HEIN

HEIN ENGINEERING CO., LTD

緬甸浩天工程建設有限公司

我公司採用先進的技術和工藝，
竭誠為廣大客戶提供優質的產品及完善的售後服務。

Our Aim Is Your Satisfaction!

HEIN Engineering Co.,ltd.

In 1997 ,We established our Hein engineering Co.,ltd with 4 engineers and 50 labors At Mandalay.

At first ,We produced grinding,mixing and drying machinery for feedmill .
We also build factories, workshops and warehouses by using steel structure.

In 2004 ,We have accelerated our business by moving to Yangon.
Now We are building modern steel structure factories, industries, warehouses and Feedmills.

Up to 2006 ,over 160 factories and 5 feedmill have already been built in Myanmar.

Htoo Thit feedmill ,The largest fish feedmill (pelleting) in Myanmar in Shwe Lin Pan Industrial zone, was built by our company.

In 2004 ,Biomass gasification technology was adopted from china on an experimental Stage .In 2006, We have successfully start to run commercial scale.

In May 2006 ,we have already siging M.O.U with Act Ventures Sdn Bhd. (Malaysia) About gasification technology and innovation.

Type of Service we can create..

Steel Structure Construction

Feed Mill Production & Installation

Hein Biomass-Gasifier

Our Engineers

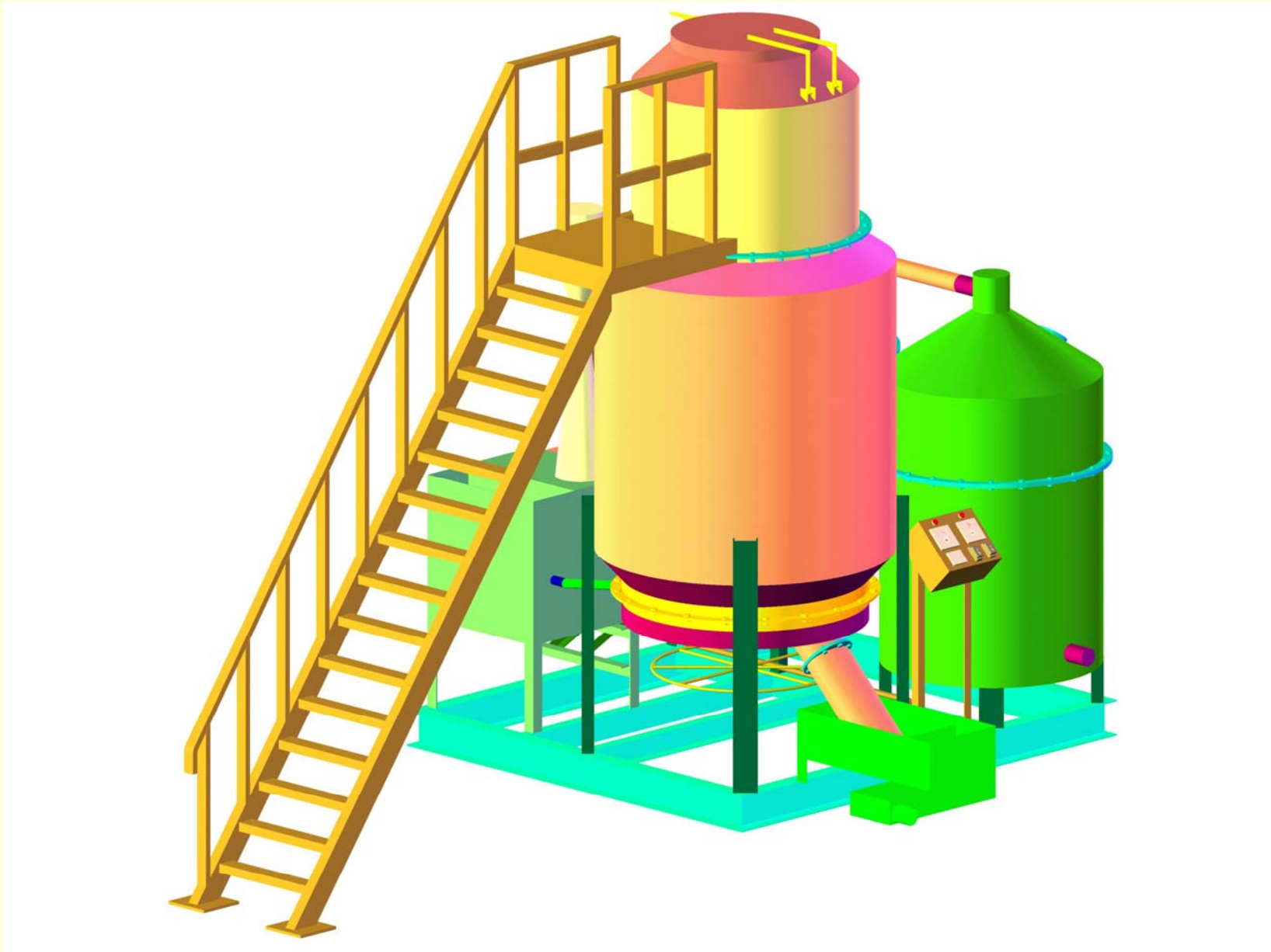
Our Design Center

Some of our enperience

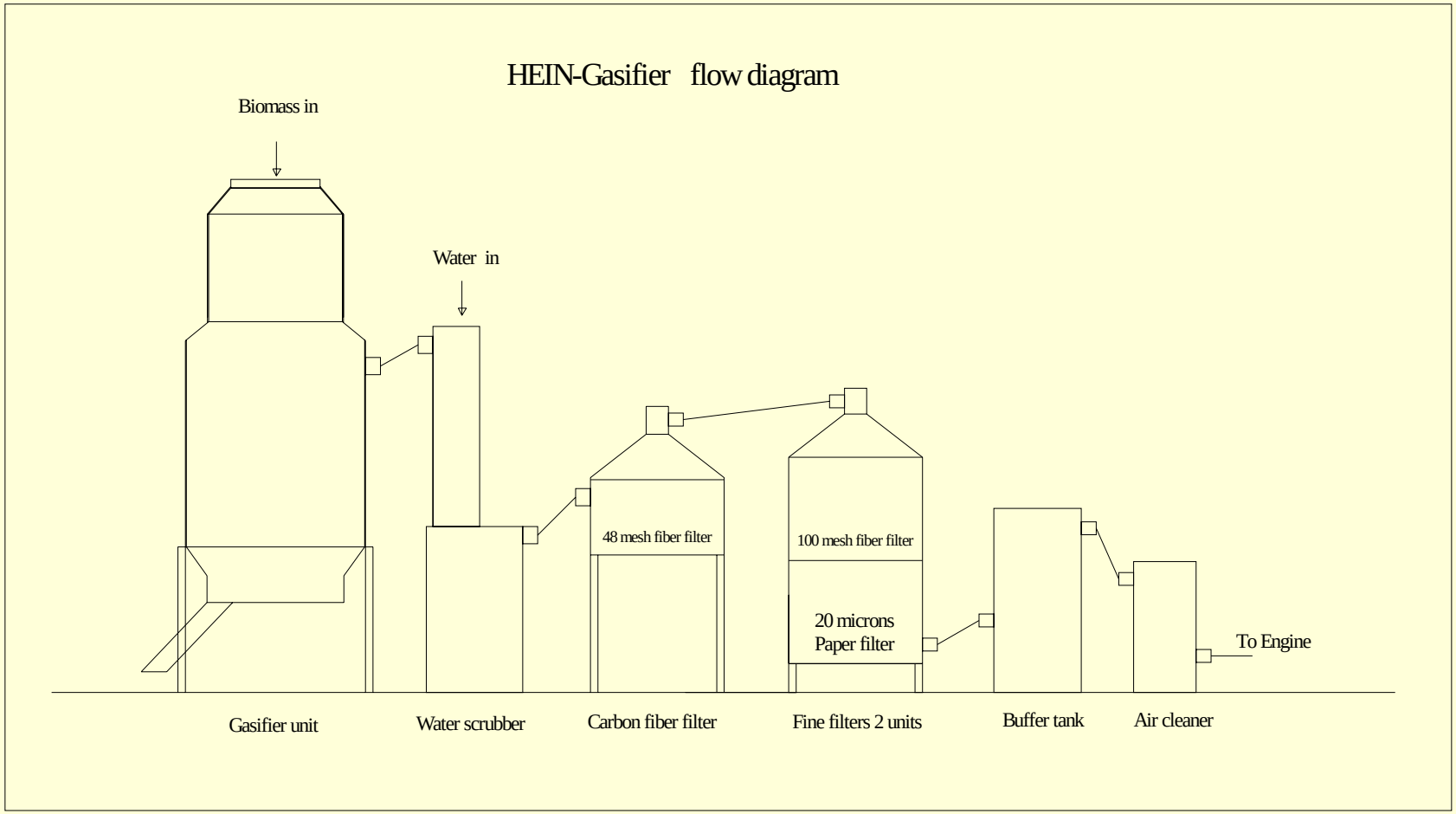
5 T/h Pellet mill

The biggest feed mill in Myanmar (20 T/h)

Hein Gasifier Model-HG-T001 3D- drawing



Hein Gasifier Model-HG-T001 Flow Diagram



Our Testing equipment

Hein Gasifier Model-HG-T001

Contol Pannel

Hein Gasifier Model-HG-T001

Dual fuel Diesel genset

Specification

- Model	HG-T001
- Type	Downdraft , open top
- Over all size	6.5 ft x 8 ft x 10 ft
- Rated Capacity	75KWe
- Starting System	Water pump , 0.75Kw
- Starting Time	5~15 minutes
- Gas output rate	200~250nm3 /h
