Froling – Biomass boilers & technologies

Commercial wood chip / pellets boilers

Turbomat 500 (1,7MBtu/h)

- Controls SPS 4000 (PLC)
  - ⇒ Universal industry standard
  - ⇒ expandable
- Screw/hyraulic feed
  - ⇒ Fuel: pellet / chip
    - Water content: max. **w 50**
    - Size: max. **G100**

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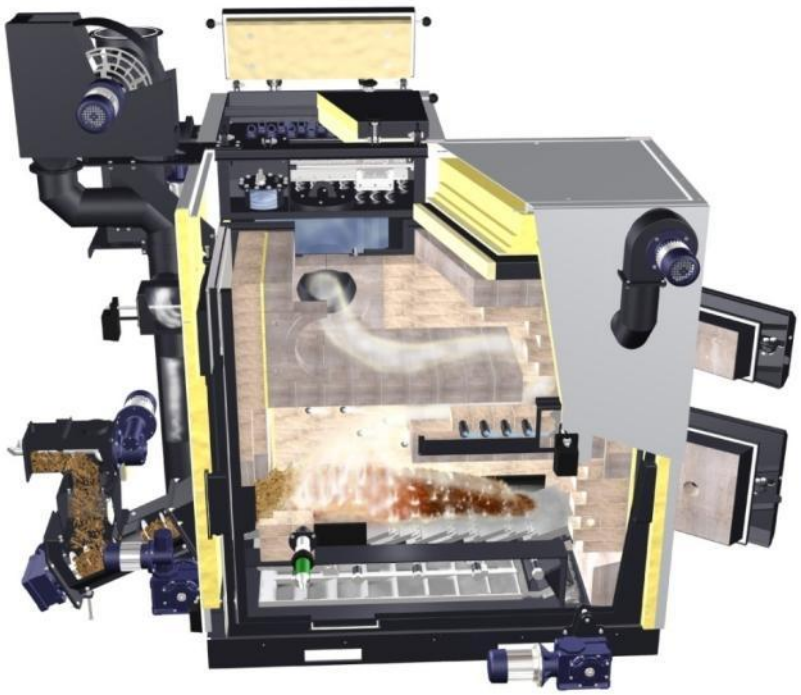
Turbomat 500



- Screw feed system
  - ⇒ Fuel:
    - Water content: max. **w 50**
    - Size: max. **G50**
- Control SPS 4000 (PLC)
  - ⇒ Up to 2 heating circuits
  - ⇒ Hot water tank
  - ⇒ Tanks
    - 2 sensor management
    - 5 sensor management
  - ⇒ Oil-fired/gas-fired boiler

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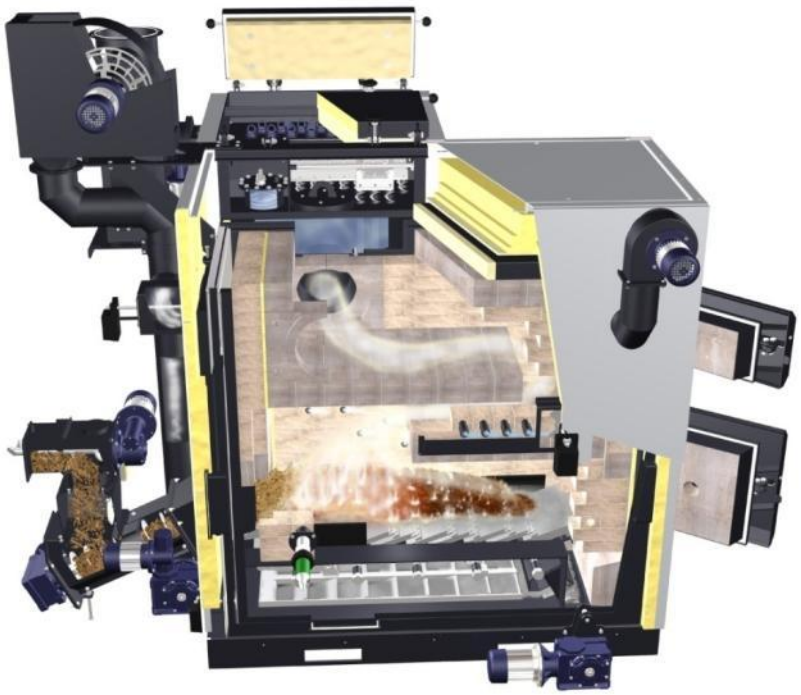
Turbomat 500



- Hydraulic feed system, belt / chain conveyor
  - ⇒ Fuel:
    - Water content: max. **w 50**
    - Size: max. **G100**
- Controls SPS4000 (PLC)
  - ⇒ Up to 2 heating circuits
  - ⇒ Hot water tank
  - ⇒ Tanks
    - 2 sensor management
    - 5 sensor management
  - ⇒ Oil-fired/gas-fired boiler

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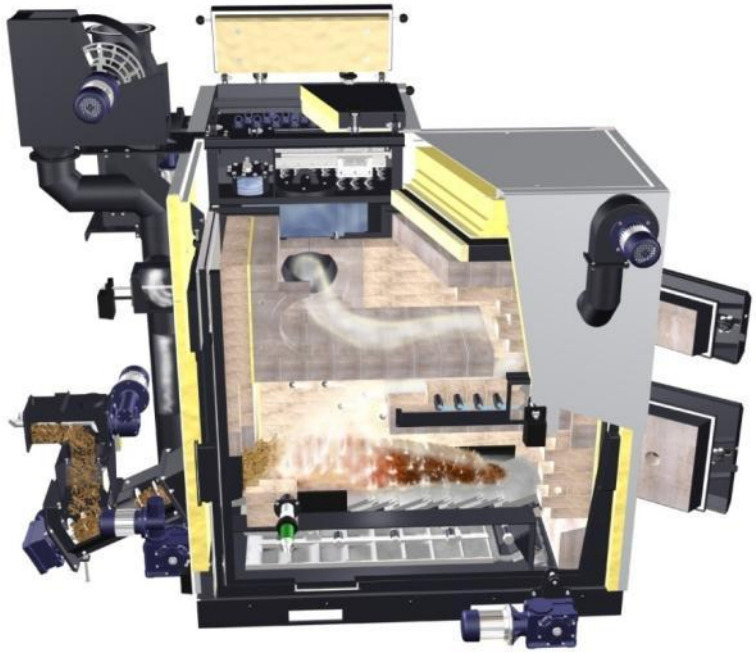
Turbomat 500



