

Tire Pyrolysis Technology



Overview

End-of-life tires (ELTs) remain one of the most pressing global waste challenges, with millions of tires discarded annually and very few sustainable disposal options. While approaches such as tire-derived fuel (TDF) and mechanical recycling offer limited reuse, tire pyrolysis enables the conversion of ELTs into high-value products that can replace virgin hydrocarbons and support a circular economy.

Lummus Technology, in partnership with Innovent Renewables, offers an exclusive continuous tire pyrolysis technology that delivers an end-to-end solution for converting ELTs to high-value products.

Innovent has successfully proven the technology, from tire handling through product processing, at its commercial facility in Mexico. The plant is designed to process up to 25 tons of ELTs per day. The continuous and energy-efficient tire pyrolysis process transforms ELTs into recovered carbon black (rCB), high-quality tire pyrolysis oil (TPO), and steel wire. The pyrolysis oil can be further upgraded with Lummus' industry-leading downstream technologies to produce valuable chemicals and fuels.

Advantages

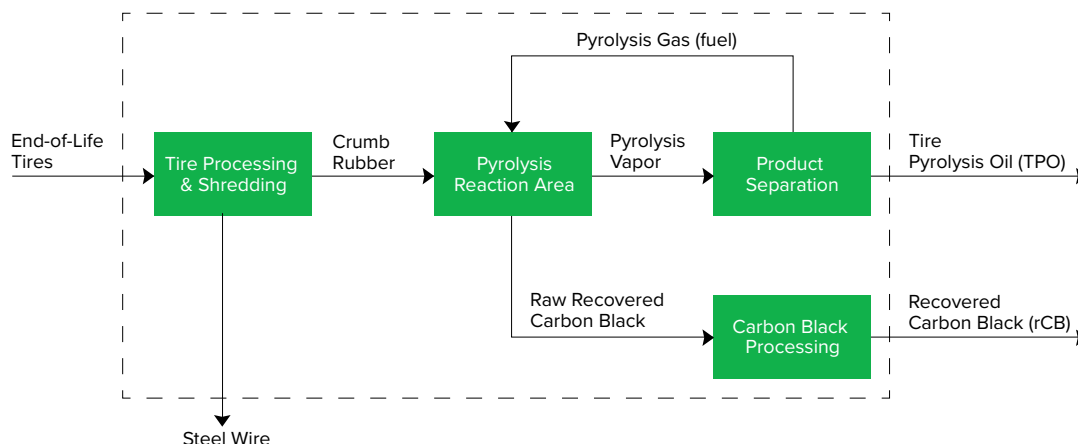
Process Features	Process Benefits
Continuous pyrolysis reactor design	Consistent product quality and significantly higher efficiency compared to batch processing
Modular and scalable configuration	Rapid deployment and flexible capacity expansion
Integrated rCB purification and polishing	Delivers high-value recovered carbon black
Integrated oil separation and purification	Delivers high-quality pyrolysis oil suitable for upgrading
Ready to integrate with Lummus' downstream technologies	Enhanced product value through conversion to fuels and chemicals

Performance Characteristics

The following products are generated from the tire pyrolysis process. Exact quantities may vary depending on the ratio of passenger tires to truck tires in the feedstock.

- 40-45% recovered carbon black
- 35-40% tire pyrolysis oil
- 10-12% steel
- 12-14% pyrolysis gas

Process Flow Diagram



Process Description

The tire pyrolysis process consists of the tire preparation unit and the tire pyrolysis unit. The two units can be located on the same site or separately if needed. The tire preparation plant is not necessary if crumb rubber is already available.

Tire Preparation

The tires are fed into a primary shredder, which reduces them into coarse shreds typically ranging from 2 to 6 inches. These rough shreds are then transferred to a secondary granulator, where they are further reduced in size into chips on the order of a few millimeters. As the granulation process liberates the embedded steel components, the material stream passes through magnetic separation systems to remove the steel wire efficiently. The recovered steel is collected as a product for recycling, and the cleaned crumb rubber is then ready for processing in the pyrolysis unit.

Tire Pyrolysis

Crumb rubber is fed into the continuous pyrolysis reactor, which operates at high temperatures, through a controlled feed system. Inside the pyrolysis reactor, the crumb rubber is thermally decomposed in the absence of oxygen, producing pyrolysis vapor and raw rCB. The vapor is cooled in a series of condensers, separating the liquid pyrolysis oil for storage and non-condensable pyrolysis gases, which are scrubbed and recycled as fuel for heating the reactor. The tire pyrolysis unit will generate an excess amount of pyrolysis gas, which may be sold or utilized for other applications at the site.

The raw rCB is discharged continuously, cooled, milled, and screened to achieve the desired particle size and purity. Oversized particles are recycled, and the final rCB product is bagged for shipment.