TECHNOLOGY FOR A SUSTAINABLE TOMORROW

FOCUS

TIRE RE-SHREDDERS

SO YOU WANT TO RECYCLE TIRES?

Vecoplan®

So You Want To Recycle Tires?

The United States generates approximately 300 million waste tires per year. For years, the vast majority of those tires went straight into the landfill. Needless to say, that has created a huge problem over the years…a problem that was not going to just go away.

Through government interaction and entrepreneurial opportunity, recycling tires has become a big business. From TDF (tire derived fuel) to playground cover and from landscaping mulch to asphalt additives, the uses for recycled tires is growing on a daily basis. As we discover new ways to get rid of these tires, tire recycling becomes a more and more viable option for investors.

Starting Up - Some Things To Consider

Developing a business plan for recycling tires involves many aspects that can easily be overlooked:

- How many tires can you gain access to within a 200 mile radius?
- Are they passenger tires, light truck tires or both?
- How much can you charge to collect the tires?
- Do you have a customer who will take the shredded tires?
- What will they use it for…TDF? Landscaping material? Engineering grade? Playground cover?

It is our experience that you need to have access to about 500,000 tires a year to begin working on a successful business model. Anything less than this will not justify the initial capital investment required.

The next thing you need is a customer (preferably a large group of customers) that will purchase the ground rubber from you. The price you can get for ground rubber is a simple, relatively linear formula; the finer you grind the tires, the more money you can sell the material for. However, the finer you want to grind the tires, the more equipment you need to get the job done. You cannot, for example, make chips or crumb (1/4" minus down to 200 mesh) with one shredder. In fact, getting down to 30, 40 mesh typically involves as many as 4 steps to accomplish.

It is not our intent, however, to develop a business plan for you. After all, shredding is our business and it is what we do best. We hope that, by now, you have already done all the initial planning you need to do. Shredding equipment is usually the last step you need to take in developing a successful business model. We will certainly do our best to help answer any unanswered questions you might have about the industry but, again, our expertise is in the equipment.

Below you will find an easy-to-follow, step-by-step guideline that you can use to give you a general overview on shredding tires to make TDF, wire-free chip and crumb down to about 1/4 inch. Anything finer than 1/4 inch requires another step that Vecoplan can also offer in our overall scope of supply.

Step 1 - The Primary Shredder

As of today, approximately 50% of recycled tires are used as tire derived fuel (TDF). TDF is defined as 2" x 2" particle (sometimes even 1" x 1") with the steel wire still in it. You can make TDF with a single shredder, called a "primary shredder", a vibratory screener and some conveyors. Primary shredders to handle passenger tires only start at about $130,000 to $150,000. If you want to handle passenger tires and truck tires (but not OTR, or "off the road"), then you can plan on spending roughly $300,000 for the primary shredder alone. You should plan on spending another $200,000-$250,000 for the vibratory screener and conveyors required to make up a system for making TDF.

Whole tires would be loaded onto a roller belt conveyor that takes the tires up into the primary shredder. After passing through the primary shredder, the "shreds" fall down onto the vibratory screener. Anything larger than 2" x 2" gets carried onto a "return conveyor" that brings the over-sized pieces back into the primary shredder where they are shredded again (and again and again, if necessary) until they are 2" x 2" or smaller. The "unders" (2" x 2" or smaller) are now TDF and simply get taken away from the vibratory screener via another belt conveyor into a pile.

A system like this, laid out in a straight line would be approximately 80 feet long (max) and about 20 feet wide (max).

Approximate investment = $300,000 to $500,000 depending on passenger tire ONLY versus passenger and truck

Approximate operating costs of JUST the system as described in Step 1 = $12.00 to $15.00 per ton

