



# Alternate Fuel Firing Systems For High Substitution Rates

Steven Miller - Partnership Manager, FLSmidth Cement 2024  
East Coast Cement Conference

# Alternate Fuel Firing

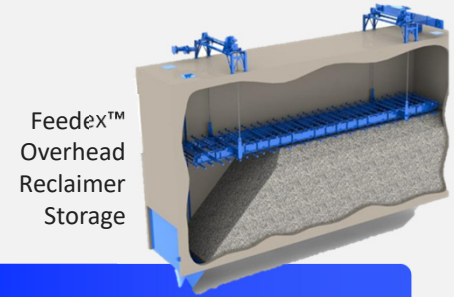


# Factors For Achieving High Alternate Fuel Firing

- Reliable and consistent sourcing
- **Fuel quality:** heat value, water content, particle size, etc.
- Accurate measuring and dosing
- Adequate residence time
- Good process control
- Bypass installation for Cl control
- Adequate ROI



# Feeding And Dosing Solutions



## VOLUMETRIC / GRAVIMETRIC DOSING

Fast and inexpensive way to test fire AF  
**0-50mm Fuel Sizes**



Dried Sewage sludge (1-20mm)

RDF (0,1-30mm)

Rice Husk (0,1-15mm)

## DOCKING STATION

Automatic unloading system with storage in the trailers  
**0-100mm Fuel Sizes**



Shredded tires (1-50mm)

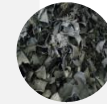
MSW (10-250mm)

Wood Chips (1-50mm)

RDF (0,1-30mm)

## STORAGE – FEEDEX™

Continuous extraction of coarse or fine fuels from reclaimer storage  
**0-300mm Fuel Sizes**



Shredded tires (1-50mm)

MSW (10-250mm)

Wood Chips (1-50mm)

RDF (0,1-30mm)

# FLSmidth Pfister® Rotor Weighfeeder Trw S/D

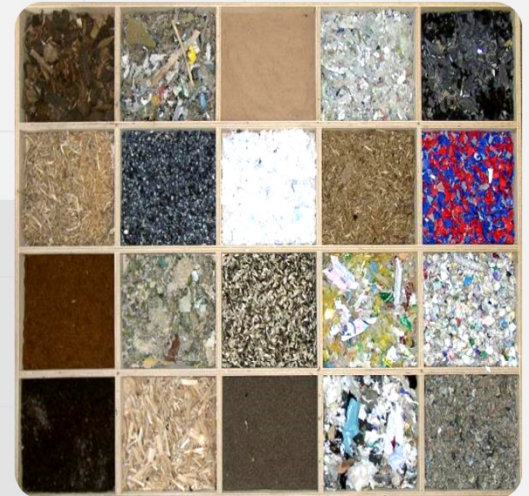
Since 1997, We Have Installed  
> 350 Pfister Feeders To  
Support Alternative Fuel  
Utilization



Dosing waste materials and bio masses  
to the main & calciner burner.

Processed, pneumatic conveyable,  
fuels such as wood chips, rice husk, etc.

Feed rate 0,5 – 60 t/h - highly precise  
with a maximum deviation of  $\pm 1.0\%$ .



# The ILC Low NOx Calciner

Always The First And Easiest Choice For AF Combustion

## Well Suited For Firing A High Percentage Of Waste Fuel

- 80-100% substitution with up to 100x100 mm 2D martial.
- Tire chips up to 50mm

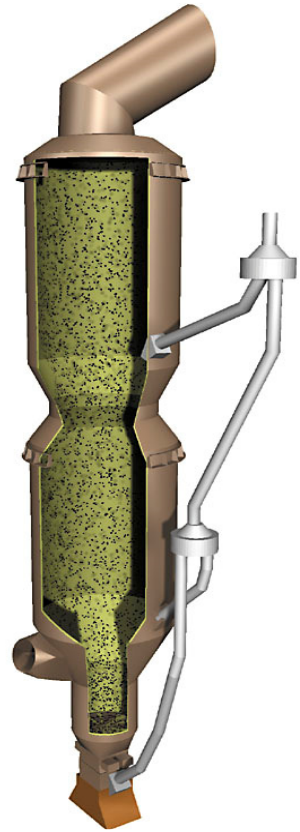
## Large Particles Stays In The Bottom Zone With

- Ample time for drying, ignition and combustion
- High oxygen level that ensures faster burnout

## Long Gas Residence Time And Low Velocities Are Ideal

- Particles falls back and re-circulates
- Enables a particle combustion time up to 20-60 seconds