- 4-shelled high-temp. combustion chamber
- Moving conveyor grate incl. autom. ash removal
  (permanent without stopping, reduction of output, …)
- Vertical 4-pass heat exchanger
  patented, 6 bar, integrated cyclone dust separator

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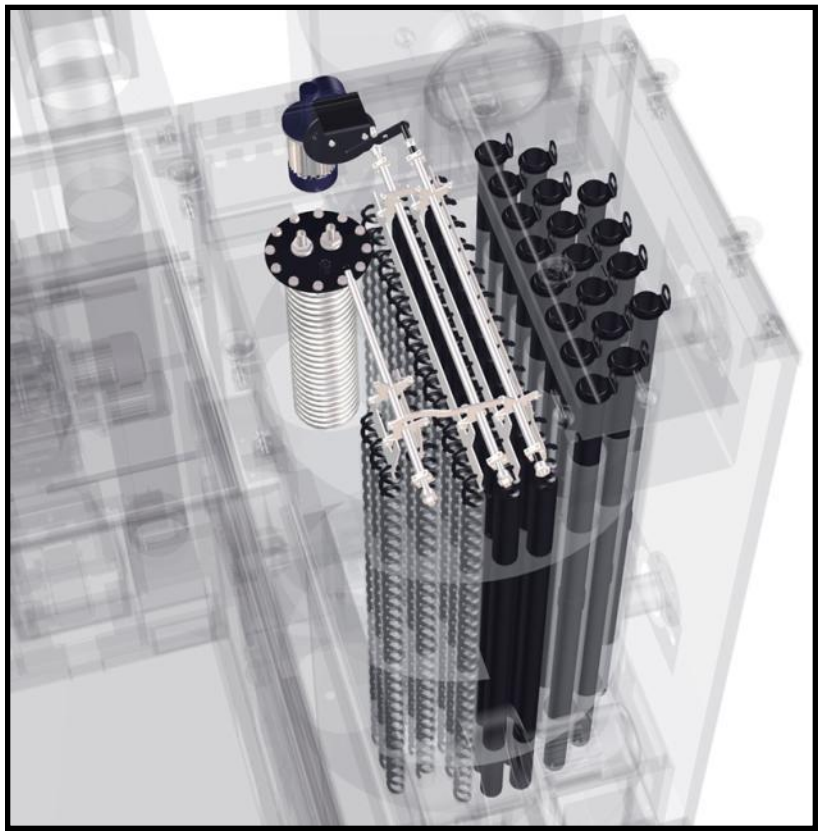
Turbomat 500



- Heat exchanger
  - ⇒ Patented multi-cyclone dust separator
    - Dust emission < 50mg/Nm³
  - ⇒ Automatic cleaning
  - ⇒ Integrated safety battery
  - ⇒ Jacket cooling (optional)
  - ⇒ Option to integrate emergency oil burner

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Turbomat 500

- Flue gas recirculation (optional)
  - ⇒ Combustion optimisation
    - Very low emissions
  - ⇒ Output optimisation
    - Primary flue gas recirc for wet fuels (> 40 %)
    - Secondary flue gas recirc for dry fuels / pellets (< 20 %)

