A JOHN DEERE COMPANY

WIRTGEN GROUP

André Lossjew | Benninghoven

BENNINGHOVEN DRYING TECHNOLOGIES

Cost allocation
Road rehabilitation

WIRTGEN GROUP

Our mission:

How can we support our customers in building energy-efficient and CO2-neutral roads?

and …

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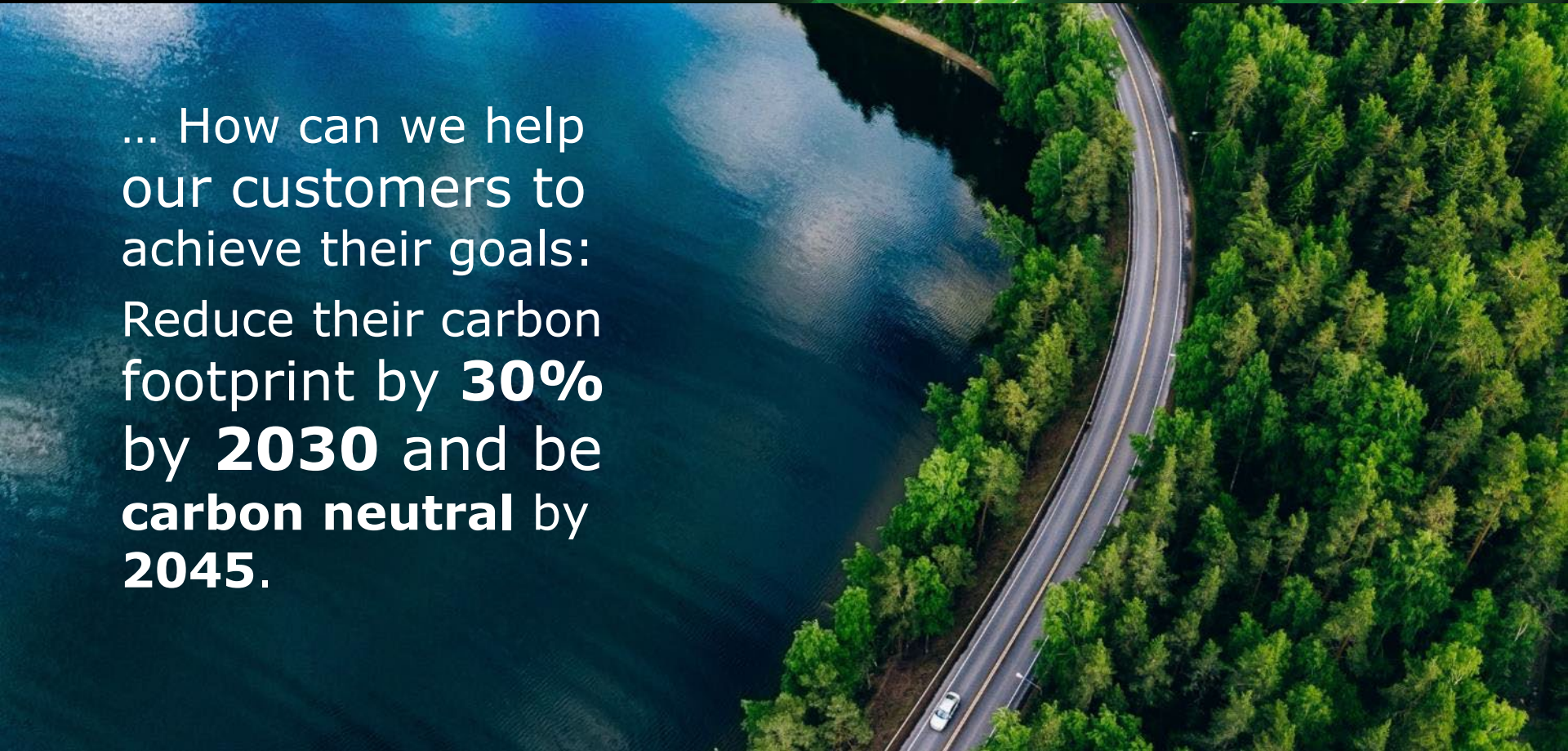


… How can we help our customers to achieve their goals:

Reduce their carbon footprint by **30%** by **2030** and be **carbon neutral** by **2045**.

