

Holzverstromung Nidwalden GSMA



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CEO BR Engineering GmbH
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- background
- Holzverstromung Nidwalden
- process description
- gas sampling, measurement and analysis
 - volume
 - composition
 - O₂
 - CO

G.T.S. ITALIA srl/GmbH
Via S. Lorenzo, 34
I-39031 Brunico/Bruneck (BZ)
www.ts-energygroup.com
Italy

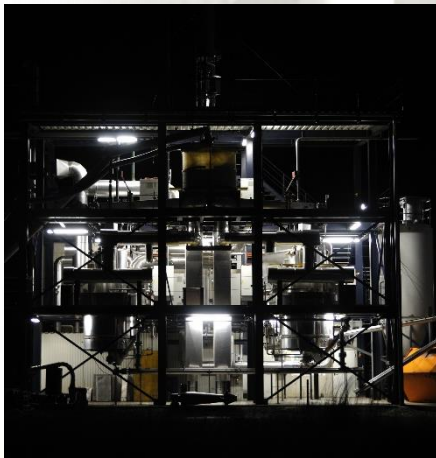
BR Engineering GmbH
Maihofstrasse 95 B
CH-6006 Luzern
www.br-engineering.ch
Switzerland



1993 – 1995: Labor scale



1996 - 2007: Pilot Plant, 120 kWel

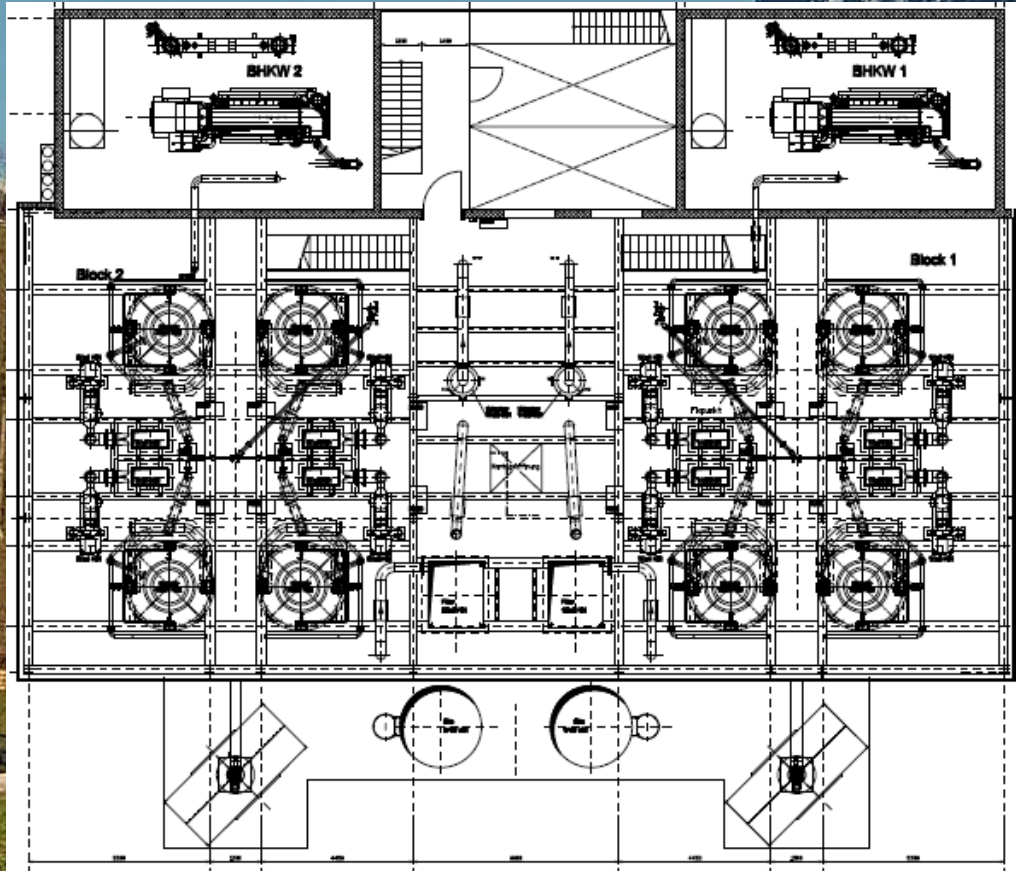


