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References:

Dyckerhoff (Göllheim, Kiln 2)	3D temperature analysis NOx prediction SNCR injection system SNCR control 8 coating detectors	1800 tpd, heat balance 25:75 [%], RDF-rate 60% raw Nox: 1200-1400 mg/Nm ³ (daily average) NOx limits: DMV: 500 mg/Nm ³ NOx, HHMV: 1000 mg/Nm ³ Result: 30% reduced NH3 consumption
Dyckerhoff (Göllheim, Kiln 1)	3D temperature analysis NOx prediction SNCR injection system SNCR control 8 coating detectors	1200 tpd, heat balance 25:75 [%], RDF-rate 60% Raw NOx: 800-1000 mg/Nm ³ (daily average) NOx limits: DMV: 500 mg/Nm ³ NOx, HHMV: 1000 mg/Nm ³ Result 1: 35% red. NH3 consumption at limit 500 mg/Nm ³ NOx Result 2: NOx limit compliance of 200 mg/Nm ³ at 30 mg NH-slip
Gebrüder Seibel	3D temperature analysis SNCR control 8 coating detectors	Target: Reduction of the control deviation of the NOx daily mean value
Dyckerhoff (Lengerich, Kiln 8)	3D temperature analysis NOx prediction SNCR control 8 coating detectors	Calciner kiln, NOx limits: DMV: 275 mg/Nm ³ NOx, HHMV: 550 mg/Nm ³ Target 1: Reduction of NH3 consumption at limit 275 mg/Nm ³ NOx Target 2: Compliance with future limits (NOx: DMV200/HHMV400, NH3 <30)
Dyckerhoff (Lengerich, Kiln 4)	3D temperature analysis NOx prediction SNCR injection system SNCR control 8 coating detectors	Calciner kiln, well cement/black clinker NOx limits: DMV: 500 mg/Nm ³ NOx, HHMV:1000 mg/Nm ³ Target 1: Reduction of NH3 consumption at limit 500 mg/Nm ³ NOx Target 2: Compliance with future limits (NOx: DMV200/HHMV400, NH3 <30)
Dyckerhoff (Geseke)	3D temperature analysis NOx prediction SNCR injection system SNCR control 8 coating detectors	NOx limits: DMV: 400 mg/Nm ³ NOx, HHMV: 800 mg/Nm ³ Target 1: Reduction of NH3 consumption at limit 400 mg/Nm ³ NOx Target 2: Compliance with future limits (NOx: DMV200/HHMV400, NH3 <30 mg)
Märker Zement	3D temperature analysis SNCR injection system SNCR control 8 coating detectors	NOx limits: DMV: 300 mg/Nm ³ NOx, HHMV: 600 mg/Nm ³ Target 1: Reduction of NH3 con. at limit 300 mg/Nm ³ NOx Target 2: Compliance with future limits (NOx: DMV200/HHMV400, NH3 < 30 mg)

DMV – Daily Mean Value; HHMV – Half Hour Mean Value

Experience with more than
100 billion Nm³ flue gas cleaned by STEAG's SNCR per year
in power plants

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NOx – Reduction
How to reach low emissions
by less demand on reagent
SNCR



Upgradable solution:

heSNCR – high efficiency SNCR

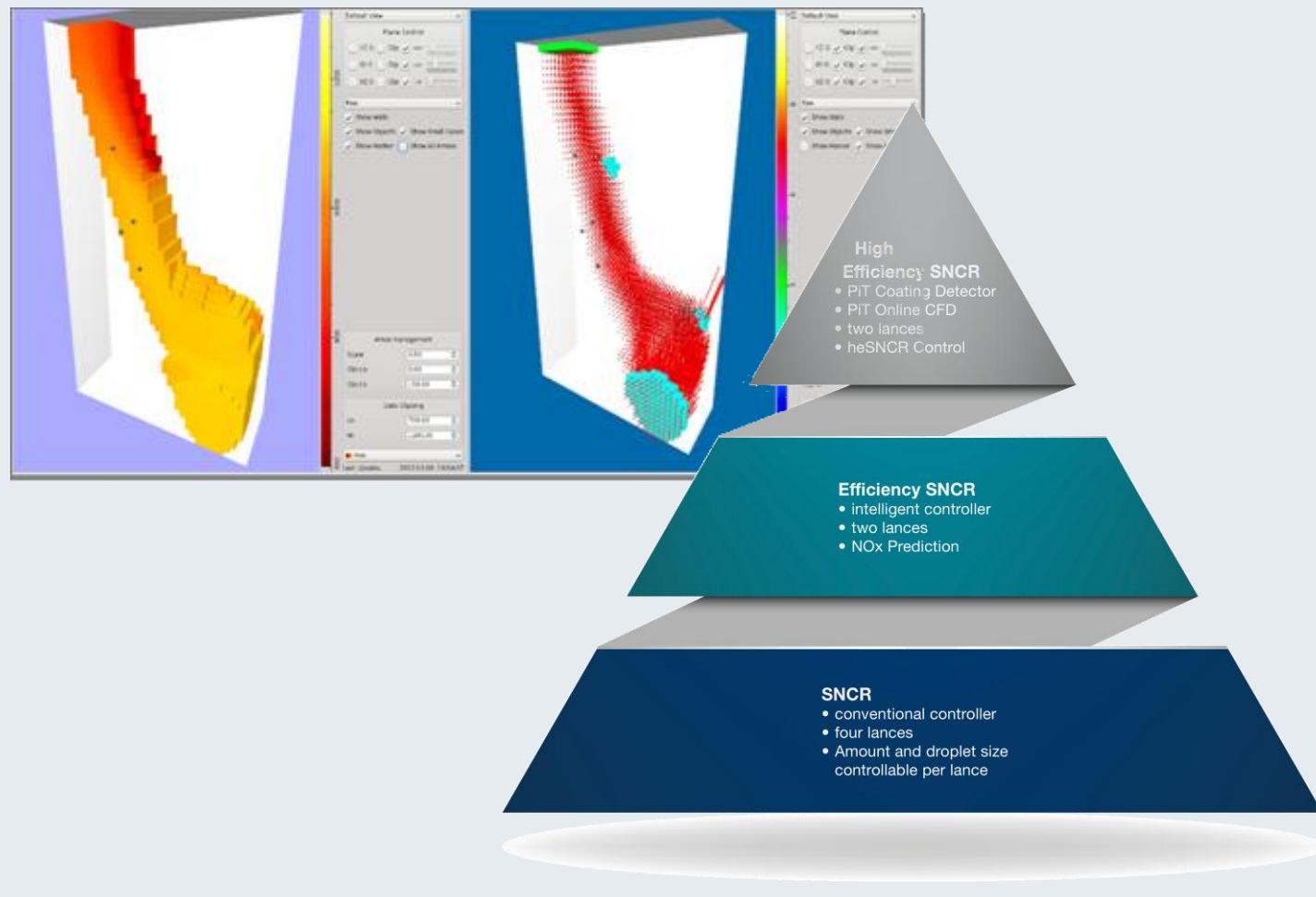
- PCS + Intelligent high efficiency control system
- NOx prediction (with Thermography)
- PiT Coating Detectors
- PiT Online-CFD
- Typical: Reduction of 1000 mg/Nm³ NOx to 200 mg/Nm³ NOx with 30% reduced reagent consumption compared to SNCR / standard suppliers

