



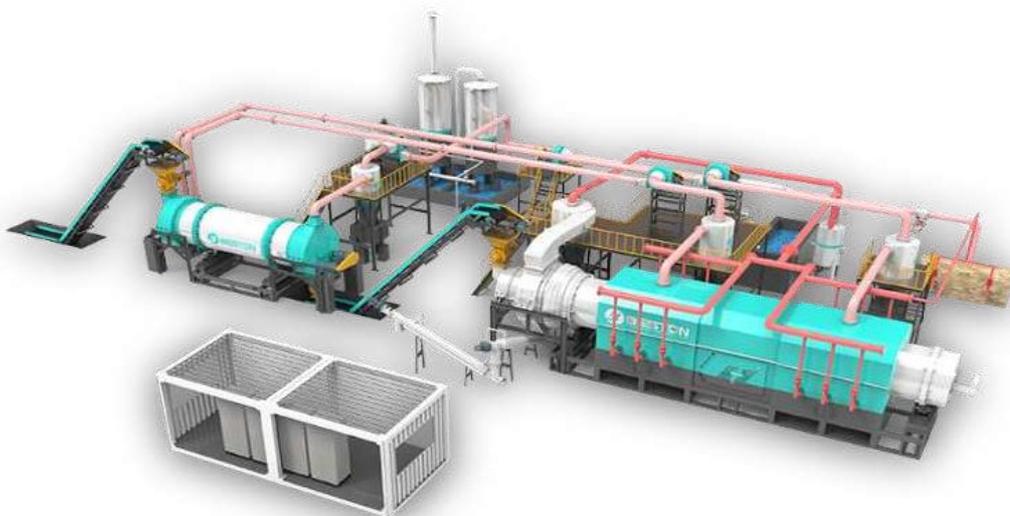
GRAIN TECH MATERIAL HANDLING

SPECIALISTS IN THE DESIGN, MANUFACTURE
AND INSTALLATION OF PROCESS EQUIPMENT

INFO-TECH

BIO-MASS CARBONIZATION

WOOD WASTE TO CHARCOAL MANUFACTURING



➤ What is Biomass Carbonization

Biomass carbonization plant refers to equipment that can convert biomass waste into biomass charcoal under high-temperature conditions. This equipment includes an exhaust dust removal system. The de-dusting system operates to purify the gas in the carbonization process. Ultimately, this system recycles biomass without polluting the surrounding environment. Many customers now consider it a worthwhile investment in this kind of equipment.

➤ What is the Biomass Carbonization Process?

The biomass carbonization process is divided into a feeding process, carbonization process, discharging process, bio-gas recycling process, and de-dusting process. Input biomass waste is supplied to the main furnace by either a manual or automatic feeder.

