

Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln

Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
21-24 April 2015

ThyssenKrupp Industrial Solutions

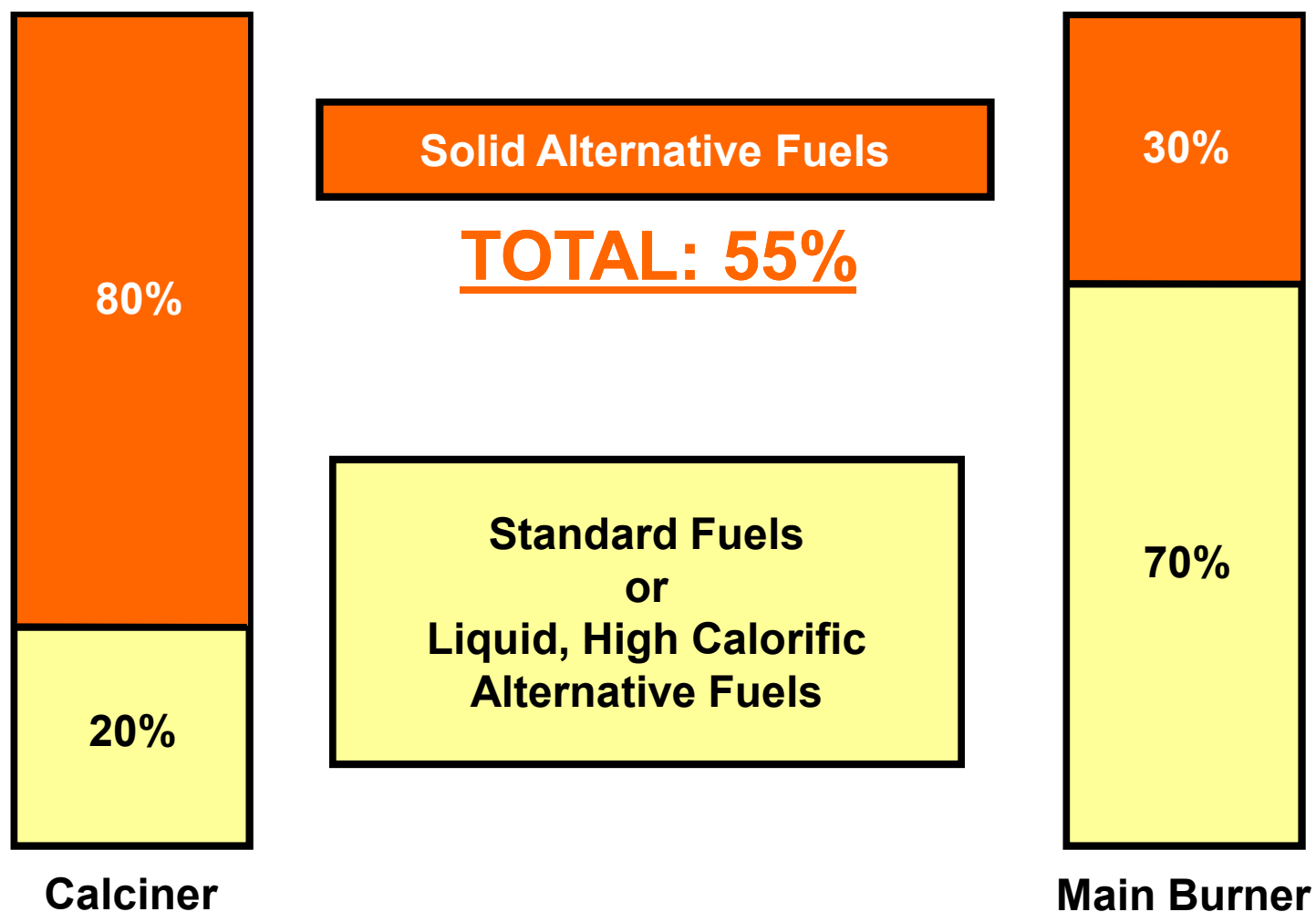


ThyssenKrupp

TKIS Solutions for AFR Usage - Content

- Basic Usage Preconditions
- High Flexibility with CC-Chamber
- High lumpy AFR Volumes at Calciner with Polysius PREPOL SC
- Main burner Polysius POLFLAME VN for high AFR at Kiln
- Proper Feeding and Dosing

