

# Advanced Biomass Gasification

## High Pressure Gasifier for Gas Turbine Application

### Combustion, Gasification and Propulsion

#### Laboratory, Indian Institute of Science, Bangalore

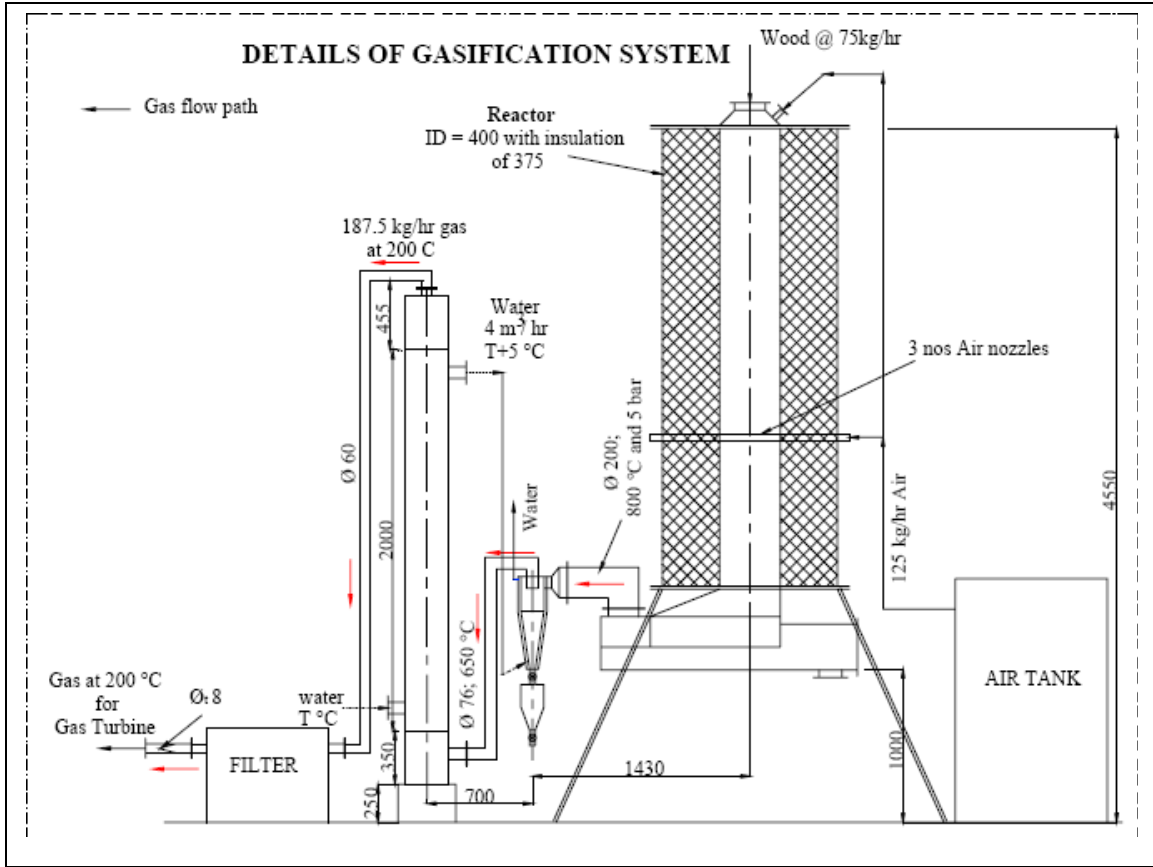
#### Background

- **Objective** - To develop a high pressure down draft gasifier and characterize its performance in conjunction with a suitable gas turbine.
- **Duration:** 30 months
- **Participating institutions** - BHEL, IICT, IITM, IISbB