WIRTGEN GROUP

REGENERATIVE Fuels

HVO

BtL

BIOGAS

Wood Dust

CO_2 NEUTRAL Fuels

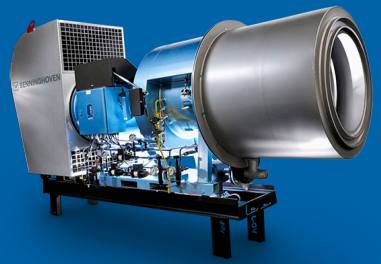
Electrical Energy

DME

E Fuels

Hydrogen

38%



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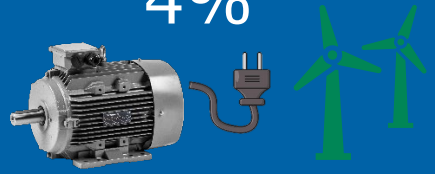
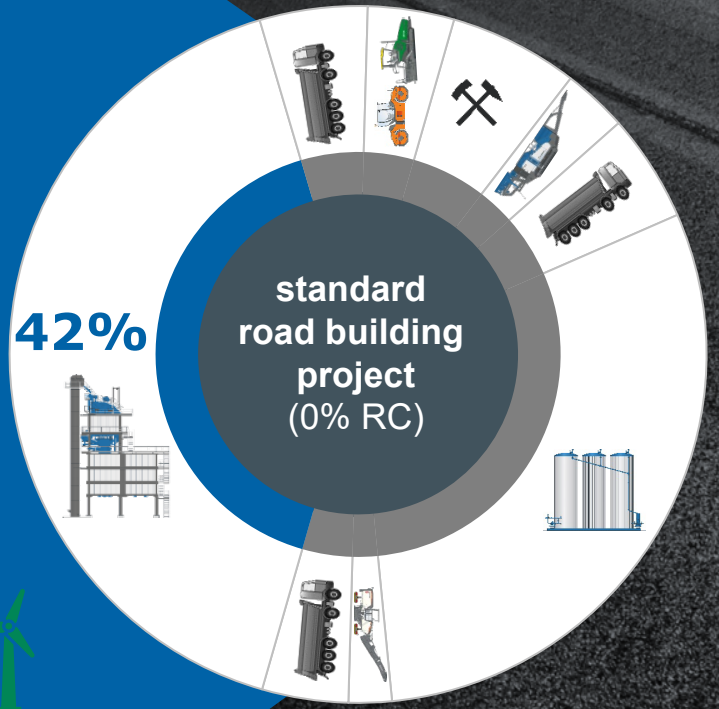


42%



BENNINGHOVEN SUSTAINABILITY

Sustainable and Economical

WIRTGEN GROUP

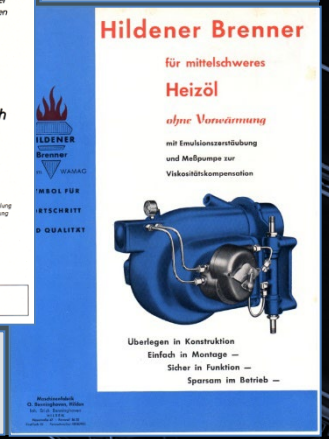
The biggest potential for saving CO_2 at the asphalt mixing plant is the choice of fuel

70 Years of burner technology

1952 - 2022

WIRTGEN GROUP

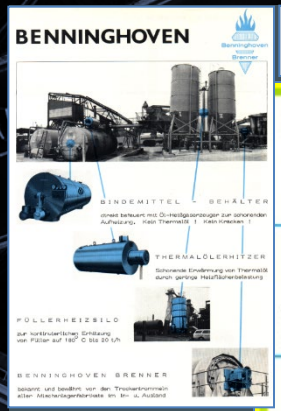
1952



Einstieg in die Feuerungstechnik

1966

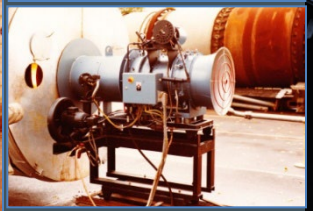
Groß-Burner für die Gesteinstrocknung



1959

Erweiterung um Thermal-Öl-Erhitzer etc.

