

PFISTER®

FEEDING & DOSING Technology

FLSMIDTH
CEMENT

AF Feeding Solutions

Maximise fuel substitution – AF & Bio Mass

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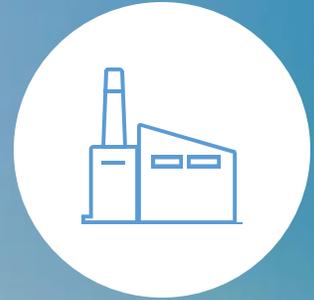
AF – Pfister solutions

- 1) The way to zero emission
- 2) Pfister global footprint
- 3) Pfister AF-Products
- 4) Testing
- 5) Starter Kit
- 6) Storage Solutions
- 7) Enhanced Fossil Fuel Feeding
- 8) Applications
- 9) Summary



ROAD TO ZERO EMISSIONS BY 2030

HOW ARE WE GOING TO ACHIEVE THIS?



NEW CEMENT COMPOSITIONS

CARBON CAPTURE

DIGITALIZATION

EFFICIENCY IMPROVEMENTS

FUEL SUBSTITUTION



2022

2030

2050

FLSmidth PFISTER Headquarter (Germany / Augsburg)



- Engineering for all Pfister Products
- Sales Management
- Order Handling
- R&D Dosing Centre
- International Service Support
- International Spare Part & Upgrade Support
- Remote Service Support

FLSmidth PFISTER® Production Sites



Presezzo, Italy

- Assembly & testing for international markets
- R&D Test Centre
- Spare Part Management



Bawal, India

- Assembly & testing for local and international markets
- Local service
- Spare Part Management



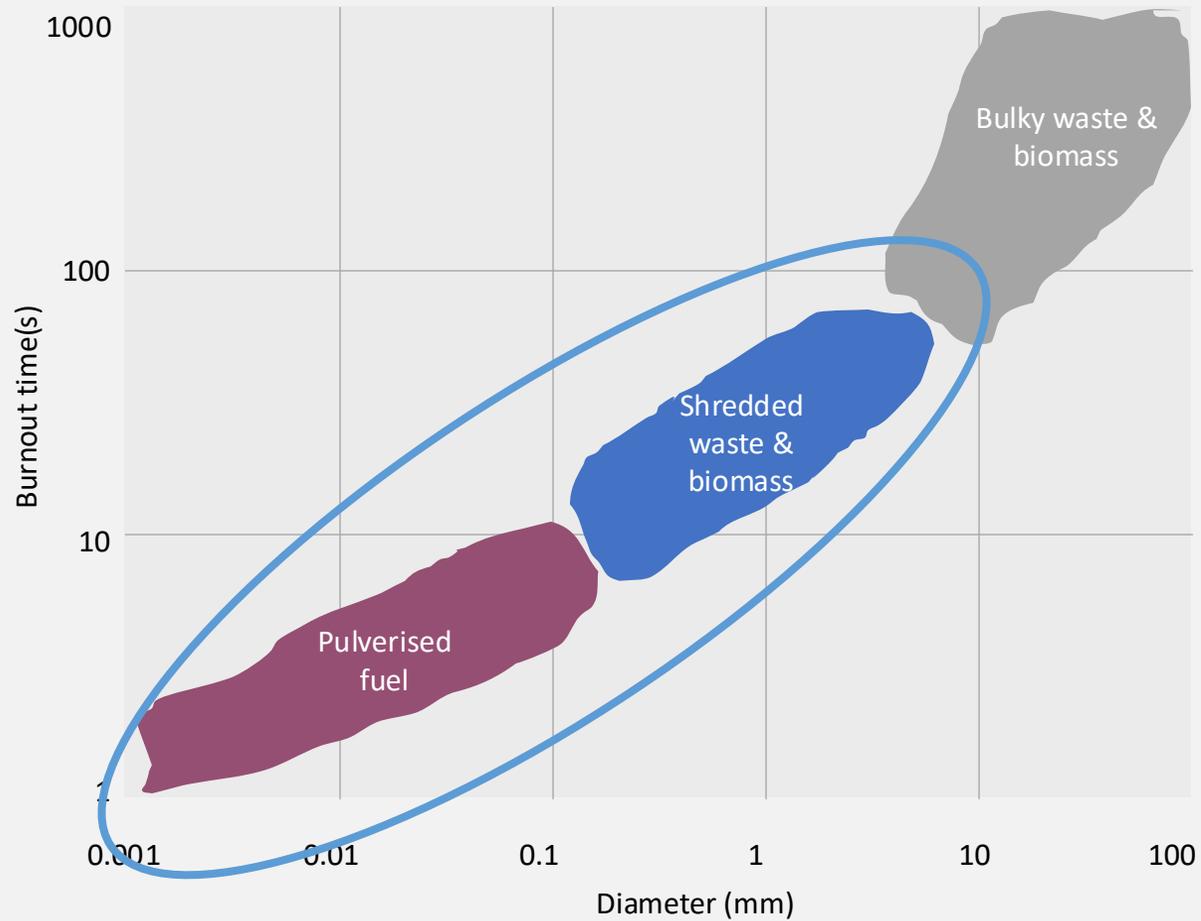
Qingdao, China

- Assembly & testing for local and international markets
- AF R&D Test Centre
- Local & international service
- Spare Part Management

Municipal Waste vs. Alternative Fuel



Effect on particle size on combustion time



Solids from <25mm to 1200mm, liquids, sludge, etc



Whole tyres



Waste plastic



Shredded tyres



Waste oil



Shredded paper

Pfister AF- Examples



Alternative Fuels Performance

	Main burner	Satelite Burner	Calcliner	HOTDISC
Maximal Fuel Size	15x15mm 2D / Powder	30x30mm 2D / Powder	100x100mm 2D / Fine 3D	Ø 1200x500mm
Moisture	< 20%	< 20%	< 25%	< 30%
Calorific Value	High requirement	High requirement	Moderate	Low
Feeding stability	High flexible	Medium Flexible	Medium Flexible	Low
Thermal Substitution rate	99%	60%*	99%	60%*