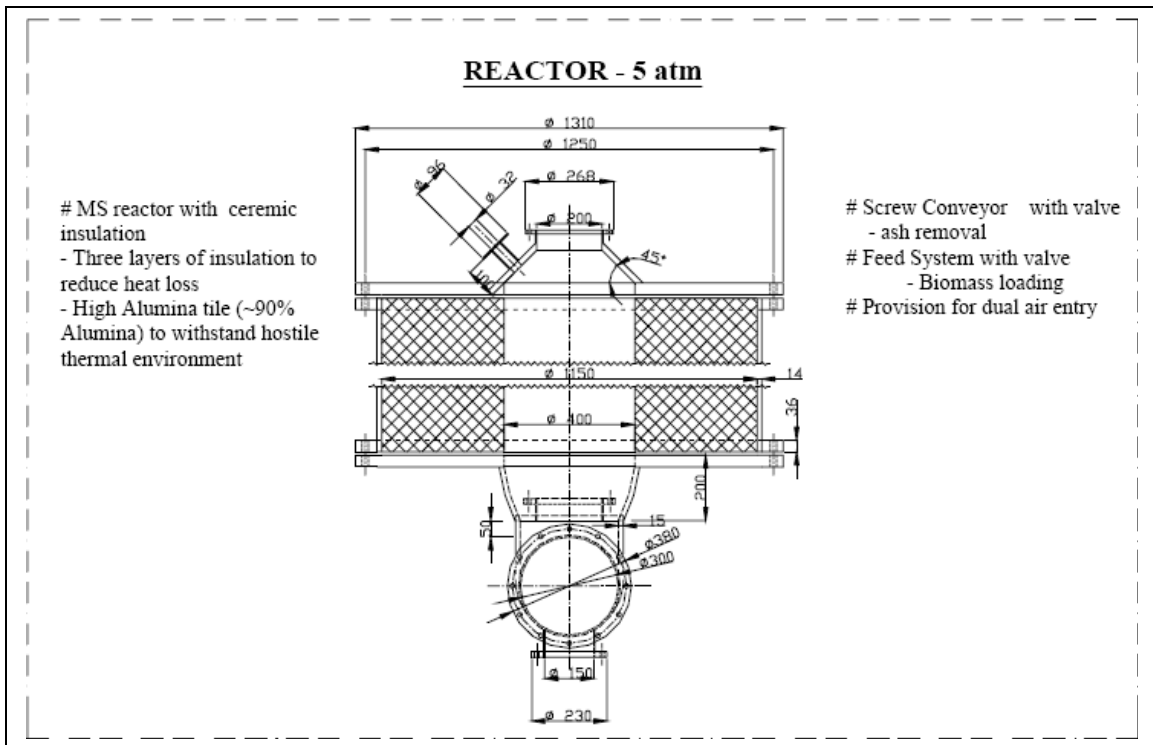
#### Scope of Work at IISc - Current Status

- Design of major elements of the gasification system completed.
- Engineering drawings completed.
- Fabrication of major components completed.
- Erection under progress.
- Appropriate instrumentation for testing identified. Most of those such as gas analyzers and temperature and pressure sensors have been sourced.
- Order placed for a micro-turbine.

