PLTU Tanjun Awar Awar Biomass Blending Combustion Technology

PT DATONG JAYA INDONESIA

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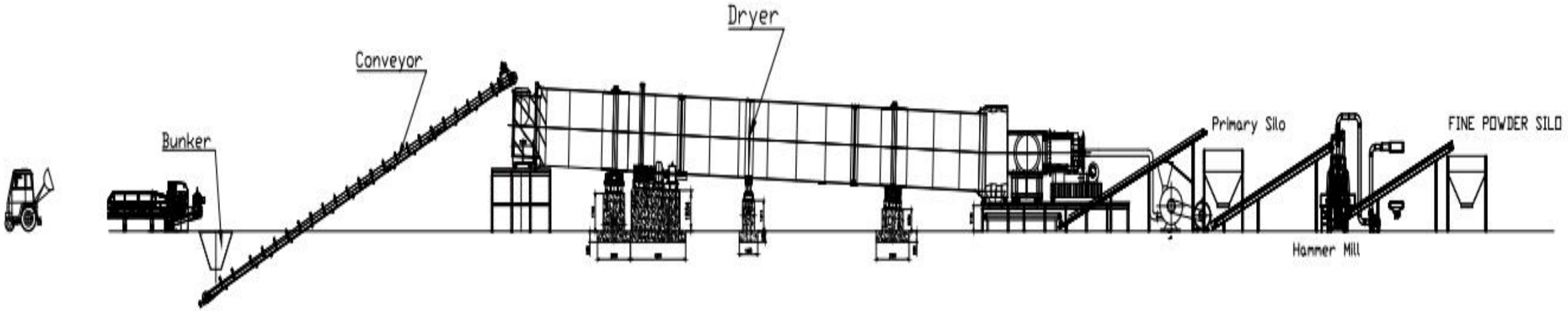
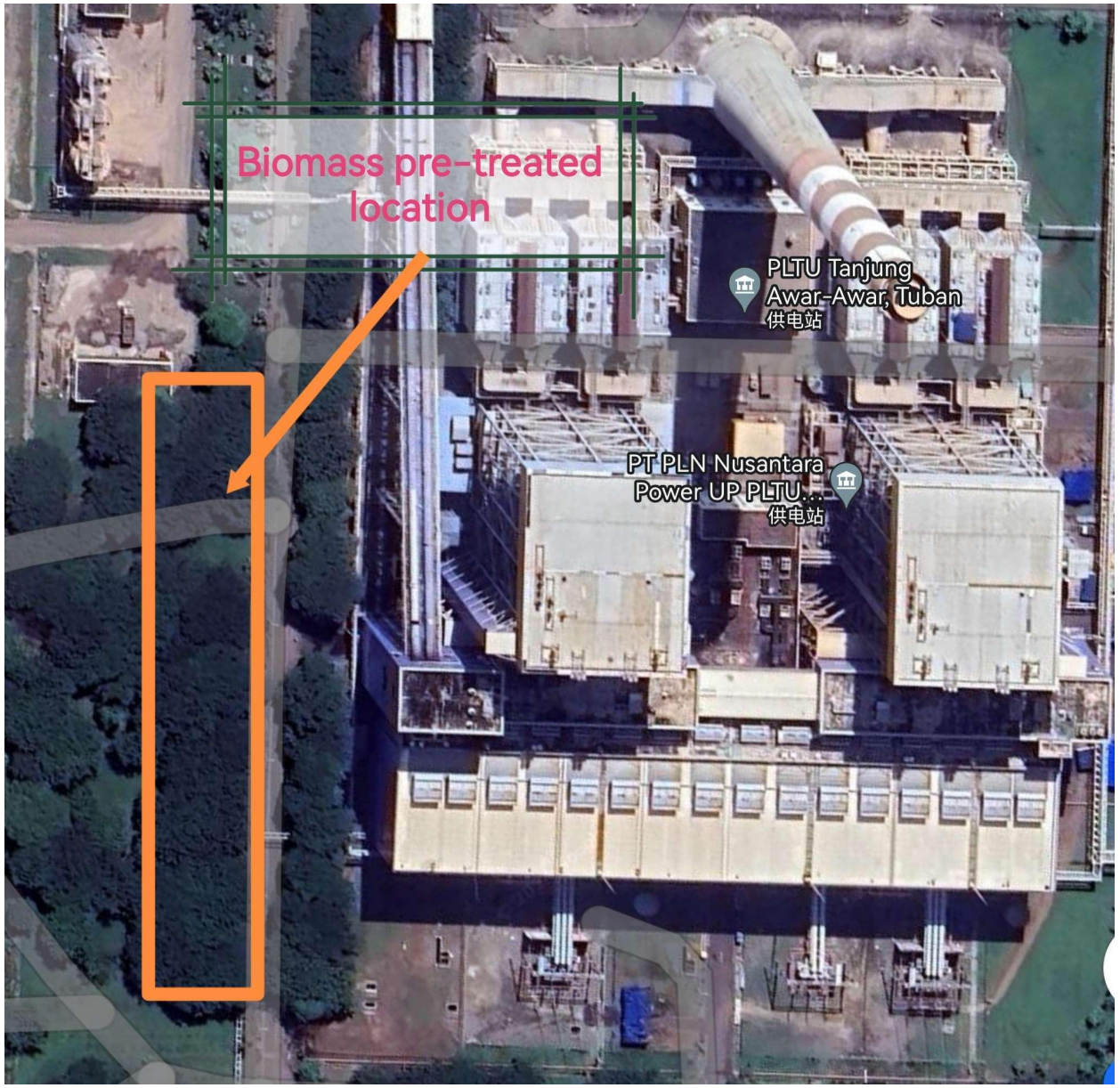
Biomass type: corncob, rice husk, sawdust
Mixed burning amount of single boiler: 20t/H
Composition of mixed combustion system: design and build separate biomass pretreatment system, primary crushing system, feeding system, drying system, primary silo system, hammer mill system, powder silo system, fire and explosion protection system, screw feeder system, Roots blower powder feeding system, piping system, and pulverized coal biomass burner