* Depending on material conditions up to 100%

Dosing course bulk material with TRW-S/D at calciner side



- Household waste
- Mainly plastic and paper
- Bulk density: 0,15 – 0,25t/m³
- 2D: 100x200mm
- 3D: 150x50x50

- Straw, length approx.150mm
- Bulk density: 0,048 t/m³

- Wood chips with some straw
- Bulk density: 0,152 t/m³
- Max. material size: 200x50x50mm

Pfister AF-Solutions

- Pfister AF-Feeders TRW-S/D with pneumatic conveying or mechanical transport
- Starter Kit with GDU / TRW-S/D and pneumatical conveying
- Silo for smaller storage or reception with TRW-S/D feeding system
- Feedex for larger storage in combination with fossil fuel replacement especially for automatically blending AF materials to equalize the caloric value and...

Data and range of the Rotor Weighfeeder TRW-S/D

There are currently 4 standard sizes that can be used for AF
TRW-S for non explosive materials
TRW-D for explosive material (Zone 20 inside Zone 22 outside)

The ranges for RDF with min density of 0,07 t/m³ are:

TRW-S/D 4.14-3 0,6 to 6 t/hr

TRW-S/D 4.18-5 1,2 to 12 t/hr

TRW-S/D 4.20-6 2,0 to 25 t/hr (max. 30 tph)

TRW-D 4.10-2 only for granulated material like MBM
and DRIED SLUDGE up to 10t/h

The accuracy is at least +/- 1%

Minimum density 0,07 t/m³ (absolute minimum 0,05 t/m³)

Maximum density 0,6 t/m³ (absolute maximum 1-2 t/m³)

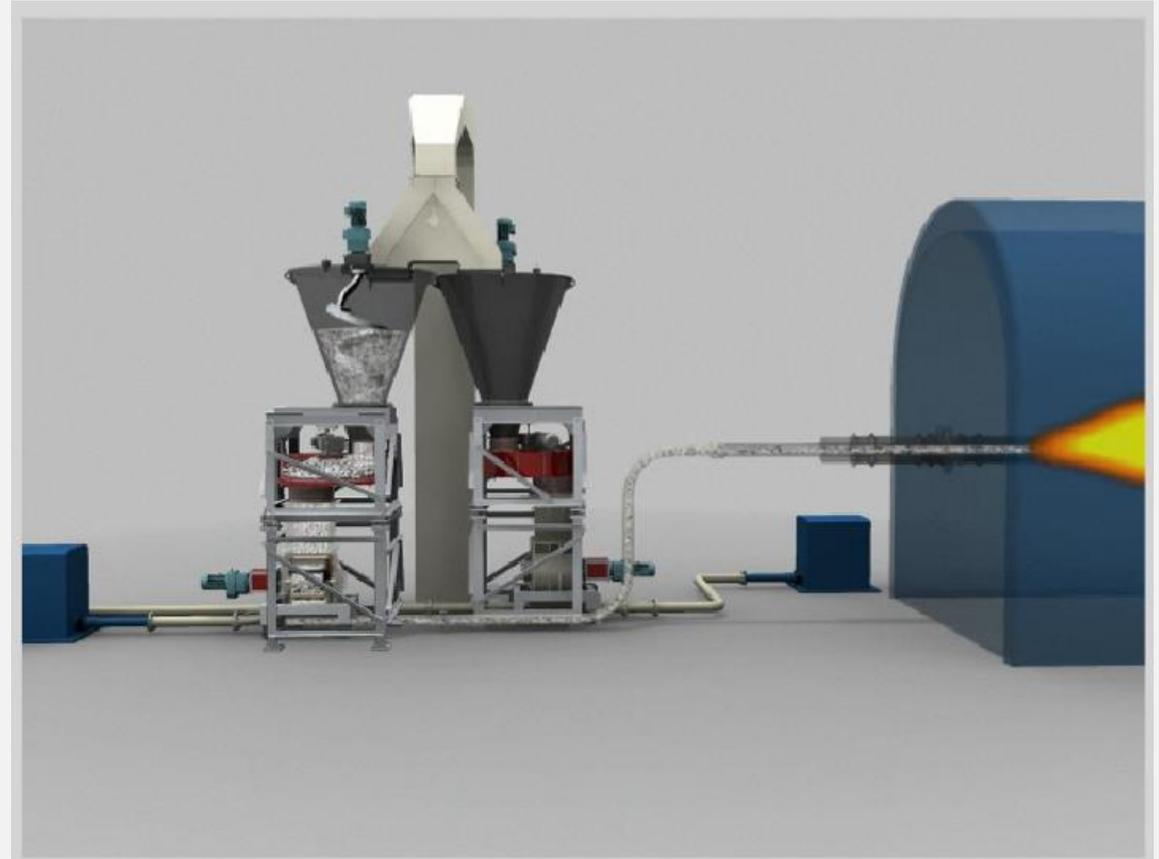
Moisture limit of RDF: Standard 25% Maximum 30%

Max. Material sizes for mechanical transport:

2D material sizes: Dust minimum - 100x100mm average- 100x200mm maximum

3D materials sizes: Dust minimum - 50x50x50mm average - 100x100x50 maximum

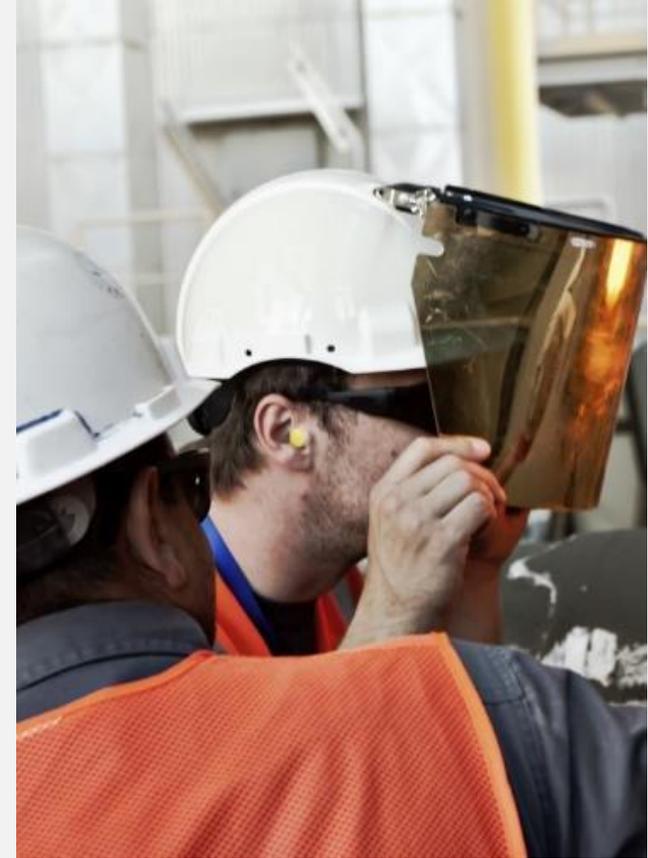
Other: -Tire chips 50x50x20 max when steel wires are present.



Feeding and Dosing Biomass & Alternative Fuels with FLSmidth MULTI – FUEL system TRW-S/D



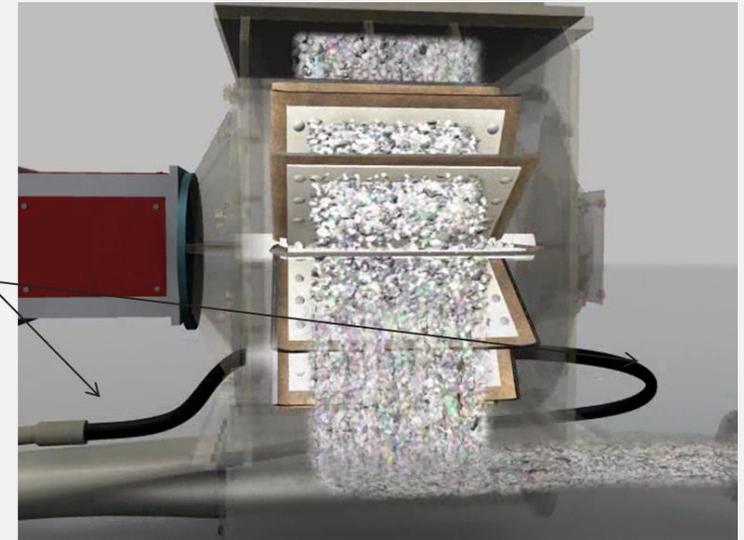
- **Rotor Weighfeeder TRW-S/D**
- for dosing waste materials and bio masses to the main & calciner burner.
- Biomass is CO₂ neutral;
- The use of sewage sludge avoids land filling and reduces nitrate emission in ground water
- Burning waste materials supports the reduction of using natural resources like oil, gas & coal.
- > 350 references delivered



PFISTER Rotary star feeder for pneumatic transport



- pipes are equipped with manual ball valves
- air amount will be fixed during commissioning
- air is taken from the conveying air



Gravimetric dosing of alternative fuels sold in 55 countries

> 350 rotor weigh feeder Pfister TRW-S/D

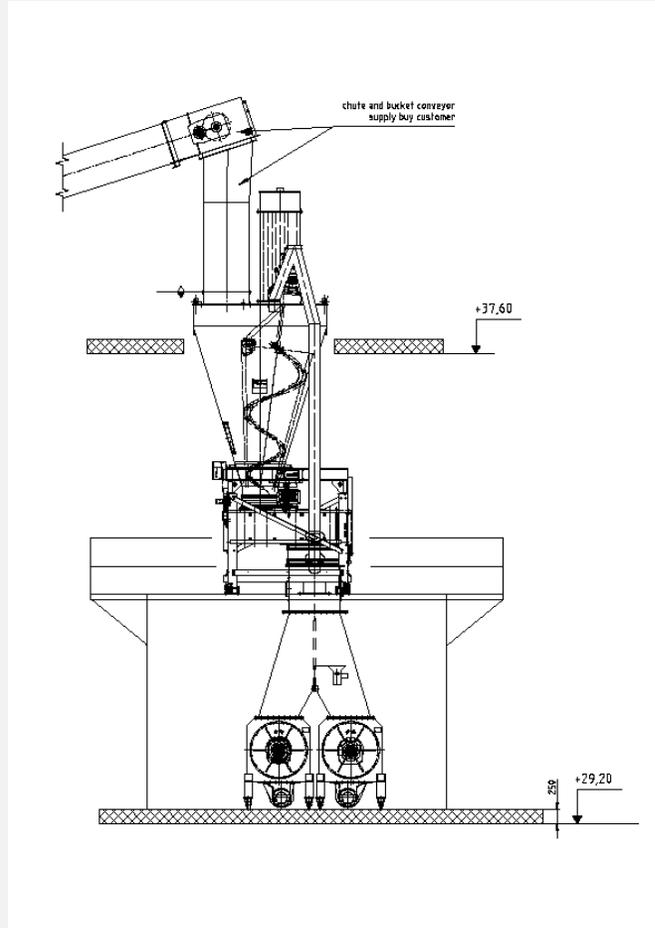
Argentina	3	France	15	Kuwait	2	Pakistan	1
Austria	7	Germany	59	Laos	1	Poland	15
Belarus	1	Greece	1	Lebanon	1	Portugal	7
Belgium	5	Guatemala	1	Lituania	1	Romania	1
Brasil	2	Hungary	3	Malaysia	1	Russia	2
Bulgaria	1	Ireland	4	Mexico	1	Serbia	2
Cambodia	1					Slovenia	2
Canada	2					Spain	23
China	7					Sweden	9
Costa Rica	1					Switzerland	4
Denmark	7					Tanzania	1
Dubai	1					Thailand	1
Ecuador	2	Israel	5	Namibia	2	Turkey	15
Egypt	2	Italy	4	Netherlands	1	UK	11
Estonia	2	Japan	10	Nigeria	1	Uruguay	3
Finland	1	Korea	9	Norway	4	USA	10



