SIMEC
WE ENGINEER YOUR SUCCESS!

Technology-Solution-Equipment

Upgrade the Value of Palm Based Biomass

HENAN SINOVO MACHINERY ENGINEERING CO., LTD.
www.simecpellet.com
info@simepellet.com
+86 372 5375806

SIMEC
WE ENGINEER YOUR SUCCESS!

CE SGS ISO

Company Profile

Henan Sinovo Machinery Engineering Co., Ltd (SIMEC) is a leading supplier of plants, equipment, services for Palm EFB Pellet Project, Palm EFB Pyrolysis Project, Palm Trunk Pellet Project, Biomass Torrefaction Project, Agrowaste Pellet Project, Biocoal Pellet Project, etc. SIMEC technology is developed as complete solution, including biomass size reduction, drying, thermal chemical reaction, pelleting, bagging, automatic control, etc.

We're specialized in the research of biomass energy applications, and equipment manufacture.

As byproduct of oil palm industry, the biomass feedstock, for example, palm EFB/trunk, palm kernel shells, is sustainable in supply. The value of palm based biomass can be upgraded by state-of-the-art technology to benefit the industry.

The target of all our research and equipment engineering is to promote the application of biomass energy technology. The biomass energy utilization influences the energy structure all over the world. On one hand, there is the shortage of traditional fossil energy; on the other hand, the low grade utilization of bio-energy is a wastage. So for our earth and our future generations, it is very important and necessary to develop high efficiency technology and equipment to utilize biomass materials.


Certificate – Сертификат – 證明書 – Certificat – 증명서 – 证书

Certificate of Compliance

CE


CERTIFICATE

TÜV

EN 46001: 1996 & ISO 13485:1996

ISO 9001: 2008


发明专利证书

Process Technology

Palm Empty Fruit Bunch Process Technology & Dedicated Machinery





Palm Empty Fruit Bunch is called palm EFB, about 20~23% to FFB in Crude Palm Oil Mills. Fresh palm EFB has very high moisture content, about 67%, and massive fibrous nature. As a kind of solid byproduct, it is being generated continuously in palm oil mills in huge quantity. But untreated palm EFB is difficult to be utilized directly.

Palm EFB contains neither chemical nor mineral additives. SIMEC develop process technology and dedicated machinery that can process palm EFB to be biomass fuel, biochar, organic fertilizer, etc. Our R&D focus on upgrading the value of palm EFB.

The following is an introduction to some of the technology and equipment from SIMEC.

1. Palm EFB Size Reduction Technology & Equipment

- PALM EFB CHOPPING MACHINE
- PALM FIBER HAMMER MILL
- ULTRA FINE PULVERIZER MACHINE
  (high fineness, low capacity)

2. Palm EFB Drying Technology & Equipment

3. Palm EFB Pyrolysis Technology & Equipment

4. Palm EFB Torrefaction & Pelletization Technology & Equipment

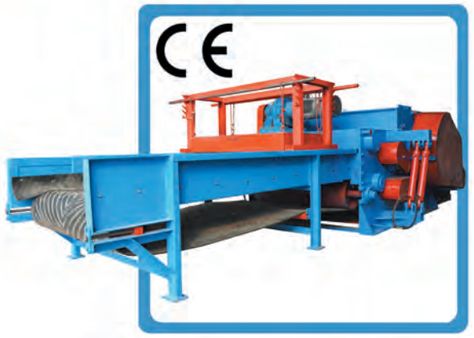
SIMEC
WE ENGINEER YOUR SUCCESS!

1

Palm EFB Size Reduction Technology & Equipment

Chopped Palm EFB Crushed Palm EFB Pulverized Palm EFB

◆ PALM EFB CHOPPING MACHINE



Palm EFB chopping machine is the initial machine for palm EFB size reduction in high efficiency. The technology adopts improved drum type cutter and optimized structure design to coordinate with fibrous feature of palm EFB. SIMEC palm EFB chopping machine can chop pressed palm EFB, as well as fresh palm EFB to be 10-100mm palm fiber. The chopped fiber becomes a suitable feedstock for dryer, hammer mill, pyrolysis & torrefaction reactor, composting plant, etc.

