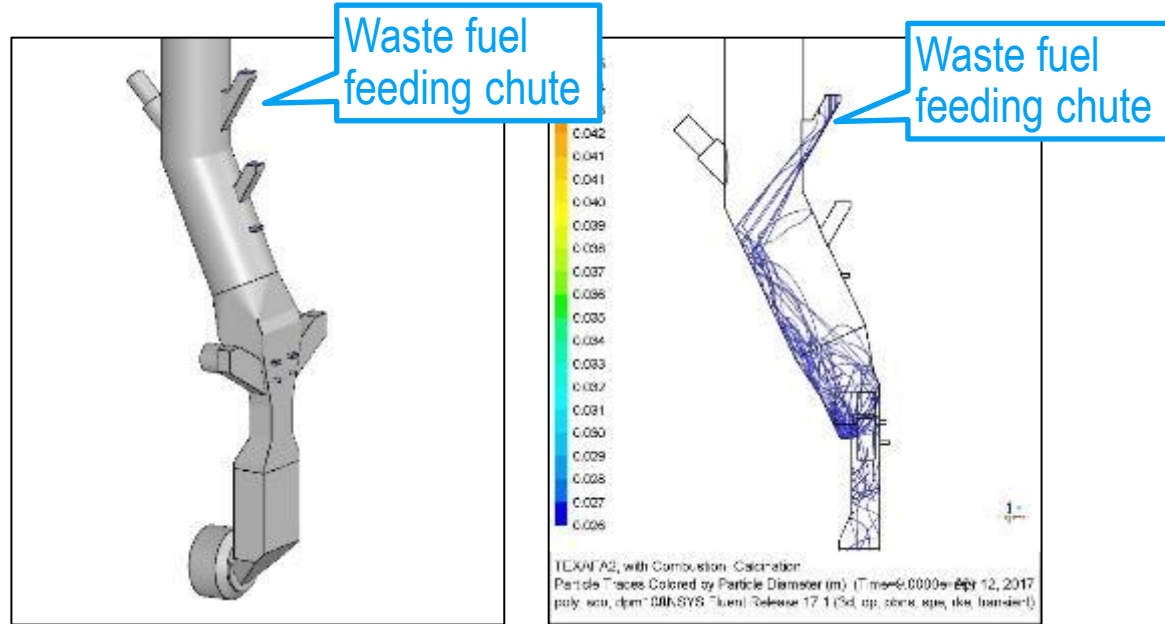
East Coast Cement Conference, Louisville, KY

10/24/2024 | Uwe Maas
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Combustion of RDF with standard calciner: the limits



Particle size

- light, 2D particles can be burnt
- coarse, 3D particles fall directly into the kiln inlet



Gas retention time

Full burn-out of light, 2D particles means long precalciner loops with > 5 seconds residence time.