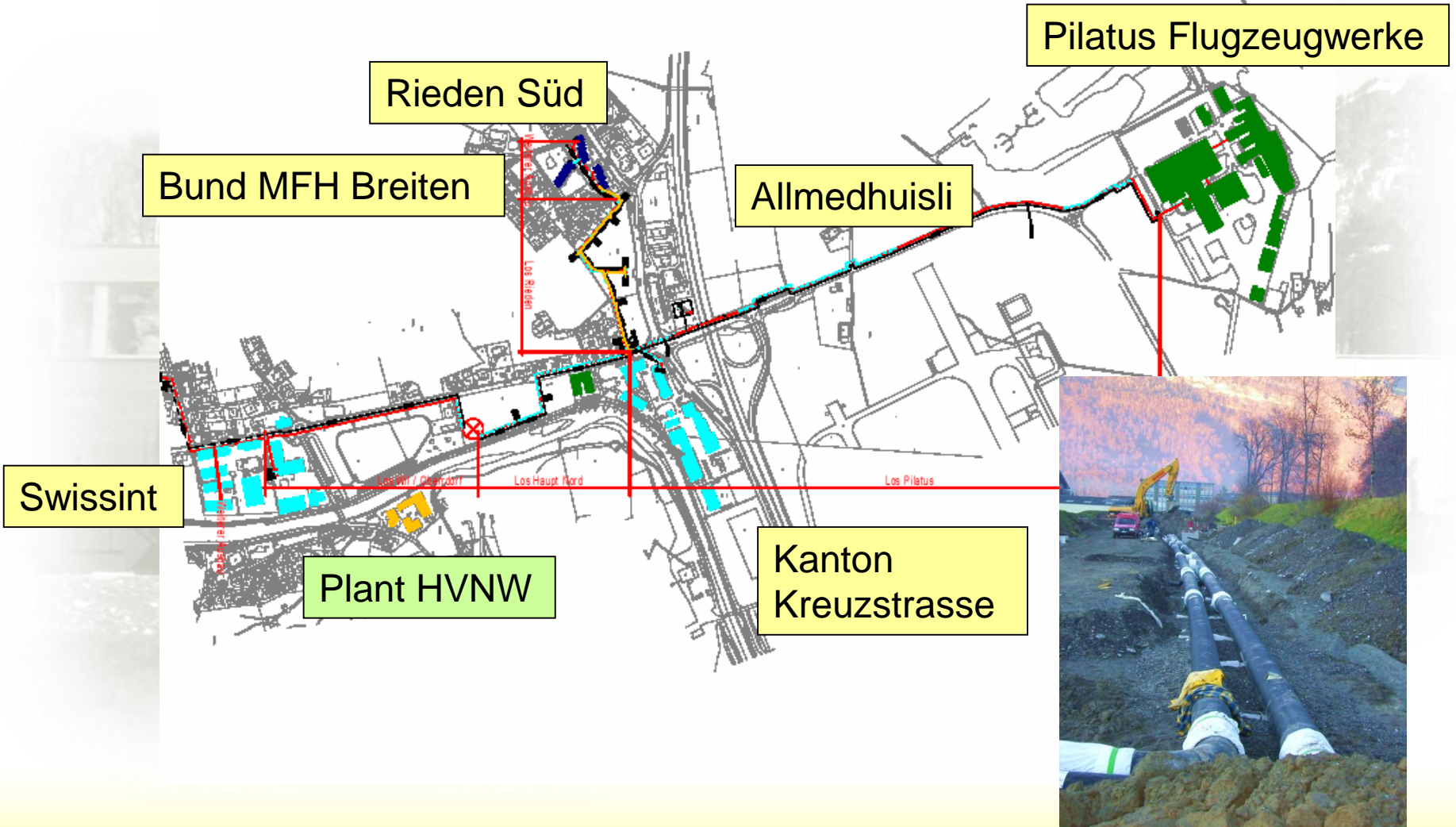
2007: Demonstration Plant, 300 kWel



2008: 1st industrial plant, 1 MWel

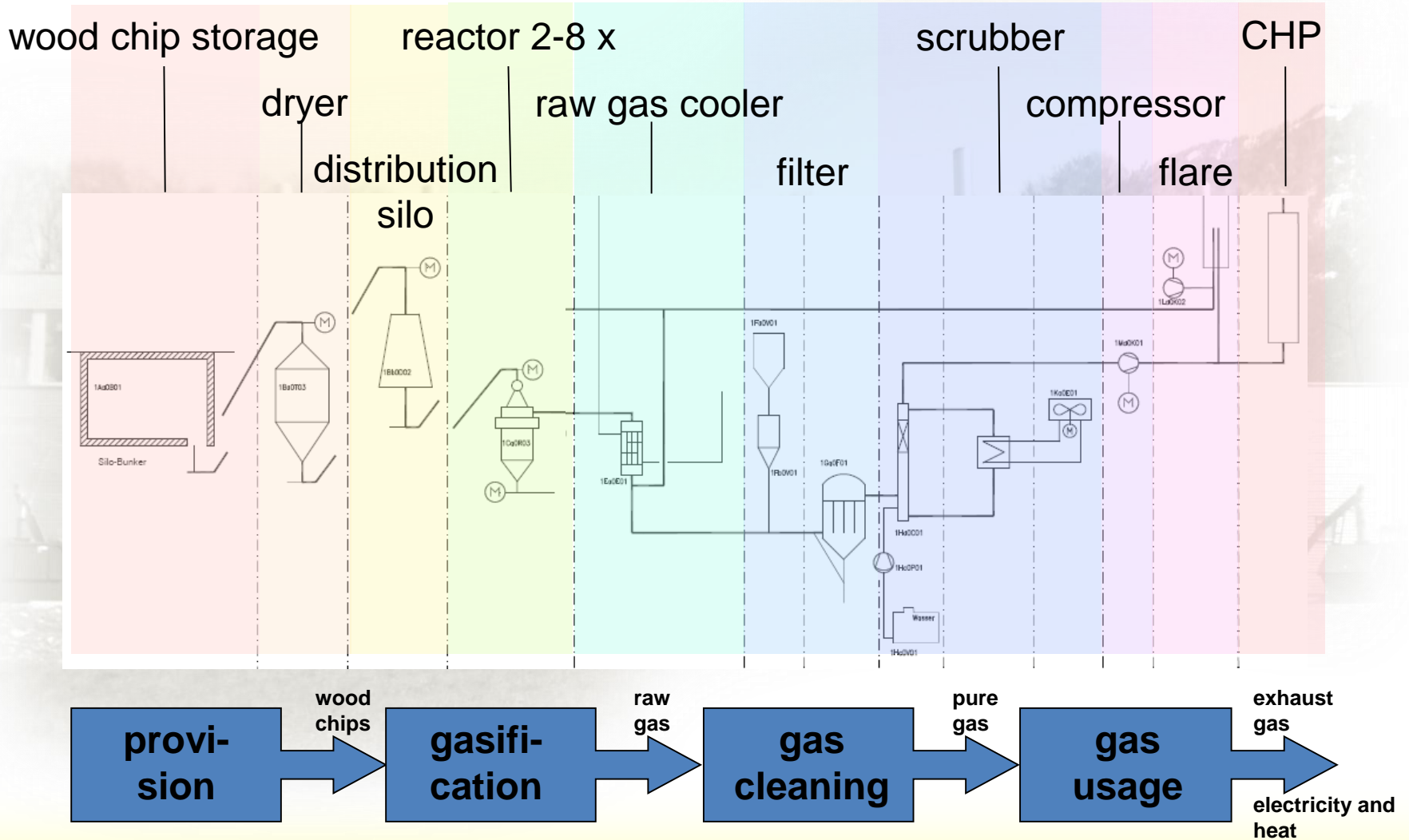
background







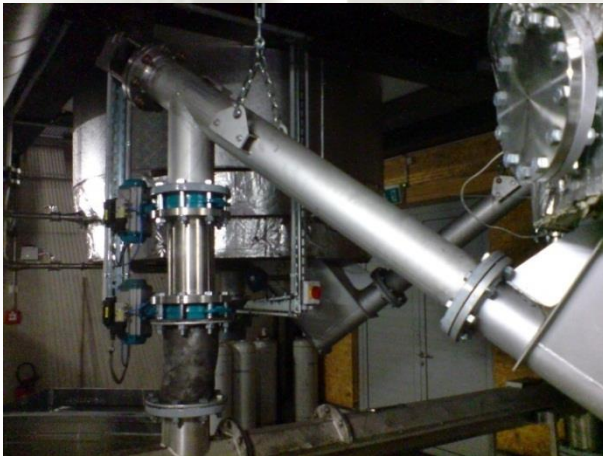
Treatment: Coarse shredder → iron separation → fine shredder → non-iron separation → screening fine/medium/coarse