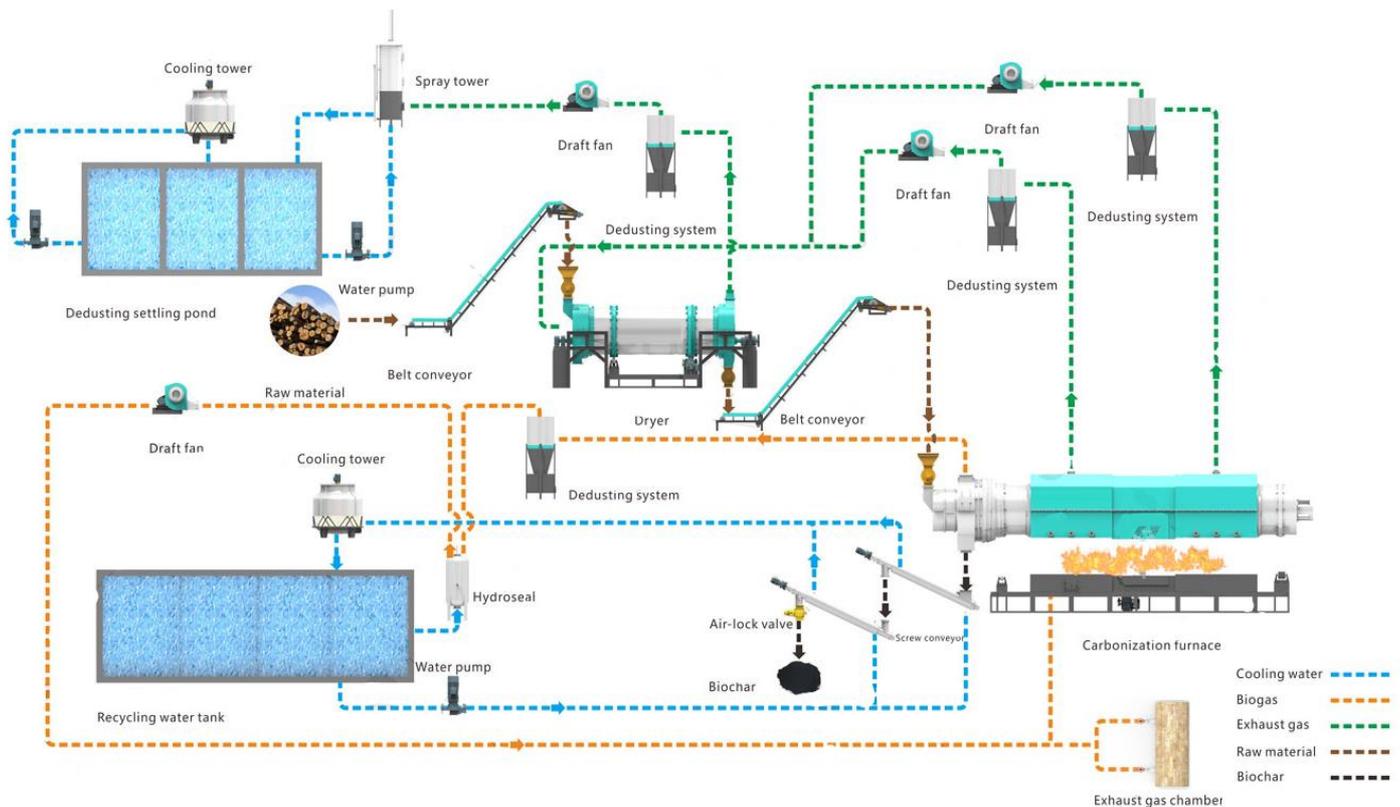
After pre-heating the main furnace, the temperature in the main furnace gradually rises. When the temperature reaches 250 degrees, the biomass starts to react to form biochar. The reaction of biomass carbonization takes about 15-25 minutes.