Location of biomass pretreatment system: The biomass pretreatment system is arranged in the open space on the left side of Unit 1, covering an area of 2,600 ㎡, the stockyard is located near the coal yard of the power plant. During daily operation, the biomass raw materials need to be transported to the biomass pretreatment yard in front of the boiler by forklift.



Primary crushing system: the system is mainly used for primary crushing of corncobs. The discharge size of the crusher is 50-80 mm, and the output of a single equipment is 15t/H. The primary crushing is operated independently offline, and the system is designed with one for use. The feeding hopper adopts the forklift loading mode, and the primary crushers connected with a set of underground transfer hopper for discharge.

Model: pd1300
Size of feed inlet: 1300 * 350 mm
Main engine power: 4 p-132kw
Feeding power: 7.5kw
Pulling power: 7.5kw
Oil pump power: 1.5kw
Knife roll speed: 600r/min
Number of flying knives: 4 pieces
Output: 10-15t/H

Primary conveying system: the dryer is fed by belt conveyor, and the biomass materials after primary crushing are transferred to the primary belt conveyor through the underground hopper and then sent to the drum dryer.

Dryer system: The moisture content of biomass has a great impact on the combustion efficiency of the boiler. The total moisture content of biomass entering the boiler needs to be controlled below 30%. The moisture content of sawdust is generally 60-70% or even higher. The dryer adopts the flue gas heating method. The moisture content of heated biomass is controlled at about 30%. The output of the dryer is 40t/H. Material is discharged by belt conveyor and sent to the primary surge bin.

Primary bunker: the dried biomass materials are sent to the primary bunker. The capacity of the surge bin is 30 cubic meters.

Hammer mill system: In order to ensure that the size of biomass material entering the furnace is less than 3mm, rice husk and crushed corncob need to be crushed for the second time, the system is designed with a set of hammer mill, the feeding size of the hammer mill shall not be greater than 80mm, the discharging size shall be less than 3mm, and the system output shall be 10-15 t/H.