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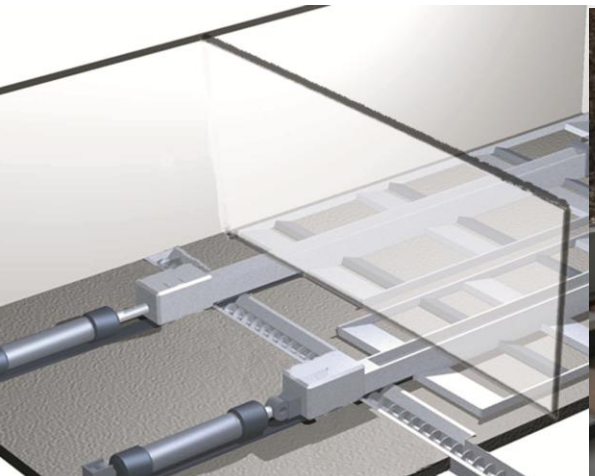
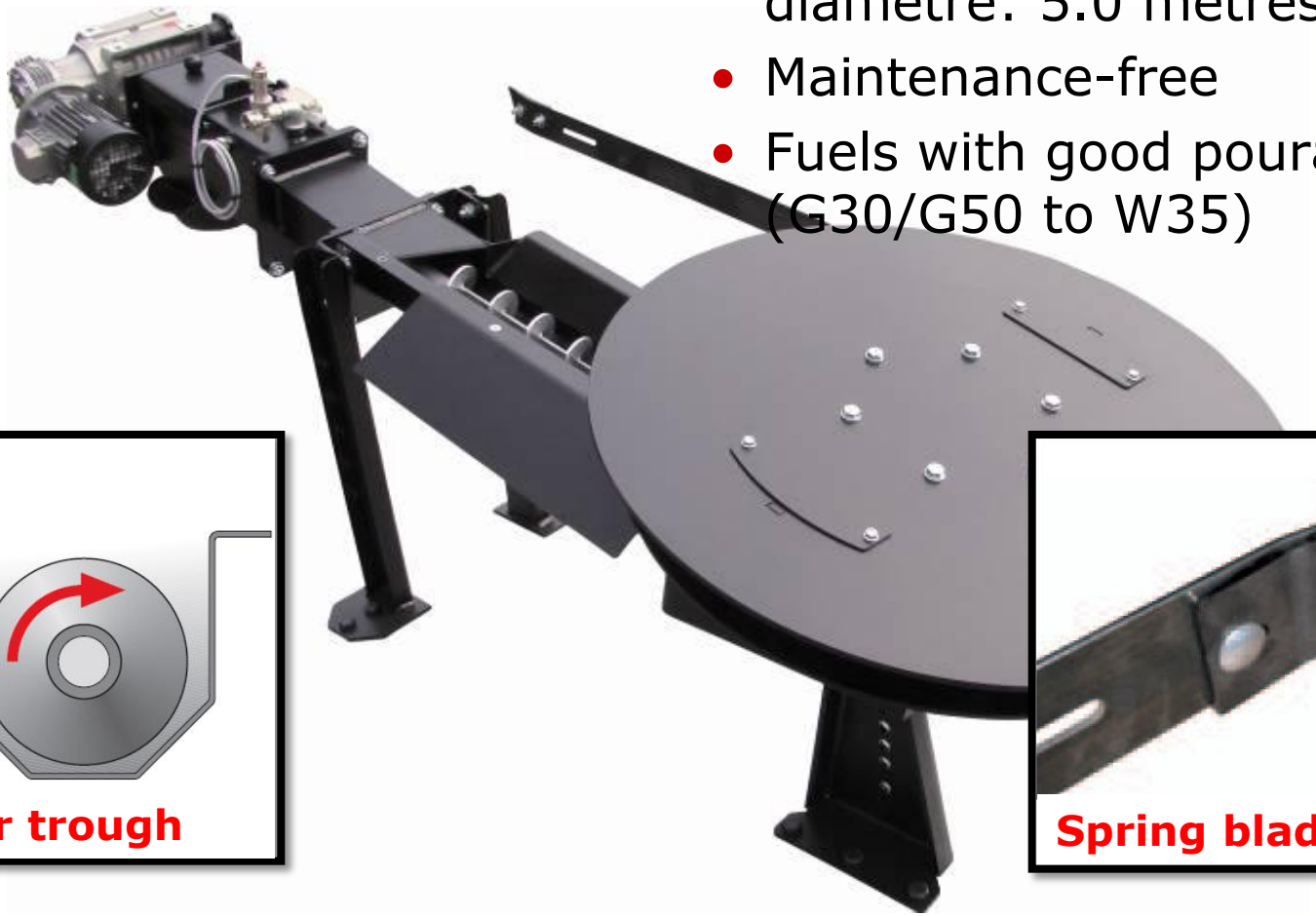
Feed systems

- Rotating arms up to 500kw
- Scraper floor (standard)
- Bespoke third party systems



Spring blade agitator FBR

- Maximum working diametre: 5.0 metres
- Maintenance-free
- Fuels with good pourability (G30/G50 to W35)



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Torsion arm agitator TGR

- Patented design
- Maximum working diametre: 6.0 metres
- Up to wood chips G50
- Designed for fules with low pourability
- NO pellets!

Feed System

	Spring blade agitator FBR	Torsion arm agitator TGR
Permitted fuels		
Wood chip G30	+	+
Wood chip G50	+	+
Wood chip G100	-	-
Pellets	+ o (horizontal)	-
Capentry waste	+	+
Bunker dimensions		
Diametre	2 - 2,5 - 3 - 3,5 4 - 4,5 - 5m	3,5 – 4 - 4,5 5 - 5,5 - 6m
Height	2,5m (Pellets S650) - 5m (Wood chip S200)	3m (Pellets S650) - 6m (Wood chip S200)
Screw diametre		
	110 – 150 mm	110 – 150 mm

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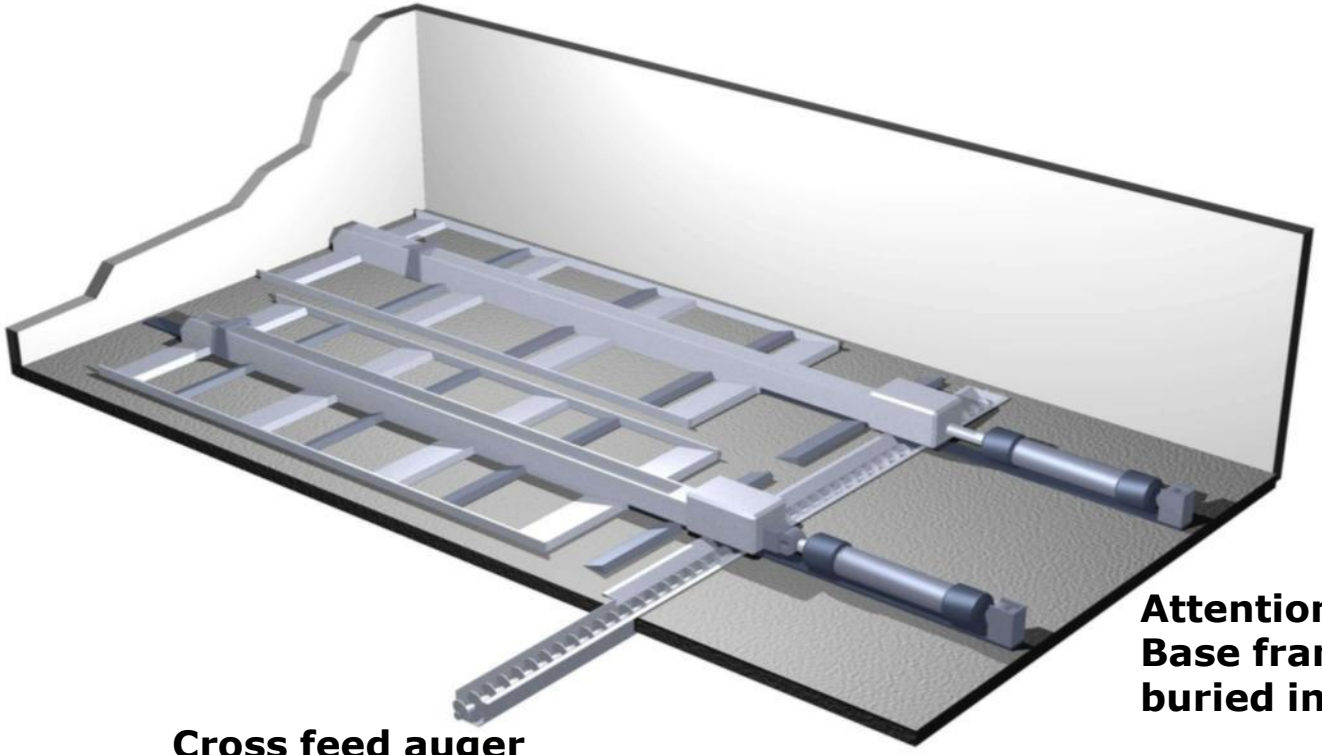
Hydraulic scraper floor

