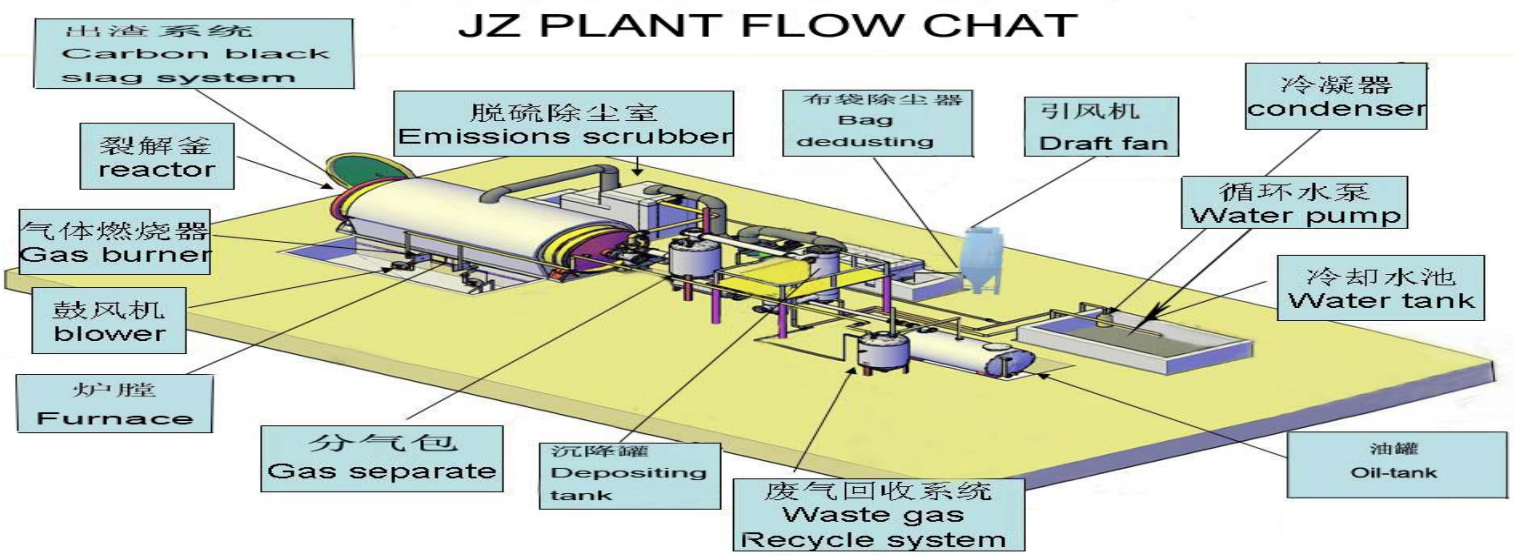
JINGCHENG India

PYROLISIS PLANT



Technology

Pyrolysis involves heating waste tyres /plastic without oxygen to break them down to char or carbon char, oil, and gas. Plants operate within a temperature range of 250° - 500°C.At temperatures above approximately 150°C tires release increasing amounts of liquid oil products and gases. Above 400°C, depending on the process employed, the yield of oil and solid tire-derived char may decrease relative to gas production.

A typical commercial operation is described below.

1. **Tires delivered to a site are weighed. Tires are introduced to systems whole or else halved, chopped, or shredded.**
2. **The feedstock is typically dried and preheated, using tire-derived gas.**
3. **Temperature and residence time in the reactor are two key pyrolysis reactor design criteria.**
4. **In the gasification stage, tire-derived oil, is condensed and cooled. Light and heavy oil fractions may be handled separately. A separator removes any remaining water vapor. The product is filtered.**
5. **Solid tire-derived char is cooled, typically using a water-cooled stage. The product may be sized and screened to remove fiber. A magnetic separation stage captures magnetic materials remaining in the char. washing the char and further size reducing it produces the carbon black product.**
6. **Tire-derived gas maintains operating pressure in the system and provides heat to the system. Vented gases pass through a pollution control train, which may include a gas flare.**
7. **Gas can further treated for power generation. It is passes through venturi scrubber to remove particulate matter from gas and then it is passes through water cooled condenser which can help to bring down the temperature of tire-derived gas and cracking of tar from it. Further it is passes through various filters containing wood waste and saw dust waste to remove moisture from gas and finally cleaned through fabric filter. Resultant Gas is clean and can directly feed to Gas Driven Generating Set.**