- Hopper Vibrations	No.
- Type of Ash Disposal	Water Seal
- Frequency of cleaning	Every 250 hours
- Manpower requirement	2 Unskilled Labors
- Fuel system	Dual-fuel
- Diesel consumption	0.5 gal/hour
- Biomass consumption	135 kg/h (rice husk)
- Water consumption	600 gal/h

Advantages

- - Only one moving part (water pump)
- - low maintaince
- - Unskilled person can operate gasifier
- - Alarm system for biomass Loading and ash disposal
- - Display filter block condition
- - Shorter pay back period (6 months)
- - High durable
- - 3 step, dry type tar filter system
- - (1) 48 mesh (300 microns) Carbon fiber filter
- - (2) 100 mesh (150 microns) Carbon fiber filter
- - (3) (20 microns) Paper filter system
- - Low Tar contact 60 mg/nm3

Hein gasifier under construction

Hein gasifier under construction

300kw gasifier under test run

M.O.U signing with Malaysia Company

M.O.U signing with Malaysia Company

Cost saving for 100kw diesel generator

		Fuel		Rate	Cost/h	1month
		Gal/h	Kg/h			
Diesel	100%	2.5		4,000	10,000	**2,400,000**
					-	-
Diesel	25%	0.625		4,000	2,500	600,000
Rice Husk	75%		50	20	1,000	240,000
Labor					350	84,000
Maintaince					300	72,000
Total						**996,000**
Cost Saving per month						**1,404,000**
Cost for gasifier						**7,000,000**
Pay back time						**5 months**

Remark- This calculation is Based on 30 days per month and 8 hours per day.

Business Opportunity

Operation cost for 1kwh

No.	Particular	unit	quantity	Rate	Amount (Kyat)
1	Rice Husk	Kg	1.80	6.00	10.80
2	Engineer	No.	2.00	0.90	1.80
3	Labor	No.	6.00	0.45	2.70
4	Generator maintaince				5.00
5	Gasification unit maintaince				2.00
6	General and Over head charge				2.00
7	Bank interest		1200	0.18	22.50
	Total				**46.80**

Inverestment cost for 200kw biomass generator is 120,000,000 Kyats.