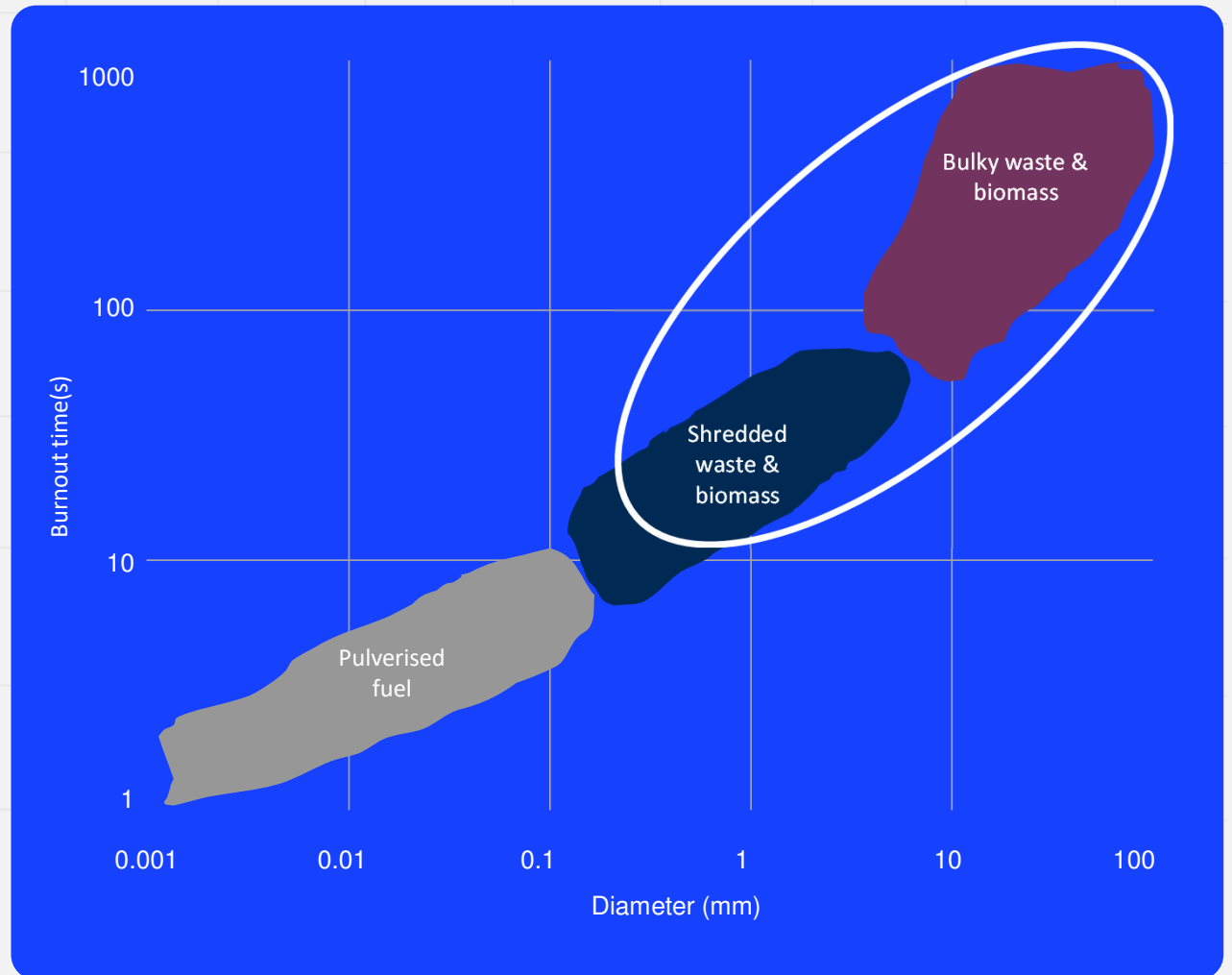
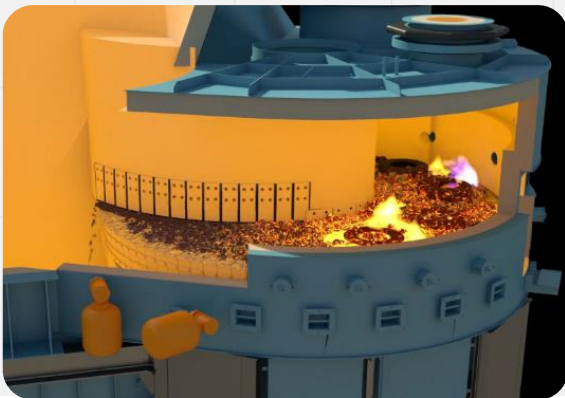
**Optimal fuel dosing point and accuracy is of key importance!**



# Hotdisc<sup>®</sup> Reactor

A Solution To Avoid  
Expensive High  
Quality AF

Made for material size of up  
to 1.2 m – from sludge or  
grains to whole truck tyres



# Hotdisc® Reactor

## PROVEN PERFORMANCE

- Over 20 years of documented results achieving a calciner substitution rate in the range of 50% to 80% - or even higher