- Push rod unit
  - ⇒ Width per rod: 2m
  - ⇒ max. length per bar: 15m
  - ⇒ max. stacking height: 4m
    4m –bulk density 250kg/m³



Cross feed auger to boiler

Attention:
Base frame has to be buried in concrete

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Feed System

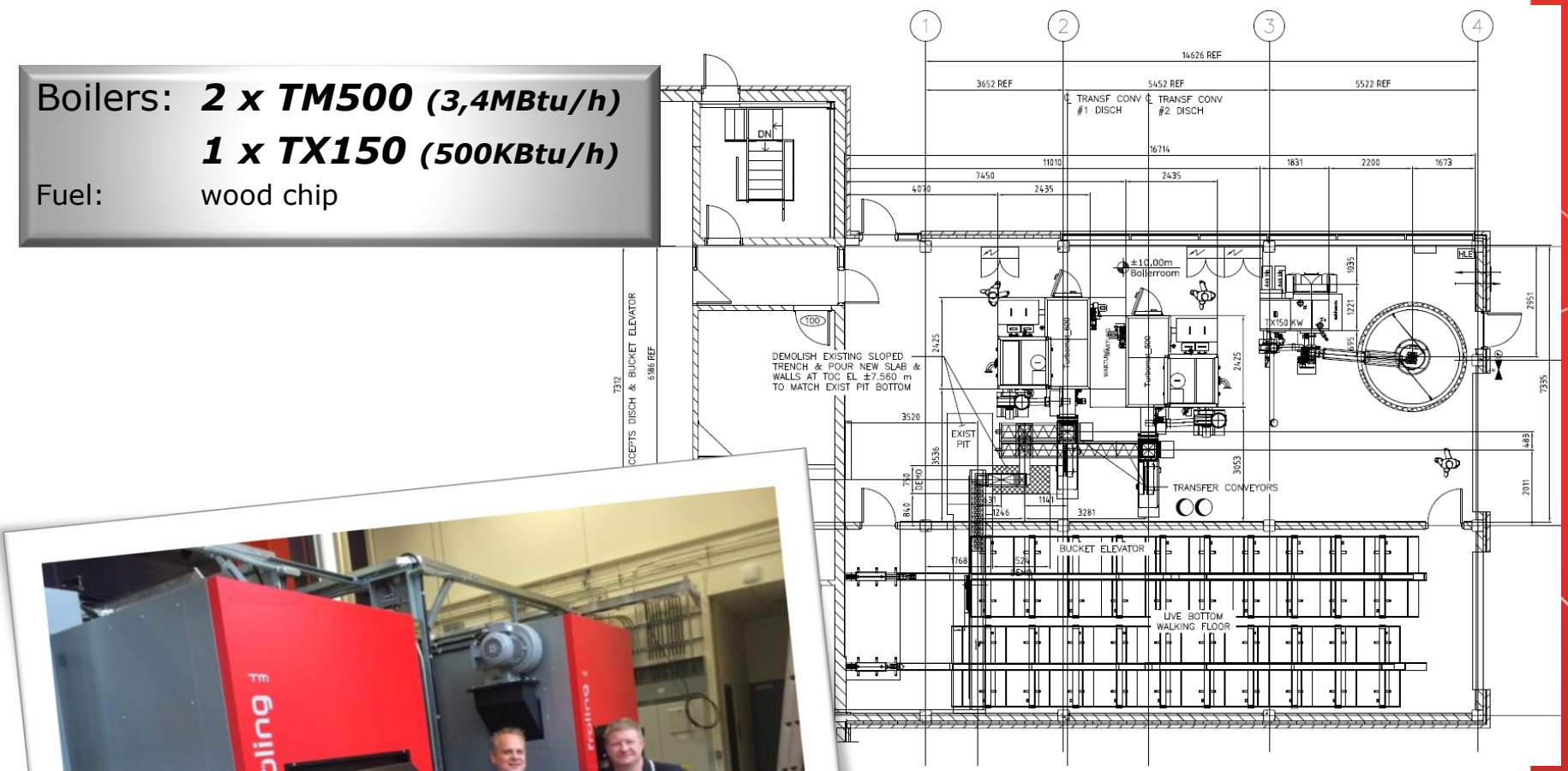
	Pellet screw	Scraper floor unit
Permitted fuels		
Wood chip G30	-	+
Wood chip G50	-	+
Wood chip G100	-	+
Pellets	+	o
Carpentry waste	-	+
Bunker dimensions		
Length	Open trough max. 6 (9) m	up to 15m
Width		up to 2,5m
Height	max. 6m	Depends on width, length and weight (4m S250; B2m; L 10m)

Confederation College: 2 x TM500; 1 x TX150

Boilers: ***2 x TM500*** ***(3,4MBtu/h)***

1 x TX150 ***(500KBtu/h)***

Fuel: wood chip



Confederation College: 2 x TM500; 1 x TX150

Confederation College Celebrates the Grand Opening of the OPG BioEnergy Learning and Research Centre

(September, 8 2014) - **September 8, 2014, THUNDER BAY, ON –** Confederation College officially opened the Ontario Power Generation BioEnergy Learning and Research Centre (OPG-BLRC) today as part of BioEconomy Week. Partners, supporters and community members were on hand for the opening and had the opportunity to participate in a guided tour of the centre.