Importance of the Calciner for the Usage of AFR



Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln

Uwe Maas, ThyssenKrupp Industrial Solutions

24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam

3

ThyssenKrupp Industrial Solutions

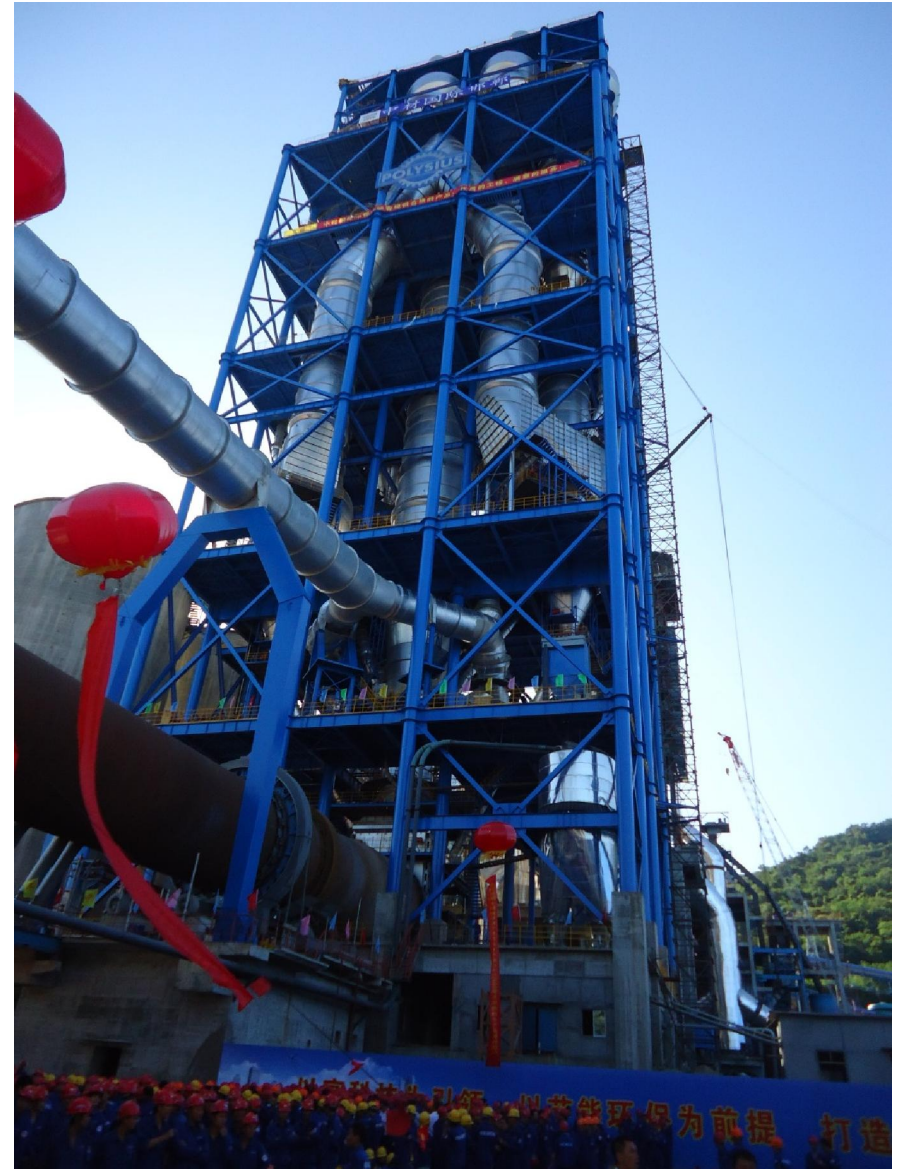


ThyssenKrupp

Calciners for AFR

- Optimal Intake
- Proper Mixing
- **Calciner Volume**

Higher Amounts of AFR
require sufficient