1971



Burner für Asphalt-mischanlagen

heute

Outlook

Energy Costs in Asphalt Production

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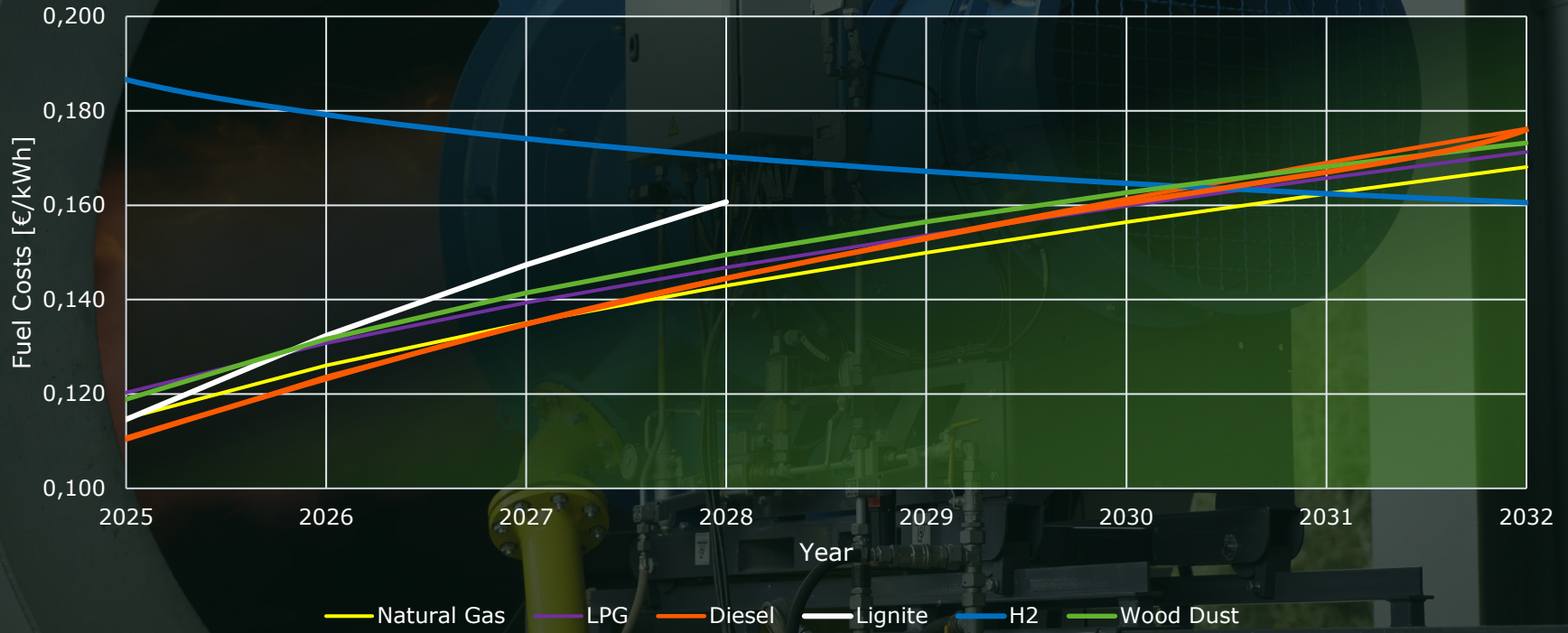

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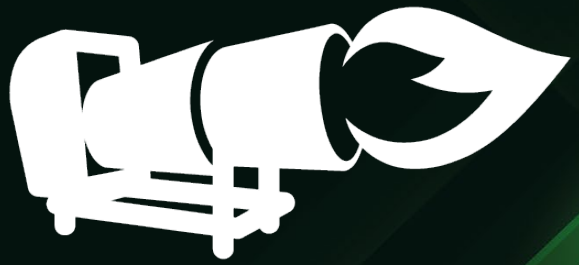


