

CASE STUDY

Company:

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Products:

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Microwave pyrolysis for the recycling of used tyres

EU-funded researchers have developed an end-to-end process for used car tyres to turn them into valuable products that can be used in the tyre industry rather than just recycled.

Challenge

With the growing number of vehicles, the disposal of used tyres is a growing problem. They are also often disposed of illegally or dumped in landfills, which poses a serious environmental problem. But the technology for recovering high quality materials from scrap tyres is evolving.

In the EU-funded SULFREE (Tyre recycling pyrolysis for producing oil with less than 0.2% sulphur content, low cost sulphur impregnated carbon for reducing mercury air emissions, with simultaneous elemental) project, researchers have developed a complete process to turn waste rubber residues into valuable materials.

Solution

The process starts with a microwave pyrolysis. Since no used tire recycling microwave pyrolysis plants have been in operation until now, this was a great success. For this process Fricke and Mallah supplied 5 microwave generators with 3 kW / 2450 Mhz each. Via the innovative internal mixing system with discs and bars the waste rubber is intensively mixed to achieve complete pyrolysis.



Carbon black and hot gas, the products of the pyrolysis process, each have a high sulphur content. The carbon black is activated by steam to increase its market value. The hot steam is cooled, compressed and injected under pressure into a fixed bed reactor to produce ultra-low sulphur oil and gas as well as sulphur.

Benefits

A condenser system, which produces condensed high-sulfur oil instead of steam, significantly reduces the cost of the process. The shell-and-tube heat exchanger of the condenser facilitates heat and steam recovery to meet the energy needs of the system and to activate the carbon black.

Scientists demonstrated the cost-effectiveness of the system. The recovery rates were comparable to those of existing programs (more than 90%). The important difference, however, is the resulting high-quality products: Pyrolysis oil, sulphur-impregnated activated carbon, elemental sulphur and combustion gases.

SULFREE is of great economic and environmental benefit, as the promotion of tyre recycling minimises the illegal disposal of used tyres.