

Rubber Crawler Tracks

RECYCLING

A. Construction tracks.

Containing: steel cleats, cables and rubber layer covering both sides.



Traditional digger with track



and dumped construction tracks.



Agriculture track (repair & recycling)



Construction track(recycling)

B.T.R.C.

The recycling technology for tracks, both construction tracks and agriculture tracks, is based upon the BTRC development using UHP (Ultra High Pressure) water jetting to pulverize the rubber in a one-step operation and cleaning the cleats ready for re-use.

The recycling of these two types of tracks is slightly different because the construction tracks having steel cleats and cables but the agri tracks having only reinforcing steel cables and they are also different in size and construction.

The recycling of construction tracks (the jetting operation) provides pulverized rubber powder and at the same time provides clean steel cleats.

The looped cables are in many cases destroyed during the working operations of the construction machines. They are considered as (clean) scrap.

The main goal was to determine the most efficient parameters to obtain the highest speed of processing (cm²/sec) recto/verso with the minimum energy (kwh/kg) required and of course the best financial consequences.

Beside the technical issues there was the quality of the recycled material as an important element to determine the best financial results of the recycling operation. The quality of the recycled material and evidently the market price were the very important last issues.

The (high) quality of these recovered products was evaluated on their market value (the re-use) e.g. recovered rubber and the steel cleats.

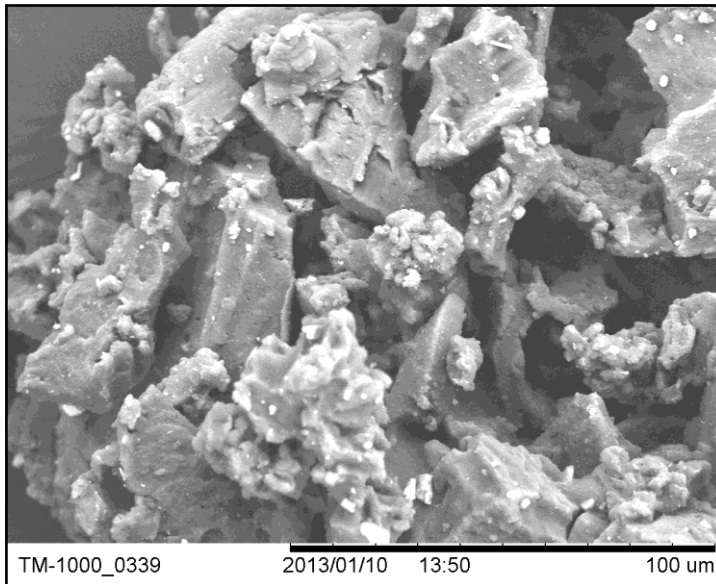
Finally a proper technical design lay out was made for the recycling machinery of the tracks and the recycled products.

The financial conclusions were brought together in a financial plan confirming the excellent ROI, EBITDA etc.

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Recycled materials:

- a. Pulverized rubber powder: reclaim quality, P.A.R. - Physically Active Rubber (see the TDS elsewhere) as a result of the UHP water jetting to pulverize the rubber directly into reclaim powder of some 400µm (40 mesh) max. Ready to be re-vulcanised on its own or diluting new compounds @ 50 or more phr.



SEM showing the rough surface of the PAR with cavities containing even more cavities.



P.A.R. physical active rubber ready to be re-vulcanised

- b. Steel cleats:

During the operation of the construction machines the steel cleats were protected by the rubber layer providing the grip and the steel cables making the traction liaison between all cleats.

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These steel cleats are either cast steel or forged iron. In both cases these are expensive elements. After jetting the tracks one can recover these cleats without any damage and perfectly clean. They are ready for re-use.

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Note: The agriculture tracks do not have cleats.



Example of different construction tracks with cleaned cleats.
Both examples are different brands and have different cleats.
Note the cables are in 'loop' format. Here they are locally quite good.

c. Cables

The cables are cleaned of rubber in the same jetting process as the rest of the track.

The reason for replacing the worn out tracks is just the destruction of the cables. Therefore the cables are always considered as scrap.

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Speed of the recycling operation:

Basic set up speed of recycling is approx 2,5cm/sec.

Increasing the number of UHP pumps consequently increases the speed of the full recycling.

Repair:

The repair of the construction tracks (mostly) with broken cables seems not to be efficient.

The repair of the agriculture tracks, when worn down to a few centimeter can easily be done using the jetting operation to clean the worn out studs.

This enables vulcanisation of new studs on the same location creating a second life of this agriculture track. The studs (at the inside) providing the real driving force are not worn out and do not to amended.

Safety issues.

The UHP water jetting of some 4.200 bars with water jetting speed of some 850m/sec (Mach 2) is a dangerous operation and needs special precautions.

The machinery is designed for taking this important issue into consideration.

Green issues / CO₂ reduction.

The CO₂ reduction using the BTRC technology is basically the sum of 2 issues:

1. The CO₂ reduction due to the recycling of the steel components.
2. The CO₂ reduction due to the recycling of the rubber and fluff products.

The re-use of the recycled rubber is a reduction of: 2,27 ton CO₂/ton rubber.

The re-use of the recycled steel is a reduction of: 1,90 ton CO₂/ton steel.

It is obvious that the total annual reduction of the CO₂ has to be calculated depending on the total tonnage recycled.

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General: EOL (end-of-life) rubber recycling.

BTRC made up a UHP water jetting technical report for EOL rubber products e.g. OTR's dia 1.4m to dia 4m, steel cord conveyors, tracks, fenders, oil & dredging hoses etc.

All parameters were listed in order of efficiency (speed of operation kg/hour) and energy savings (kW/kg powder).

This report is also including the analysis of the UHP water jetting effect on (EOL) rubber as a result of all 7 physically processes in and caused by the UHP water jetting, type of UHP pumps and jetting equipment.

The Upstream- and Downstream processes are also described.

Report available (228 pages).