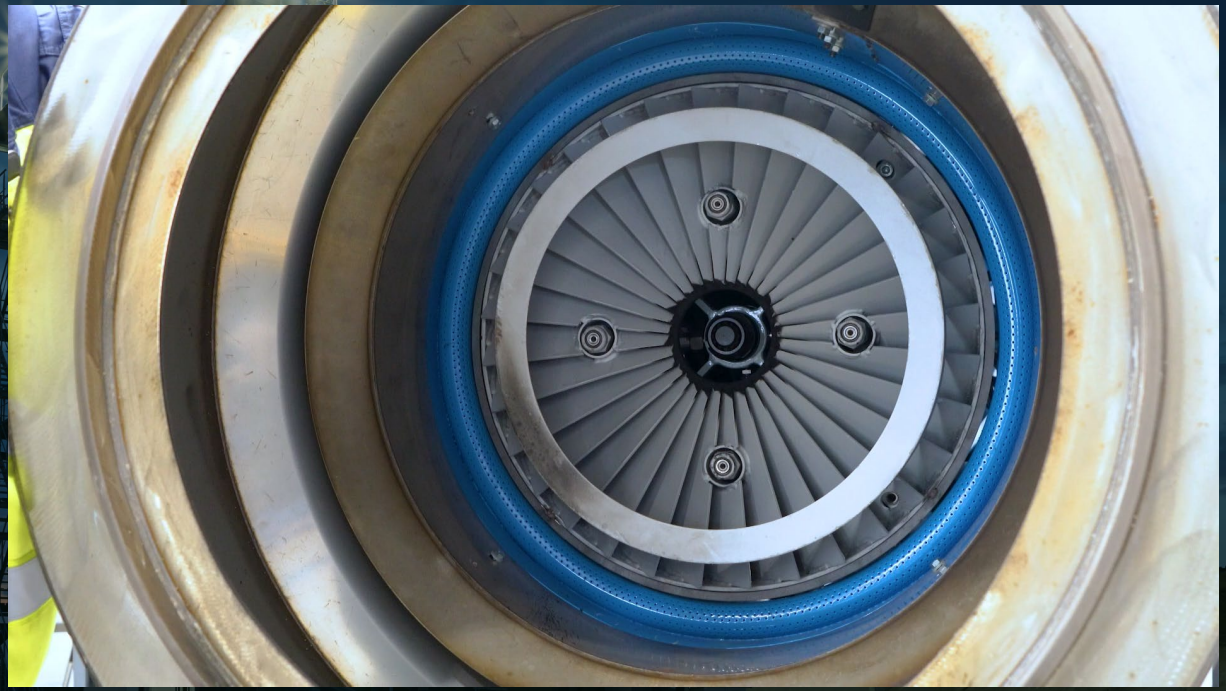
BENNINGHOVEN **MULTI JET**

Benninghoven Multi Jet Burner

WIRTGEN GROUP

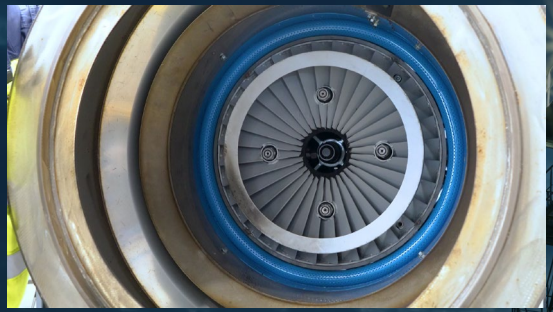
Multi Jet

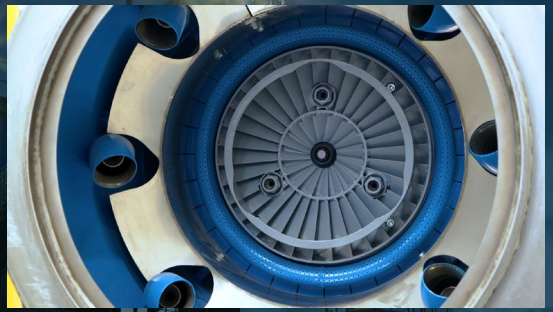
- Up to 3 Fuels
- NG / LNG / LPG
- Diesel / HVO / BtL / Bio Oil
- MultiJet Control
- Fast Fuel Change
- Mixed Firing
- Air Flow optimized -20% Power consumption
- Remote access for Support

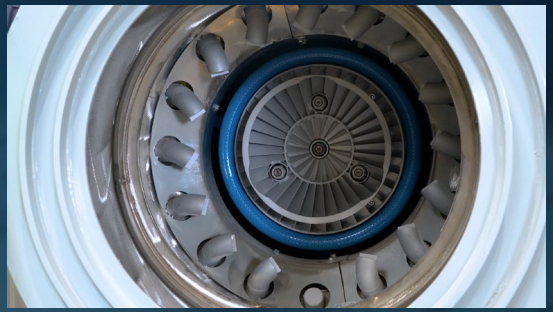


Benninghoven Multi Jet Burner

WIRTGEN GROUP







Multi Jet

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- MultiJet Control

Multi Jet H_2

- H2 / H2 Ready
- NG / LNG / LPG
- Diesel / HVO / BtL / Bio Oil
- MultiJet Control