Business Opportunity

If We sell 100 Kyats for 1kwh pay back period is	2.35	Year	100	51,072,000
If We sell 150 Kyats for 1kwh pay back period is	1.21	Year	150	99,072,000
If We sell 200 Kyats for 1kwh pay back period is	0.82	Year	200	147,072,000

This calculation is based on the following data.
The Generator will be run 300 days per year.
The Generator will be run 20 hours per day.
The Generator will be run 160 KW per hour.

China price at Muse is 1 RMB/kwh . (170 Kyats)
Thailand price at Myawade is 8 baht/kwh (270 Kyats)
Electric price at Sittwe is 350 kyats/kwh.
Electric price at Kawthoung is 500 kyats/kwh.

BIOMASS ENERGY

What is Biomass ?

BIOMASS ENERGY

Biomass conversion process

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Biomass[(1)] Conversion

using solid or liquid feedstocks, such as…

- corn stover, switchgrass, poplar, willow
- potato, brewery waste
- wood waste - sawdust, wood chips, pallets/crates
- vegetable oils - rapeseed, corn, safflower
- agriculture waste
- municipal waste

… via

ThermoChemical Process

Burn

Remove air & Add heat 800-1000'F

Add air & heat 1300-2000'F

Direct Combustion (Wood waste)

Pyrolysis (Liquid BioFuel) Synthetic Fuel Oil

Gasification (BioGas) Producer Gas

"or"

BioChemical Process

Add yeast

Remove air & add heat 70-150'F

Alcoholic Fermentation (Liquid BioFuel) Ethanol

Anaerobic Digester (BioGas) Digester Gas

"or"

Chemical Process

Crush oil seed & add heat ~110'F

BioDiesel

to produce renewable...

Heat or Electricity directly

"or"

Other solid, liquid or gaseous biofuels

(1) Biomass is Solar Energy stored in organic matter. Biomass energy technologies capture the energy stored in biomass and make it available in useful forms.

BIOMASS GASIFICATION

What is gasification ?

Biomass gasification means incomplete combustion of biomass resulting in production of combustible gases consisting of Carbon monoxide (CO), Hydrogen (H2) and traces of Methane (CH4). This mixture is called producer gas. Producer gas can be used to run internal combustion engines.

In anticipation of unreliable petroleum supply, between 1920 and 1940 compact down draught gasifier systems for automotive application, were developed in Europe. During the 2" World War tens of thousands of those gasifiers were used in Europe and elsewhere. Shortly after the War most gasifiers were decommissioned because of widespread availability of inexpensive liquid fuels.

BIOMASS GASIFICATION

History

BIOMASS GASIFICATION

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History

BIOMASS GASIFICATION TECHNOLOGY

There are mainly four type of gasification method.

