

Oil hoses and dredging hoses

RECYCLING and REPAIR

A. The Oil-hoses and Dredging-hoses - Recycling.



The recycling technology for oil hoses and dredging hoses 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 flanges and steel wires ready for re-use.

The recycling of these two types of hoses is slightly different because the construction of each of them is different.

The buoyancy layer is an extra issue in the recycling.

The main goal was to determine the most efficient parameters to obtain the highest speed of processing (cm²/sec) with the minimum energy (kwh/kg) required leading to 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 (re-use) market price were the important last issues.

Finally a proper technical design lay out was made for the recycling machinery. The financial conclusions were brought together in a financial plan confirming the excellent ROI, EBITDA etc.

B.T.R.C.

The recycled materials:

a. The steel flanges:

The 'cleaned' steel flanges are ready for reuse.

The outside surface of flanges of the oil and dredging hoses are protected by a rubber layer and are no subject of corrosion.

The circular 'traces' on the flange (see picture) are only superficial and do not change the surface roughness. They are caused by the rotation of the UHP water jetting and do not cause any effect on the later re-vulcanisation. They increase the attachment of the new re-vulcanised rubber.



b. The steel (bead) wire and helical wire:

The 'cleaned' steel (bead) wire and helical wire are ready for reuse

The steel (bead) wire and helical wire are protected by a rubber layer and are no subject of corrosion, they are ready for reuse.



B.T.R.C.

c. The steel rings on the dredging hoses:

The steel ring reinforcement on the dredging hoses are 'cleaned', but they have been subject to corrosion and cannot be reused. They have only scrap value.

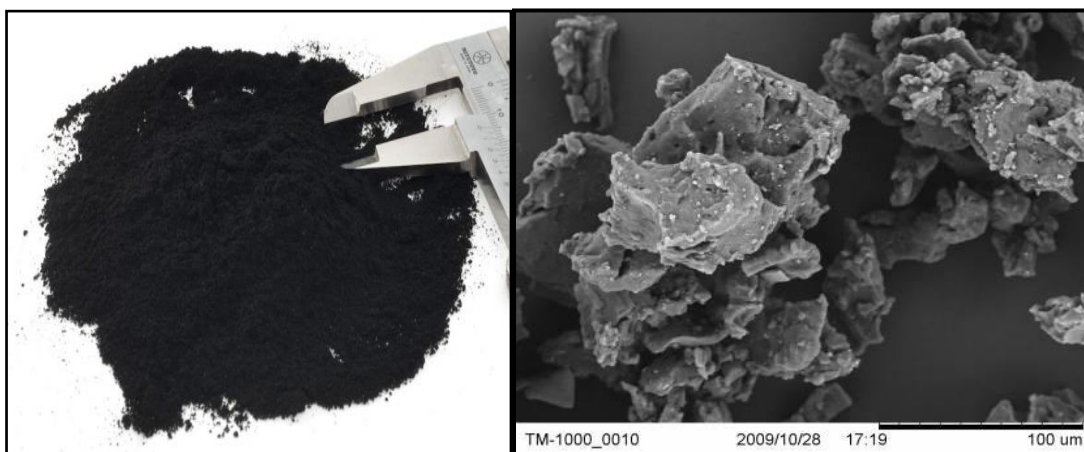
d. The rubber / textile fluff:

This recycling process which is basically designed for the recycling of the steel parts which have a far greater (re-use) value than the recycled rubber and fluff.

The recycling process however provides also pulverized rubber powder and textile fluff. This recycled rubber / textile (see picture) needs further recycling treatment.



The further processing of this recycled rubber / fluff provides fine rubber powder (max 400 μ m) and clean fluff (short fibers). They both have a high market value ready for re-use.



Max 400 μ m with great surface of approx. 1m²/gr

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This cleaned recovered textile fluff is proven to be a perfect reinforcing material in some new technical compounds.



The speed of the full recycling operation of the hoses.

The basic set up speed of recycling is approx. 2,5cm/sec.
When increasing the number of UHP pumps consequently increases the speed of the full recycling.

The recycling machinery.

BTRC developed 2 kinds of possible operations:

1. For recycling a complete full hose in a one-step operation.
2. For recycling the flanges and the rest of the hose separately.

Both of these solutions have been designed for container transportation for recycling locations anywhere in the world.

The operations should be done locally to avoid expensive transport.

The choice for either (1) a full-hose recycling or (2) a partial flange-recycling is an arbitrary choice also depending on the (remote) location of the hoses.

The machinery is designed to work with its own energy and own water supply/recycling. Connections to the local grid is always possible.

The limited use of energy is a major part of the high-tech UHP development. The limited use of water (jetters of 100µm jetstream) is even further reduced by recycling some 80 to 90%.

B.T.R.C.

B. Oil Hoses and dredging hoses - Repair.

The local repair of damaged hoses starts with a proper examination of the damage where the speed of the operation is the most important issue. The UHP jetting repair only on the damaged spot can be done to 'clean' the damaged rubber area to a certain dept (cleaning the steel wire) and prepare this spot for a new local re-vulcanisation eventually with additional textile reinforcement.

This local 'cleaning' jetting operation can be done on different depts of 'cleaning' from 10 to 40mm deep in one step without damaging the steel wire. The UHP water jetting process is only cleaning the steel wire without any damage of this steel wire.

This repair surface is subject of a fast cleaning operation with adapted UHP water pressure and rotation speed with a 'cleaning' speed of some 10cm²/sec. A proper small mobile 'taupe-mandril' is needed for any repair operation to keep the full shape of the hose. Therefor BTRC designed a proper technical solution.

The mobile repair machinery is designed to work on its own with its own energy and water supply/recycling.

The UHP water jetting machinery is designed for container transportation for recycling locations anywhere in the world. The repair operations should be done locally to avoid expensive transport.

C. 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 recycling operation need to be considered properly because of the tensions in the helical steel wire. This can cause severe damage of the equipment and of the personal.

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

D. 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.