Typical size of product: 2" x 2" with wire still present

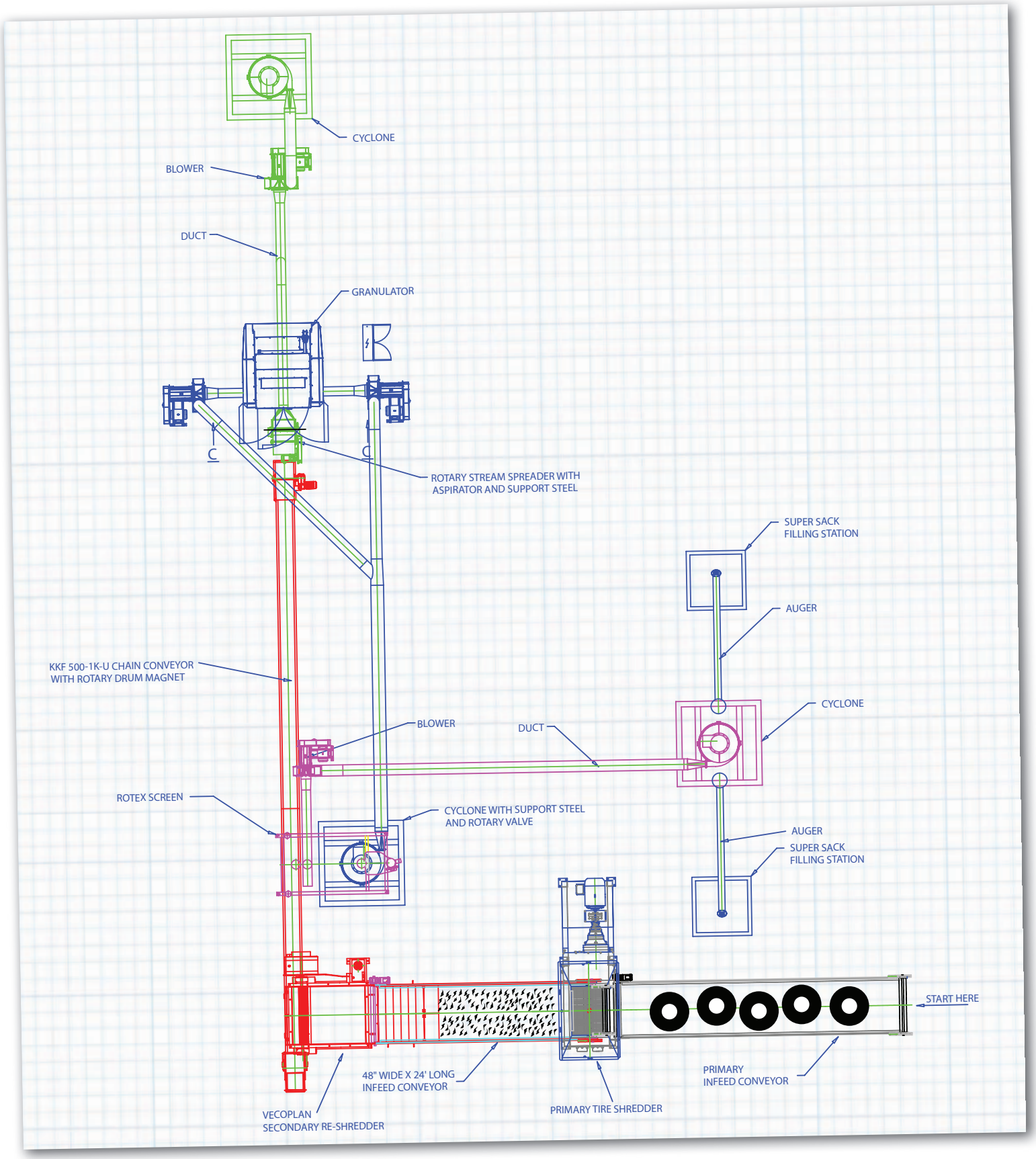
Markets: TDF

Product value: $25-$50 per ton depending on market, quality, customer demand, etc.