## APPLICATION

- New build or plant Upgrade



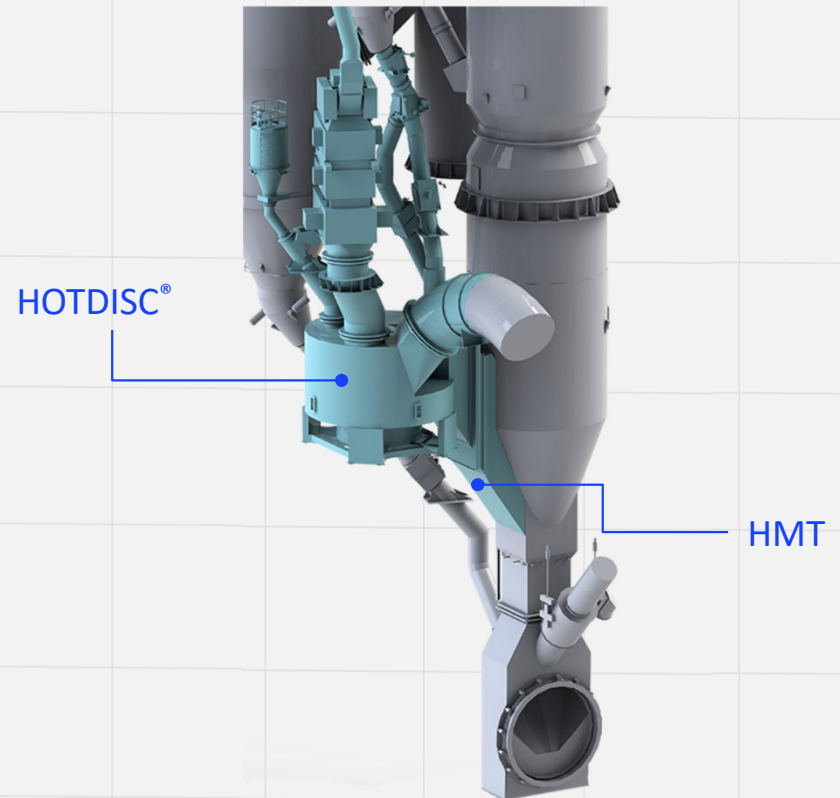


# Hotdisc® w/ HMT (Hot Material Transport)

Same Functionality With Added Benefits

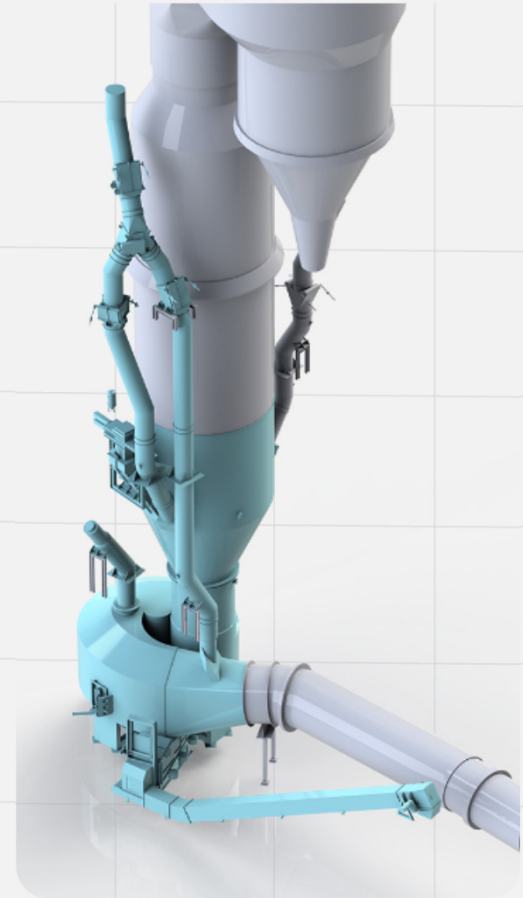
## HOTDISC

- Reactor itself is disconnected from the calciner/riser duct.
- HMT connects HOTDISC to calciner/riser duct for gas flow and combustion ashes
- Simplifies and reduces downtime and installation



# Hotdisc-S<sup>®</sup> Reactor For Separate Line Calciners

- The **HOTDISC-S** is optimized for separate line calciners
- The waste fuel and tertiary air flow counter currently in the **HOTDISC-S** instead of co-currently
- The dropout from the **HOTDISC-S** does not fall into the riser. It falls separately into an ABC inlet for cooling.
- The waste fuel is primarily fired in the calciner while the **HOTDISC-S** completes the combustion of fuel that falls through to it.