Calciner Volume



Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
4

ThyssenKrupp Industrial Solutions



ThyssenKrupp

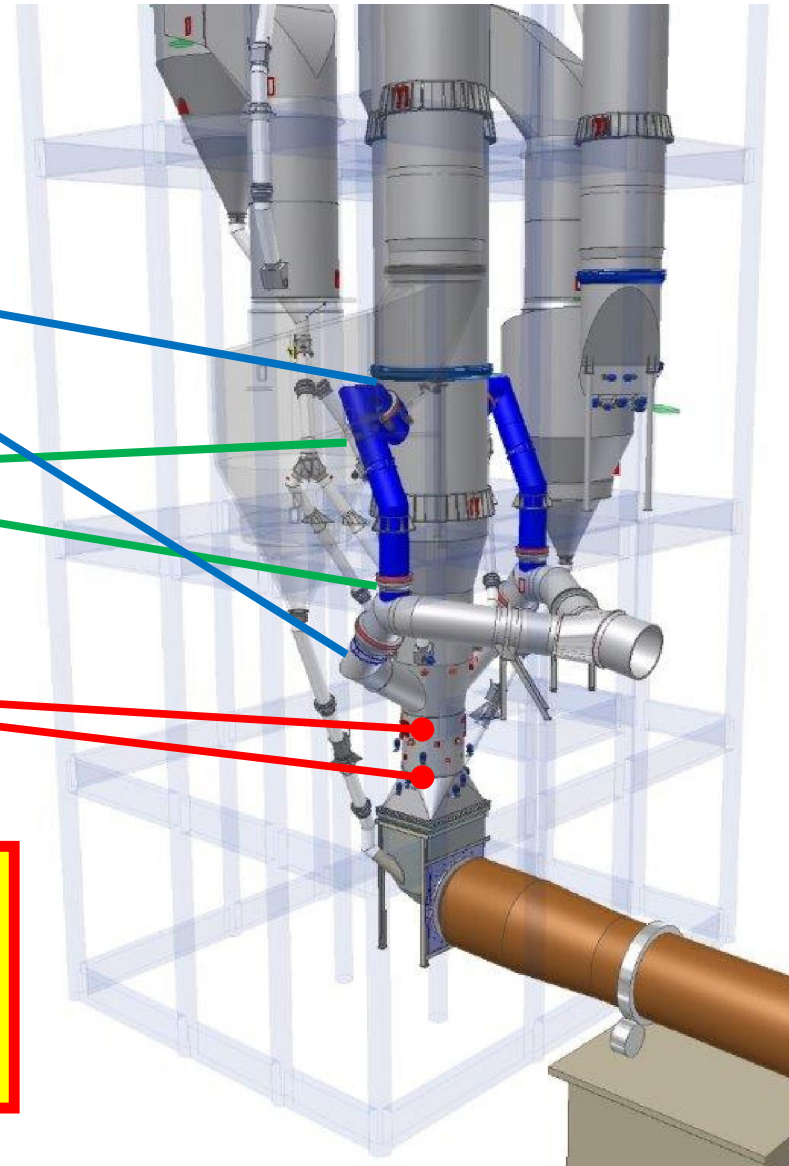
Calcliner: Optimal Intake Split for

Tertiary Air

Raw Meal

Fuels

**Only optimal Arrangement
ensures effective Burnout
and minimal Emissions**



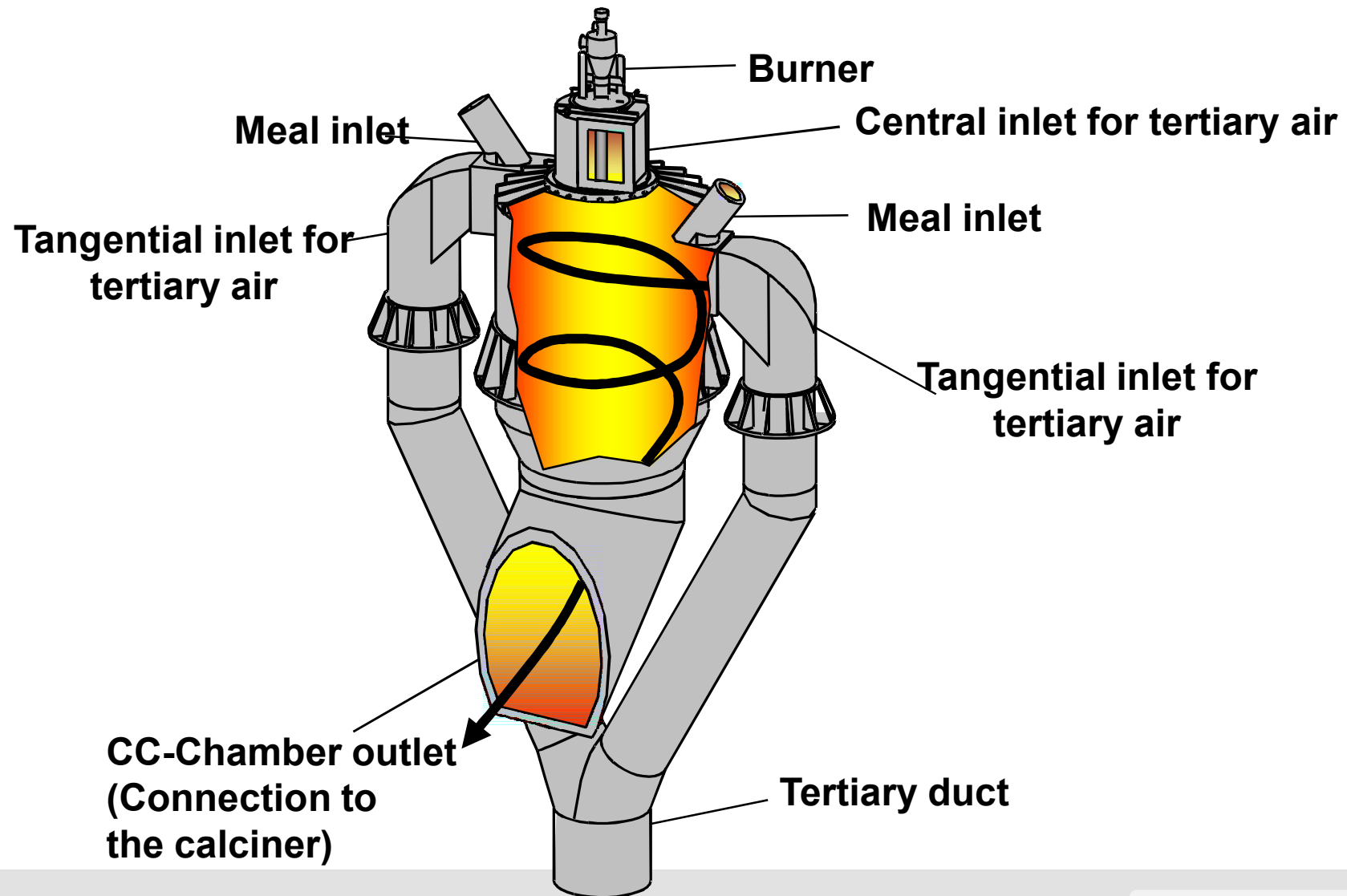
Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
5