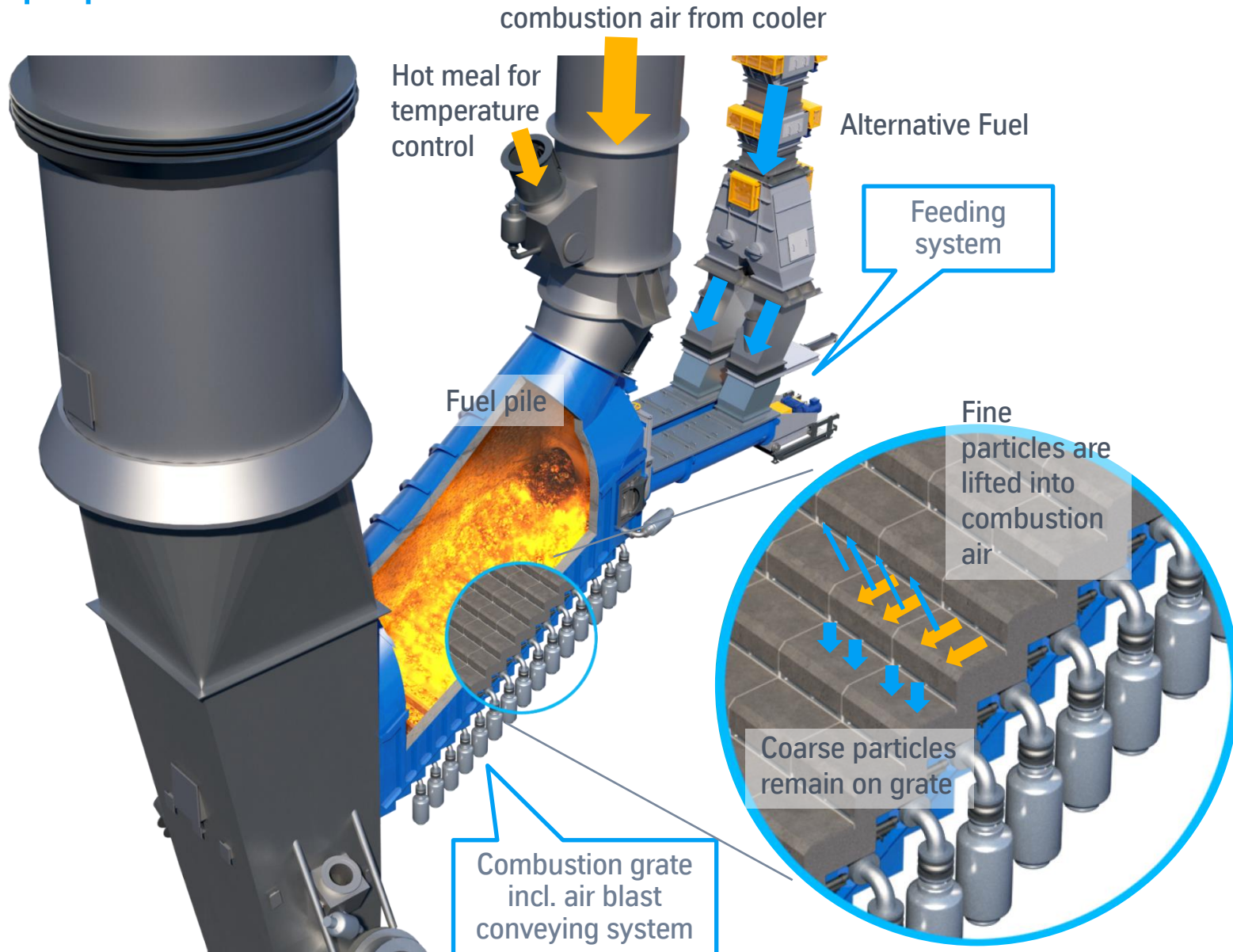


1000 seconds

High thermal substitution of classical fuels even with shorter calciner

- Long residence time boosts the solid phase combustion
- Much less mechanical preparation necessary
- higher flexibility in terms of waste materials which could be burned

prepol[®] SC – Overview



- ✓ AF feed via screw conveyors
- ✓ Patented air blast transport without moving parts in hot zone
- ✓ Hot tertiary air for drying and incineration
- ✓ Separation effect on the grate: fine particles entrain, coarse particle remain on the grate (high efficiency)
- ✓ Temperature control using hot meal
- ✓ Reliable and easy to operate system



Sungshin Cement: company



Sungshin Cement Co., Ltd.



- Established 1967
- Head quarter in Seoul
- One of the major cement companies in South Korea
- 5 cement plants in all regions of the country
- Danyang factory is the biggest

- 5 kiln lines:
 - ❖ 4 x Polysius 4,000 – 6,000 tpd
 - ❖ 1 x Mitsubishi 9,100 tpd
- Total cement capacity at Danyang: 100 mil. tons
- RDF usage since approx. 10 years



Sungshin Cement: project description



- **Kiln line:**
- Kiln no. 5 in Danyang plant
- Polysius ILC kiln line with 5,800 tpd capacity (actual)

Before the update:

- RDF usage limited to below 30% of calciner fuel
- Reason: increase of CO, NOx and THC emission values exceeding the governmental limits
- Waste oil in the kiln inlet to mitigate the NOx creating operational problems

Goals:

- Increase RDF usage to $\geq 85\%$ at calciner
- CO and THC values within the limits
- No usage of waste oil in the kiln inlet anymore