Systems supplied into China:

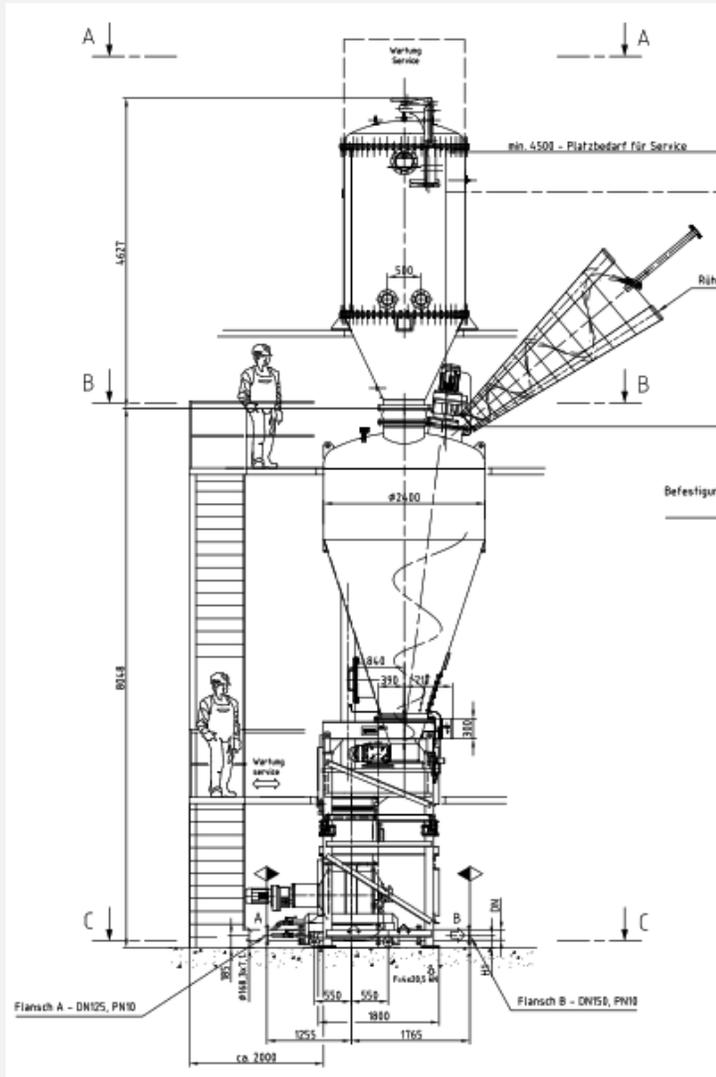
- Conch
- Jidong (BBMG Group)
- CNBM Group
- Sinoma (Tianjin / Chengdu)
- Nanfang Changshan