Model	SPC650/500	SPC800/680	SPC800/1050	SPC1000/1050
Knife Roller Diameter	650 mm	800 mm	800 mm	1000 mm
Feed Inlet Size (mm)	180 x 500	225 x 680	240 x 1050	330 x 1050
Knife Amount	2 pcs	2 pcs	3 x 2 pcs	2 x 2 pcs
Rotating Speed (rpm)	590	650	650	550
Feeding Speed	37 m/min	38 m/min	39 m/min	37 m/min
Process Capacity	10 m^3/h	22 m^3/h	45 m^3/h	70 m^3/h
Main Motor Power	55 kw	110 kw	160 kw	220 kw
Feeding Motor Power	3 kw x 2	4 kw x 2	5.5 kw x 2	7.5 kw x 2
Oil Pump Power	Manual Oil Pump	0.55 kw	0.55 kw	2.2 kw

◆ PALM FIBER HAMMER MILL

Model		MFSP140/120	MFSP140/160
Rotor Diameter (mm)		1400	1400
Crush Chamber Width (mm)		1200	1600
Speed of Mainshaft (rpm)		1480	1480
Hammer Line Speed (m/s)		108	108
Hammer Amount		144	192
Power (kw)		160/185	200/250
Sieve Size		1500*390/6 pcs	1500*390/8 pcs
Dimensions (mm)	Length	3196	3920
	Width	2010	2010
	Height	2220	2220

SIMEC fine milling technology is developed based on hammer structure to process a variety of palm based wastes, such as palm EFB fiber, palm kernel shell, palm mesocarp fiber, palm trunk chips and chopped palm leaves.

The main machine adopts reinforced steel structure, multi-point shearing comminution. 8mm thickness SAW-HEAD hammers are made of high strength alloy steel. SKF BEARINGS for milling rotor are equipped with AUTOMATIC BEARING COOLING SYSTEM by circulating liquid coolant. This technology will reduce bearing maintenance cost but increase the service life.

Hammer mill is equipped with SIEMENS standard motor, and specially designed fast open slide gates to change screens and to inspect inside status.

Complete fine milling plant is equipped with raw material cleaning device for iron & stone removal, and professionally designed material discharging system to reduce power consumption.

◆ ULTRA FINE PULVERIZER MACHINE

(high fineness, low capacity)

Ultra Micro Pulverizer is designed to pulverize diverse kinds of biomass materials into fine powder. The fineness is adjustable from 60 mesh to 500 mesh to pulverize palm based material, such as palm EFB, palm kernel shell, palm mesocarp fiber, etc. The palm based biomass powder has special utilization value and is for specialized market.

SIMEC advanced technology will guarantee the stable quality and commercial value of palm based micro powder.

Model	Fineness	Power (KW)	Rotate Speed	Dimension (m)	Weight (kg)
SP-C750	60-500 Mesh	22-30kw	3200r/min	3.6*1.75*3.0	1500

SIMEC
WE ENGINEER YOUR SUCCESS!

2

Palm EFB Drying Technology & Equipment

Fresh palm EFB which comes directly from the palm oil mill has approximately 70% moisture content which can be reduced to 50%~55% m/c by mechanical press. It is necessary to reduce the moisture content further in order to meet the needs of subsequent processing, whatever to make long fiber, palm EFB pellets, compost fertilizer and other industrial utilization. Drying technology is very essential to upgrade the value of palm EFB fiber.

◆ Palm EFB Fiber Drying Plant


SIMEC drying technology is developed to reduce moisture content of fresh palm EFB fiber, composted palm EFB fiber, etc. We have the solution to utilize the flue gas from CPO mill's steam boiler as low cost heat source for dryer. Hot air stove is designed to burn PKS, wood chips, etc. Hot air makes moisture evaporate violently. Material dispersion and pushing mechanism ensures high efficiency of drying process. By state of the art technology from SIMEC, dried palm fiber is discharged in loose form continuously without balling and blockage.