Whole Passenger Tires

2" Shred Size
with Steel Wire Still Present

Typical Tire Recycling System



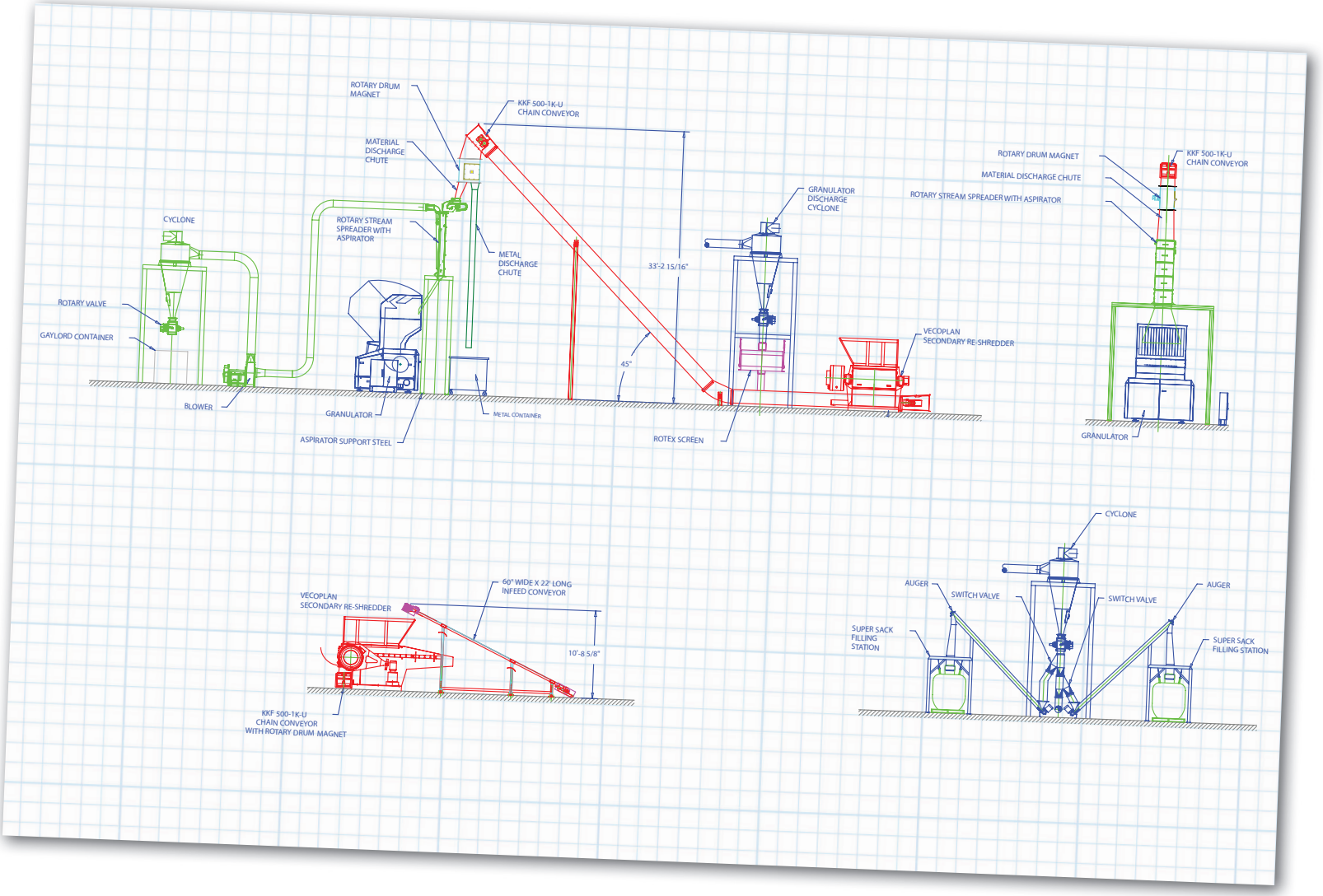
The System At A Glance

A typical tire recycling plant begins with a primary shredder, which shreds whole tires into pieces smaller than 4" x 4". These pieces are then fed into a re-shredder (such as a Vecoplan RTR Series Re-Shredder), which further processes the pieces to a smaller, consistant particle size, as well as liberates the wire from the rubber.

The processed rubber and wire is then passed through a rotary drum magnet which separates the wire from the rubber, both marketable end products.

To maximize profits from the rubber, however, the smaller the particle size, the more value it has. This being the case, the clean (wire-free) rubber is then processed into even smaller particles (about 1/4" to 1/2") via a granulator. Once the rubber is processed down to this size, fabric needs to be removed.

To separate the fabric from the granulated rubber, an "air separator" is used to "lift" the fabric from the rubber. The separated rubber, fabric and wire are now ready to be re-introduced into a vast array of recycled material markets, such as animal bedding, sports field cover, recycled metal and fibers.



