



Czech producer of shredders, mills and recycling plants

Frydlantská 160, 463 31 Chrastava, Czech Republic

Tel/fax: +420 485 152 659, +420 485 152 660

http: www.terier.cz, e-mail: terier@terier.cz

Tire recycling line

Ing. Stanislav Beranek

This offer is for complete line for tyres recycling .

1. Specifications

Material:	wheel tyres – private cars approx. – 40% truck tyres up to 1800 mm approx – 60%
Quantity:	3 tons/hour of tires
Output:	1 500 – 2 200 kg of granules in fractions 0 – 3 mm 600 – 1 000 kg of steel 200-300 kg textile and dust

2. Offer



2.1. Competitive advantage of the shredding line

- A.** The offered technology is based on the producer's extensive experience of waste processing. The shredding line construction reflects our experience of wheel tyre processing technological lines.
- B.** The offered equipment contains a complex system for process a whole tyre and obtaining highly negotiable granulated rubber at the end. When assessing the price of the equipment, it is essential to consider all its components.

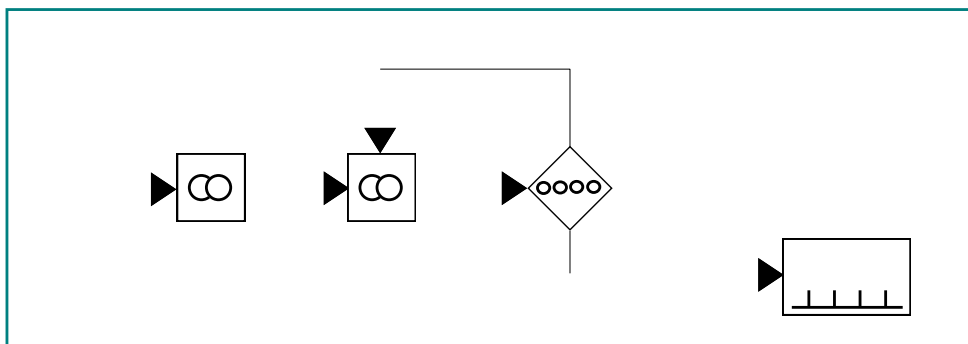
C. All the shredders have a robust construction. High-speed equipment with dynamically balanced rotors is used for fine shredding. Machine components exposed to high abrasion are made of abrasion-proof steel HARDOX 500. The most loaded parts are hard-plated with Swedish tool-steel showing minimum abrasive wear after 1000-hour operation.

D. The shredding tools design allows for an easy production and replacement.

- The set of low-speed knives at the inlet can be re-sharpened after getting blunt and used for further shredding. The proper space for the low-speed knives is protected against abrasion by rotating plates at the side knives, which reduces the material abrasion at the stationary wall, preventing them from an early damaging. The high-speed knives for fine shredding allow use all four knife sides. The knives can be sharpened at least four times, which is positively reflected in the price and in the whole operation economics.

2.2. Description of material flow through the line, machines, prices

A. Preshredding line



The staff dose the tires by a conveyor into a two-shaft low-speed shredder SCE 1300/70-150 KW. This shredder is designed for shredding tires. Shredder has two solid

rotors with knives holders.

Knives holders and distance rings are forced on on the shafts. Small easy changable knives are mounted on the knives holders by 3 screw each. Both sides of knives holder are covered by covers from toll steel.

Between knives is 0,1 mm space for cutting tires.

Knives are from special tool steel. The tires are pre-shredded into sraps. The scraps are around 50mm.

The rubber crumb then continues to a radial mesh that returns the pieces exceeding 50 mm back to the low-speed shredder. Undersize material is transported into the feeding reservoir that feeds shredding line by constant per-hour-quantity.