RDF-Diverter for 2 calciner burner points



Feeding of RDF to the main burner at the burner platform

Rotor Weighfeeder TRW-S/D
at burner platform



Feeding hazardous Fuels

Rotor Weighfeeder TRW-D

Feeding hazardous fuels like
animal meal or sewage sludge



AF Test for coarse materials

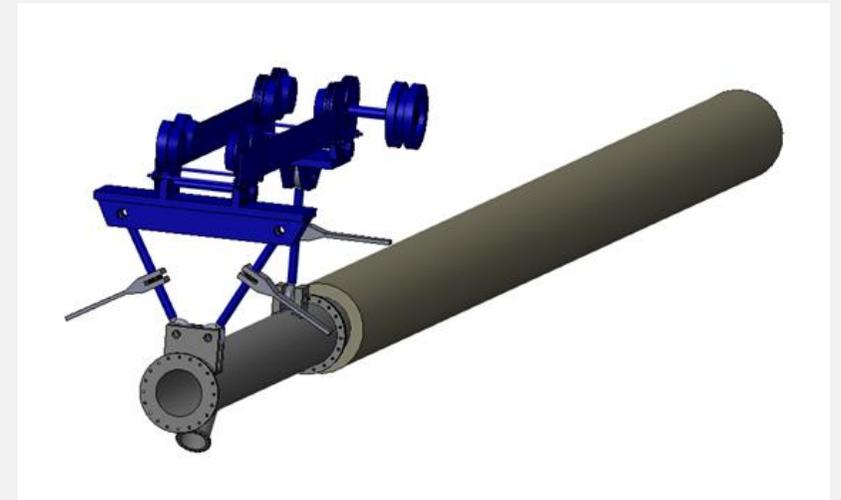
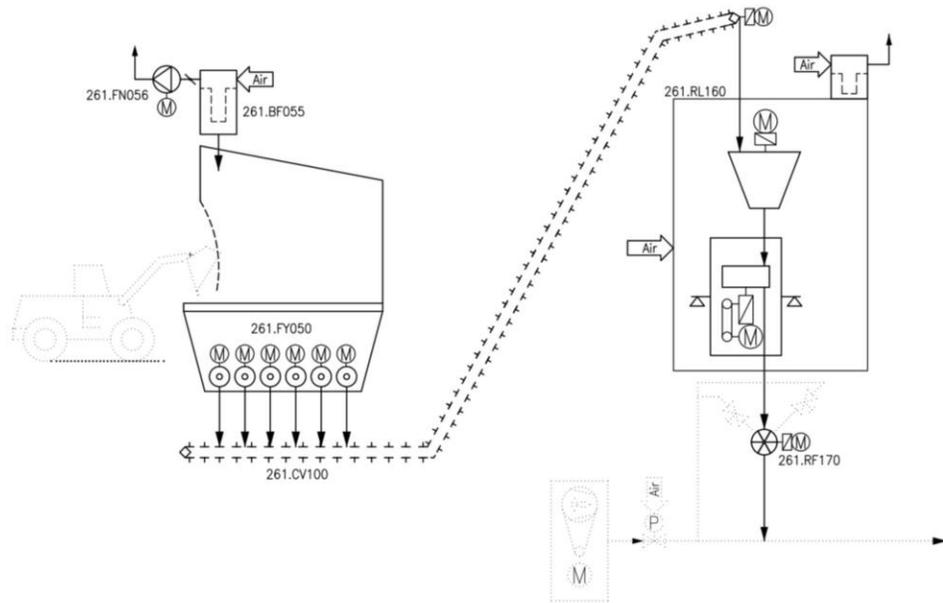


AF Test for coarse materials



Starter Kit

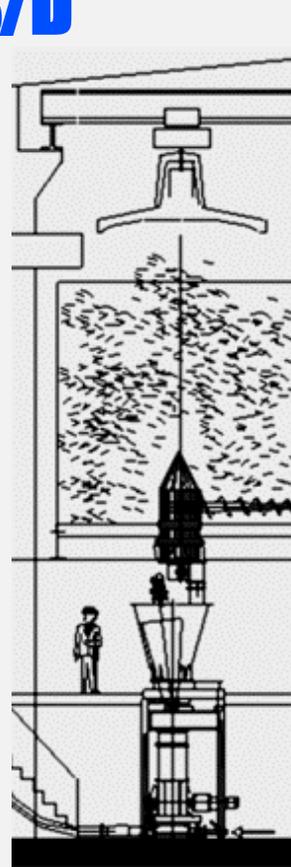
- for feed rates up to 12t/h / 100m³m/h
- RDF, industrial waste agriculture products and biomass
- easy to integrate
- best solution for first use of alternative fuels in cement plants
- safest implementation into the process / fire protection



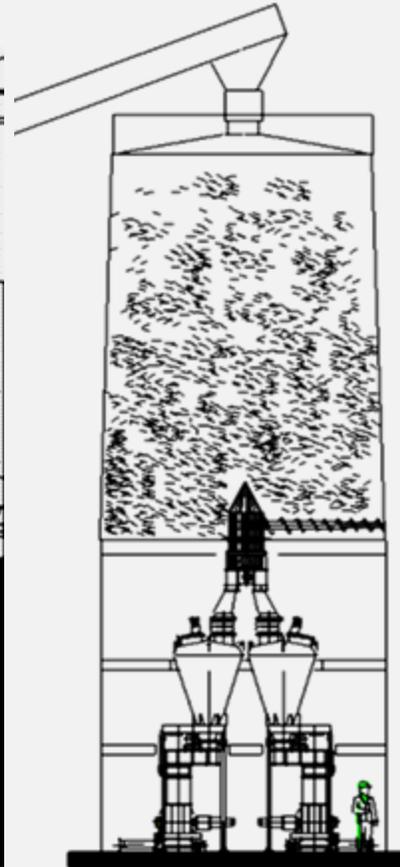
Installations with gravimetric dosing Rotor Weighfeeder® TRW-S/D