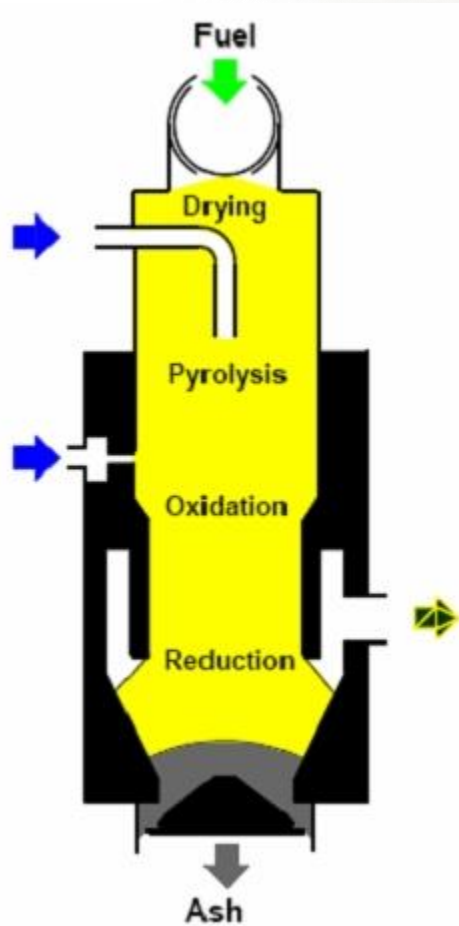
process description



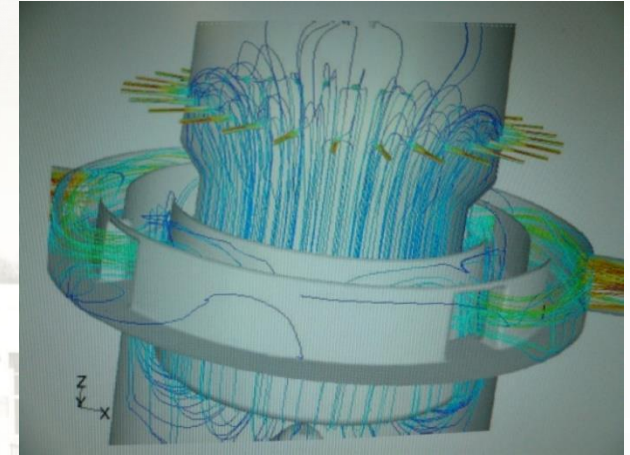
reactor head



ash screw conveyor +
valves