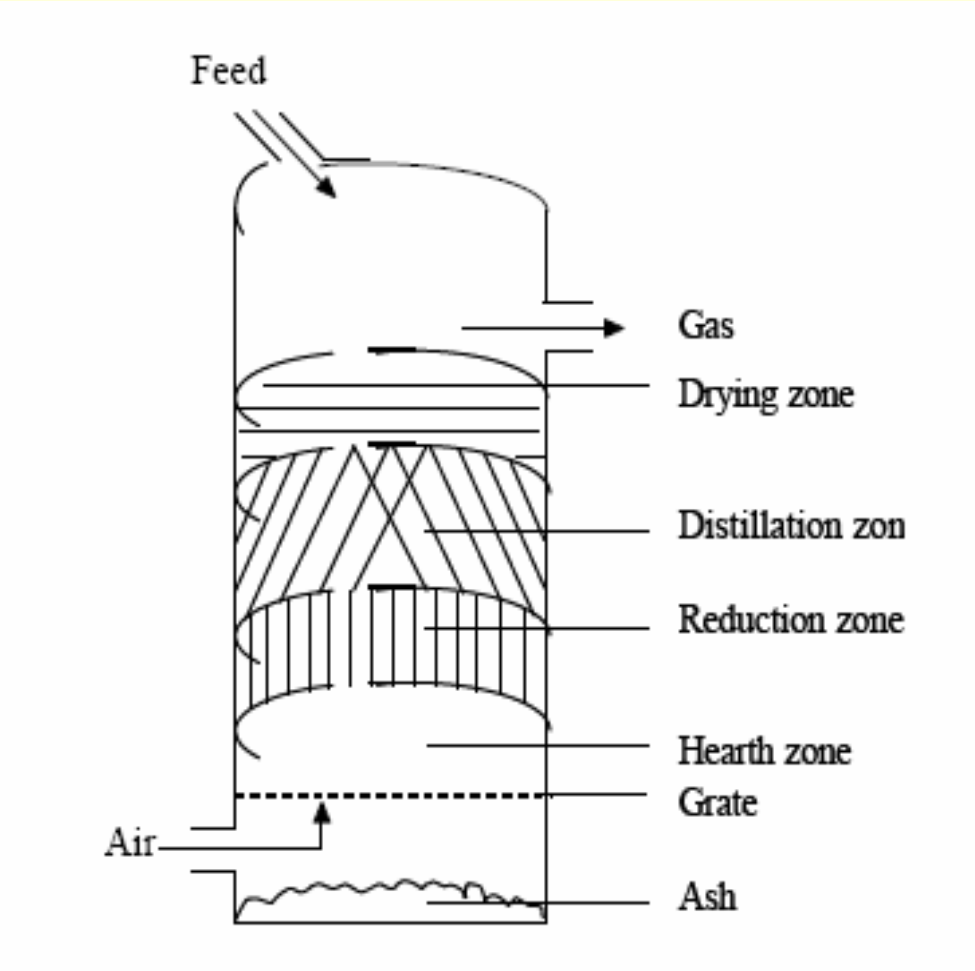
1.Up draught gasifier

2.Down draught gasifier

3.Cross gasifier

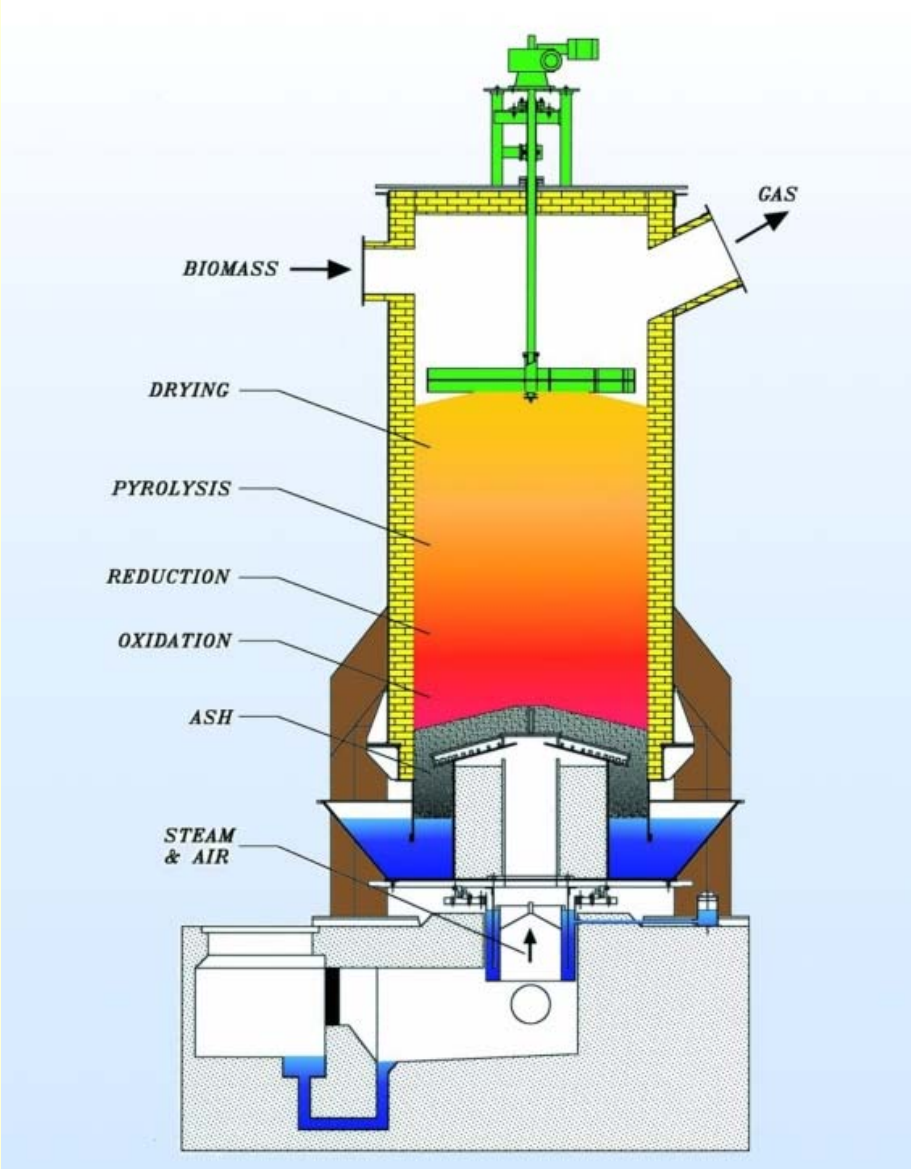
4.Fluidised bed gasifier

Up draught gasifier



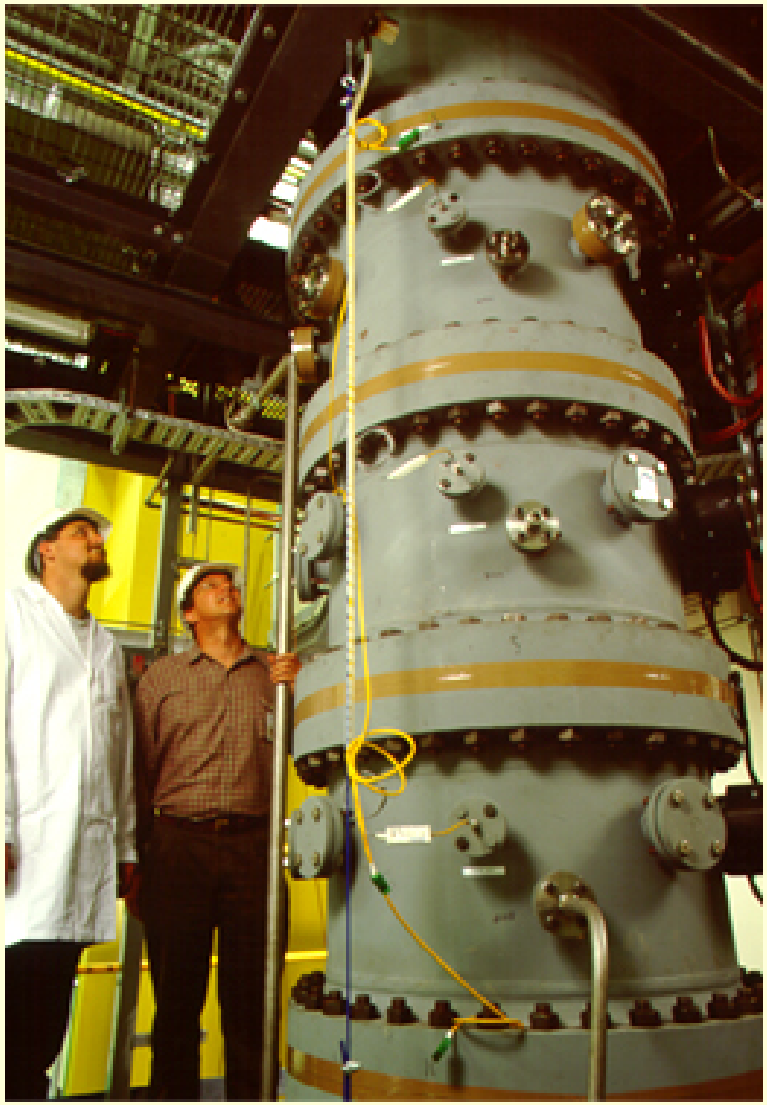
The simplest type of gasifier is the fixed bed gasifier . The biomass is fed at the top of the reactor and moves downwards as a result of the conversion of the biomass and the removal of ashes. The air intake is at the bottom and the gas leaves at the top. The biomass moves in counter current to the gas flow, and passes through the drying zone, the distillation zone, the reduction zone and the hearth zone.