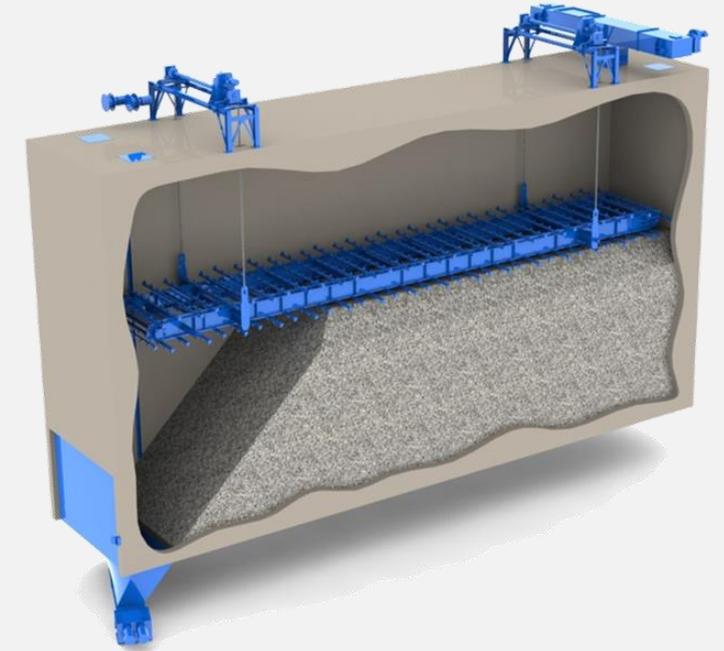
Starter Kit – Receiving Hopper



Feedbox



Silo

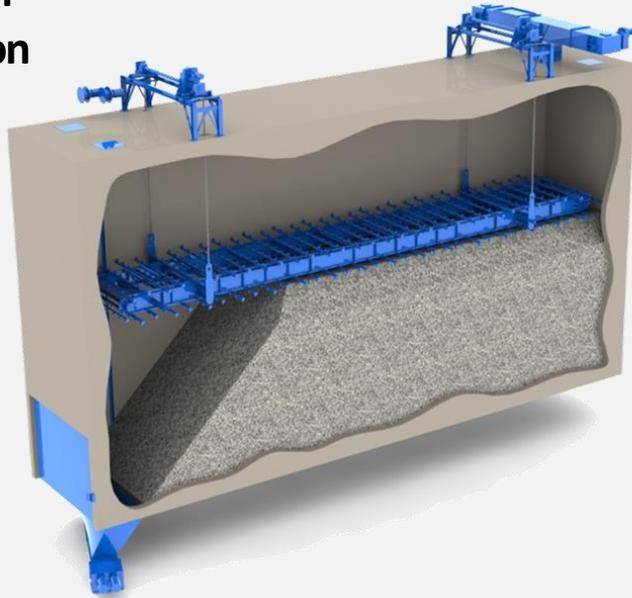


Feedex™ Overhead Reclaimer



Over head reclaimer for AF storage capacities of 1250m³

- RDF, industrial waste agriculture products and biomass
- Grain size up to 300mm
- high storage capacity (weekend without filling)
- best solution for blending AF materials
- most reliable product in the market
- low energy consumption
- easy to maintain
- ATEX certification