HOTDISC<sup>®</sup>-S Reactor

# Options To Accommodate Plant Layouts Without Impact To Performance

	HOTDISC (Slovenia)	HOTDISC- HMT (China)	HOTDISC-S (Korea)
Capacity Of Pyro Line	3500 tpd	5000 tpd	7500 tpd
Achieved Substitution Of Calciner Fuel	>85%	~ 30%	>85%
	<b>AF CHARACTERISTICS (SRF)</b>		
Heat Value	~ 7500 kcal/kg (tyres) ~ 3500 kcal/kg (RDF)	1200 kcal/kg (MSW)	~ 4000 kcal/kg (SRF)
Moisture	~ 20% (RDF)	~ 55%	20% max
Feed Size	Whole tyres < 200 mm (RDF)	<100mm	90% < 50mm

# Complete Portfolio Of Automation Solutions To Support Fuel Substitution



## PROCESS CONTROL & OPTIMISATION

- ECS/ControlCenter™ software
- ECS/ProcessExpert® software
- ECS/CemScanner™ unit



## SAMPLING PREPARATION & ANALYSIS

- QCX/BlendExpert™ software
- QCX/RoboLab® systems
- QCX/AutoSampling™ system



## SERVICES

- PlantLine™ service agreement



## GAS ANALYSIS

- KilnLoq® gas analysis systems
- GASLoq® gas conditioning system

# Introducing the FUELFLEX® Pyrolyzer

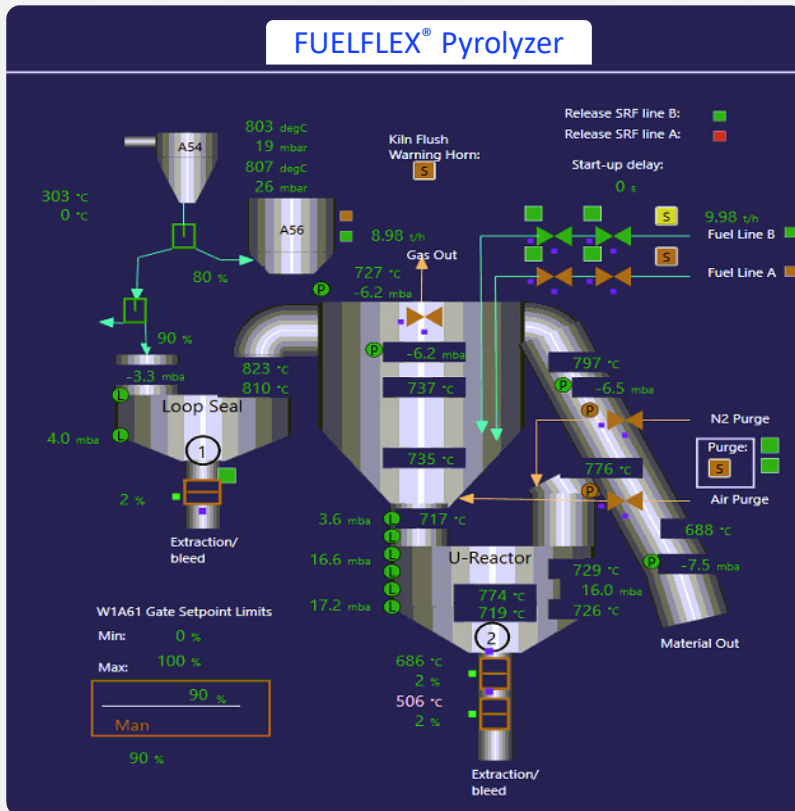


*The success of the FUELFLEX® Pyrolyzer is a big win for us, as we are now on track to eliminate all coal use in the clinker production calcination process by early next year, which surpasses our initial expectations of displacing 80%.*

**KEVIN LUNNEY, OPERATIONS DIRECTOR**  
MANNOK CEMENT

# FUELFLEX® Pyrolyzer

From Lighthouse To Game Changer



## LOWERS NOX

Eliminated SNCR and hence ammonia usage

## LOWERS FOSSIL FUEL USAGE

Virtually no coal as a fuel

## BOLT-ON INSTALLATION

Especially beneficial for small size calciners

## BUSINESS CASE

This adds up to a ROI of 1-3 years depending on local conditions



# Global Release **Coming**

- Successful operation at Mannok Cement since June 2022
- Second partnership installation has begun operation this year at Continental Cement, USA





# Learn More About the FUELFLEX® Pyrolyzer

Sustainable Strength through Innovation



**2025** 

IEEE-IAS/PCA CEMENT CONFERENCE

Birmingham, Alabama • May 4–8, 2025

[Our Paper/Presentation](#)

## Advancing Emissions Abatement In The Cement Industry

The FUELFLEX®  
Pyrolyzer  
Technology



# Thank You

[FLSMIDTH-CEMENT.COM](https://www.flsmidth-cement.com)



# FLSMIDTH CEMENT