Multi Jet SP

- Wood Dust / Lignite
- NG / LNG / LPG
- Diesel / HVO / Bio Oil
- MultiJet Control

Benninghoven Multi Jet Burner

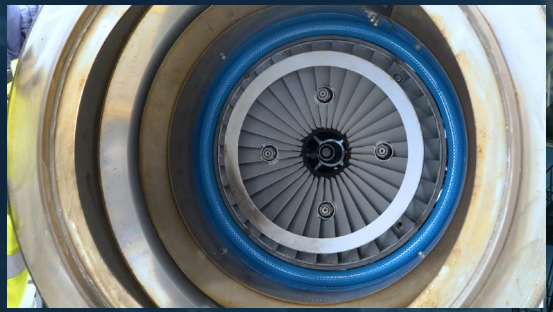
WIRTGEN GROUP

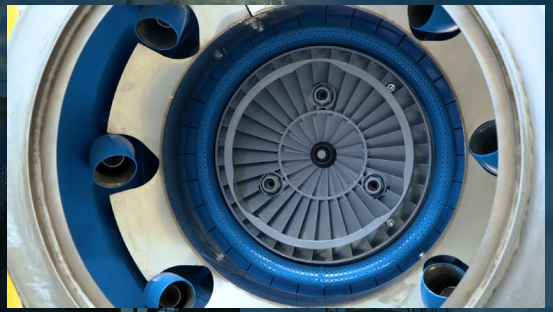
Multi Jet H_2

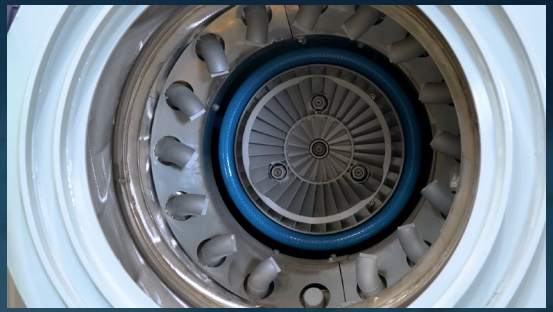
- H2 / H2 Ready
- NG / LNG / LPG
- Diesel / HVO / BtL / Bio Oil
- MultiJet Control
- Use of 100% H2
- Complete System for Hydrogen
- Zero CO2
- Low Nox Technology

Benninghoven Multi Jet Burner

WIRTGEN GROUP







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Benninghoven Multi Jet Burner

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Multi Jet SP

- Wood Dust / Lignite
- NG / LNG / LPG
- Diesel / HVO / Bio Oil
- MultiJet Control
- Pilot Flame Switch off
- Emission Compliance Guarantee
- Depending on legislation CO2 free

Benninghoven Multi Jet Burner

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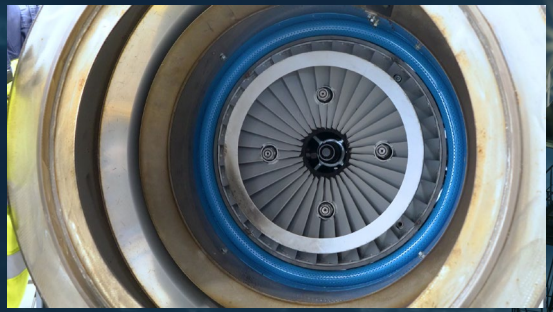