Up draught gasifier



In the drying zone the biomass is dried. In the distillation or pyrolisation zone the biomass is decomposed in volatile gases and solid char. The heat for pyrolisation and drying is mainly delivered by the upwards flowing producer gas and partly by radiation from the hearth zone. In the reduction zone many reactions occur involving char, carbon dioxide and water vapour, in which carbon is converted and carbon monoxide and hydrogen are produced as the main constituents of the producer gas. In hearth zone the remaining char is combusted providing the heat, the carbon dioxide and water vapour for the reactions involved in the reduction zone.

Up draught gasifier



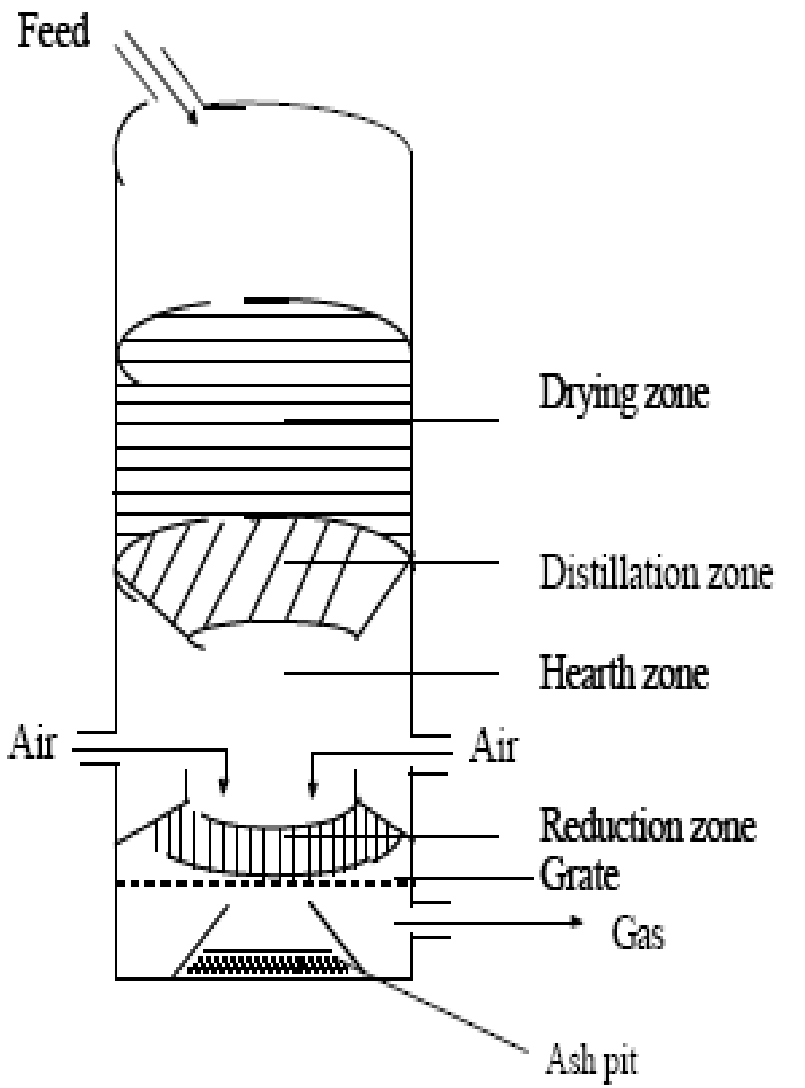
The major advantages of this type of gasifier are its simplicity, high charcoal burn-out and internal heat exchange leading to low gas exit temperatures and high gasification efficiencies. Because of the internal heat exchange the fuel is dried in the top of the gasifier and therefore **fuels with a high moisture content** (up to 60 % wb) can be used.

Furthermore this type of gasifier can even process relatively **small sized fuel particles and accepts some size variation** in the fuel feedstock.

Up draught gasifier

Major drawbacks are **the high amounts of tar and pyrolysis products**, because the pyrolysis gas is not
combusted. This is of minor importance if the gas is used for direct heat applications, in which the tars
are simply burnt. In case the gas is used for engines, extensive gas cleaning is required.

Down draught gasifier



In a down-draught reactor biomass is fed at the top and the air intake is also at the top or from the sides.

The gas leaves at the bottom of the reactor, so the fuel and the gas move in the same direction.

The same zones can be distinguished as in the up-draught gasifier, although the order is
somewhat different. The biomass is dried and pyrolised in the drying and distillation zone respectively.