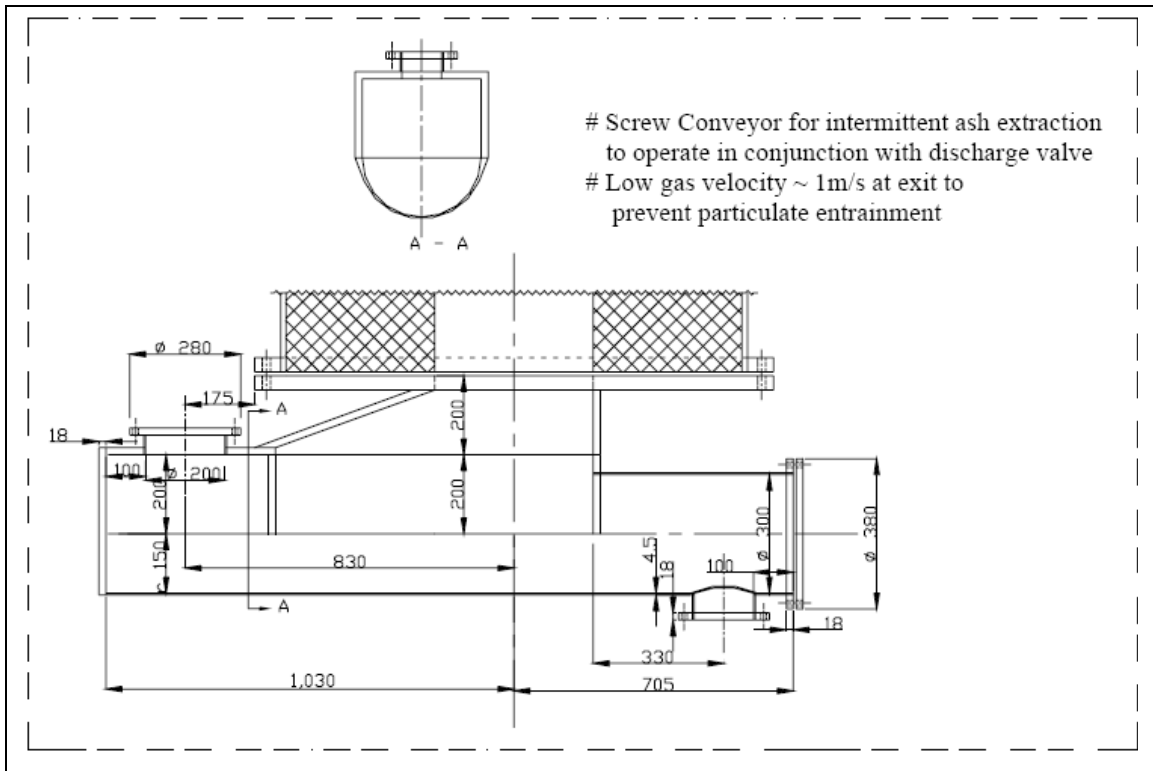
# System and Components



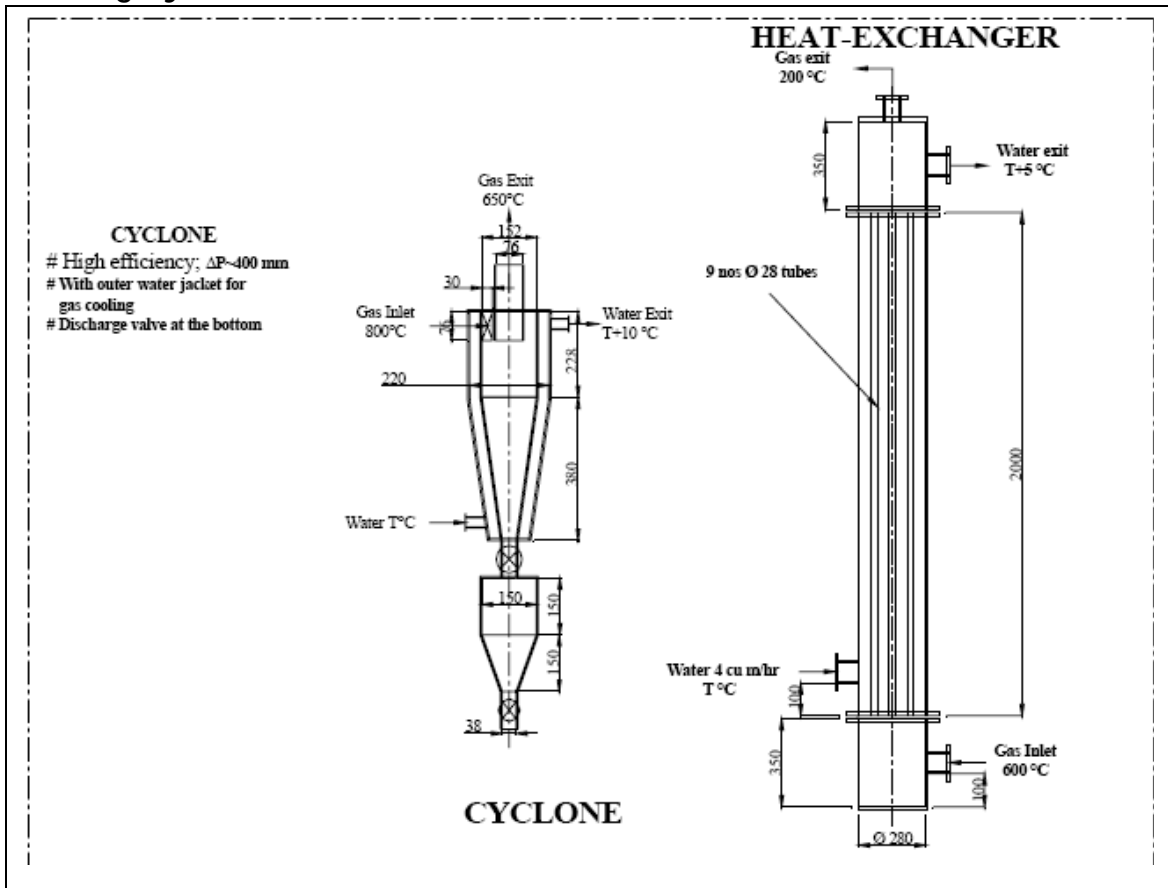
# The Reactor



## Ash Extraction System



## Cooling System



## Process and Instrumentation Scheme

- Thermocouples at strategic locations.
- Pressure sensors.
- Flow measurements – using differential pressure for both air and gas.
- Gas analyzers – NDIR based on-line gas analyzers to determine composition of H<sub>2</sub>, CO, CO<sub>2</sub>, CH<sub>4</sub>, and O<sub>2</sub>.
- PLC based automation
  - Ash screw operation
  - Feed system
  - Air flow control
  - Cooling water control
- SCADA based data acquisition system
- for display and subsequent analysis
- Tar & particulate analysis

## Work to be Completed

- Completion of gasifier assembly (two weeks)
- Test runs with locally fabricated feed and ash extraction system and gas cleaning system
- Qualification of the gas from high pressure gasification system for use in the gas turbine (July/august 2001)
- Integration of components from BHEL/IICT
- Tests on gas turbine

## Financial statement for IISC

Sl no	Budget Head	I year Sanction	I year received	Expenditure * upto 15/1/2001	First year's Balance available (D-E)	II year's sanction	Funds release requested (C-D)+G