The OPG-BLRC offers opportunities for demonstration, training and applied research related to biomass energy, including fuel quality, emission and combustion efficiency.

Biomass energy systems use clean forest and agricultural sources to produce heat and electricity with less impact on the environment than fossil fuels. Through the centre, Confederation College is committed to developing a market for biomass in northwestern Ontario and other farther reaching markets.

Featuring state-of-the-art Fröling biomass boilers, fuel handling and heating systems, the OPG-BLRC is estimated to also provide 80 per cent of the total heat load for the Shuniah/REACH Building at Confederation College this fall/winter.

Adopted and adapted from existing European technology, the OPG-BLRC is the first facility of its kind in Ontario. The team supporting the facility is currently working with regulators in Ontario to modernise guidelines governing the use of biomass. In addition,

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Confederation College: 2 x TM500; 1 x TX150

Confederation College President Jim Madder and other dignitaries participate in a ribbon cutting ceremony at the Grand Opening of the Ontario Power Generation BioEnergy Learning and Research Centre

"With the launch of this centre, Thunder Bay is furthering its reputation as a destination for scientific research and technological innovation in Northwestern Ontario. This state-of-the-art centre will certainly be at the forefront of biomass research in our region and I'd like to congratulate Confederation College and all its partners for bringing it to life."
- **Michael Gravelle, Minister of Northern Development and Mines, MPP Thunder Bay-Superior North**

"I am excited that this innovative learning and research centre will be opening in Thunder Bay at Confederation College. It is a further step forward in the development of a biomass industry in Northwestern Ontario. Our government is proud to support the expansion and development of our bio economy which already includes the conversion of the two coal generating facilities in my riding of Thunder Bay-Atikokan."
- **Bill Mauro, Minister of Natural Resources and Forestry, MPP Thunder Bay-Atikokan**

"The new Bio-Energy Learning and Research Centre will provide hands-on training for students in this emerging bio-energy field and will be integral to the success of many upcoming small to mid-size biomass projects here in Northern Ontario."
- **Lorne Morrow, C.E.O., CRIBE (Centre for Research and Innovation in the Bio-Economy)**

Biomass projects

Key questions for successful planning

Project Parameters

- ***Object** (given) **:*** — ***Heat load in kw, operating hours***
- Fuel: — Pellets | chip+ | chip-
- Space+ fuel logistics: — available space (boiler/fuel), road acces, annual fuel need
- Legislation: — emissions limits, …
- Boiler: — grate type, feed system, cyclone

Parameters which are not given can influence each other => create scenarios!

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Project Finance (payback)

- Object:
  - ⇒ base load vs partial load boiler (2000 vs. 6000 op hours)?
  - ⇒ back up/peak load boiler available?
- Fuel:
  - ⇒ Always use fuel cost „delivered on site"
  - ⇒ Free fuel available (forest owner, farmer, industry)?
  - ⇒ Look at long term availability of fuel
- Space+ fuel logistics:
  - ⇒ available space, acces: new vs. existing building
  - ⇒ annual need vs truck load? (seasonal price, access in winter, reserve)
- Legislation:
  - ⇒ Does the legislation limit my choice of fuels, boilers, etc… ?
  - ⇒ Is there a mandatory emmissions test for a certain output size?
  - ⇒ Are there any fundings for a certain output size?
- Boiler:
  - ⇒ simple boiler – expensive fuel (chip+, Pellets); complex boiler – cheap fuel

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Hotel Edenlehen, Zillertal (AT)

Boilers: **2 x Turbomat 500 kw**
Fuel: wood chip
Feed system: scraper floor

Before: 480.000l fuel oil @ 441.600,- [25,-€/GJ]
Now: 7.400m³ wood chip @ 148.000,- [8,-€/GJ]