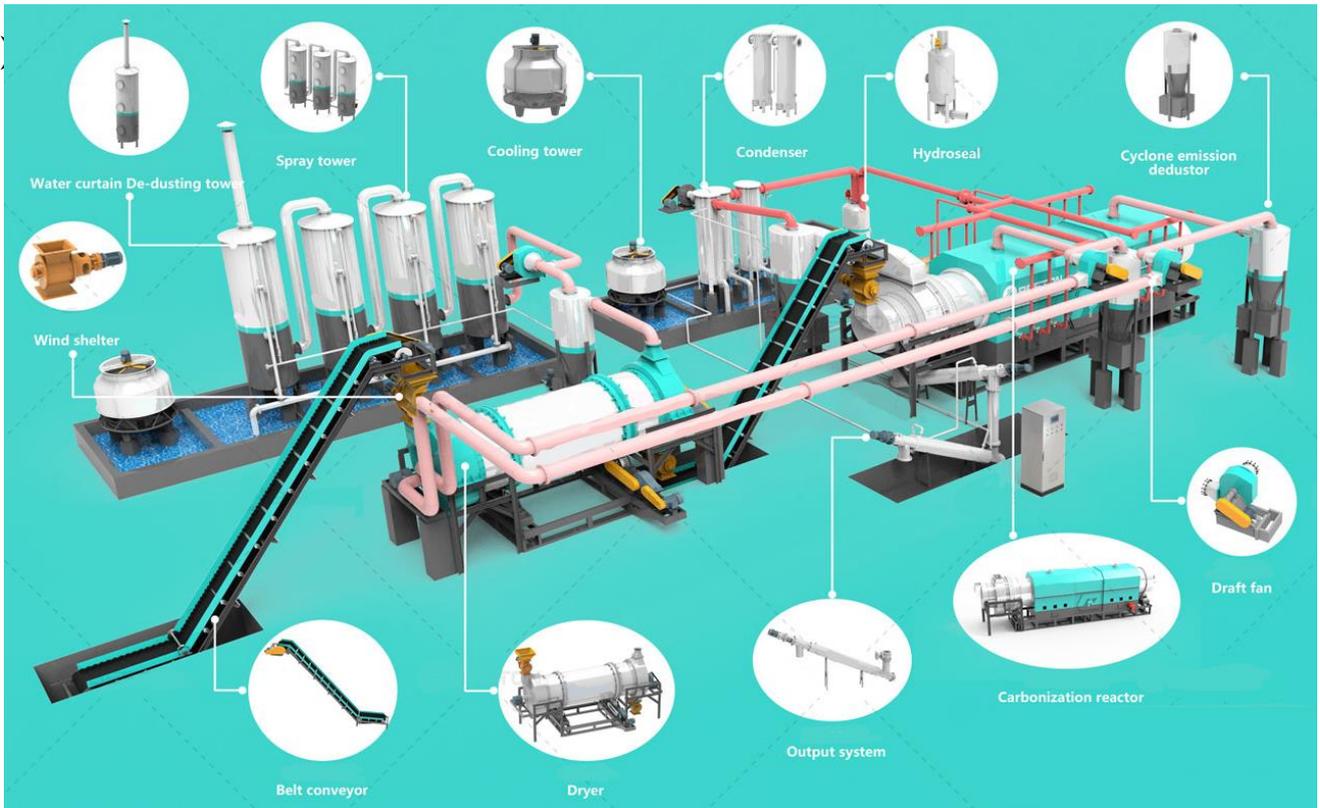
Biomass char is discharged through either a manual or automatic discharge valve.

The combustible gas in the main biochar furnace (<https://bestonmachinery.com/biochar-production-equipment/reactor/>) can be directly used for heating the combustion chamber after being treated by a water seal and condenser.

After the waste flue gas in the main furnace is treated by the dust removal system, it reaches the European emission standards. In addition, customized de-dusting systems may be provided according to customers' local emissions requirements.

➤ Carbonization Process Operation Guide Diagram





➤ Carbonization Process Equipment





➤ What is Carbonized Biomass Used For?

Carbonized biomass is used in many applications – for example: agriculture, industry, ship, cooking, etc.

Field	Uses
Agriculture	It is used to make biochar applied in agriculture. The biochar is used to improve the soil quality.
Industry	Charcoal is used in boilers and furnaces within cement, brick, ceramic, and power plant operations. Charcoal is a good alternative fuel.
Ship	Biomass charcoal is a good alternative heating fuel.
Cooking	Charcoal from biomass carbonization can be used for cooking and barbequing.