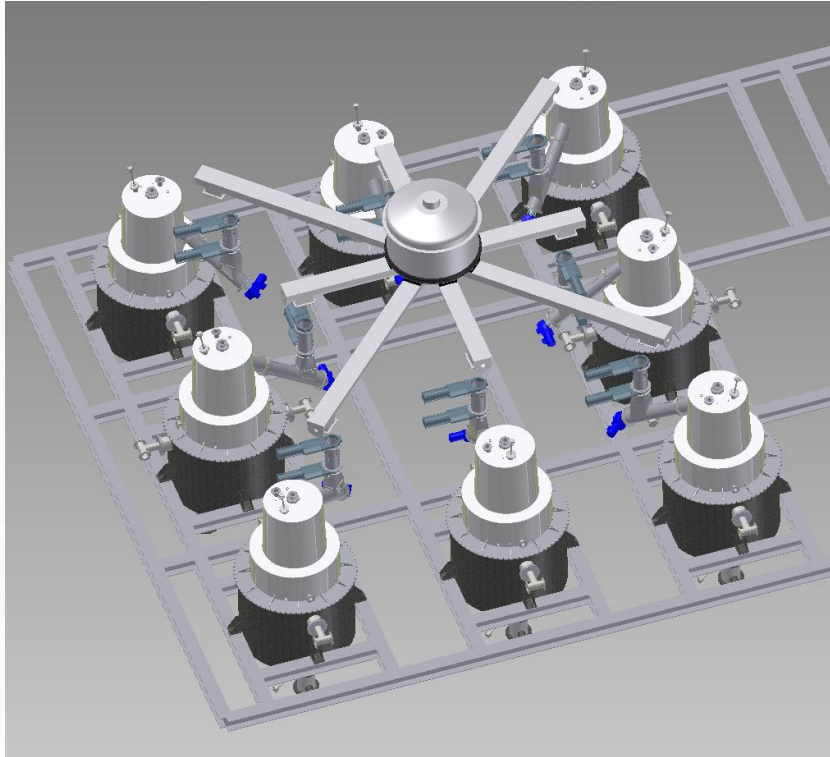
process description



fluid dynamics (CFD)



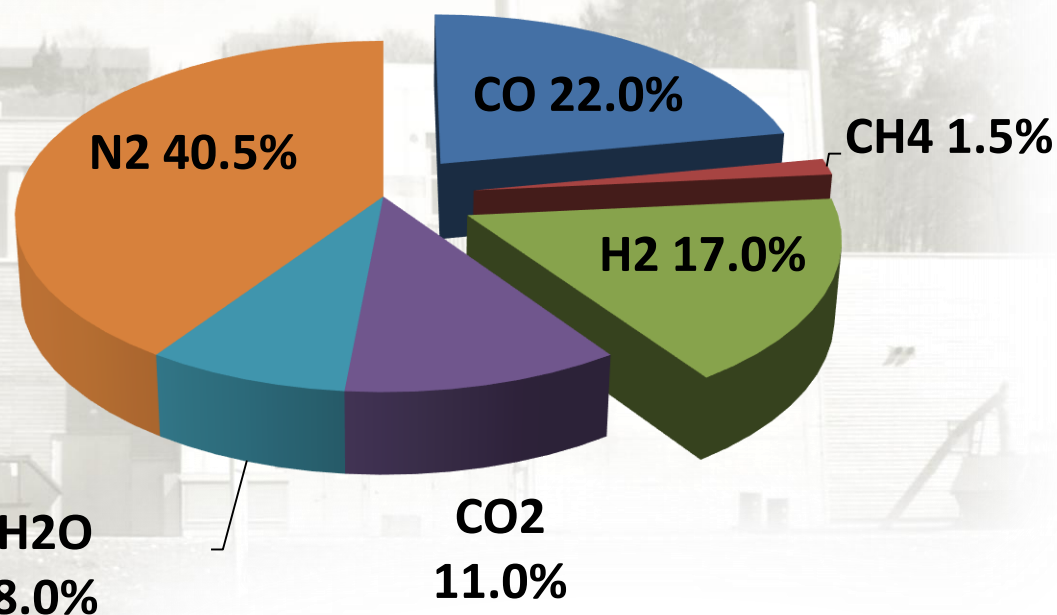
ash (grate air active)