Standard bunker size

Height	15 m
Width	5 m
Length	30 m

Storage capacity up to 1250 m³

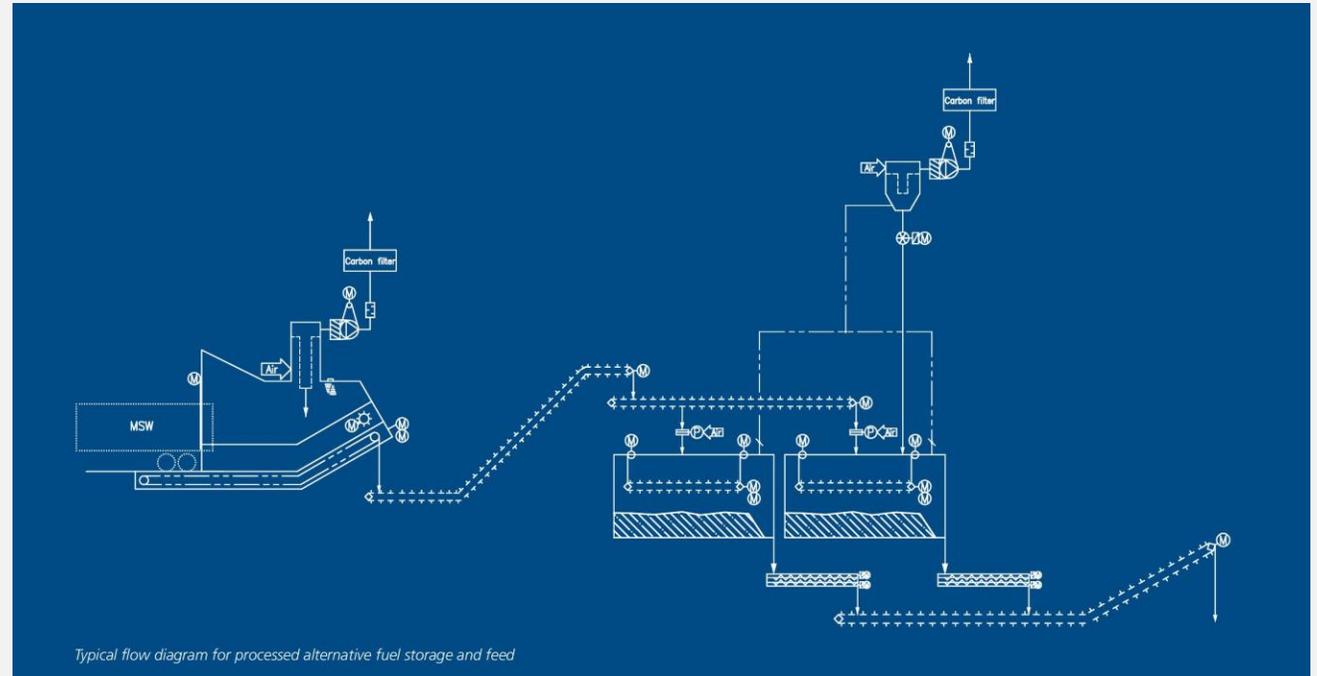
Drive power

Main Drive	2x12 KW
Hoisting Drive	2x5 KW

Intake Capacity up to 600 m³/h

Extraction Capacity up to 300 m³/h

Other sizes and capacities are available upon request



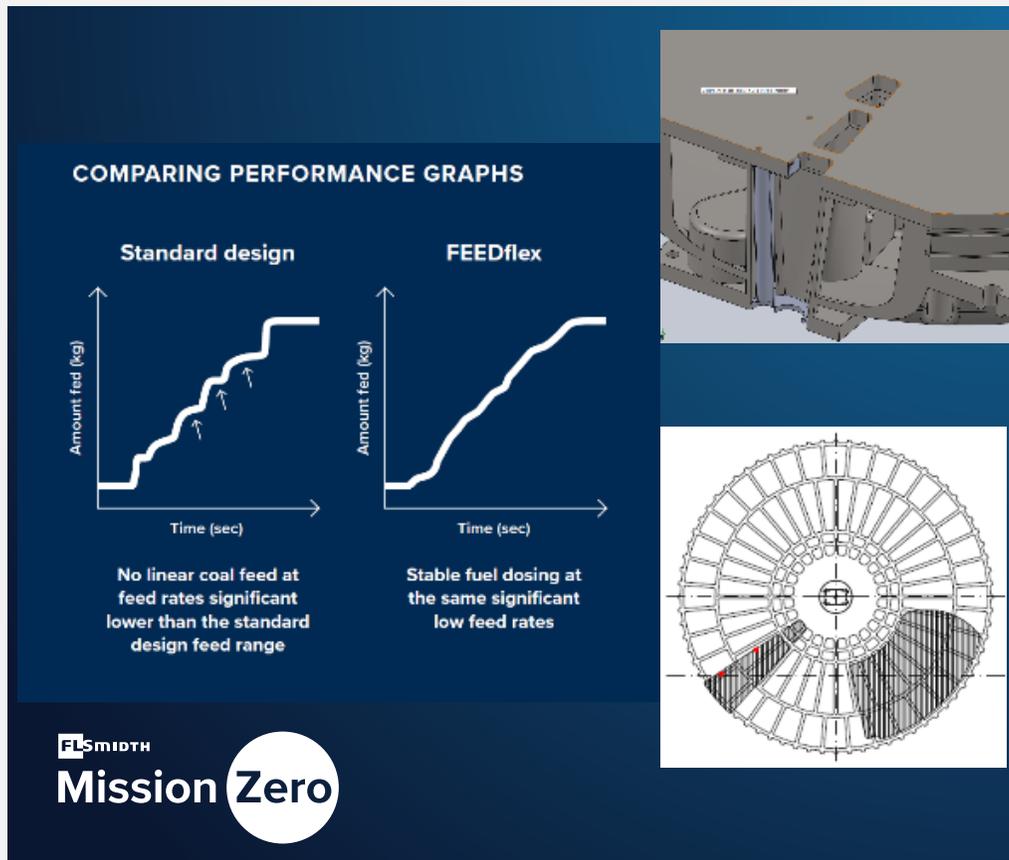
Pfister® FEEDflex™ for DRW Rotor Weighfeeders