Tip Speed 1800 rpm :25,434 Ft./min.(129 M/sec)
Tip Speed 1500 rpm :21,195 Ft./min.(108 M/sec)
Rotor Diameter x Width (MM) : 54 X 16 -48 (1,372 X 406 - 1,219)
Screen Area Sq.In.(Sq M): 2,368 - 7,104(1.53 - 4.58)
HP Range (KW) : 125 - 500 (90 - 370)
Air Requirement CFM (M3/Hr) :2,960 - 8,880 (5,029 - 15,089)
Dim A (MM) : 79 1/4’’ (2,013)
Dim B (MM) : 103 7/8’’ (2,639)
Dim C (MM) : 86’’ - 146’’ (2,184 - 3,708)

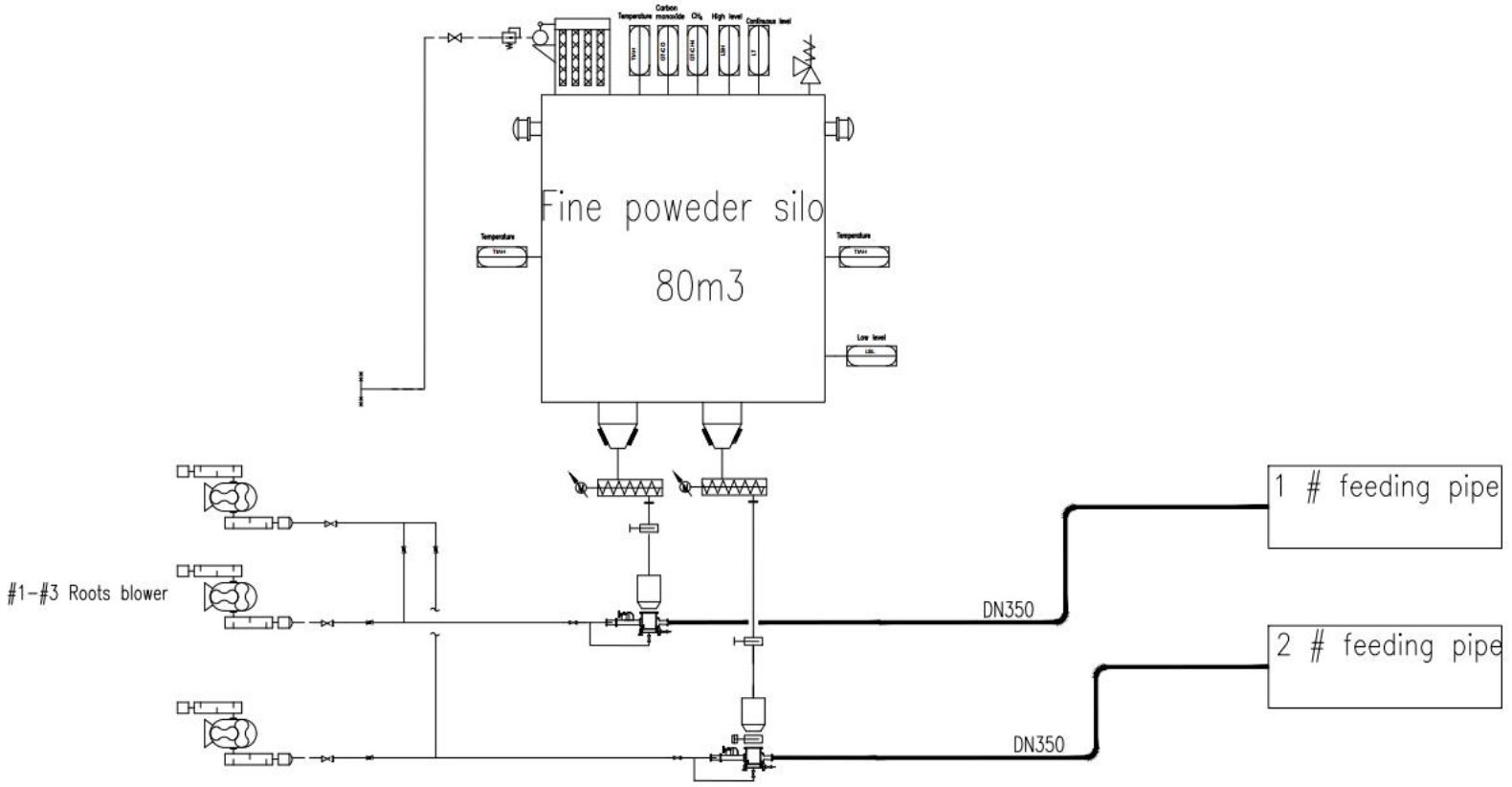
Bucket belt conveyor system: The crushed biomass powder is sent to the powder bin through the belt conveyor. Because the crushed biomass material is small in size and low in bulk density, the bucket belt conveyor is used.