A	B	C	D	E	F	G	H**
1	Equipment	60,00,000	60,00,000	50,23,465	9,76,535	5,00,000	5,00,000
2	Staff/man power	6,00,000	1,00,000	4,15,240	-3,15,240	6,00,000	11,00,000
3	Consumables & contingencies (EES)	20,00,000	3,00,000	8,75,855	-5,75,855	15,00,000	32,00,000
4	Travel & communication	4,00,000	1,00,000	1,54,300	-54,300	2,00,000	5,00,000
5	Inst. Overhead	13,50,000	3,00,000	3,00,000		4,20,000	14,70,000
	<b>TOTAL</b>	<b>1,03,50,000</b>	<b>68,00,000</b>	<b>67,68,860</b>	<b>31,140</b>	<b>32,20,000</b>	<b>67,70,000</b>

## Combined statement and funds requested

Institution	I year sanction	I year received	Expenditure up to December	I year balance available	II year's sanction	Funds requested
IISc, Bangalore	103,50,000	68,00,000	67,68,860	31,140	32,20,000	67,70,000
IIT, Chennai	34,50,000	23,00,000	3,29,192	19,70,808	17,25,000	17,70,000
BHEL, Thichy	29,90,000	23,00,000	18,00,000	5,00,000	18,30,000	25,30,000
IICT, Hyderabad	41,40,000	33,00,000	42,78,000	-9,88,000	6,90,000	15,30,000
<b>TOTAL</b>	<b>2,09,30,000</b>	<b>1,47,00,000</b>	<b>1,31,76,052</b>	<b>15,13,948</b>	<b>74,65,000</b>	<b>1,26,10,000</b>