List of machines:

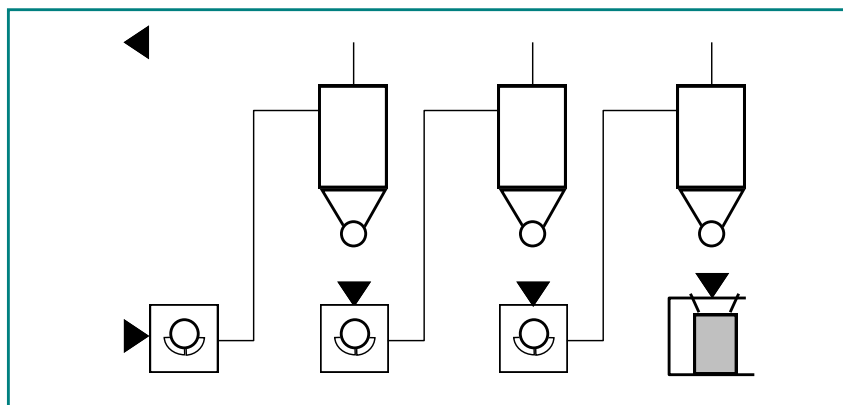
chain conveyor.1 300mm/7m-23°	2,2
Shredder SCE -1300-150 kW	150
frame for shredder	
Radial mesh 900/4000	5,5
Conveyor w. 800mm/9m	1,1
Return conveyor w..800/8m	1,1
Conveyor w.800mm/8m	1,1

B. Granulating for obtain chips 20 - 30 mm

The crumb from the reservoir is transported into granulation mill type GH in a precisely adjusted per-hour-quantity. The grinder power input is 200 kW. The GH mill is equipped with a 28 mm screen. First metal separation is behind the GH mill. Max. 1-5% of metal are in the rubber after the first separation. The rubber crumb produced after the mill is suitable as a substitute fuel, e.g. for cement works.

Feeding container 10 M3	16,5
Conveyor.650/10M-23°	2,2
GH 600/1200-200KW	200
GH Chamber	
GH Frame	
Transport ventilator + V1 pipeline route, filter	30
Hermetic vibration feeder VP 1100x3000	1,1
Belt magnetic separator SWPBO02402	2,2
Stainless conveyor w.500/4m for steel	1,5
Conveyor for rubber 500/6M-23° to the mill G	2,2

C. Fine shredding for obtain granulate 0-4 mm



After metal separation, the material goes on into the first mill G 600/1200/ 7/4/6. The mill's knives are made of a special material capable of shredding the mixtures containing residual metals. The screen in the mill output is a 10mm size. As well as at the GH grinder, the G mills shredding areas are hard-plated. Rubber crumbs are transported by a cyclone pneumatic transport.

The 2nd mill G 600/1200/9/6/3 follows, with a 4mm screen. Double metal separation is in this part of the line. The crumbs are transported by a pneumatic transport consisting of blower, pipeline, cyclone and dust and textile removing. The outcoming crumbs are stored in BIG-BAGs.

List of machines:

Mill 1 600/1200/7/4-160 KW- 6 MM sieve	160
Transport ventilator + pipeline route, filter	30
Hermetic vibration feeder VP 1100x3000	1,1
Drum magnetic separator	2,2
Screw conveyor	2,2
Vibrating separator with sieve 3 mm	5,5
Pneumatic transport of the rubber 0-3 mm to the sorter	5,5
Screw conveyor	1,5
Mill G2 600/1200/9/6-160 KW-3 MM	160
Transport ventilator + pipeline route, filter	30
Hermetic vibration feeder VP 1100x3000	1,1
Drum magnetic separator	2,2
Screw conveyor	2,2
Vibrating separator	5,5
Screw conveyor	2,2
Vibrating separator with 3 mm screen	5,5
Screw conveyor to the sorter	5,5
Screw conveyor to the mill G2	2,2
Vibrating sorter 0-1, 1-2, 2-3 mm	5,5
Pneumatic transport - 0-1, 1-2 and 2-3 mm	9
Bin for rubber 0-1, 1-2, 2-3 mm	
Textile treatment by air	45
Galleries and constructions	

Feasibility study, project design	
Central electric control	

Optional equipment

D. Preparation line

Machines in this part are not necessary.