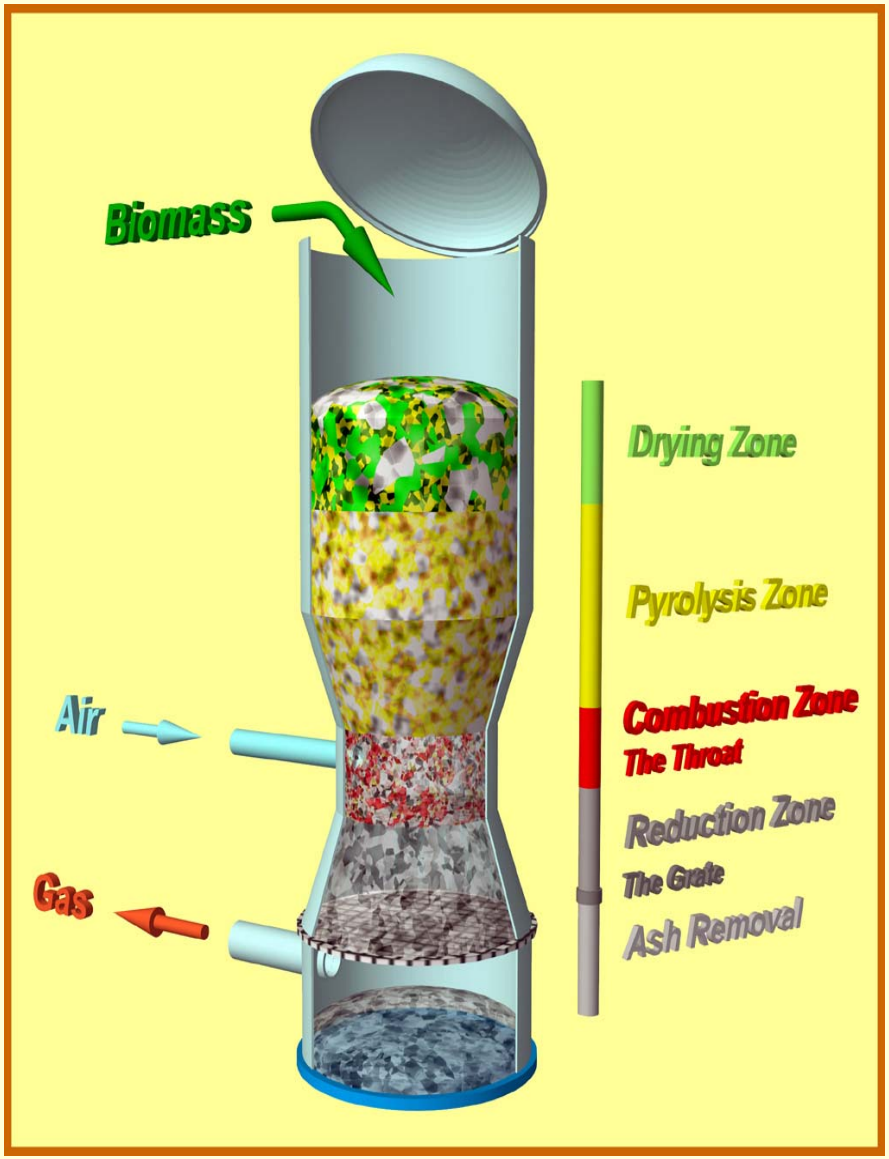
Down draught gasifier

These zones are mainly heated by radiation (and partly convection) heat from the hearth zone, where a part of the char is burnt.

The pyrolysis gases pass also through this zone to be burnt as well. The extent to which the pyrolysis gases are actually burnt depends on design, the biomass feedstock and the skills of the operator.

After the oxidation zone the remaining char and the combustion products carbon dioxide and water vapour pass to the reduction zone where the reduction reactions take place forming CO and H2.

Down draught gasifier



Hence the main advantage of a down-draught gasifier is the production of a **gas with a low tar content which is nearly suitable for engine applications**.

In practice however, a tar-free gas is seldom if ever achieved over the whole operating range of the equipment.

The main reason seems to be that not all gases pass through the hottest zones and that their
residence time in the combustion zone might be too short.

In each particular design other features are included to realize a high conversion rate of the pyrolysis gases.

Down draught gasifier

-the high amounts of ash and dust particles in the gas due to the fact that the gas has to pass the oxidation zone collecting small ash particles.

- the relatively strict requirements on fuel which has to be uniformly sized in the range of 4 -10 cm to realize regular flow, no blocking in the throat, enough "open space" for the pyrolysis
gases to flow downwards and to allow heat transport from the hearth zone upwards; therefore uniform size of the biomass is often necessary.

-the moisture content of the biomass must be less than 25 % (on a wet basis).

-**the relative high temperature of the leaving flue gases resulting in a lower gasification efficiency.**