- Benefits of the multi-reactor plant:**
- Up to 8 reactors in one block
 - Max. 1,4 MWel / block
 - Redundant gas production
 - By using several reactors in one block the gas production has an extremely high availability
 - if one reactor is offline, the others keep working
 - No shutdown of the whole plant, only a reduction of the power output
 - Maintenance can be done in the regular shift without any work peak
 - One service reactor in addition
 - Full gas production even during the annual reactor revision

gas composition

element	content
CO	22,0%
CH ₄	1,5%
H ₂	17,0%
CO ₂	11,0%
H ₂ O	8,0%
N ₂	40,5%
heat value	1,43 kW/Nm ³





gas cooler



lime dosage



gas filter



PTFE filter bag



scrubber



recirculation pump



gas analysis



Root's compressor

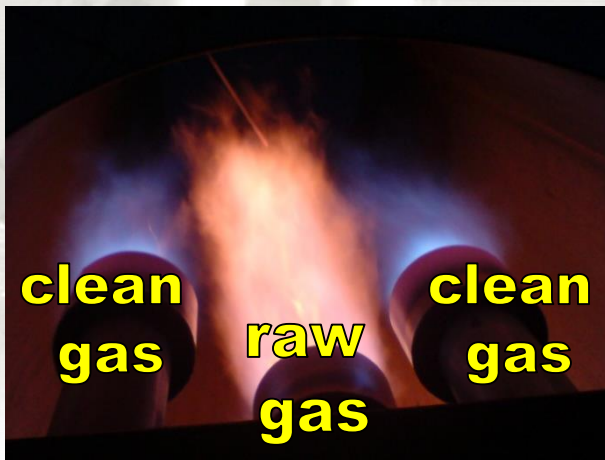
closed condensate-recirculation

tar-cracking

process description



CHP: GEJ 320



flare

LABORBERICHT

Probenbezeichnung: **JA 149 20012154**

Komponente: **Gasmotor**

Nummer der aktuellen Probe: **WC 209972**

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Maschinenrfr.: **JMS 208 GS-SLC**
Hersteller: **Jenbacher**
Probe aus: **Hölgas BHKW**
Ölbezeichnung: **Mobil Pegasus 610**
Ölmenge im System: **1831**

Probe bezieht: **Pfhorforce AG Emmenbrücke**

Diagnose der aktuellen Laborwerte

Kupfer höher als erwartet, aber noch nicht kritisch. Sie sollten die weitere Veränderung anhand der nächsten Analyse beobachten. Falls noch kein Ölwechsel erfolgt ist, wäre eine weitere Verwendung des Öles bei ähnlichen Betriebsbedingungen unter Beibehaltung üblicher Wartungsarbeiten möglich. Bitte senden Sie uns zur Trendbeobachtung die nächste Probe nach weiteren 200 Stunden. Für diesen Zeitraum ist bei ähnlichen Betriebsbedingungen kein Ölwechsel notwendig.

Dipl.-Ing. Stephan Werf

ANALYSEVEREICH	aktuelle Probe	WC 209972	WC 209973	WC 209971	WC 209970
GESAMTBEWERTUNG	✓	✓	✓	✓	✓
Untersuchungsdatum	06.11.2006	16.02.2006	13.02.2006	18.10.2004	18.10.2004
Datum Probenentnahme	06.11.2006	07.02.2006	21.10.2005	11.10.2004	11.10.2004
Datum letzter Ölwechsel	27.02.2006	12.10.2004	12.10.2004	24.11.2003	24.11.2003
Nachfüllmenge seit Wechsel	50	27	9	91	91
Laufzeit seit Wechsel	2850	3115	200	2500	2500
Laufzeit gesamt	12261	9185	8071	6020	6020