KEY BENEFITS

- Sustainability
- Productivity
- Flexibility
- Profitability
- Quick ROI

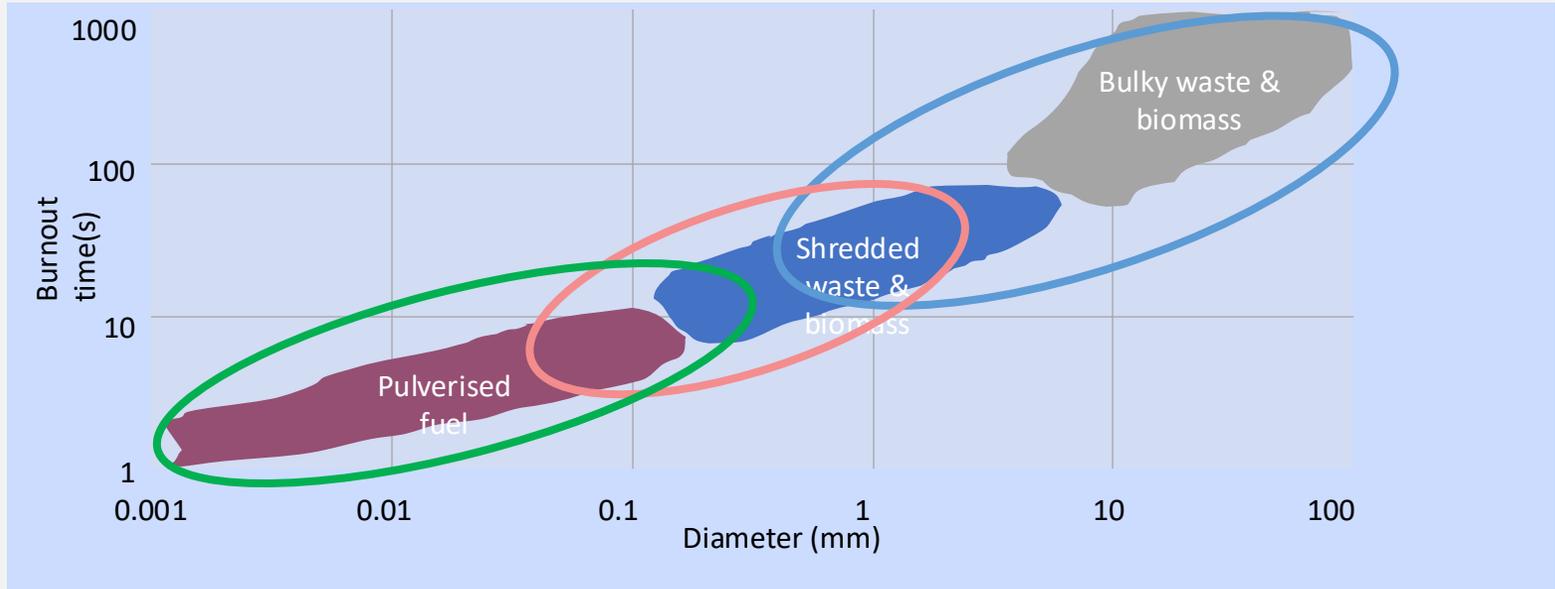


FEEDflex™ for DRW Rotor Weighfeeders

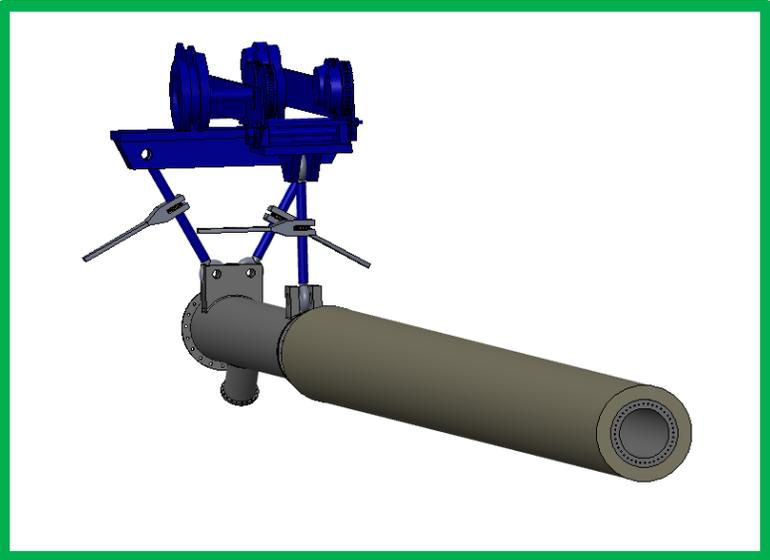


- The FEEDflex™ is a **sustainable “green” enhancement** as it enables to dose very small quantities of pulverized coal **without pulsations and related CO spikes**. FEEDflex supports our ambition on the way to Mission Zero.
- **Maximum achievable feed rate** of the machine is **not affected**.
- Flexible use of the DRW with **increasing substitution rates of secondary fuels**.
- **High capacities** in the **kiln start-up** process can be **still provided**.
- The FEEDflex technology will help to **cut fuel cost** with **quick ROI**.
- **Dosing range up to 1:100**

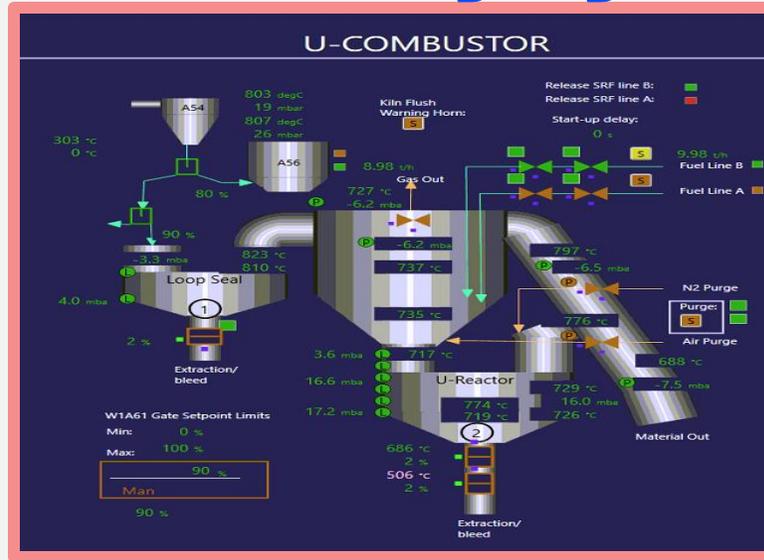
JETFLEX® 20



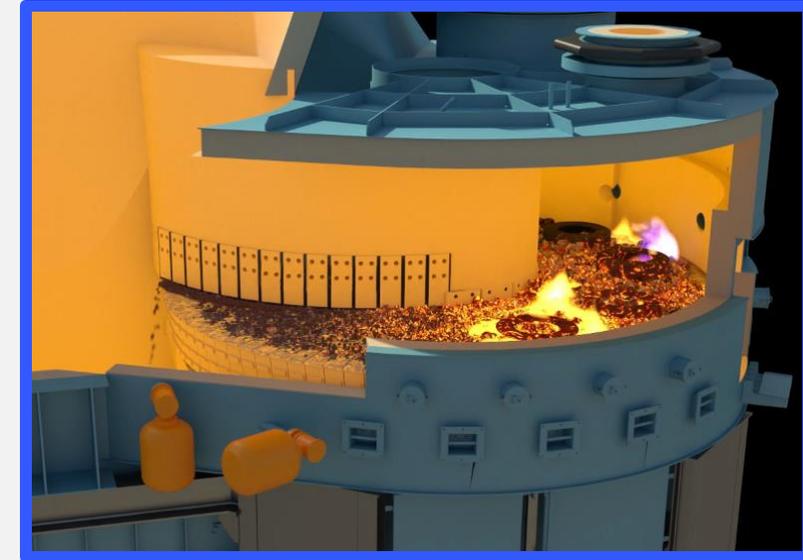
Satellite burner



Fueflex Pyrolyzer



HOTDISC® Reactor



Summary

- The cement industry is worldwide forced to reduce CO2 emissions
- AF will be switched from RDF towards biomass as temporary solution
- Our Pfister product portfolio is capable without changes / highly flexible in material handling
- Large installed base > 350 / worldwide experiences
- pneumatic conveying as safe start and final highest substitution rate
- FLSmidth Pfister is well experienced in AF since 1996
- FLSmidth Cement enables your pyro process further with its products

FLSMIDTH WILL SUPPORT YOU ON THIS PATH ... AND THE JOURNEY CONTINUES



ZERO EMISSION



ZERO WASTE



100% FUEL
SUBSTITUTION

- With MissionZero, we support our cement customers to operate at zero emissions, by 2030.
- Cement blending; decrease production costs and reduces energy consumption without compromising cement quality
- Alternative Fuels and Biomass; reduce your reliance on fossil fuels is better for your bottom line as well as for the environment

Thank you for your attention

Uwe Weber

**(Business Development Manager
Alternative Fuels)**

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