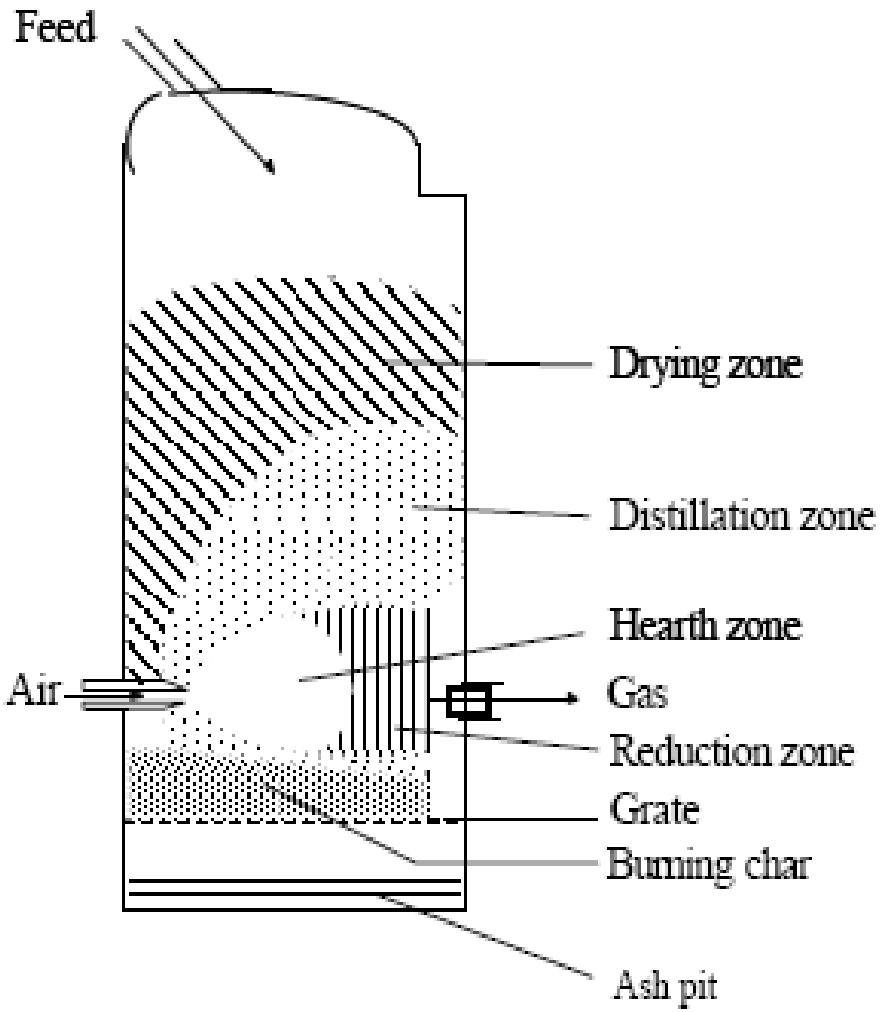
This type of gasifiers is used in power production applications in a range from 80 up to 500 kWe or more.