Gesamtbewertung

✓

normal

Probe und Deckel

ANALYSENERGEBNISSE

LABORNUMMER	aktuelle Probe
WC 209973	WC 209973
GESAMTBEWERTUNG	✓
Untersuchungsdatum	16.02.2006
Datum Probenentnahme	07.02.2006
Datum letzter Ölwechsel	12.10.2004
Nachfüllmenge seit Wechsel	27
Laufzeit seit Wechsel	3115
Laufzeit gesamt	9185
Öl gewechselt	-

oil change every 3000 operating hours
with oil tank extension (1500 without)

process description



temperature sensor



pressure sensor



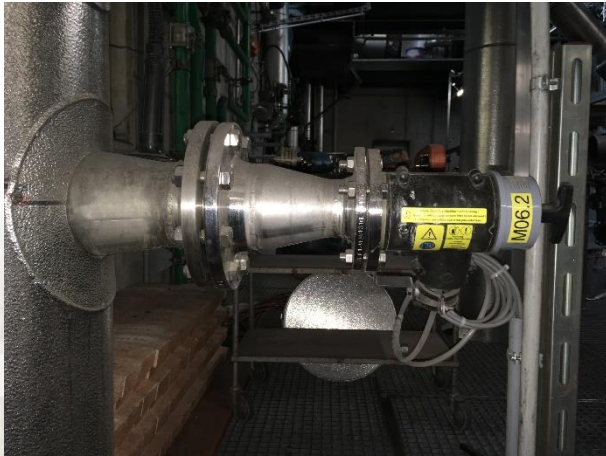
Air mass flow meter

Gas volume

- No direct measurement of the volume
- Speed of the blower indicates the total gas volume
- The combination of the values of gas exit temperature, suction pressure and gasification air mass indicates the actual production of a single reactor
- Additional: speed of primary air blower



rotary piston compressor



heated extraction unit



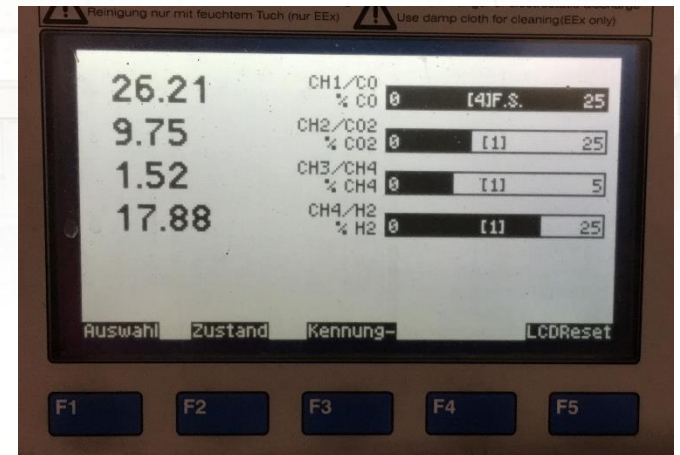
blower, dryer, filter



4 channel analysis module

Gas composition

- Measurement principle NDIR / UV
- Gas has to be free of particles and condensate
- Daily maintenance
- Heated extraction unit seems to work better than heated extraction pipe
- Back pressure regulation for constant gas flow



display at analysis module



blower, dryer, filter



O₂ analysis module



redundant O₂ analysis module

Oxygen content

- Measurement principles
 - Paramagnetic (PO₂)
 - Electrochemical (EO₂)
- Gas has to be free of particles and condensate
- Daily/weekly maintenance



display for redundant analysis module



gas analysis



CO monitor



Root's compressor
located next to the CHP



portable CO
monitor

Safety first!

- Reactors and gas cleaning system are working under negative pressure
 - No toxic gas can leak from the system, only air can break in
 - Entrapped air is immediately detected by an redundant O₂ monitoring system
 - LEL at 4%, shutdown at 2% O₂
 - No ATEX-equipment necessary
- Only the CHP room contains pressured gas pipes
 - Secured by CO monitoring and automatic ventilation systems
- Additional operator protection by portable CO monitor

Thanks to

- the Genossenkorporation Stans as the operating company of the cogeneration plant „Holzverstromung Nidwalden“ for the constructive cooperation and much more
- the audience for your attention
- questions?