Powder silo system: the biomass powder has high volatile matter, and is easy to be puffed during storage due to its low density. Therefore, the powder silo shall be designed in a small capacity mode to prevent spontaneous combustion and puffing of biomass powder due to long storage time. Two outlets of the powder silo are designed, and the lower part of each outlet is respectively connected with a set of screw feeder

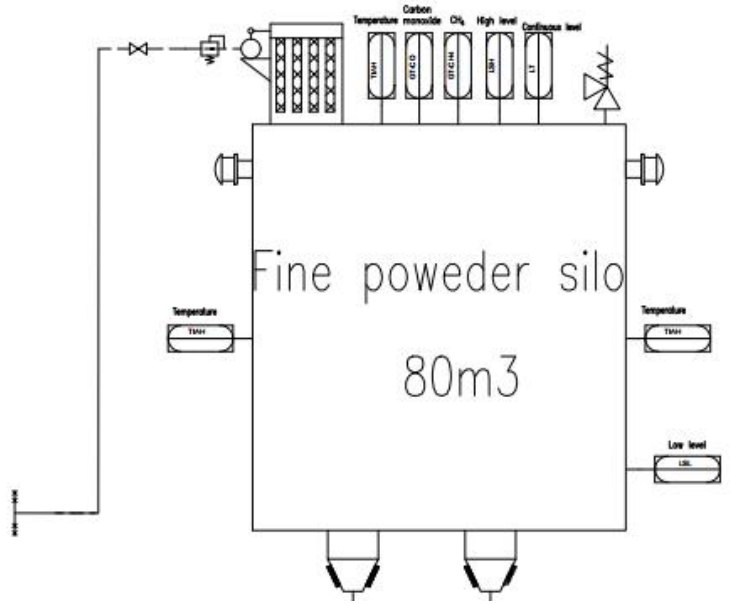
Screw feeder system: the biomass powder shall be conveyed by positive pressure, and the powder shall be conveyed to the lower pneumatic distributor by double-shaft screw feeder at the outlet of the powder silo.

