

INTRODUCTION

Kay Iron Works (Jorian) Pvt Ltd is one of the leading manufacturers and suppliers of a wide range of equipment for various industrial plants like sugar, paper, cement, fertilizer, and several others. One of our prime project is **WASTE TYRE PYROLYSIS PLANT**. The company also undertakes turnkey projects for installing machinery and plants for the above-mentioned industries. The company was established in the year 2000 by separating from parent company Kay Iron Works (Jorian) Pvt Ltd. that was established in 1946, the group has a history of integrity, innovation and addressing the needs of the times, striving to bring about transformation in the lives of our customers and industrial revolution across the country.

We are engaged in offering an extensive industrial fabrication works as per the client's preferences and drawings. Right from the humble beginning, Kay Iron Works (Jorian) Pvt Ltd has established its reputation as the most trusted turnkey solution provider in terms of quantity and quality. Relying on business experience and professional attitude, Kay Iron Works (Jorian) Pvt Ltd aims to become a leading business enterprise in the global market. But while doing so, the company remains committed to relying on Eco-friendly technologies.

Kay Iron Works (Jorian) Pvt Ltd is distinguished from other competitors because of its customer-oriented approach, timely services, and cost-effectiveness. Optimizing the state-of-the-art facilities and focused approach, the company has established an ever-growing client base in domestic Indian as well as overseas markets.



Our Quality

We are an ISO 9001 : 2014 certified company, having accreditation from various government authorities. We ensure to deliver assured quality products through stringent quality control measures. It includes expert guidance, close supervision and stringent quality tests. Quality control lasts in all stages of production, starting from raw materials procurement to commissioning of systems. Considering the sensitivity of our products, we never compromise on quality of products whatever be the situation. We have experienced supervisors, engineers and boiler approved welders.



Kay Iron Works Industries workshop



Waste Tyre Pyrolysis

We are a renowned manufacturer and Supplier of Waste Tyre Pyrolysis Plant. We fabricate Waste Tyre Pyrolysis Plant using quality raw material. Our Waste Tyre Pyrolysis Plant is extensively used for the recycling of waste tyres, plastic, rubber and helps in producing fuel like oil, carbon black powder, steel, gas that are high in demand. Waste Tyre Pyrolysis Plant, supplied by us, ensures 100% recycle of waste tires and leaves no residue at the end of the process. Our Waste Tyre Pyrolysis Plant does not require any catalyst during the recycling process and works on a process that is 100% pollution-free and safe.

Attributes:

- Requires a small amount of investment
- High availability of materials
- Short recovery period
- The latest & tried technology with the best price
- Requires less space and manpower
- Energy efficient

ADVANTAGES OF PYROLYSIS PLANTS

- Purest quality of Pyrolysis Oil as the finished product.
- Use of green technology to achieve environment-friendly processes.
- Safety valve (pressure and temperature valve) used to improve safety, profitability & ease of operation.
- It is energy self-sufficient.
- No external fuel is required for heating.
- It recovers energy and generates value from waste, in form of fuel, steel wire, and charcoal.
- Reduces land pollution.
- Eco-friendly recycling of tyres.
- Commercially viable process.
- A good substitution to LDO / Furnace oil.

Waste Tyre Pyrolysis Images



Pyrolysis process

- Pyrolysis is the chemical decomposition of organic materials by heating in the absence of oxygen or any other reagents, except possibly steam.
- Pyrolysis can be used to reprocess the tyres into fuel oil, fuel gas, solid residue (steel wire) and carbon black.
- The waste tyres are mainly composed of long chain of C-H molecules.
- Under normal process conditions the heat transfer will be done by radiation.
- The technology of pyrolysis, cracking, and monomerization of used tyres is always a hot topic.

Tyre pyrolysis:

End-of-life tyres contain a lot of chemical bound energy.

As a result of pyrolysis of waste tyres one obtains: high-energy gas, Pyrolysis oils, carbon black and steel wire.

The ratios of the first three products depend on process conditions, mainly on temperature.