Savings: ***293.600,- EUR / year***

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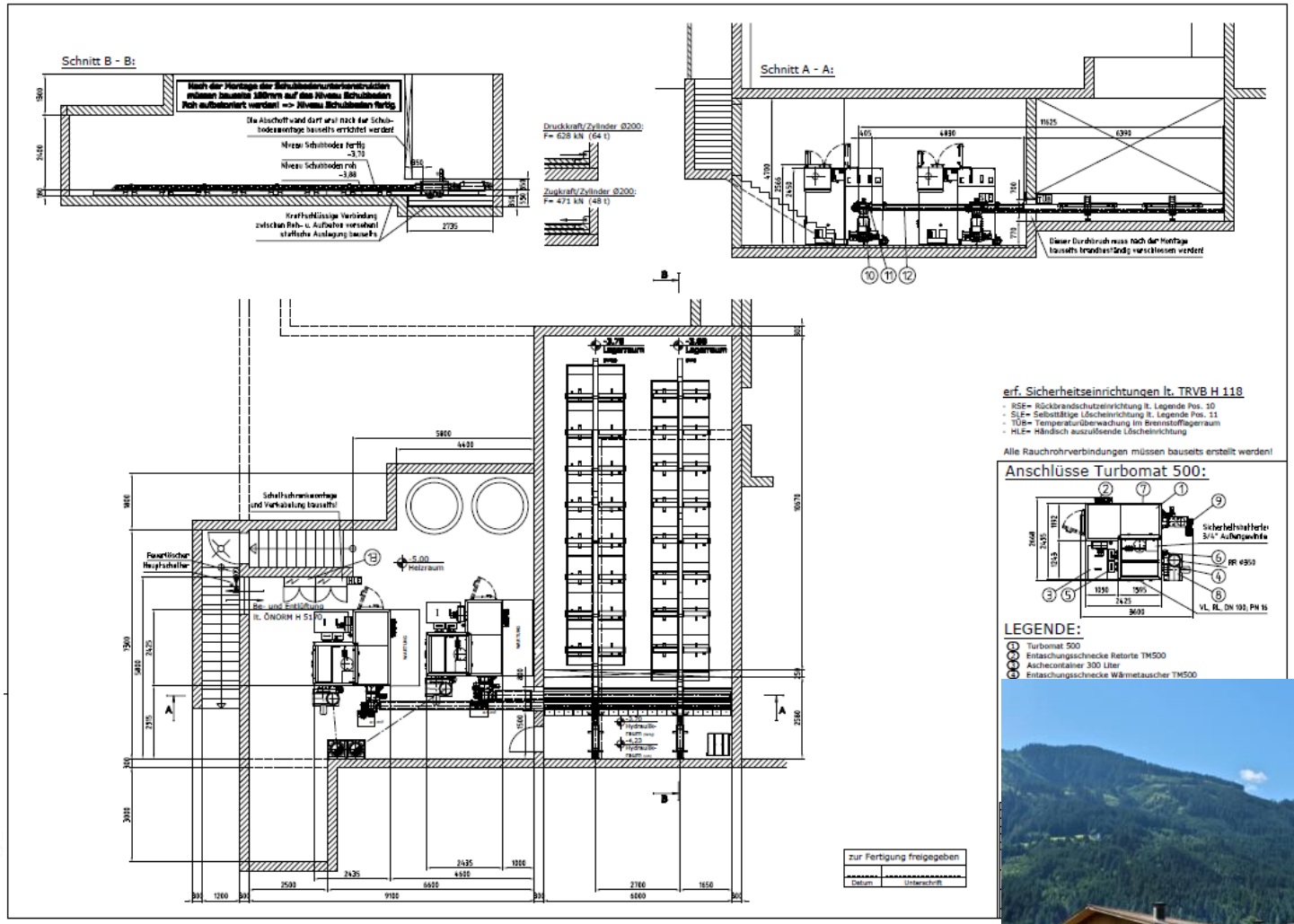
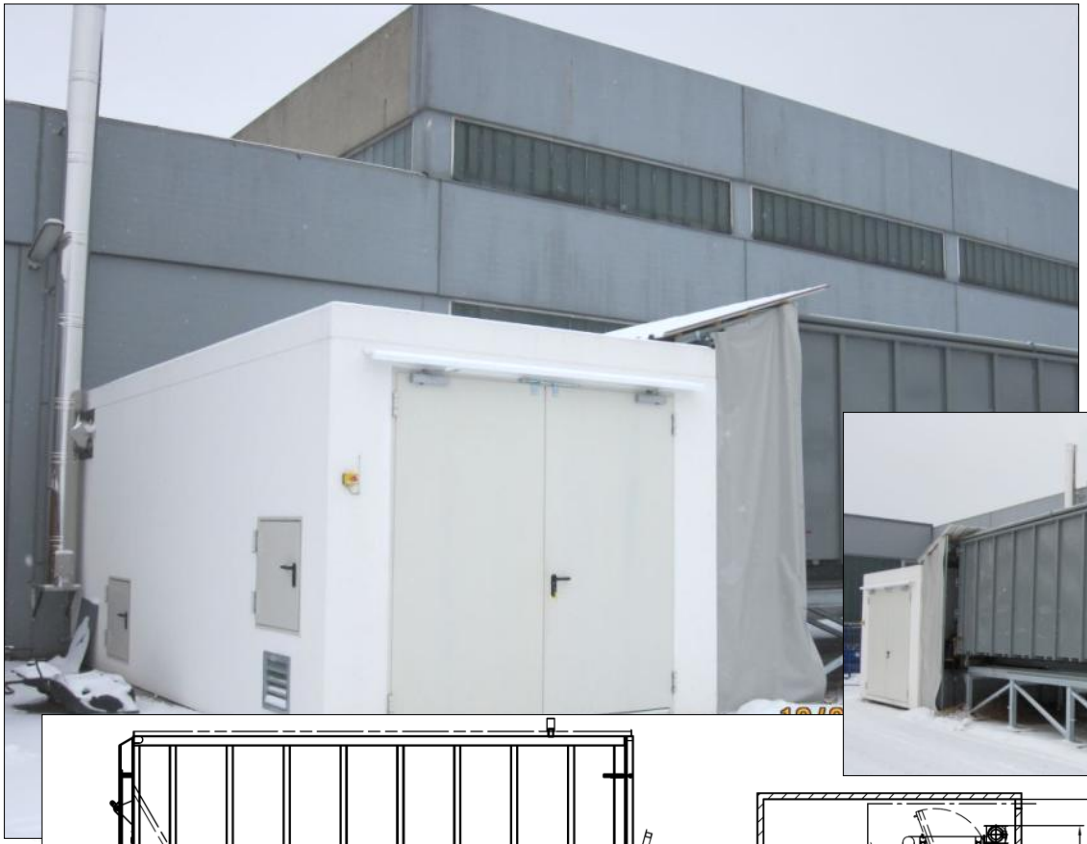
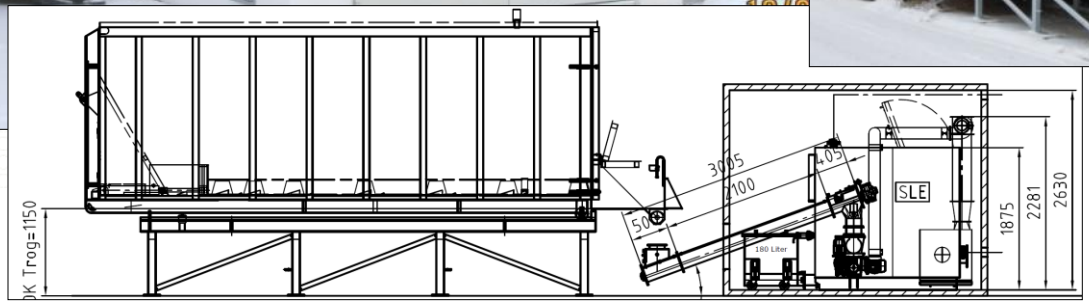
Hotel Edenlehen, layout plan