Solution: installation of a prepol SC and extending the calciner residence time



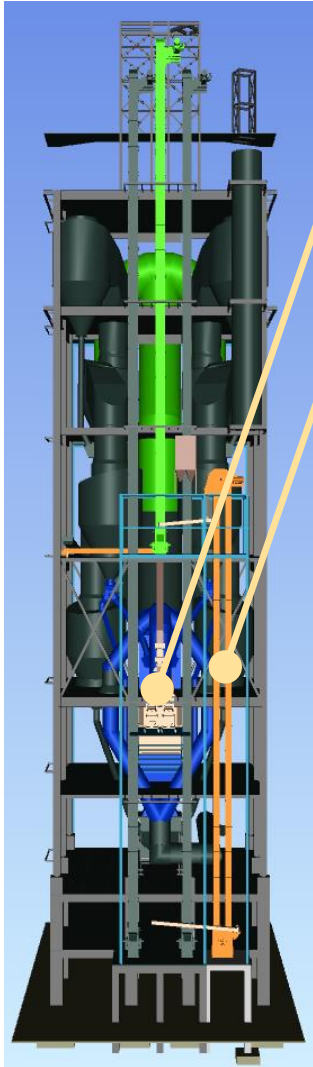
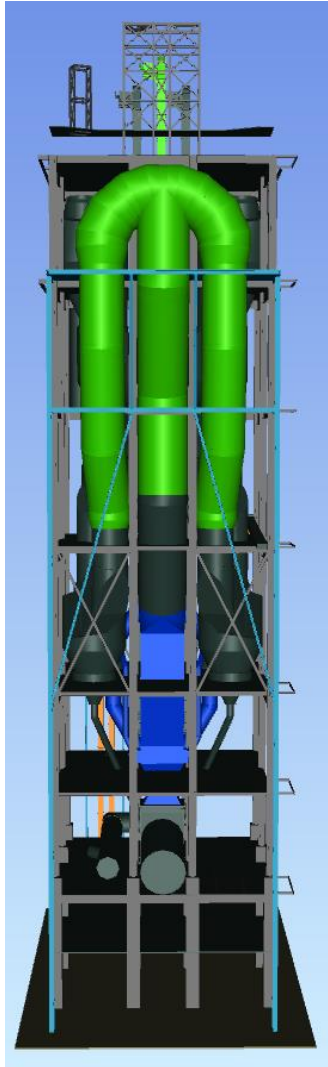
RDF used at Danyang line no. 5



- Sizes 120-150 mm
- Mostly 2D
- Moisture approx. 15%
- NCV 4,500 kcal/kg

RDF has a good quality and a high NCV

Modification project: 2 phases



Phase 1 (now):

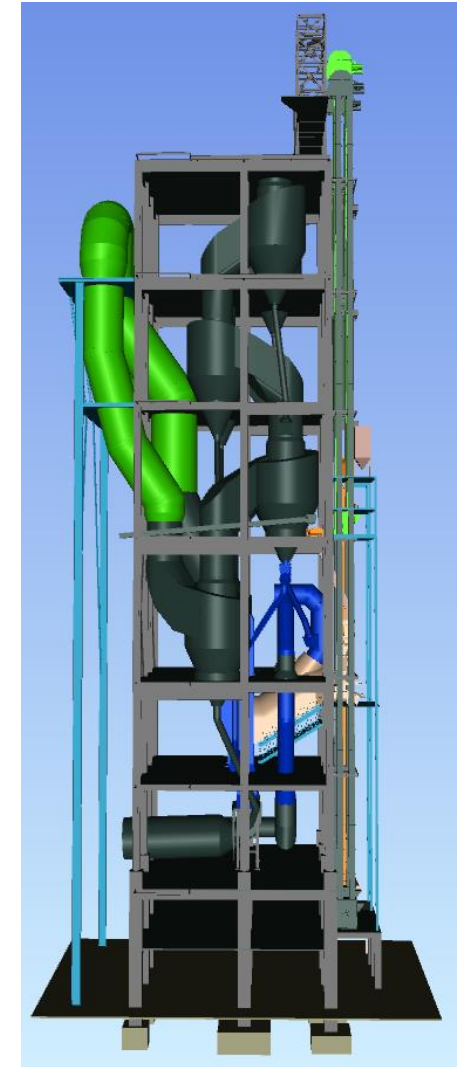
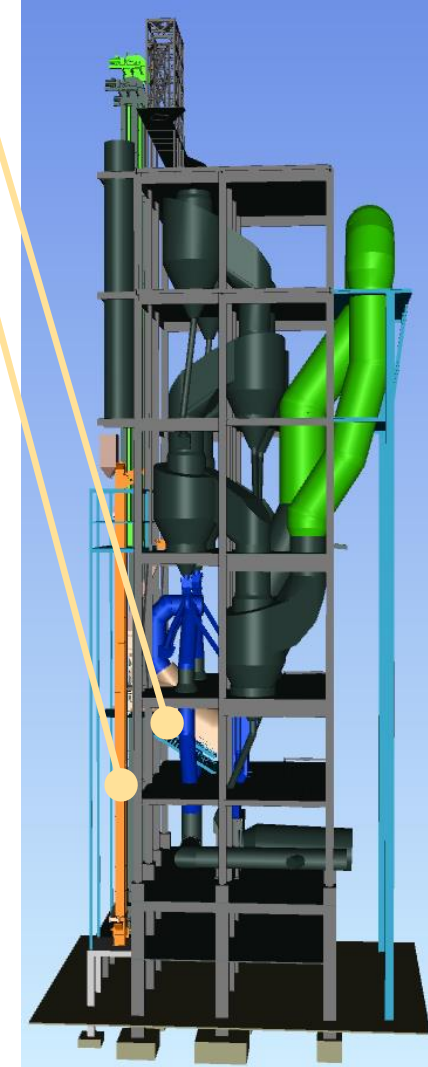
- Installation SC (beige) and modification lower calciner section (blue)
- Modification of raw meal feeding (orange and green opposite kiln)
- bag filter modification and bag filter fan capacity increase
- New SNCR system

