

# Energy and Process Technology

## Devulcanisation of Whole Tire Rubber

### Closing the Loop: Waste Tires Back into New Tires

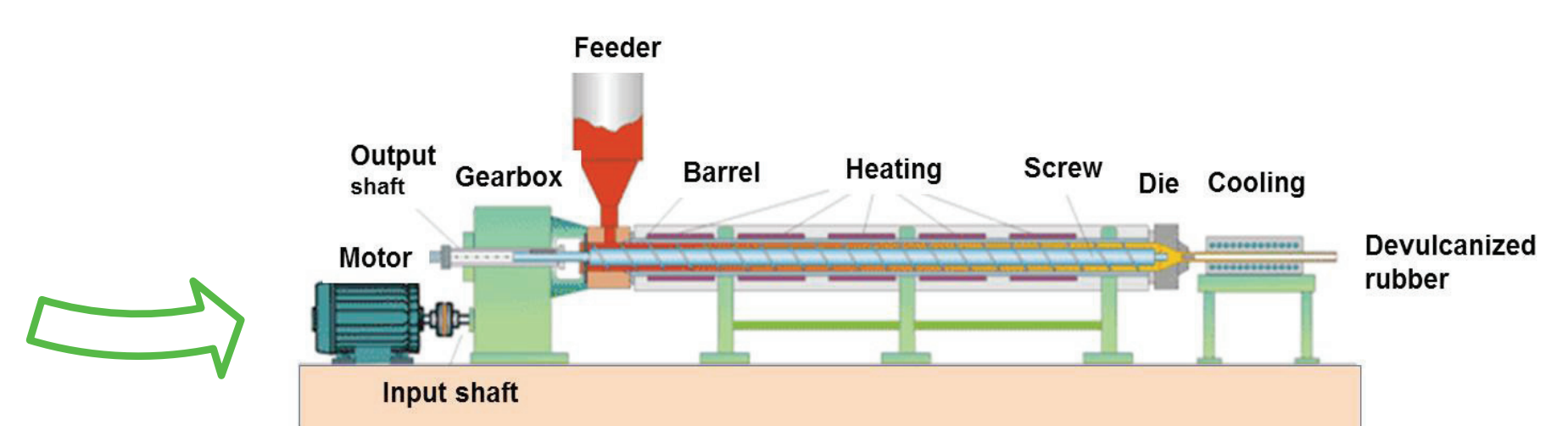
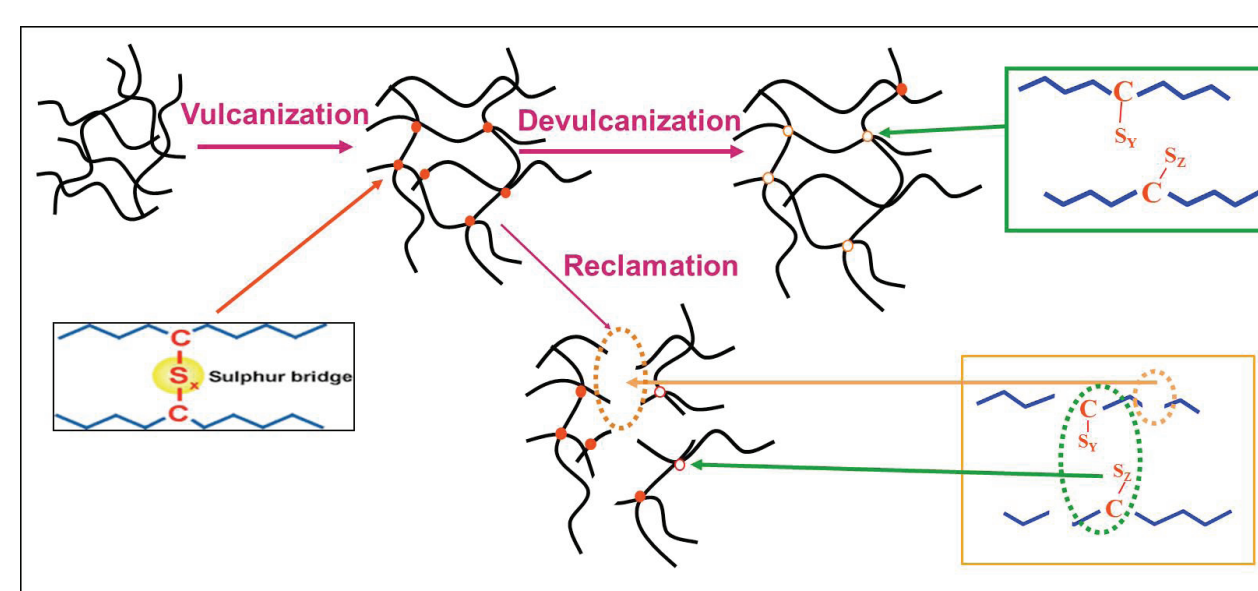
The aim of this project is to design an efficient and environmentally friendly devulcanisation process for used tires. 'Efficient' means that the recycled material can be used in high quantities, higher than the currently used few percent, in the same type of products: new tires. 'Environmentally-sound' relates to the process additives, which should be non-toxic and environmentally-safe.

Devulcanisation is the reverse of vulcanisation, the process for shaping rubber and forming a stable network from the polymer chains. In the case of tires, sulfur-bonds are formed; in the devulcanisation process, these bonds will selectively be broken in a thermo-chemical process.

The basis for the devulcanisation process is a small-scale, batch-wise process, which was developed in an earlier project

within the Elastomer Technology & Engineering group at the University of Twente. This process has to be scaled up and transferred into a continuous extruder-process. In first instance, the devulcanisation line will be designed for ground truck tires; once this is realised, the equipment and process will be adjusted for passenger car tire rubber. The main difference between the two types of tires is the main polymer: in the former case is mainly natural rubber, in the latter case it's synthetic rubber: styrene-butadiene and butadiene rubber. The synthetic rubbers are very sensitive to this treatment as chain fragments tend to re-combine, thus forming a new network.

**Interesting to know:** worldwide approximately 800,000,000 waste tires are generated annually. This is a pile five times around the globe or 3/4 the distance to the moon!



[www.theadvancedteam.com/laser\\_extruder.php](http://www.theadvancedteam.com/laser_extruder.php), (12-03-2015)

*"The outcome of this project will enable the tire industry to re-use a valuable raw material: rubber. This is a challenge, as a very high-quality recycled rubber is required: it's a safety issue. And as our resources are diminishing, this is one way to keep our transport system going: without rubber, our world comes to a standstill."*

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