ThyssenKrupp Industrial Solutions



ThyssenKrupp

CC-Chamber for Increasing Alternative Fuels

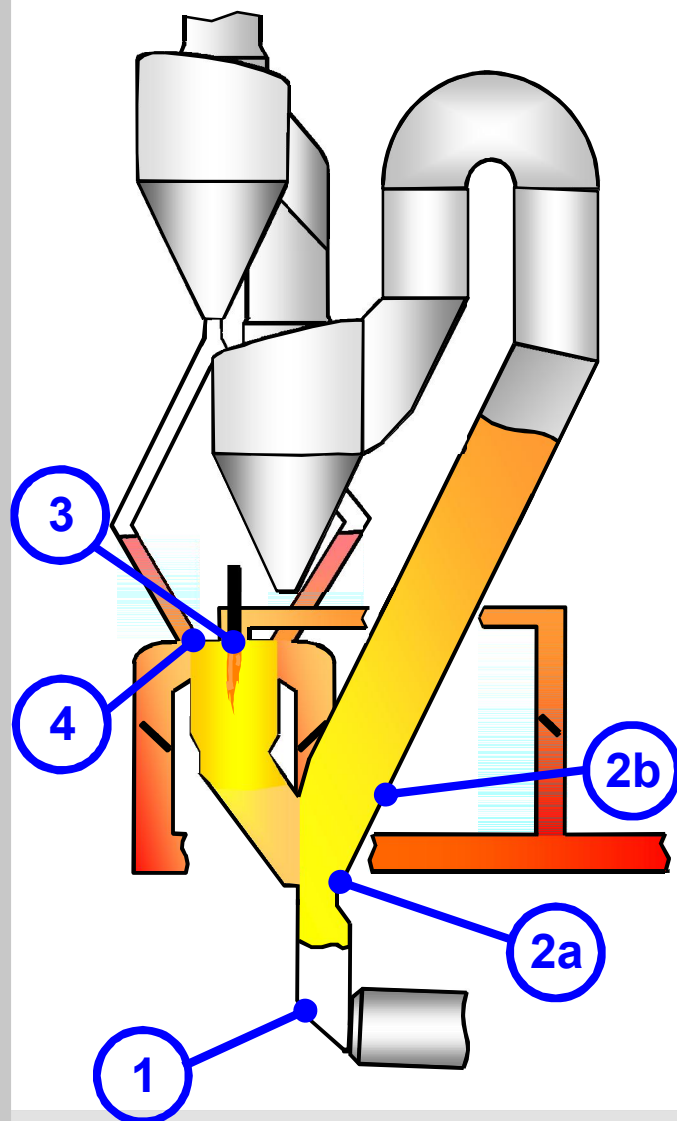


Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
6

ThyssenKrupp Industrial Solutions



CC-Chamber for the Usage of AFR

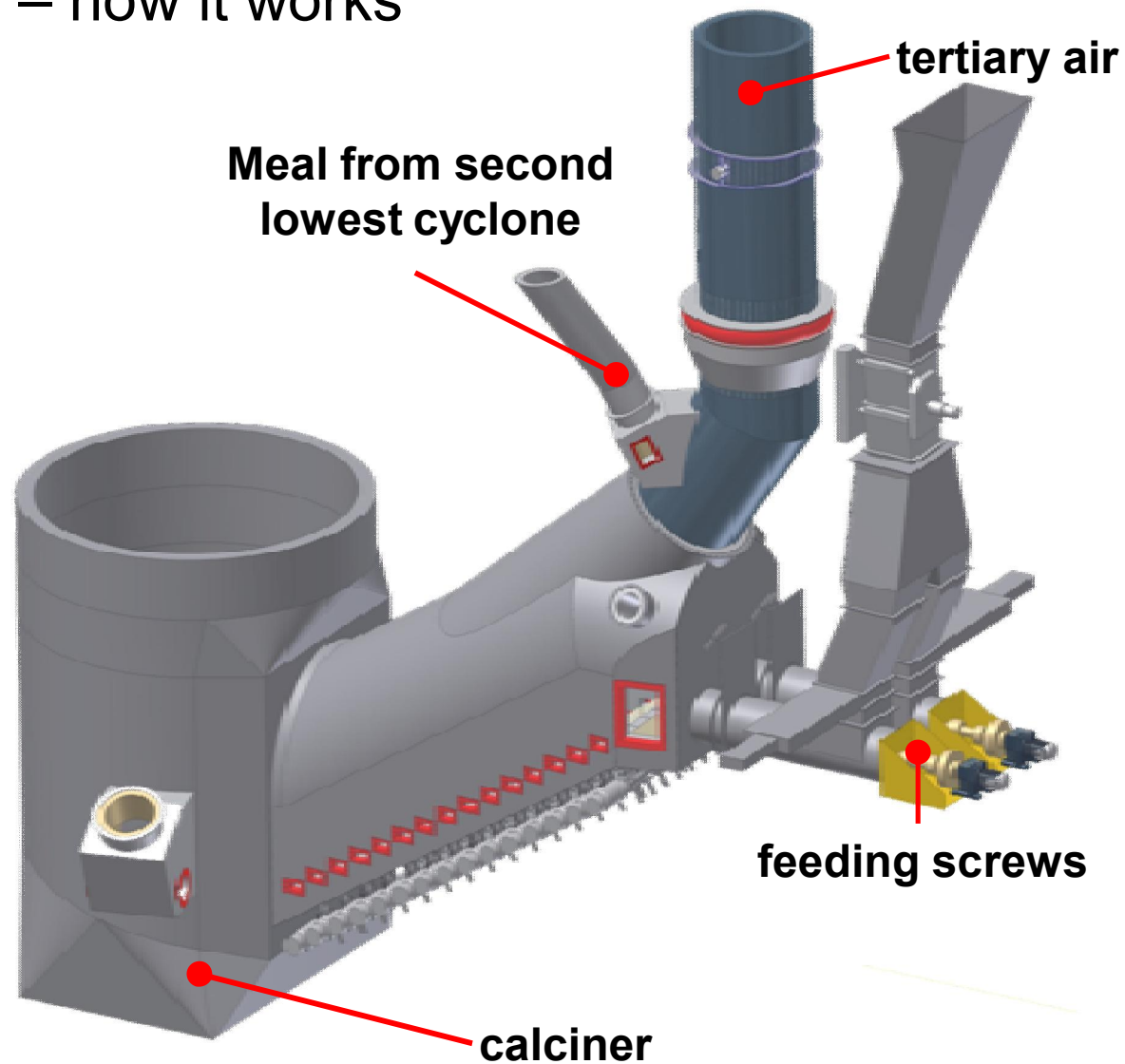


Entry Points for Alternative Fuels:

- 1 = Kiln Inlet (i.e. whole tires)
- 2a/2b = Calc. Riser Duct (i.e. rice husk, palm kernel shells)
- 3 = Central pipe of CC-burner (i.e. plastic fluff)
- 4 = CC-chamber ceiling (i.e. tire chips)