Car dealer: Boegl (container solution)



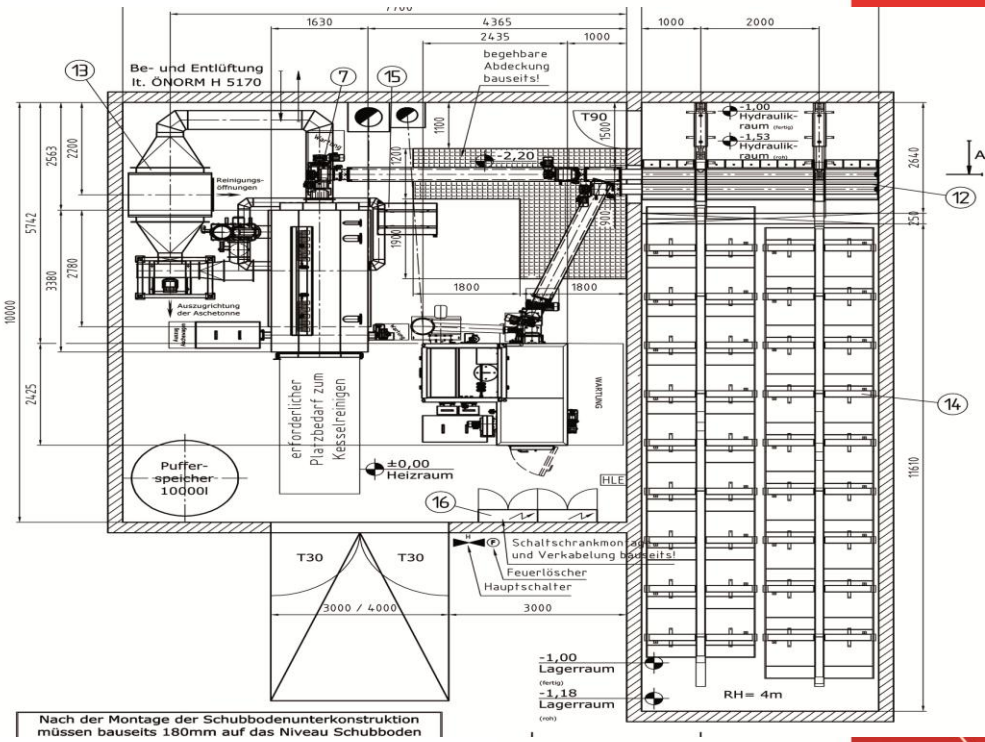


Boiler**: TM 220**

Fuel: Chip G50 W35

Heat needed for: garage, paint shop, office

Example Austrian Industry



Boilers: ***1 x LM1000*** ***(7MBtu/h)***

1 x TM500 ***(3,4MBtu/h)***

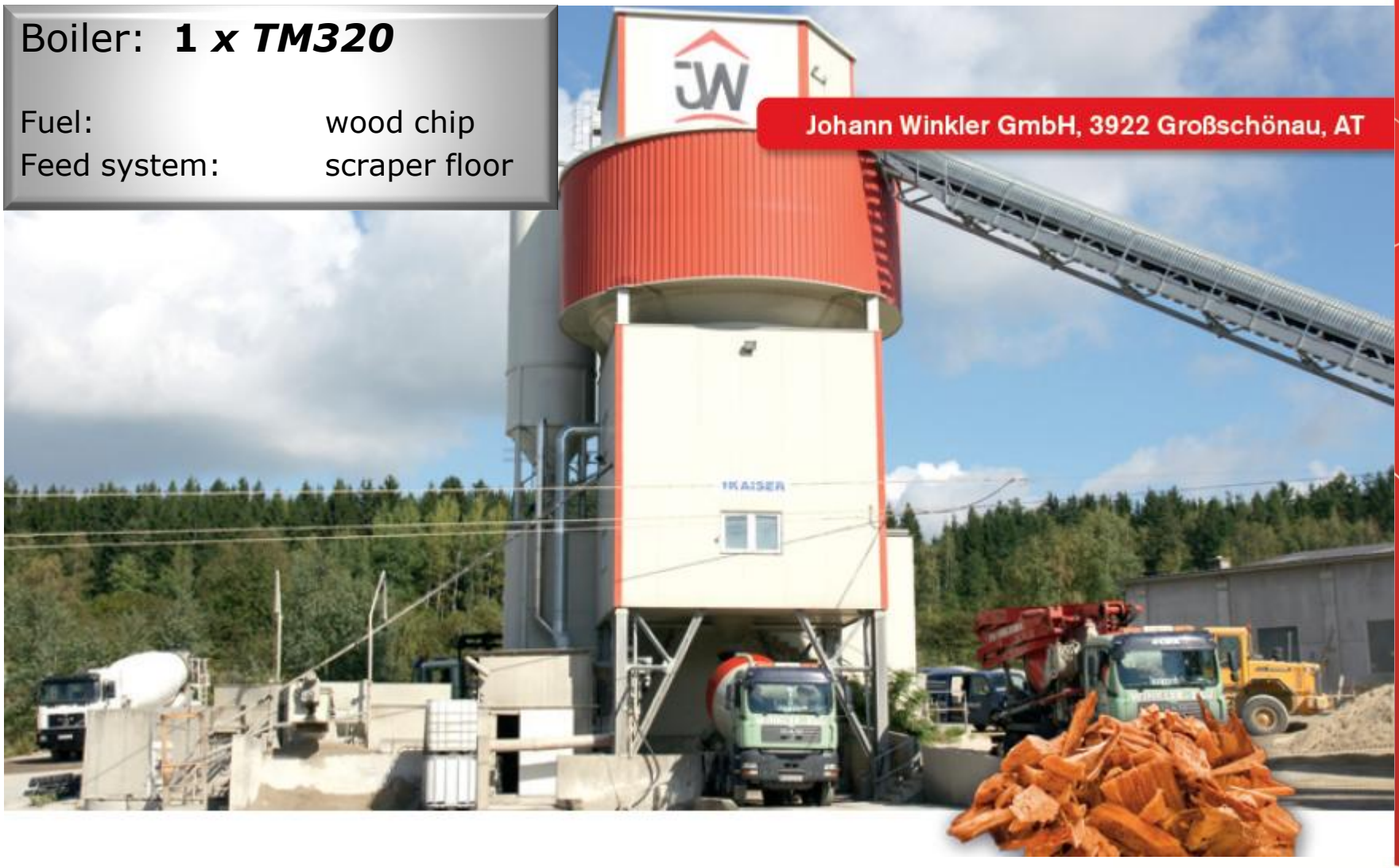
Fuel: wood chip

Feed system: scraper floor

Example: Winkler cement factory