- The pyrolysis method for recycling used tyres is a technique, which heats whole or shredded tyres in a reactor vessel containing an oxygen free atmosphere and a heat source.
- In the reactor the rubber is softened after which the rubber polymers continuously breakdown into smaller molecules.
- These smaller molecules eventually vaporize and exit from the reactor.
- These vapors can be burned directly to produce power or condensed into an oily type liquid, generally used as a fuel.
- Some molecules are too small to condense. They remain as a gas, which can be burned as fuel which can be reused in the same plant.
- The minerals that were part of the tyre, about 40 to 45 % by weight, are removed as a solid.
- When performed well a tyre pyrolysis process is a very clean operation and has nearly no emissions or waste.
- The properties of the gas, liquid and solid output are determined by the type of feedstock used and the process conditions.
- For instance, whole tyres contain fibers and steel. Shredded tyres have most of the steel and sometimes most of the fiber removed.
- Batch wise Process is done by tyre pyrolysis.
- The steel can be removed with crane. The remaining solid material often referred to as "charcoal".

Variety of polymer waste material is suitable as a raw material. Given below is the list of suitable raw materials for pyrolysis:

- Waste tyres
- Rubber or rubber parts from vehicles
- Electronic scrap
- Mixed (HDPE, LDPE, PE, PP, Nylon, Teflon, PS, ABS, FRP etc)
- Plastic disposable bottle
- The choice of feedstock and process (mainly operating temperature) can affect the value of the finished products.

Type of Material	Total Quantity	Finish quantity
Nylon scrap tyres	1000 kgs	-550 to 600 liter of Pyrolysis oil -50 to 80 kg of Hydrocarbon Gas -300 to 350 kg of Carbon Black
Radial scrap tyres	1000 kgs	-400 to 450 of Pyrolysis oil -50 to 80 kg of Hydrocarbon Gas -300 to 350 kg of Carbon Black -150 to 200 kgs of Mild steel tyre scrap

WASTE TYRE AND RUBBER PRODUCT

- Nylon Tyre(80%)
- Radial Tyre(20%)

PRODUCTS OBTAINED & ITS USES

PYROLYSIS OIL (FUEL OIL)

- Total yield obtained: Fuel oil - 40 to 43%
- Flash Point: 60 to 93.3 °C.
- Selling price comparable to industrial diesel LDO (light diesel oil)

Uses:

- Furnace Industries
- Rolling Industries
- Casting Industries
- Road construction industries
- Crude oil distillation plant

CARBON BLACK

- Total yield obtained: 30 to 35%
- The vital product of pyrolysis plant is carbon black referred as "charcoal"

Uses:

- Cement Industries
- Ink Industries
- Rubber Industries
- Carbon briquetting Plant
- New tyre manufacturing
- Rubber runway
- shoe sole.

STEEL WIRE

- Total yield obtained: 15 to 20%
- After completion of Pyrolysis Process "steel Wire" Remains as by Product which can be removed by wire puller machine after cooling down the Reactor.
- Steel wire can also be removed before adding the Radial tyre inside the Reactor by Hydraulic Steel Wire Removing Machine.

Uses:

- Sell to Steel scrap Industries
- Rolling mill

HYDROCARBON GAS

- Total yield obtained: 5 to 8%

Uses:

- Generally used as a fuel in the same plant for heating purpose.
- Used in waste water evaporating system to evaporate the waste water formed during process.

Pyrolysis plant

Pyrolysis plant is renewable energy generation system. Pyrolysis plants are designed to generate quality fuel from polymer waste. Pyrolysis system or pyrolysis plant is an industry for conversion of waste and tyre into usable products like:

- Pyrolysis oil (Fuel oil)
- Carbon black
- Steel wire
- Hydrocarbon gas

Benefits of pyrolysis plant

- Recover energy and value from waste in form of fuel, steel wire and charcoal.
- Reduce tyre land pollution.
- Eco-friendly recycling of tyre.
- Commercially viable process.
- Product is used as substitute to LDO/furnace oil.
- Perfect solution for polymer waste management.
- Raw material available.