The first step is to straight-cut tyres in 2 pieces. Material which is inside the tyre (stones, ...) can drop out. Half part of tyres is easy to manipulate.

Next step is debeader. It takes metal bead out of tyre. This operation is important and has two meanings:

1. Wear of knives in preshredding and shredding line is aprox. 20% lower comparing with line without debeader
2. Clean metal is getting by this operation

If there are big tyres more than diam 1 200 mm up to 2 000 mm hydraulic shears are used to cut these tyres.

List of machines:

	Tyres preparation	
1	Debeader	
2	Cutter	
3	Hydraulic shears	

E. Granulate final treatment

This part of the line is not necessary.

The final treatment technology consists of a mesh and fluid sorter system that size the rubber crumbs, removing residual magnetic metal and textile. The outgoing material is then transported to BIG-BAGs and taken for further processing. Continuous suction provides for dust-free technology.

List of machines:

Screw conveyors	13,2
Vibrofluid sorter KPS 1800 NA 1-2 MM, 2-3 MM	16
Pneumatic sorter KUTR 800/1800 NA 0-1MM	4
Screw conveyors for unclean rubber	6,6
Screw conveyors for clean rubber	6,6
Steel construction	
Distributor EE	

Prices will be changed if Exchange rate CZK/EUR will change for more than 2 %.

Packing, transport and assembly is not included in the price.

2.4. Assembly

The assembly can be carried out on a flat floor with no extra construction adjustments. The assembly takes about max. 30 working days. The price for chief-assembly is EUR 40 000.

2.5. Transport

For transport we need:

Container 40 ft HC 10 pcs
 Container 40 ft OT 3 pcs

Or similar space in trucks

2.6. Major machines - Technical parameters

SCE 1300/50 150 kW:

Shredding area size	1300x1 1150 mm
Knife width	100, 90, 80, 70 mm
Rotor revolution	20 rev/min.
Drive	2xplanetary gearing box
Power	155 kW
Number of rotor holders/knives	18/432
Power output on a shaft	75+75 kW
Throughput	5 - 15 t/hour
Lowering hydraulic aggregate power input	3 kW
Weight	15 t
Rating moment	100000 Nm
Dimensions w x l x h	3000x5000x3000

GH 600/1200-6/6/28:

Rotor diameter	600mm
Rotor length	1200mm
Rotor revolution	500 rev/min
Electric engine power input	200 kW
Electric engine revolution	1470 rpm
Number of rotor knives	6x4=24 pcs
Number of renewed knives	6x2=12 pcs
Power output on 30 mm mesh at 70x70 mm inlet, incl. dust	2-3t
Lowering hydraulic aggregate power input	0,37 W
Weight	10 t
Dimensions w x l x h	2500x4000x3000

G600/1200-7/4/10:

Rotor diameter	600mm
Rotor length	1200mm
Rotor revolution	500 rpm
Electric engine power input	160 kW
Electric engine revolution	1470ot/min
Number of rotor knives	7x2=14 pcs
Number of renewed knives	4x2=8 pcs
Power output on 10 mm mesh at 28 mm inlet, incl. dust	2t
Lowering hydraulic aggregate power input	0,37 W
Weight	8 t
Dimensions w x l x h	2500x4000x3000

G600/1200-7/4/4:

Rotor diameter	600mm
Rotor length	1200mm
Rotor revolution	500 rev/min
Electric engine power input	160 kW
Electric engine revolution	1470 rpm
Number of rotor knives	7x2=14 pcs
Number of renewed knives	4x2=8 pcs
Power output on 4mm mesh at 6mm inlet, incl. dust	1,5t
Lowering hydraulic aggregate power input	0,37 W
Weight	8t
Dimensions w x l x h	2500x4000x3000

2.7. Spare parts – service life

Shredder SCE 1300

Set of knives – service life at tyres shredding before changing is aprox. 6000 t of tires. Knife has two cutting edges, so after aprox. 6 000 ton has to be turn.

After aprox. another 6 000 ton knives should be sharpened and 96 knives should be filled in.