Specification (m)	Drum Diameter (m)	Drum Length (m)	Rotate Speed (rpm)	Power (KW)
ϕ2.0*20	2	20	3-10	3*4
ϕ2.9*20	2.9	20	3-10	5.5*4

3

Palm EFB Pyrolysis Technology & Equipment

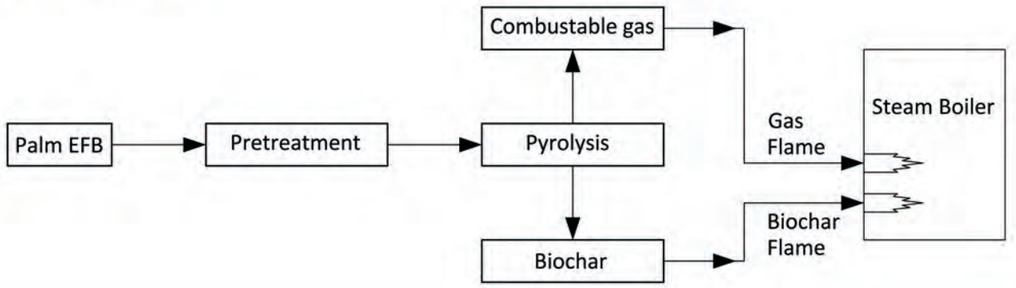
◆ Palm EFB Pyrolysis Plant

Almost every crude palm oil mill owns self-operated biomass steam turbine power plant. The fuel for steam boiler includes palm kernel shell, palm mesocarp fiber, wood chips, etc. These are high cost fuels because of their existing commercial value in the market. But untreated palm EFB are not premium fuel for steam boiler.

SIMEC pyrolysis technology is developed to utilize palm EFB in a proper way which has high efficiency and creates commercial benefits. Feed palm EFB into SIMEC pyrolysis plant then palm EFB will be converted to combustible gas and biochar that both have high calorific value. Through minor modifications to the steam boiler, combustible gas and biochar can co-fire in combustion chamber and generate sufficient energy. So, with SIMEC technology, palm EFB becomes high value boiler fuel for power generating. Its commercial value and economic benefit is released in a right way.

With SIMEC pyrolysis technology, palm EFB can be utilized as high value fuel in CPO mill where it's generated as byproduct, without any transportation cost.

With SIMEC pyrolysis technology, palm EFB can replace the conventional fuel of steam boiler, and greatly reduce fuel consumption cost of self-operated power plant. The conventional fuel, such as palm kernel shell can be sold at a right price to contribute more profit to CPO mill.



SIMEC
WE ENGINEER YOUR SUCCESS!

4

Palm EFB Torrefaction & Pelletization Technology & Equipment

Torrefaction is a mild pyrolysis process that increase the value of palm EFB. After being torrefied, palm EFB fiber becomes high calorific value & hydrophobic material, which can be further pelletized by SIMEC Pellet Mills.

◆ PALM EFB TORREFACTION PLANT

The torrefaction plant is fully automatic, energy-saving and free-emission.

SIMEC patented torrefaction process is carried out in a temperature range of 230 to 300℃ in the absence of oxygen. This thermal pretreatment of palm EFB fiber improves its energy density, reduces its oxygen-to-carbon (O/C) ratio, and reduces its hygroscopic nature.

It also reduces power requirements for size reduction, and improves handling, and offers cleaner-burning fuel with little acid in the smoke.

Torrefied material absorbs little moisture when stored. It can be produced to be superior-quality biomass pellets with higher volumetric energy density.

The pelletizing process resolves some typical problems of biomass fuels: transport and storing costs are minimized, handling is improved, and the volumetric calorific values is increased.

Pelletization can increase the energy content of the fuel on a volume basis. Pelletization of torrefied palm EFB fiber greatly decrease the transportation and handling cost of biomass.

SIMEC started R&D on palm EFB pelletizing technology in the year of 2008. Initial field test was in Malaysia, adopting SPM520 pellet machine. SIMEC palm EFB pellet mills have been specially developed to produce palm EFB pellets and palm mesocarp fiber pellets. SIMEC Technology will create value for palm industry.

◆ PALM EFB PELLET MACHINE

Palm EFB Pellet Machine

Type: SPM520S

Power: 132 KW

Specification:

- Main shaft front and rear bearings both adopt SKF brand.
- Equipped with temperature monitoring system for roller bearings.
- Main shaft and roller bearings adopt automatic lubrication system.
- Pneumatic quick-dump bypass and safety pins for overload protection.
- Die & rollers electric hoist device.