CC-Chamber offers
High Flexibility
for AFR in the Calciner

Prepol SC – how it works



Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
8

ThyssenKrupp Industrial Solutions

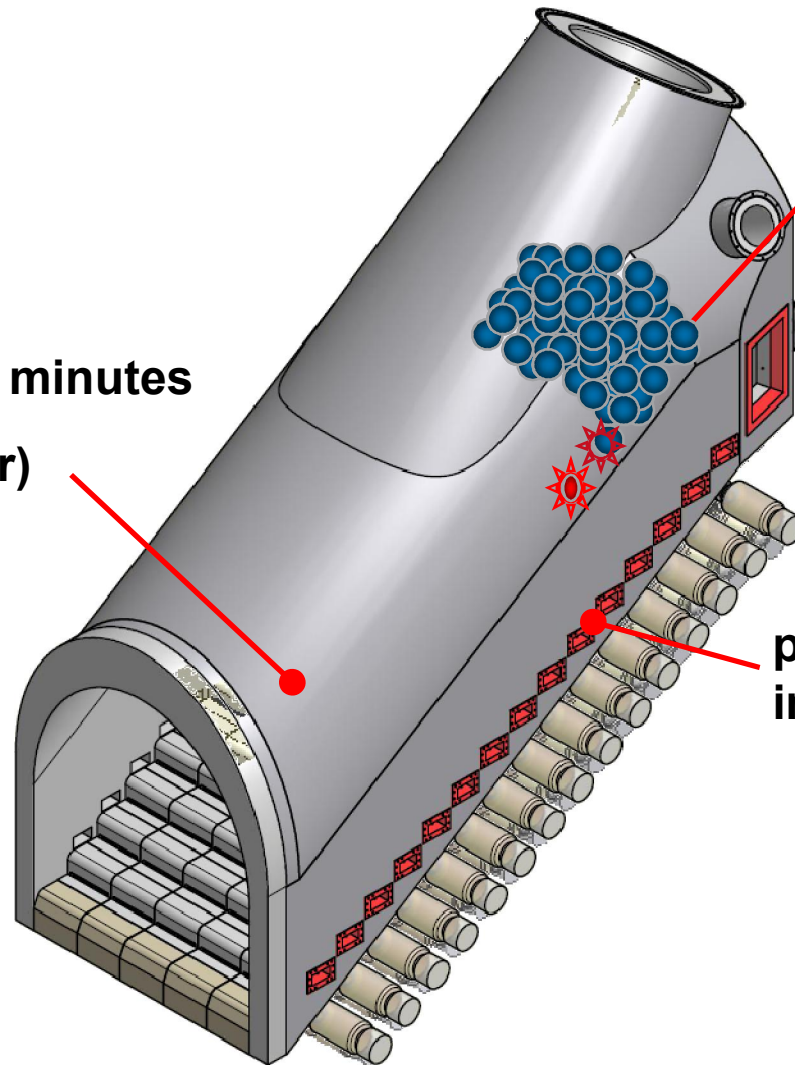


Prepol SC – an effective combustion system

combustion grate

residence time: 15 minutes

(200 times Calcliner)



**feeding screws /
ignition table:
self sealing**

**pneumatic grate:
improves burnout**

Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
9

ThyssenKrupp Industrial Solutions



Combustion grate



- **40 MW thermal power**
- **20 m² grate area**
- **Retention time = 15 minutes**
- **15 steps = 15 times activation and separation of the fuel**

Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
10

ThyssenKrupp Industrial Solutions



ThyssenKrupp

Side view of the Prepol SC

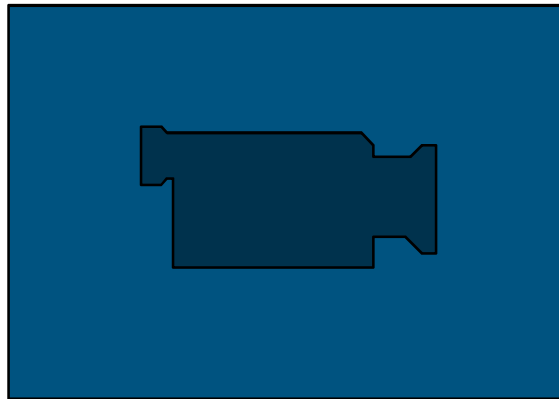


Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
11

ThyssenKrupp Industrial Solutions



PREPOL SC in operation



Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
12

ThyssenKrupp Industrial Solutions



PREPOL SC: Fuels

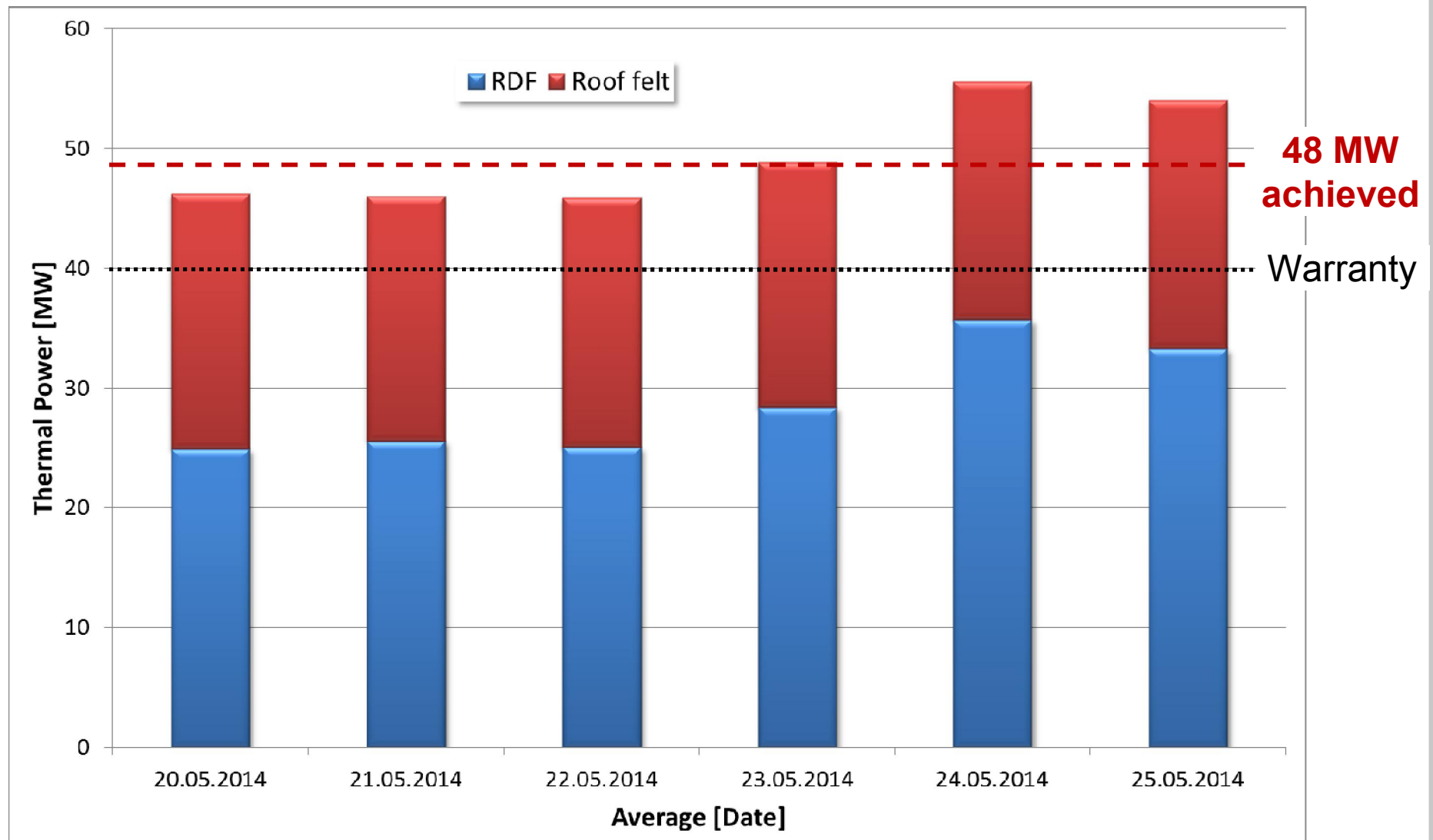
Tar Felt



Coarse AFR



Results Performance Test



Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
14

ThyssenKrupp Industrial Solutions



AFR - Required Fuel Qualities at the different Locations



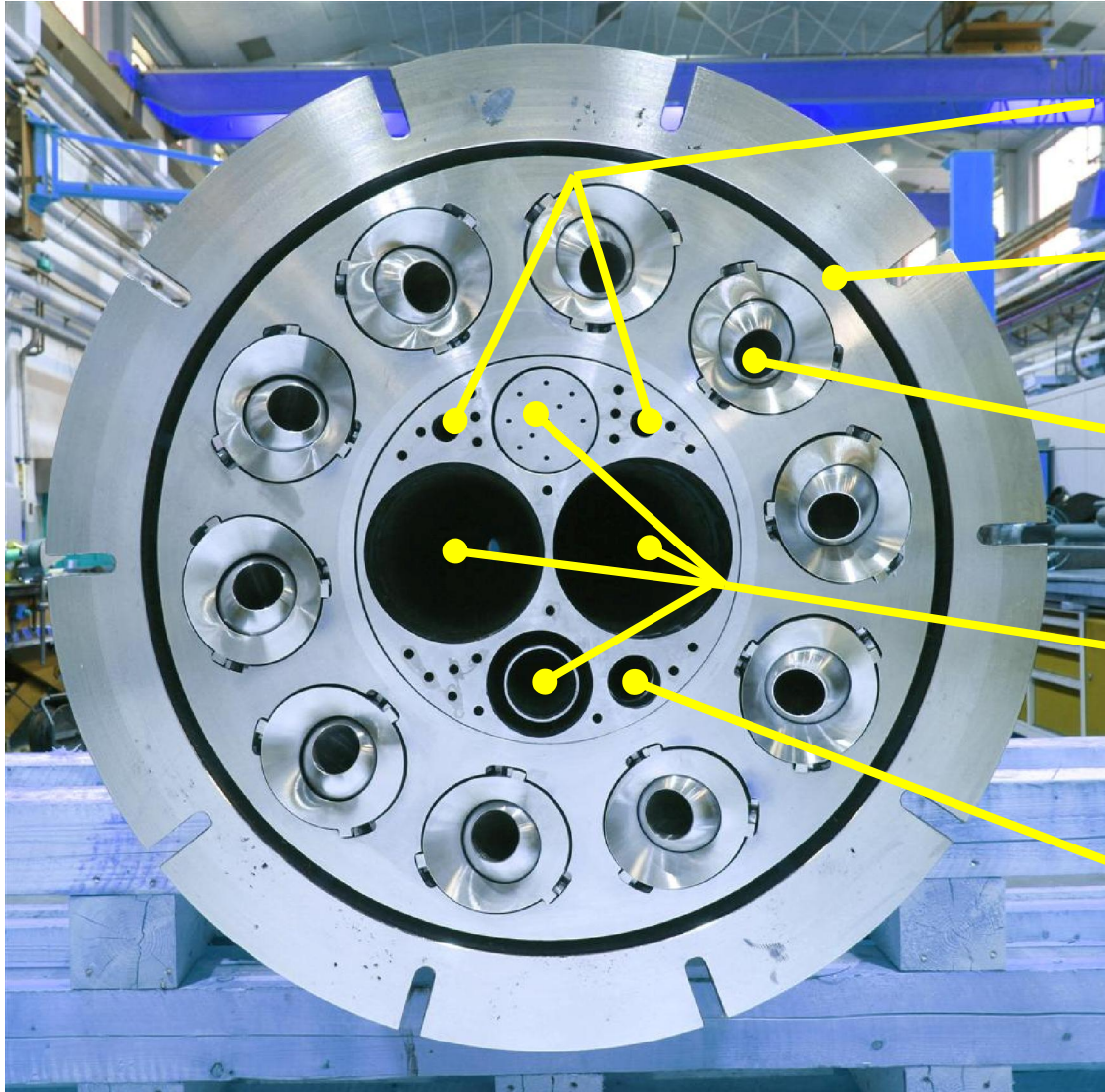
	Main Burner	Calciner	CC- Chambe r	Prepol SC
Particle Size 2D [mm]	< 30	< 80	< 150	< 300
Net Calorific Value [kcal/kg AFR]	> 3,500	> 1,500	> 1,500	> 1,500
Moisture Content [%]	< 12	< 20	< 20	< 25
Material Shape	2D only	mainly 2D	mainly 2D	mainly 2D
Max. 3D Size [mm]	≤ 1	≤ 5	≤ 5	≤ 30