Mill GH 600/1200

Set of knives

4 shredding edges, service life of one steel edge before sharpening 100 hours

Max. 5 sharpenings

Estimated service life of the knives - 4 x 100 x 5

Hardox screen – service life (steel) 500-600 hours

Rotor

After the wear of the loaded rotor parts (max. once per a year) – optional renovation of the whole rotor by a hard overlay.

Time: two to three days

Mills G 600/1200

Set of knives

Service life before sharpening 100 hours

Max 10 sharpenings

Estimated service life of the knives - 10 x 100

Screen : service life 1000 hours

3. Power input

The installed power input of the line is 900 kW. Electric energy consumption for economic assessment is roughly 60% of the installed input in terms of conventional operation.

4. Required space

Space for tyres storage : recommended space 4 000 to 10 000 m².

Shredding and final treatment technology: 18 x 45 x 8 m

Storage of granulate, steel and waste : Closed warehouse for granulate max 400 m² and over. We recommend to store textile and steel directly in containers. We are not able to recommend the number of containers – it depends on the disposal system.

5. Realization period

1. Project stage max. 1 month
2. Production of the machines 6 – 8 months
3. Assembly and commissioning 1 month (not included in the price!)

6. Payment condition

1. Deposit 30 % after the sign of the contract
2. Deposit 20 % 2 month after the sign of the contract
3. Deposit 20 % 4 month after the sign of the contract
4. Payment 30 % after tests in Terier before transport

7. Application

1. Recycled tire rubber (rubber crumb)

Sport surfaces

Rubber crumb is used for sports ground (football, basketball, ...), playgrounds, racecourses and athletic surfaces. Playgrounds and athletic surfaces are frequently covered with a layer of rubber granules in order to help prevent injuries. Many stadiums throughout the industrialized world have running tracks that consist of recycled material. Most commonly, a moisture-curing urethane is mixed with 4-10 mesh crumb rubber and applied in a similar way as other poured pavements

Molded Products

In the past few years, the increasing supply of crumb rubber and a newly developed moisture-curing urethane binder has led to a rapid increase in the number of products made by simple compression molding. Typically, this method is used to produce high-volume, low-tech products, such as livestock mats, railroad crossings, removable speed bumps and athletic mats.

Thermoplastic-Elastomer Compounds

Combining crumb rubber with a thermoplastic binder at high temperatures yields a material that can be processed more like a thermoplastic compound, but still has some of the elasticity of rubber. This is a very cost effective method of producing high volume products such as acoustic insulation in cars, pallets, railroad crossings, etc

Rubber Modified Asphalt (RMA)

Increased resistance to rutting, reflective and thermal cracking are the main benefits of RMA. Other advantages include better de-icing properties, reduced traffic noise and, most importantly, a significantly increased service life and thus a lower life cycle cost

2. Steel wires and beads

Steel wires and beads from recycled tires are used as common steel scrap.

3. Textile

Separated textile from recycled tires is possible to use as alternative fuel in cement plants.

References :

Al Omair Rubber Factory (tubes), Riyadh, Saudi Arabia, 1997

GRG Holding, Czech rep., 2004, 3t/hour

Ekoela, Elektrinės 21, Elektrėnai, Lithuania 2006

MARSO for chemicals, Industrial Zone A1, 10th of Ramadan City, Egypt 2007, 2010, 2014

GRG Holding, Tušimice, Czech rep. – 8t/hour,

Bonus České Budějovice, Czech rep. 4t/hour,

Cleroden, Czech rep. – 2t/hour

Godecie, Czech rep. – 2,5t/hour

Mesnac, Qingdao, China, 3t/hour

Bene trade Czech, 1t/hour, private car tires

Metaloidas, Lithuania, 2,5t/hour

Atbara Cement Company, Sudan, 5t/hour

Metaloidas for Finland, 5t/hour

Videos: <https://www.youtube.com/watch?v=K3bYEfhkeoU>

<https://www.youtube.com/watch?v=MYMXYFmQUnA>