eSNCR – efficient SNCR

- Conventional control system + intelligent control system (with interface to DCS)
- NOx prediction (based on thermography)
- Typical: Reduction of 1000 mg/Nm³ NOx to 500 mg/Nm³ NOx with 15% reduced reagent consumption as SNCR / standard suppliers or 200 mg/Nm³ NOx limit
- Upgradable to heSNCR

SNCR – basic module

- Conventional Control System (via PLC or in DCS)
- Upgradable to eSNCR + heSNCR



Results:

OFFICIAL STATEMENT BY DYCKERHOFF 05-2012:

The heSNCR project for Göllheim kiln 2 was successful and achieved a reduction of ammonia consumption of 30%. STEAG Powitec got therefore end of April the order for the kiln 1 in Göllheim.

OFFICIAL STATEMENT BY DYCKERHOFF 03-2013

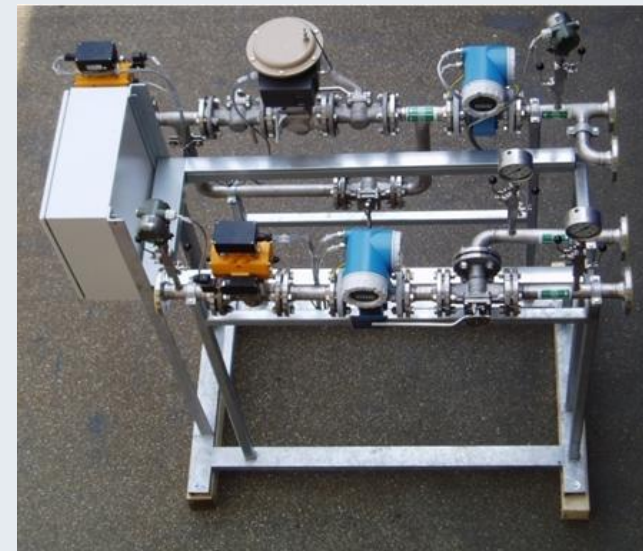
By the heSNCR on kiln 1 in plant Göllheim the ammonia consumption at the NOx- limit 500 could be reduced by about 35%. During a six-day test drive, because of winter stop, the NOx limit value 200 could be successfully maintained at a NH3 slip below 30.

FURTHER ORDERS FROM DYCKERHOFF

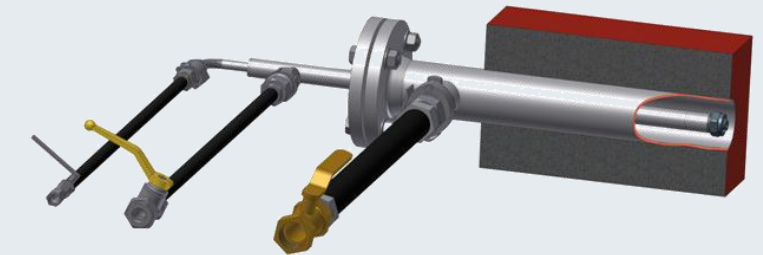
Lengerich kiln 8 (04-2013) - Calciner kiln - FLS

Lengerich kiln 4 (04-2013) - Calciner kiln/well cement-black clinker - Polysius

Geseke (05-2013) - KHD



Control skid of a conventional SNCR-system



Control skid for of a high efficiency SNCR-system