Proven TKIS Solutions for all Ranges and Typ
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
15

ThyssenKrupp Industrial Solutions



POLFLAME Burner for Secondary Fuels



UV/IR Flame Detector

**Concentric Outer Channel:
Coal/Petcoke/Cooling Air**

Primary Air Nozzles

**4 Center Secondary Fuel
Channels**

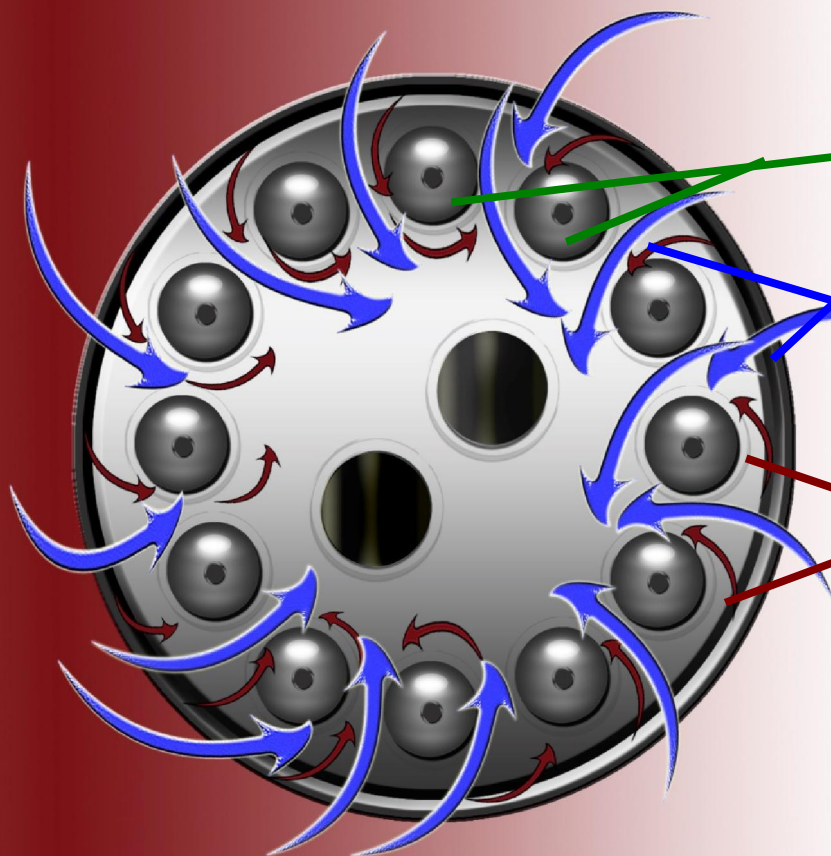
Ignition/Pilot Burner

Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
16

ThyssenKrupp Industrial Solutions



POLFLAME: Advantage Nozzle Design for AFR



- High impulse primary air streams facilitate quick injection of secondary air
- Secondary air is entering Burner Center directly
- Solid fuels and AFR are carried by this air flow into burner center also

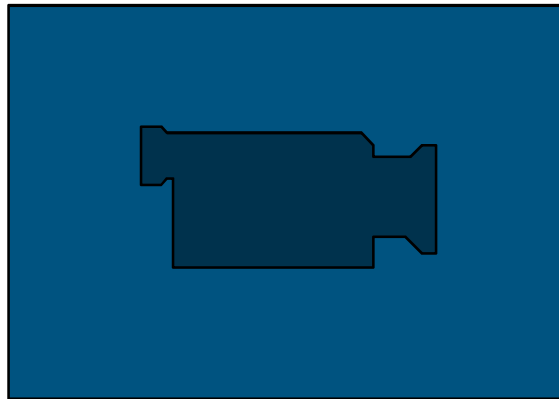
**POLFLAME Burner offers superior Mixing of Air and
AFR**

Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
17

ThyssenKrupp Industrial Solutions



POLFLAME VN Burner: In Operation with 100% Alternative Fuel



100% AF-rate; IR Camera – flames not visible, only particles

Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
18

ThyssenKrupp Industrial Solutions



POLFLAME VN in Combination with Solid AFR Satellite Feeding Pipes



Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
19

ThyssenKrupp Industrial Solutions



AFR – Where to use solid AFR depending on total Amount



Total Solid AFR	AFR Calciner	AFR Kiln	AFR Feed Points at Calciner
- 10%	-10%	0%	1
- 30%	-30%	0%	2
- 45%	-35%	-10%	2 <u>OR</u> 1+Prepol SC
> 45%	-40%	-15%*	3 <u>OR</u> 1+Prepol SC

*might be higher with modern main burner and optimal AFR properties at kiln

AFR at Calciner FIRST

Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
 Uwe Maas, ThyssenKrupp Industrial Solutions
 24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
 20