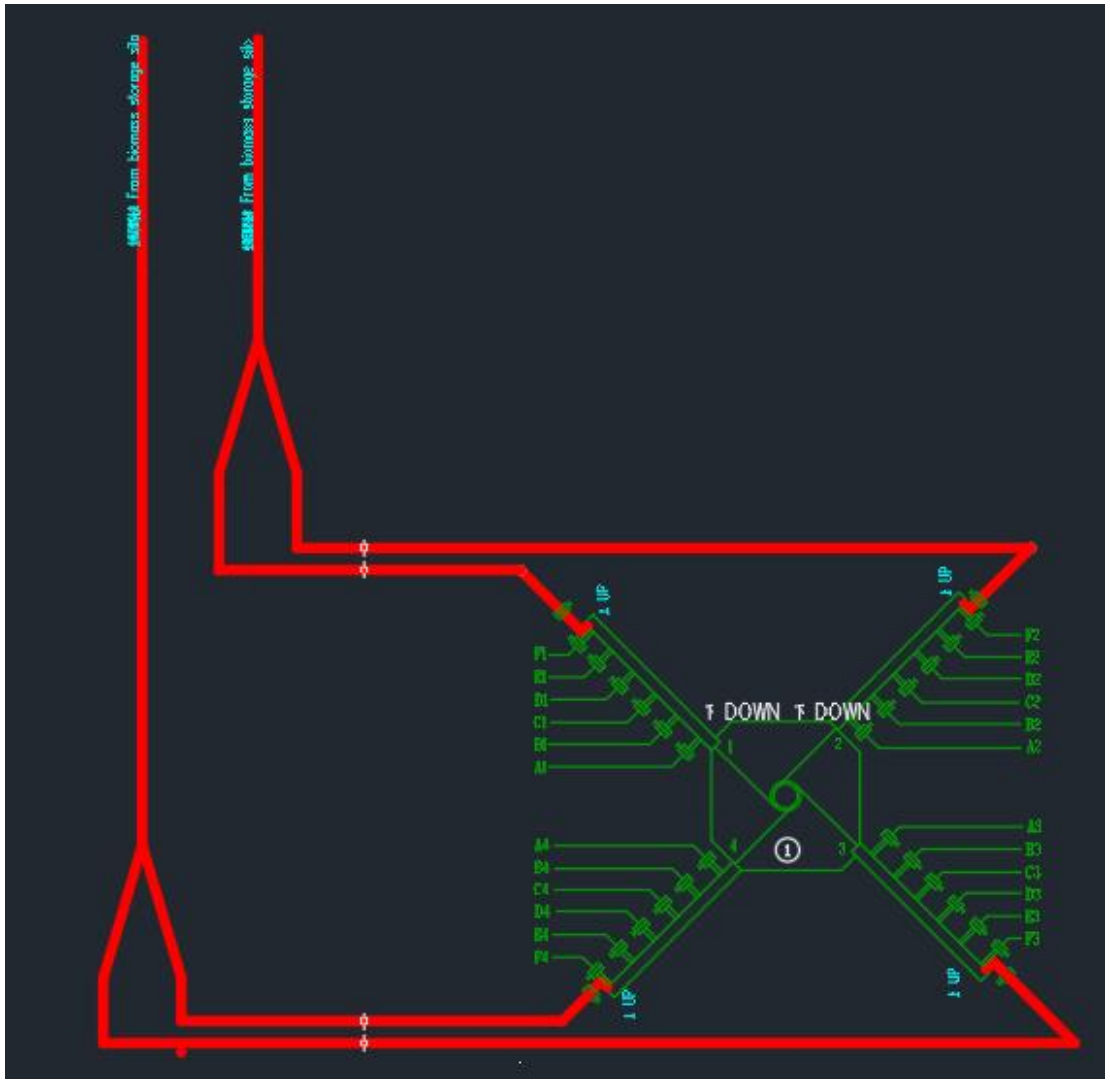
Roots blower system: The biomass powder in front of the furnace is conveyed by positive pressure and dilute phase. In order to ensure the stability and reliability of the system, the design of dual-purpose and one-standby is adopted.