Palm EFB Pellet Machine

Type: SPM780

Power: 200 KW

Specification:

- Dual force feeders.
- Integrated main shaft.
- Main shaft bearings adopt SKF brand.
- Automatic lubrication system for roller bearings.
- Automatic forced cycle oil lubrication system for transmission unit.
- Frequency control timing feeder adopts SEW gearbox.
- Moisture adjusting device and overload protection system.

SIMEC
WE ENGINEER YOUR SUCCESS!

Palm Kernel Shell Charcoal Plant

Palm Kernel Shell is byproduct in CPO mill, about 6~7% ratio to FFB. PKS shouldn't be sold directly as cheap biofuel. With SIMEC state-of-the-art biochar technology, the value of PKS can be greatly enhanced.

PKS charcoal is a highly porous material which has huge surface area that exhibits good adsorptive capacities. It has high fixed carbon content without any chemical additives.

◆ PALM KERNEL SHELL CHARCOAL PLANT

SIMEC charcoal plant is automatic biochar production system to produce Palm Kernel Shell Charcoal via anaerobic destructive distillation technology. It is a kind of thermal chemical process which will generate combustible gas. The gas will provide heat for continuous biochar production. Waste heat could be captured from flue gas to dry the raw material to improve production efficiency.

The operation of PKS charcoal plant is fully automatic, being realized through the logical self-regulation based on the essential pre-set production parameter.

Features of Automatic Charcoal Plant

- Automatic operation, continuous production and simple maintenance.
- Low production consumption, equipped with combustible gas utilization system.
- Energy saving, equipped with waste heat capture system.
- High production rate performed by state-of-the-art technology.
- Equipment safety and reliability guaranteed by advanced design & engineering.
- Biochar cooling & discharging system enables low temperature of PKS charcoal which can be bagged directly.

Applications of PKS Charcoal:

- As precursor for activated carbon production.
- For waste water treatment, deodorization, filtration system.
- As bio-char for fertilizer additives and other agriculture purposes.
- To replace coal based coke in metallurgy process. Because of the low sulfur and ash content and high calorific value, PKS charcoal can be said better and even cheaper fuel than coke. In addition to that, as CO_2 generated from PKS charcoal is not counted as Green House Gases, use of charcoal has the possibility of CDM project.

SIMEC
WE ENGINEER YOUR SUCCESS!

Biomass Pyrolysis Laboratory Apparatus

Biomass pyrolysis laboratory apparatus is designed for scientific research on biomass thermal chemical process.

The apparatus can perform biomass thermochemical experiments at set temperature precisely. The sensitive data collecting system provide precise experimental data of pyrolysis temperature, gas flow volume, pressure and so on. Different types of biomass pyrolysis experiments can be conducted by this apparatus, for example, torrefaction, carbonization, etc.

Compact design of the laboratory apparatus enables the operator to conduct biomass pyrolysis experiments in research office. The simple and accurate operation of the apparatus help the people, who will set up commercial biomass pyrolysis projects, to collect the relevant experimental data for further analysis and research, then improve commercial operation and enhance commercial benefits.

Realizable Experiments:

- Torrefaction and other pyrolysis process under different reaction temperature and material flow rate.
- Collectable experimental samples for further analysis:
  Torrefied biomass and biochar sampling.
  Syn-gas sampling before purification.
  Syn-gas sampling after purification.
  Liquid byproduct sampling, such as tar, pyroligneous acid.
- Syn-gas volume dynamic measurement.
- Experimental study on combustion of syn-gas before and after purification.
- Based on the samples, data, analysis, by scientific calculation, almost all the experimental purposes could be realized to meet the requirements of scientific research work.

Palm Trunk, Palm Kernel Cake/Extract, Mesocarp Fiber

Process Technology and Solution

To make biomass pellets from oil palm trunk by SIMEC developed technology. Palm trunk pellet is high value fuel for biomass firing boilers, biomass & coal co-firing boilers. High potential carbon offset fuel.

The pulp left after oil is rendered from the kernel is formed into "palm kernel cake", used as high-protein feed for dairy cattle. To pelletize PKC will benefit storage, transportation, sales and handling.

Mesocarp fiber is premium biomass fuel in the boiler. But it can be replaced by EFB with the help of SIMEC pyrolysis technology. To make biomass pellets from mesocarp fiber will create new business and bring great profit to CPO mill.