Down draught gasifier

Down draught gasifier

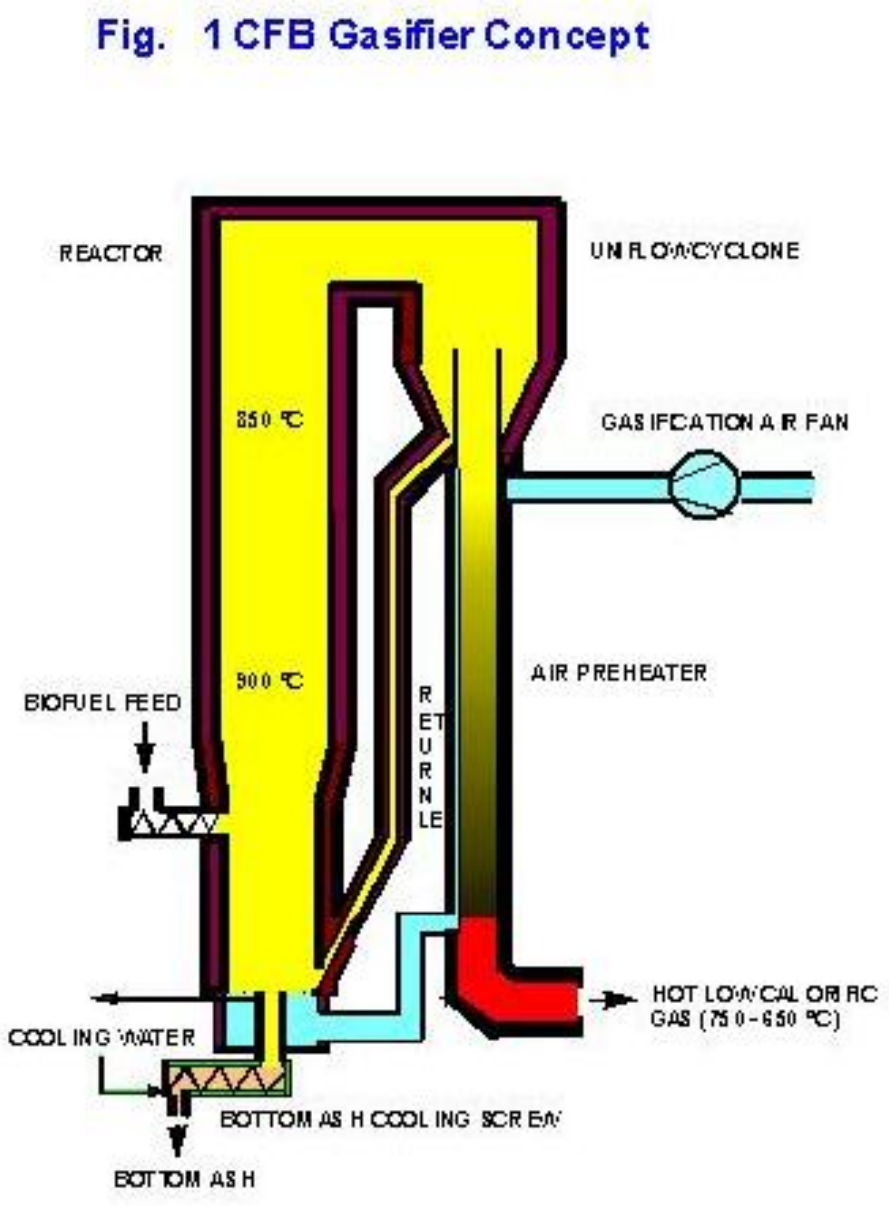
Down draught gasifier

Cross gasifier



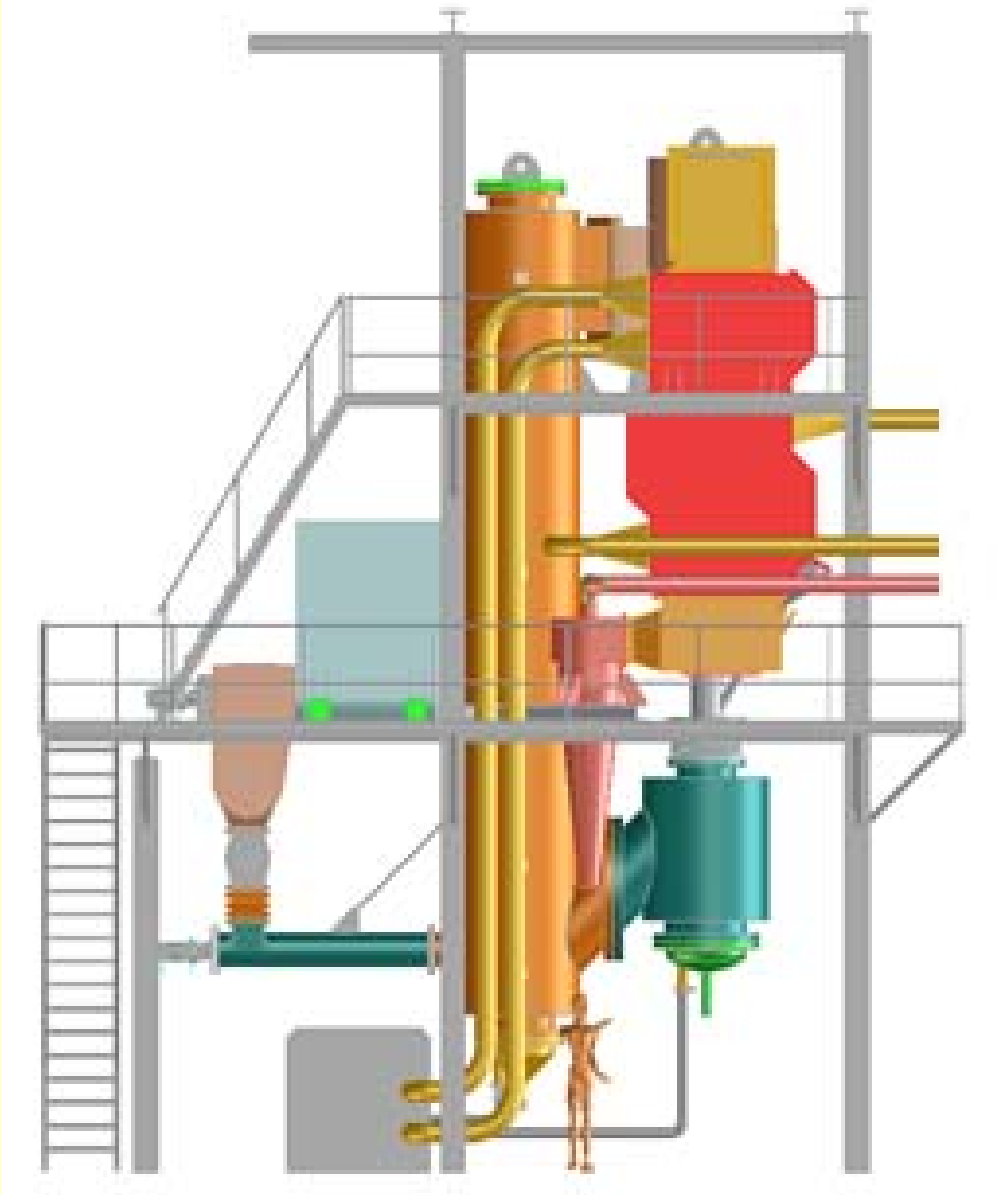
Cross-draught gasifiers are adapted for the use of charcoal, see figure 3. Charcoal gasification results in very high temperatures (1500 EC and higher) in the hearth zone which can lead to material problems. Advantages of the system lie in the very small scale at which it can be operated. In developing countries installations for shaft power under 10 kWel are used. This is possible due to the very simple gas-cleaning train (cyclone and a bed filter). A drawback is the minimal tar-converting capability, resulting in the need
for high quality charcoal.

Fluidised bed gasifier



In fluidized bed gasifiers the air is blown upwards through the biomass bed. The bed under
such conditions behaves like boiling fluid and has excellent temperature uniformity and
provides efficient contact between gaseous and solid phase. Generally the heat is transferred
initially by hot bed of sand. The major advantage of fluidized bed gasifier over, say,
downdraft is its flexibility with regard to feed rate and its composition. Fluidized bed systems
can also have high volumetric capacity and the temperature can be easily controlled.

Fluidised bed gasifier



Fluidised bed gasifier

Advantages of fluidised bed reactors in comparison with fixed bed reactors are:
-compact construction because of high heat exchange and reaction rates due to the intensive mixing in the bed;

-flexible to changes in fuel characteristics such as moisture and ash content; ability to deal with fluffy and fine grained materials with high ash contents and/or low bulk density;

- relatively low ash melting points are allowed due to the low reaction temperatures.

Conclusion

Characteristics of different gasifier

	down draught	up draught
Fuel (wood)		
- moist. cont. (% wet basis)	12 (max. 25)	43 (max. 60)
- ash content (% dry basis)	0.5 (max. 6)	1.4 (max. 25)
size (mm)	20 - 100	5 - 100
Gas exit temp (°C)	700	200 - 400
Tars (g/Nm3)	0.015 - 0.5	30 - 150
sensitivity to load fluctuations	sensitive	not sensitive
turn down ratio	3 - 4	5 ~ 10
Producer gas LHV (kJ/Nm3)	4.5 - 5.0	5.0 - 6.0

Conclusion

COMPARISON OF A FIXED BED AND FLUIDISED BED GASIFIER

	Fixed bed	Fluidised bed
Fuel: size (mm)	10-100	0-20
ash content (% wt)	<6	<25
Operating temperature (°C)	800-1400	750-950
Control	simple	average
Turn down ratio	4	3
construction material	mild steel + refractory	heat resistant steel
capacity (MW)	<2.5	1~50
Start-up time	minutes	hours
Attendance	low	average
Tar content (g/nm3)	< 3	< 5
LHV (MJ/nm3)	4.5	5.1

愿我们的劳力
能为您的基业创造更加辉煌的明天！

Thank you.

HEIN

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