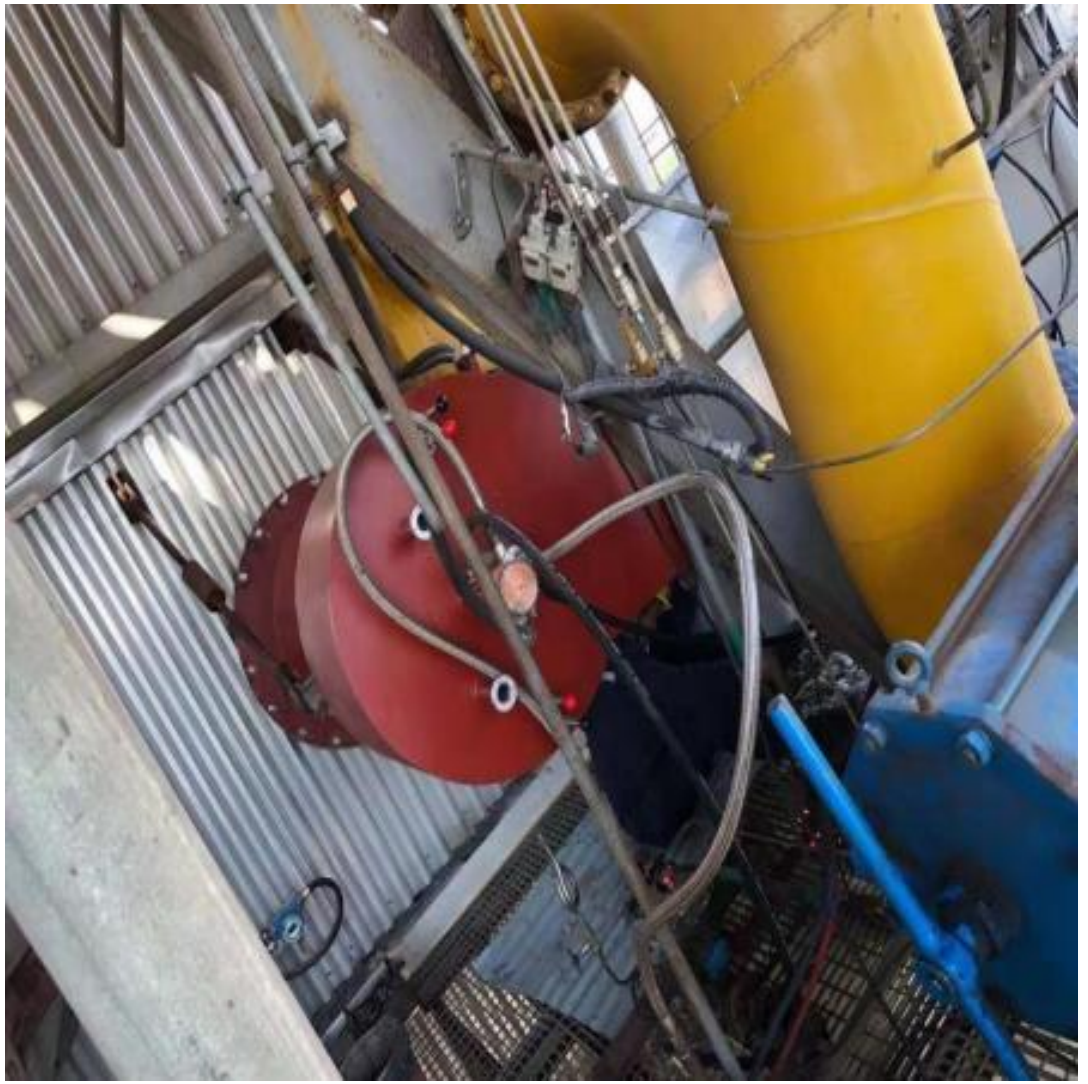
Pipeline system: according to the size of biomass powder and the amount of blending, the diameter of the positive pressure conveying pipeline is DN350, and the design of two main pipes is adopted. The main pipes are sent to the designated burner height layer through the boiler. According to the structure of the tangential boiler, the two main pipes are sent to the diagonal burner in two ways in front of the burner.



Fire-fighting and explosion-proof system: the biomass powder is high in volatile matter, and is flammable and explosive after drying. In the process flow after crushing, the conveyor belt and silo shall be designed with fire-fighting and explosion-proof systems, the bucket belt conveyor shall be designed with fire-fighting sprinkler system, the powder biomass silo shall be designed with temperature sensor, CO gas detection instrument, methane gas detection instrument, and explosion-proof door.







Biomass burner system: The dried biomass powder has high volatile matter and is easy to burn, which can effectively improve the combustion stability of the boiler. The new pulverized coal biomass coupling burner can effectively prevent coking.