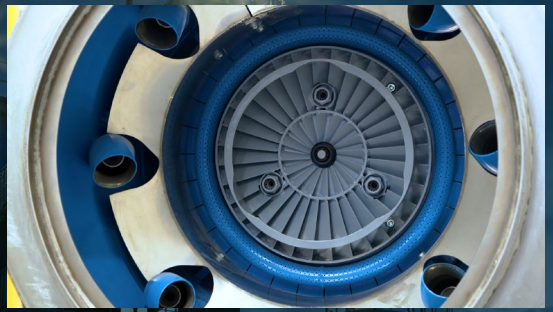

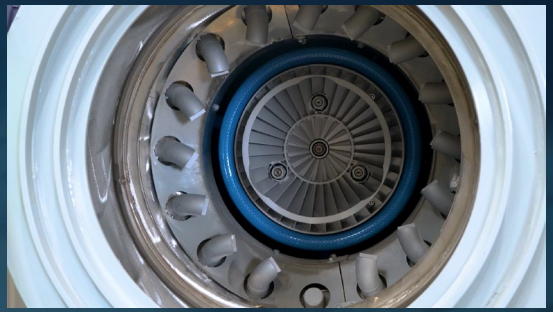

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BENNINGHOVEN

The new
Burner Generation

Project development
From the study to the prototype

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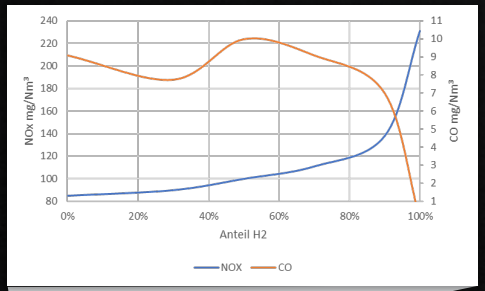
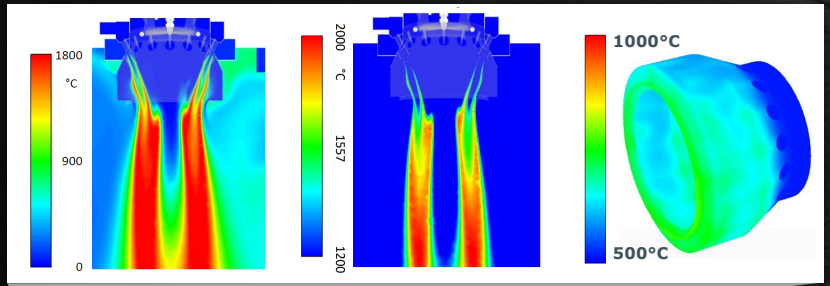
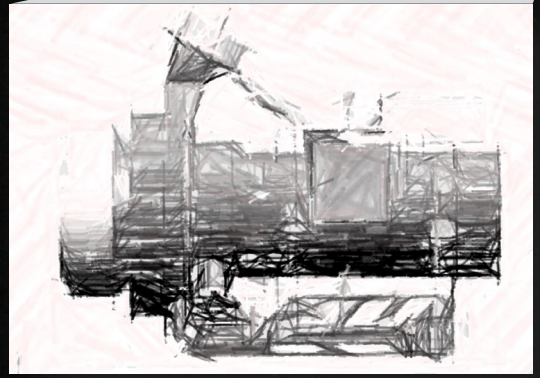
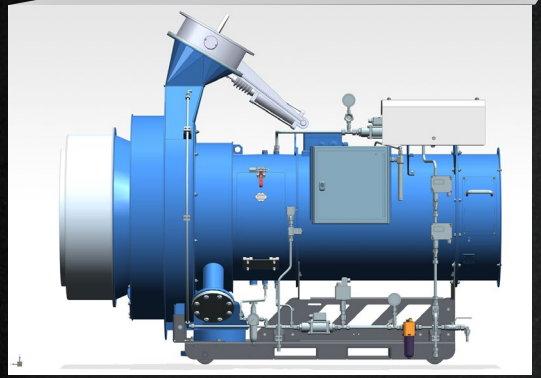




GP JOULE TRUST YOUR ENERGY · RYZE HYDROGEN · Everfuel · Air Liquide · NIPPON GASES The Gas Professionals

Project Study → Concept Study → Numerical Study → Design Phase → Test Phase → Series release





Production System Solution
Schematic illustration

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1. Mobile hydrogen storage unit*
2. Pressure control section
3. Safety chimney
4. Hydrogen control section
5. Drying drum, H_2 prepared

*Not included in the scope of delivery

Safety requirements

- According to DIN 746-1
- Safety Integrity Level (SIL) 2 for all relevant parts (IEC 62061)
- Safety assessment for handling and maintenance
- Risk assessment according to Machinery Directive 2006/42/EC
- Approval of the system by an officially notified body in accordance with the *"Zero series"*

WIRTGEN GROUP

Kristiansund, Norway October 2023

- **3000 tonnes** of asphalt already produced with **100% H2** (Dec. 2023)

VEIDEKKE

New Burner Generation
An Overview

WIRTGEN GROUP

Use of 100% hydrogen

Zero CO_2

Remote - direct access to the burner control

Noise emissions from the new burners have been reduced by 5 dB

4 fuels simultaneously in 3 aggregate states

Air flow in the burner has been optimised = electrical power consumption has been reduced by20 % for the same output

Mixed firing

Flying fuel change

The efficiency of the heat transfer has been extremely increased - through optimum utilisation of the combustion chamber

Automatic switch for peak loads (gas)

Low NOx Technology