main measures to reach the goals

Phase 2 (later):

- Extension calciner loop (green at kiln side)

if further improvement of residence time is necessary



Basis for the final set of measures was a plant audit before the modification

prepol SC technical data



- prepol SC 8-18
- 8 columns / 18 steps
- 2 feeding screws / 1,200 mm diameter each
- 144 air blast nozzles
- **thermal capacity 110 MW**

Danyang prepol SC modification: preheater tower / mobile crane



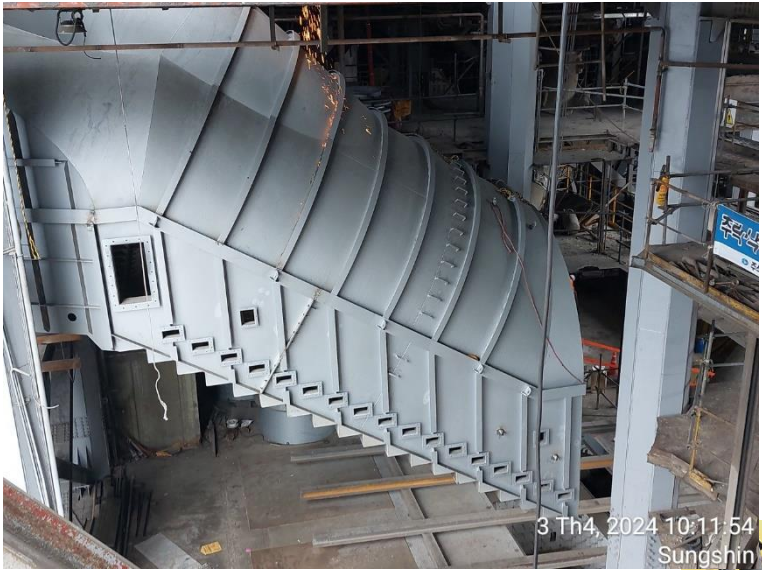
Preheater tower
Line no. 5 (left)



mobile cranes
for lifting the equipment



Danyang prepol SC modification: impressions of installation of the SC



Danyang prepol SC modification: installed equipment



Commissioning and results performance test

Course of commissioning

- The kiln ran smoothly right from the start
- For higher RDF usage the delayed feeding system upgrade had to be finished first
- 3 weeks after this was done the performance test was executed
- All performance warranties were achieved
- The client was very satisfied and signed the PGT within one week



Results performance test

VALUE	Unit	Warranty	Achieved during PGT
Coal used in calciner	t/h	≤ 2.76	2.64
\cong TSR of prepol© SC	%	$\geq 85\%$	85.7%
NOx	ppm	≤ 190	137
THC	ppm	≤ 20	19
Clinker production	t/h	5,800	5,962

prepol© SC showed good performance at high substitution rate with low emissions



Resume

- The prepol© SC at Sungshin Cement achieved a high substitution rate at the calciner with a smooth kiln operation
- The required stringent emission limits of this plant were met simultaneously
- The commissioning went well and clinker capacity and TSR at calciner could be achieved quickly
- The results were so convincing that Sungshin Cement cancelled the second phase = calciner extension
- The customer is very satisfied and discussions for the installation of additional prepol© SC at other kiln lines are underway

With a prepol© SC installation any preheater is well equipped to achieve a high TSR at the calciner