Basic function of pyrolysis plant is to achieve following process conditions:

- Operating temperature of Reactor is between 300 to 350 degree c.
- Duration period of pyrolysis batch is between 10 to 12 hours.
- Pyrolysis of tyre is done in the absence of oxygen.
- Scrubbing of pyrolysis oil, hydrocarbon gases and fuel gases to prevent pollution.

Pyrolysis plant needs following machinery & equipment:

- Raw material handing section.
- Pyrolysis reactor
- Hydraulic cutter.
- Hydraulic auto feeder.
- Condensation system.
- Scrubbing system.
- Hydrocarbon gas cleaning & storage system.
- Pyrolysis oil storage system.
- Cooling tower.
- Control panel and alarm systems.
- Equipment line in commercial pyrolysis plants is further modified to suite customer's requirements.

PLANT & ITS COMPONENTS

REACTOR

- Made from heat resistance Plate.
- Reactor is consider as the heart of this plant
- Raw material feed inside will start converting to gas at 300-350 degree Celsius
- Anaerobic heating process takes place.



TANKS

A) GAS TANK

- It is also called gas separator tank because gas obtained by heating raw material from reactor will get separate here .
- Hence oil produce will store in the bottom of tank and gas will move further to water coolant pipe



B) CARBON HOLDING TANK (2 NOS)

- Carbon holding tank which is in water seal tank in this tank oil and carbon will mix well and will move to pipe condenser and carbon particles will set down.



C) UNDERGROUND OIL TANK

- Should Be 40% Oil Store In This Tank.
- Light Gas Transfer To Gas Tank From This Under Ground Oil Tank.



CONDENSING SYSTEM

A) CONDENSING PIPE

- This pipe is very useful to increase Yield Percentage.
- It is usually designed in zigzag pattern, so it creates huge condensing area.
- Very easy to maintain.
- Condenser is coil type.
- The more the coils faster the cooling process. Hence more yield percentages obtained.
- Continuous water supply converts condensed vapor into oil, which is transferred into oil receiving tank and the uncondensed gas travels to the next level.



B) COOLING TOWER

- It has 70 TR capacity.
- It is very useful for cooling of hot vapors to oil.
- It convert hot water to cold water by circulation.



CHIMNEY & BLOWER

SMOKE CHIMNEY (100 FEET)

- Smoke chimney is connected to wet scrubber system
- Black smoke is converted to white smoke via scrubber system which will be
- released through chimney into air.
- It is of 100 FT so that pollution is prevented into air.