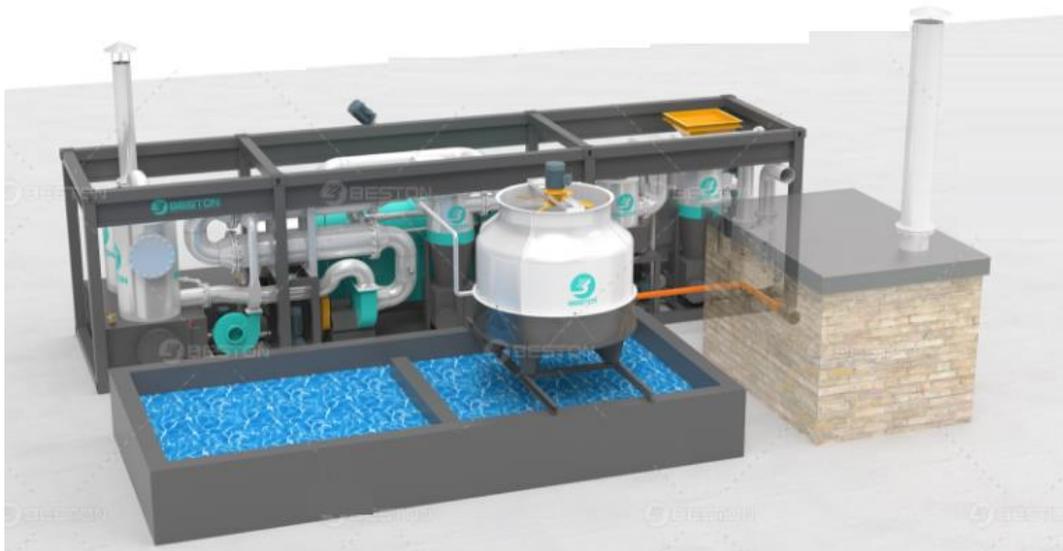
➤ Batch Type of Carbonization Equipment

- Process 1 furnace per day or 2 furnaces per 3 days.
- The structure of this production line is simple. It is easy to install and operate.
- The requirement for workers is low, and the requirement for workers' skills is low.
- The required land area is small.
- Low energy consumption (11 to 25 kW/hour)
- It can be moved to other places easily.
- Fuel – natural gas, LPG, diesel.



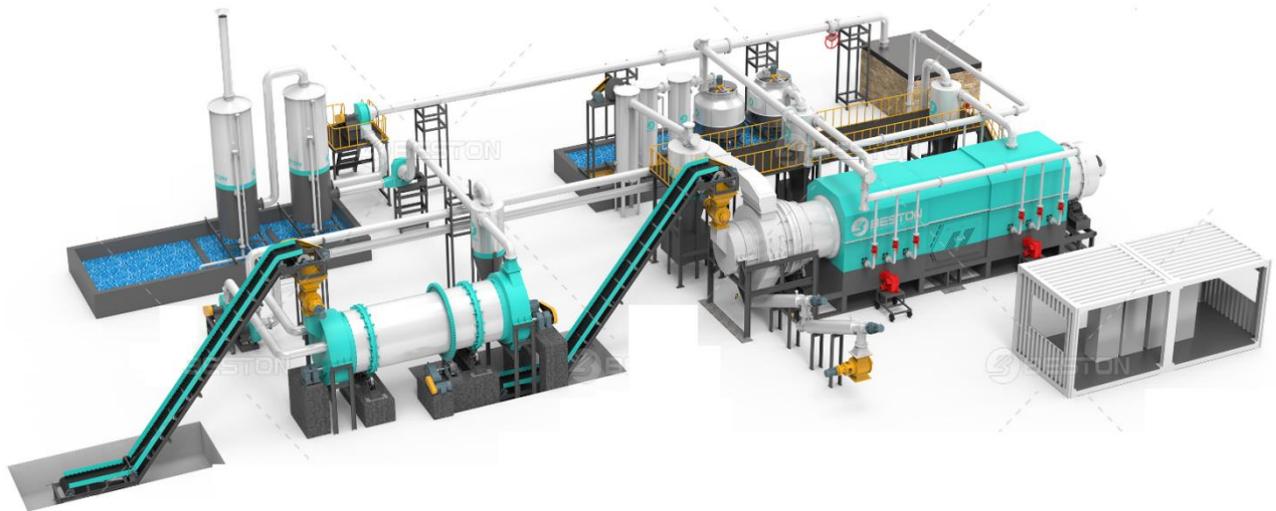
➤ Skid-mounted Type of Carbonization Equipment

- Small footprint, compact and modular design.
- No foundation work is required.
- Installation is simple and fast. 90% of installation has been completed prior to the ex-works factory delivery.