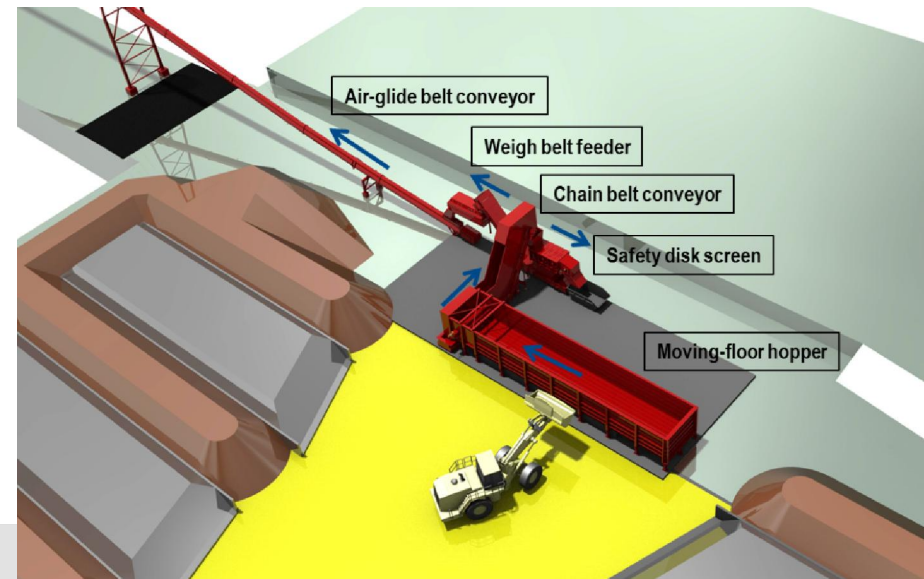
ThyssenKrupp Industrial Solutions



Tyre Chip Feeding



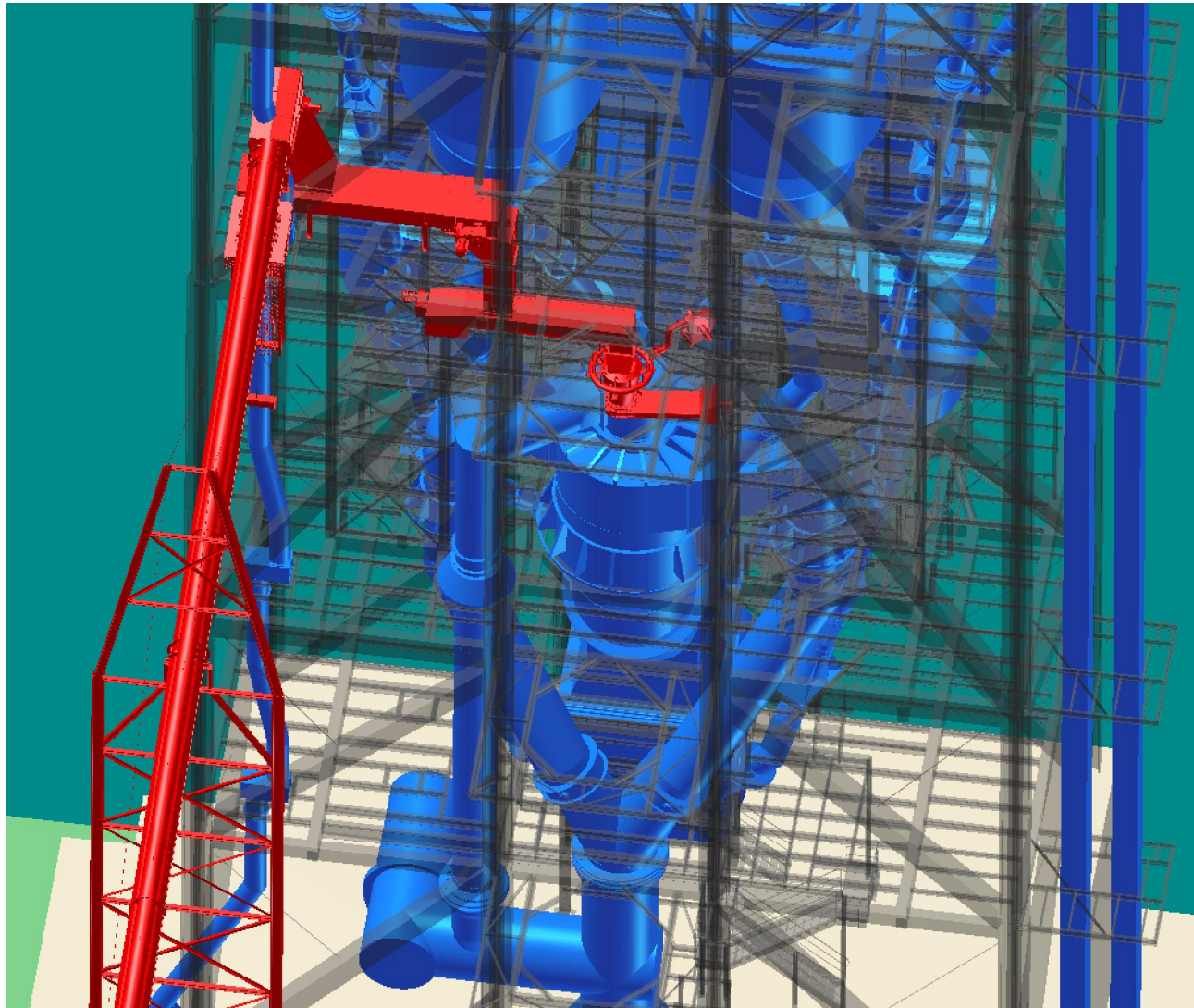
Project
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
21



ThyssenKrupp Industrial Solutions



Injection to CC-Chamber at Calcliner



Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
22

ThyssenKrupp Industrial Solutions



ThyssenKrupp

Summary

- Properly designed Calciner precondition for high AFR usage ► up to 50 mm size
- CC-Chamber offers high flexibility in introducing AFR ► up to 150 mm size
- Polysius PREPOL SC best solution for high amounts of lumpy AFR in the calciner ► up to 300 mm size
- Main burner POLFLAME VN for optimum combustion of high AFR amounts in the kiln ► up to 30 mm size
- High availability requires properly selected feeding and dosing equipment

For using AFR your partner of choice is
ThyssenKrupp
based on its vast experiences in all required fields



Thank you for your
attention.
Any questions?

Please, visit us at our ThyssenKrupp
booth

Proven TKIS Solutions for all Ranges and Types of AFR Usage in the Cement Kiln
Uwe Maas, ThyssenKrupp Industrial Solutions
24th AFCM Technical Symposium and Exhibition, Hanoi, Vietnam
24

ThyssenKrupp Industrial Solutions