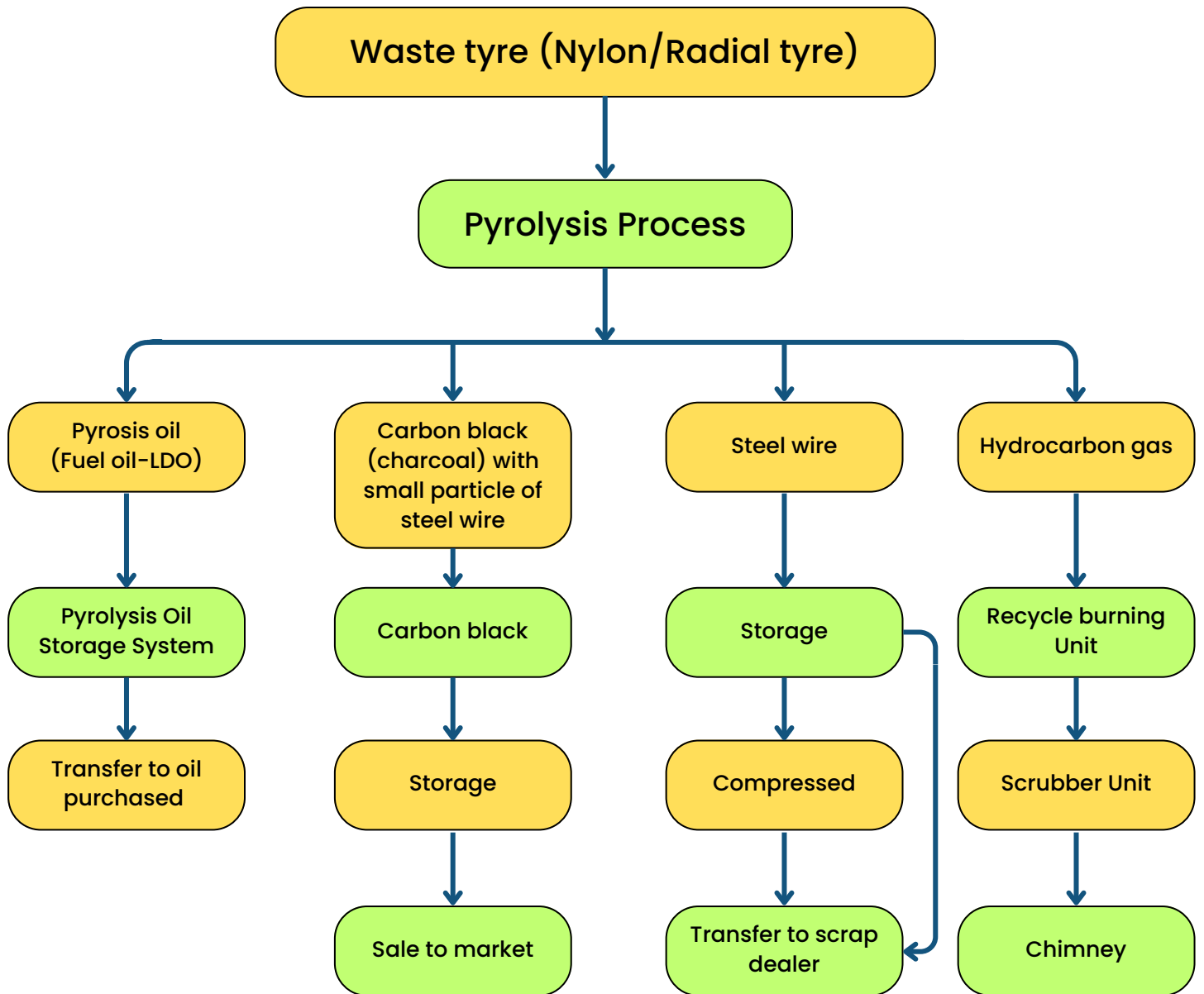


WET SCRUBBER SYSTEM

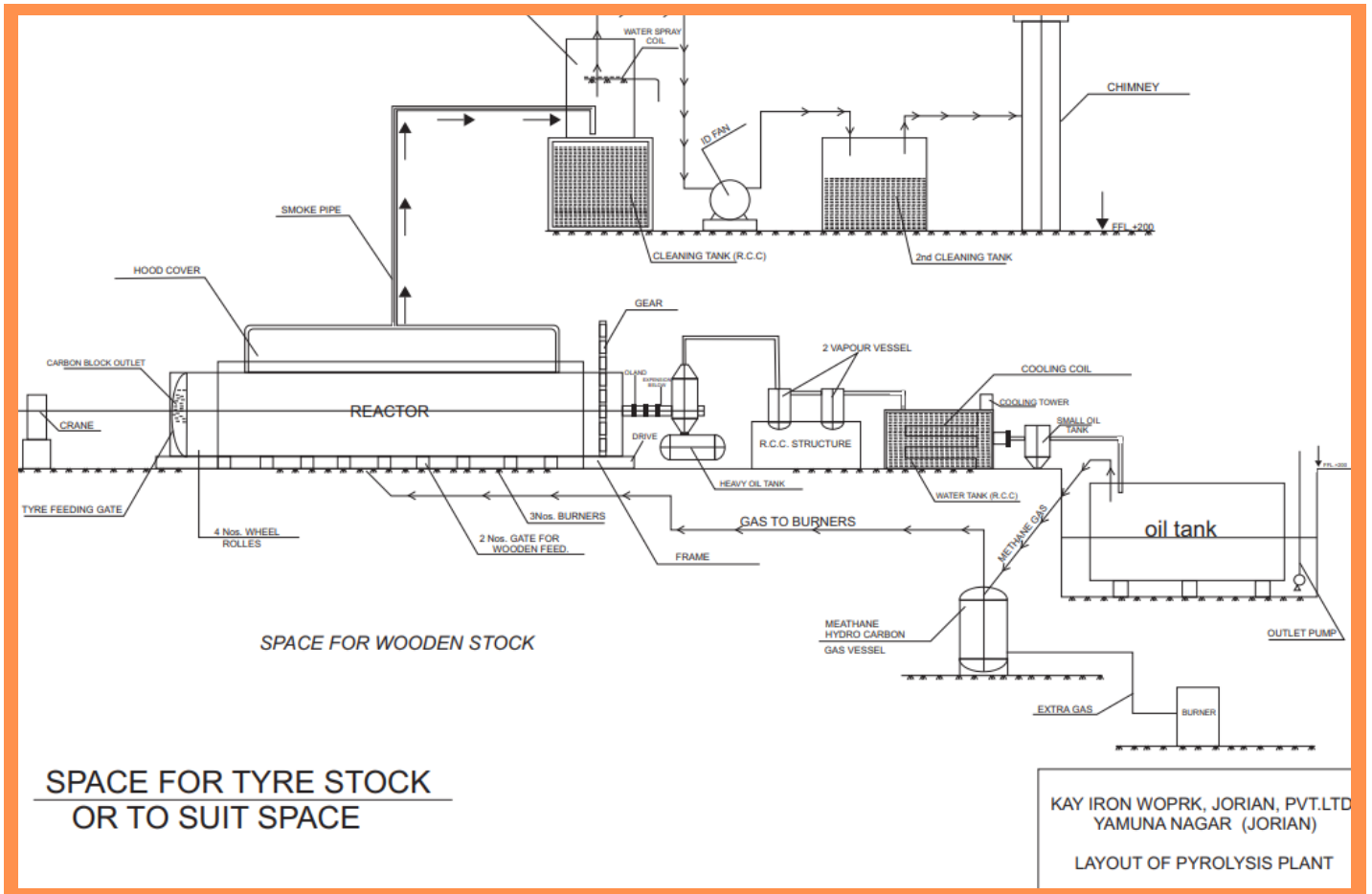
- It consist of water sprinklers inside the pipe.
- Polluted smoke coming from the process is continuously sprinkled by water.
- Hence carbon gets settle down at the bottom of the tank & white smoke will
- be released through chimney.



Flowchart for pyrolysis process



Drawing for Pyrolysis Plant



AUXILIARY EQUIPMENTS



NITROGEN PLANT



PYRO WATER BURNER



100 FEET CHIMNEY



COOLING BLOWER



AUTO IGNITION SYSTEM



TYRE SIDE WALL CUTTER

POLLUTION NORMS

OUR PLANT FOLLOWS POLLUTION NORMS DECLARED BY THE GOVERNMENT. WE PROVIDE ACCESSORIES / OPTIONAL EQUIPMENTS TO REDUCE POLLUTION NORMS, TO INCREASE PRODUCTION CYCLE AND TO RUN MACHINE SMOOTHLY WITH LESS MAINTENANCE.

WET SCRUBBER SYSTEM	CONVERTS POLLUTED BLACK SMOKE TO SAFE & WHITE SMOKE	OUR SUPPLY
NITROGEN SYSTEM	COOLS DOWN REACTOR FASTER WHICH ELIMINATES RISK OF INJURY	OPTIONAL
CHIMNEY	REDUCES POLLUTION BY RELEASING SMOKE AT A HEIGHT OF 100FT	OUR SUPPLY
AUTO IGNITION SYSTEM	BURNS FOUL SMELLING SMOKE TO MAKE IT HARMLESS	OUR SUPPLY
PYRO WATER BURNER	REPLACES WOODS IN THE PROCCES, THUS SAVES TREES	OPTIONAL



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