➤ Continuous Type of Carbonization

- It can operate continuously for 24 hours.
- High degree of automation.
- It can process 10+ raw material types.
- Continuous raw material infeed and finished product discharge.
- It is equipped with an exhaust gas de-dusting system where the exhaust hot air and gas is purified.



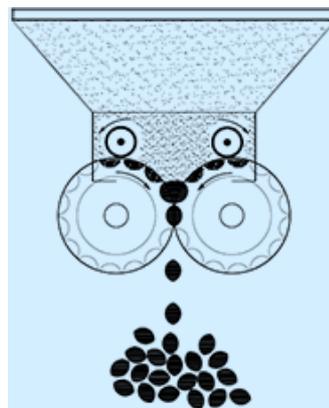
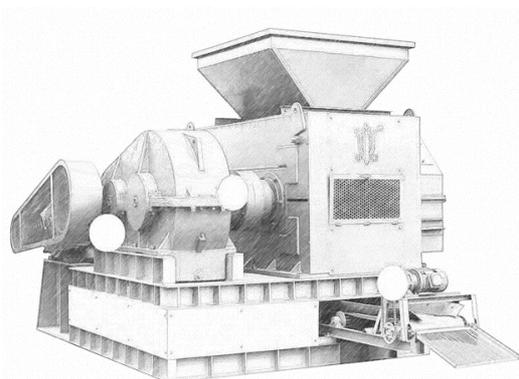
➤ Capacity and Models:

Model	BST-J12	BST-J18	BST-J40	BST-05 Pro (skid-mounted)	BST-10	BST-30	BST-50
Input Capacity	12m ³ /batch	18m ³ /batch	40m ³ /batch	0.3-0.5m ³ /h	2-4m ³ /h	7-9m ³ /h	10-15m ³ /h
Reactor Size(m)	φ1.9*L4.5	φ1.9*L6.6	φ2.8*L7.1	Φ0.83*L5.5	φ1.3*L14	φ1.7*L14.2	φ2.0*L14.2
Land for Equipment (L*W*H) (m)	9*6*6	12*6*7	15*18*7	10*8*3.9	29*15*5	30*15*8	35*18*9
Weight (Standard Configuration) (T)	18	22	34	15	35	35	49
Energy Consumption (kw/h)	11	13.5	25	31	34.7	61.5	116
Working Method	Batch			Fully continuous			
Feeding Requirement				Size: ≤20mm; moisture: ≤15%; strong liquidity			
Structure	Horizontal rotation			Double barrel single hearth	Double barrel double hearth		
Speed	0-2 RPM			1-9 RPM			
Control Method	Control by buttons			Automatic control			
Reactor Material	Q245R			Q245 + 310s			
Pressure	Micro negative pressure						
Heating Material	Diesel, natural gas, heavy oil, biomass, etc.						
Heating Method	Direct heating						
Noise (dB)	≤80						
Condenser	Circulating water cooling						
Rotation Method	External gear rotation						

CHARCOAL BRIQUETTES

For effective carbonized biomass use within industrial applications and economy of transport, the charcoal is generally formed into briquettes

Structure of Briquette Machine



➤ Components

It mainly consists of a frame (or foundation support), reducer, drive- spindle seat, drive-spindle, driven shaft, main bearings, coupling, main rollers, auxiliary rollers, wheel hub, drive gearing, driven gearing, briquette forming roll deviation adjuster, bearing seat, wedge assembly, oil cylinder, piston, oil pump, feeding hopper and unloading belt conveyor.

In order to meet the requirements for combustion and smelting, usually the briquettes will be formed into 20 to 80mm size with their shape being round, elliptical, square, pillowed or customised.