Boiler: **1 *x TM320***

Fuel: wood chip
Feed system: scraper floor



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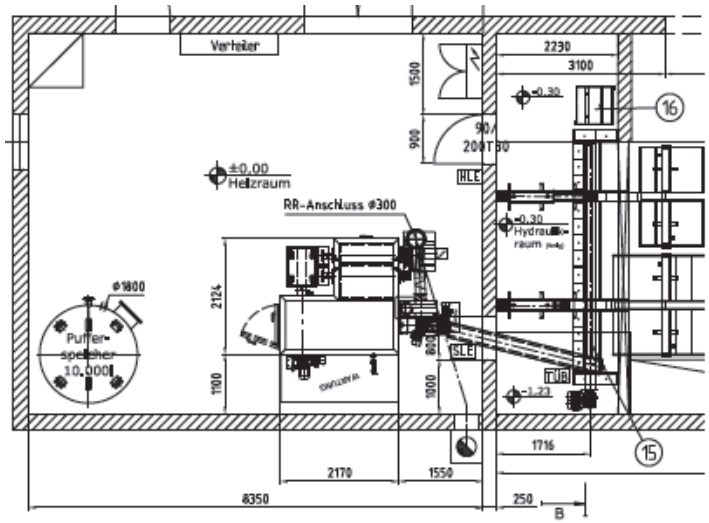
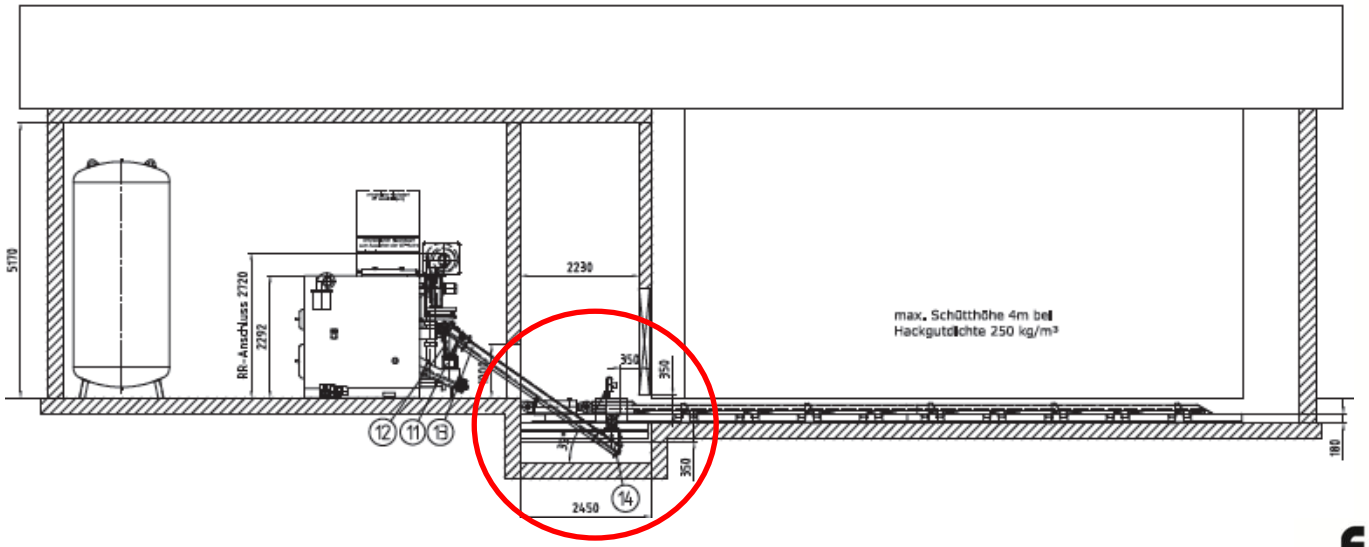
Example: Winkler cement factory



Boiler: **1 x *TM320*** ***(3,4MBtu/h)***

Fuel: wood chip

Feed system: scraper floor



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Questions …

Discussion…