Features of the plant:-

1. **100% waste tyre recycling is achieved (No churn left after the process)**
2. **No chemical ingredients are used in process (environment friendly)**
3. **During and after the process there is no soil, water or air pollution.**
4. **Creates economically valuable products out of waste tyres**
5. **The most cost-effective waste tyre recycling technology In the world.**
6. **Raw material (wastage tyre) is cheap and easy to procure.**
7. **Each recycled ton of tyres preserves 10 tons of CO_2 that is a major green house gas.**
8. **It is a 100 % pollution free process, thus making eco-friendly Environment.**
9. **The process can be applied to all rubber based materials.**
10. **The system creates an alternate source of energy to replace petroleum Products and natural gas.**
11. **System gives the opportunity to governments and local administrations to deal with the wastage tyre problem to a great extent.**
12. **The process of Pyrolysis has duration of 4 to 12 hours, depending on the quantity and size of tyre (car tyre, truck tyre, etc.). During the process different vacuum values are applied in pre-determined temperatures and in different phases. Different gases are obtained and the condensed gas is stored as a fuel oil in tanks.**

By-Products after Pyrolysis

o Oil 35% to 45%

The mean ultimate analysis of pyrolytic oils is reported in following table. Also, the mean heating value of oil is also provided. The ultimate analysis indicates an oil product well within the range of that of a fuel oil refined from crude oil. As per given below comparison. The main oil product produced by our recycling application is the fuel oil that is wide used for industrial and commercial purposes. The oil has 40% to 45% of the amount of recycled scrap tyres, which will be carried with tanker trucks.

o Char and Carbon Black 30% to 40 %

A solid product termed tire-derived char or tire-derived carbon char is produced by most Pyrolysis processes . The solid product can be further processed to enhance specific characteristics and to meet specifications for carbon black, or can be marketed directly. Carbon black produced by Pyrolysis process (CBp) is more economical compared to carbon black produced primarily from petroleum and is more price-efficient to be used as an ingredient in the industries listed;

• Electric cable jacketing, Conveyor band, Carrier Bands, Hose and doormat, Black nylon bag, Rubber additive Automotive spare parts, Heat isolation, Black colorant in rubber materials, Plastic pipes, Industrial rubber, products , Fire fighting

o *Gas 12% to 15%*

Non-Condensable gases arise during the pyrolysis process.

• It has higher calorific value as compared to natural gas.
• It can be replaced where natural gas and propane are stored.
• The high energy gas is utilized as a source of energy for the Pyrolysis process.
• The amount of gas generated in the system is 12% to 15% of the total amount of recycled tyres and considering the 10 ton scrap tyre/day recycling capacity, the facility generates 1200 -1500 m3/day gas, which has an enormous energy potential when evaluated

o Steel 10% to 12%

Steel scrap extracted is considered a fairly clean scrap iron ready to be marketed. Valuable steel wires are pressed and sold to steel and scrap dealers.