➤ Application for Charcoal Briquettes

Charcoal briquettes from biomass sources includes carbonization and then briquetting of a wide range of biomass energy resources such as wood processing and forestry harvesting waste and residue materials, agricultural waste such as straw, husk and cobb. Commercial grade charcoal briquettes are typically made incorporating a binder and filler where the charcoal is crushed finely and screened to achieve the required particle size for briquetting. A binder, typically starch, is added to the fines, as well as water. The charcoal comprises 75% of the briquette mix while water and starch comprise 20% and 5% respectively. The briquetting press has heavy duty design features to ensure that high density briquettes are formed as a continuous process which may be either an integral part of a charcoal producing facility, or an independent operation, with charcoal being received as raw material.

Charcoal briquettes derived from woody and agriculture biomass sources can be used as a replacement for existing fossil fuel heating applications and have advantages in industrial use over other heating agents.

Charcoal has:

1. A low sulphur content,
2. High carbon to ash ratio,
3. Relatively few and unreactive inorganic impurities,
4. A specific pore structure with a larger surface area, and
5. Little smoke discharge.

A large range of biomass residues can be carbonized and agglomerated into the charcoal briquettes including small, chipped pieces of wood, forest residue materials, straw and agricultural harvest waste. It generally takes 5 tonnes of woody biomass waste to produce one tonne of charcoal on a dry yield basis. Sustainable carbonized briquette biofuels have two favourable properties, namely availability from renewable raw materials and its lower negative environmental impact than that of fossil fuels.

Wood generally produces around 3500 kcal/kg for green wood and 4500-4770 kcal/kg for dried wood. Wood pellets produce 4500 ± 100 kcal/kg, whereas charcoal varies around 7500 kcal/kg.

➤ Briquetting Machine Specifications

Model	ZZXM-4	ZZXM-6	ZZXM-8	ZZXM-10
Output	3-4 t/h	6 t/h	8 t/h	10 t/h
Roller Width	250mm	240mm	220mm	300mm
Roller Diameter	360mm	400mm	450mm	500mm
Power	7.5kW	11kW	18.5kW	22kW
Reducer	ZQ350	ZQ400	ZQ500	ZQ500
Pressure Type	Mechanical	Mechanical	Mechanical	Hydraulic
Roller Material	65Mn	65Mn	65Mn	65Mn
	9Cr2	9Cr2	9Cr2	9Cr2
	Wear-resistant alloy	Wear-resistant alloy	Wear-resistant alloy	Wear-resistant alloy
Roller Assembly	Split-clamp type	Split-clamp type	Split-clamp type	Temper assembly
Hardness of Roller	52-62 HRC	52-62 HRC	52-62 HRC	52-62 HRC
Pressure Structure	Four-rollers double pressure	Four-rollers double pressure	Four-rollers double pressure	Four-rollers double pressure
Dimensions (mm)	1200x1150x1835	1400x1298x2125	1700x1510x2200	2000x1960x2440
Weight(kg)	2100	2300	2750	5800
Model	ZZXM-15	ZZXM-20	ZZXM-30	ZZXM-40
Output	15 t/h	20 t/h	30 t/h	40 t/h
Roller Width	336mm/400mm	428mm/500mm	500mm	600mm
Roller Diameter	650mm	750mm	850mm	1000mm
Power	37kW	55kW	90kW	110kW
Reducer	ZQ650	ZQ850	ZQ1000	ZQ1000
Pressure Type	Hydraulic	Hydraulic	Hydraulic	Hydraulic
Roller Material	65Mn	65Mn	65Mn	65Mn
	9Cr2	9Cr2	9Cr2	9Cr2
	Wear-resistant alloy	Wear-resistant alloy	Wear-resistant alloy	Wear-resistant alloy
Roller Assembly	Temper assembly	Temper assembly	Temper assembly	Temper assembly
Hardness of Roller	52-62 HRC	52-62 HRC	52-62 HRC	52-62 HRC
Pressure Structure	Four-rollers double pressure	Four-rollers double pressure	Four-rollers double pressure	Four-rollers double pressure
Dimensions (mm)	2188x1972x1670	2660x2300x1750	2965x2450x1980	3065x2850x2220
Weight(kg)	7600	9000	15500	25000

* Note: A larger capacity is available at request.

➤ Carbonization Plant Installation Examples





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