Technical Detail:-

- **This is a batch process system.**
- **The wastage tyres are fed into the reactor vessel and heated under controlled conditions of temperature and pressure.**
- **The process will bring about molecular restructuring of the rubber under the pyrolysis process as the result; furnace oil in gaseous form is produced along with other gases.**
- **These vaporized gases are passed through heat exchangers, where in the tyre oil is condensed into liquid form.**
- **During the process, carbon black and steel are also generated. The heat exchanger uses coolant water, as a condensing medium and this water is re-circulated through process.**
- **<u>These systems can be operated 24/365</u>.**

Equipment Technical Parameter

D2200mm*L6000mm+(D = diameter L= length) 6 tonnes capacity
dimension: D2200mm*L6600mm+(D = diameter L= length) 8 tonnes capacity
D2800mm*L6000mm+(D = diameter L= length) 12 tonnes capacity

1 Material…….. Plastic rubber (tires),
2 Structure……. Horizontal type revolves
3 Oil yield (tire as raw materials)…….. 40%-45%
4 Carbon black…… 30 to 35%
5 Steel wire…….. .. 10 to 15%
6 Gas……12 to 15%
7 Work pressure……Normal Pressure
8 Cooling Method…….. Water
9 Cooling water Consumption (T/h+…….. cyclic
10 Type of installation…… With foundation
11 Fuel material…….. Coal, Wood, Fuel gas, Fuel oil, charcoal

Energy Requirements

Pyrolysis process produces an excess of energy. Combustion of tire-derived gas provides sufficient heat to drive the reaction. The use of supplemental fuel – Scrap wood/coal - is limited to the startup period. The electrical usage of systems is 12.8 kWh/ton of ton of waste tyre. The heat required to sustain the pyrolysis reaction is approximately 630 and 1,025 Btu/lb .

FINANCIAL ASPECTS (7 ton conversion per day)					
(i) Personnel (per month)	**Personnel**	**Salary (Rs.)**	**Nos.**	**Amount (Rs.)**	
	Manager(Production)	7,000	2	14,000	
	Maintainance engineer	10,000	1	10,000	
	Semi-skilled workers	4,000	6	24,000	
	Office Ast(Acts & H.R)	3,500	1	3,500	
	Watchman cum peon	3,000	2	6,000	
	Total			**57,500**	
	Additional perquisites @ 20%			**11,500**	
	Grand Total			**69,000**	**69,000.00**
(ii) Raw Material (per month) Amount (Rs.)					
waste Tyre 7000kg per day x 26days x Rs 8 per Kg					**14,56,000.00**
coal/wood 600kg per day x 26days x Rs 7/kg					**109,200.00**
				Total	**15,65,200.00**
(iii) Utilities (per month)					
Power 15HP x 0.75 x 24hours x 26 days x Rs6					**42,120.00**
Water					**3,000.00**
				Total	**45,120.00**
(iv) Other Contingent Expenses (per month)					
1) Postage and Stationery					500.00
2) Telephone					2,000.00
3) Traveling and freight					10,000.00
4) Consumables					10,000.00
5) Repair and Renewals					10,000.00
6) Insurance					30,000.00
7)	**Rent**				NIL
				Total	**62,500.00**
Total Recurring Expenditure (per month) Rs.					
i) Personnel					69,000.00
ii) Raw material					15,65,200.00
iii) Utilities					45,120.00
iv) Other Contingent Expenses					62,500.00
			Total		**17,41,820.00**
				Cost of production per year	**2,09,01,840.00**
2) Turnover (per year)					
By selling 2800Ltrs*26 days *12months*Rs34/LTr (40%)					2,97,02,400.00
By selling steel scrap 700kg*26day*12months*rs15/kg (10%)					32,76,000.00
By selling char 2100Kg *26days*12 months*Rs 5 /kg (30%)					32,76,000.00
				TOTAL SALE	**3,62,54,400.00**
3) Net Profit (per year)					
= Total Sale (per annum) – Cost of Production					**1,53,52,560.00**
Assumption : 26 working days per month					

NOTES:-

**** MODIFICATIONS IN DESIGN IS A CONTINOUS PROCESS.SPECIFICATIONS ARE INDICATIVE AND COMPANY RESERVES THE RIGHT TO ALTER MODIFY AND CHANGE AS PER REQUIREMENT.***

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