Step 2 - The Secondary Shredder

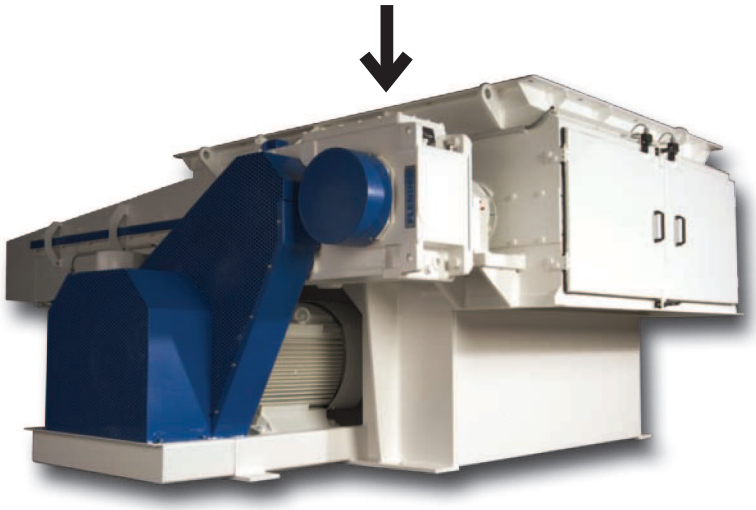
Some markets require the material to be smaller than 2" x 2" and, more importantly, may require the material to be "wire free". There is no way to make "wire free" product with just a primary shredder; a secondary shredder must now be added.

Vecoplan's RTR (rotary tire re-shredder) is the perfect machine for this job! Not only does the RTR do an excellent job of liberating the wire from the rubber, but it does it at a lower operating cost than any other secondary shredder available on the market today.

The RTR has a single rotating head (called the "rotor") that has knives (or "cutters") mounted on it. The RTR has a hydraulic ram that pushes the pre-shred into the rotor and a PLC program controls the feed rate of that ram based on the amp load of the main drive motor. The cutters on the rotor pass through a close tolerance, stationary bed knife to cut the rubber and pull the wire from the pre-shred. A stationary screen is situated around the outside half of the rotor and so nothing can get out of the machine until it is small enough to pass through that screen. The smaller the screen, the longer the material stays inside the machine. Screens are made in various sizes and are easily interchangeable. You can make 1" product, ¾" product or 5/8" product with a simple, 15-minute screen change.

The rubber and wire come out of the RTR in the same waste stream, so the product gets carried away via a drag chain conveyor which has a self-cleaning, rotary drum magnet located on the end of it. The wire is separated from the rubber at this point. The wire can be collected in anything from a 55 gallon drum to a self dumping hopper that your forklift can move around. The rubber, now mostly "wire free" is dropped into super sacks.

Your Shredded Tire Waste...



Clean Wire

Clean Rubber

Approximate investment
(Step 2 ONLY) - $250,000 - $500,000

Approximate operating costs for JUST the system as described in Step 2 only = $9.00 to $15.00 per ton

Typical size of product: 5/8", ¾" and 1" with wire removed

Markets: Playground cover, landscaping mulch, arena cover, wire free TDF, engineering grade replacement for gravel

Product value (rubber): $150-$200 per ton depending on market, quality, customer demand, etc.

Product value (wire): $40-$120 per ton depending on market, quality, customer demand, etc.

Step 3 - Granulation

Now that you have the wire out of the rubber, further size reduction is easier. You can demand more and more money for the product the smaller you make it.

Granulators can take the ¾" minus material out of the secondary shredder and reduce it down to about ¼" to ½" depending on the need. If additional size reduction is required after the granulator, then it is necessary to reduce the material down to at least ½" to ¼" to prepare the material for the next step.

In addition to the further size reduction this step offers, you will also now need to start removing the loose fabric from the material. Passenger tires have about 10-15% nylon or polyester fabric in them by weight. Consumers of ground rubber down in this size range do not want the fabric in the material.

Separating the fabric from the rubber is typically done using some sort of air system to "lift" the loose fabric out of the material stream. Each time the material is size reduced, more and more fabric will be liberated from the rubber and fabric separation will be required. Depending on how small you go, some of the fabric can (and will) stay imbedded in the rubber.

Approximate investment
(Step 3 ONLY) - $350,000 - $500,000

Typical size of product: ¼" to ½"

Markets: Horse arena cover, sports field additive, etc.

Product value (rubber): $200-$300 per ton depending on market, quality, customer demand, etc.

Re-Shredded Rubber from Secondary Shredder

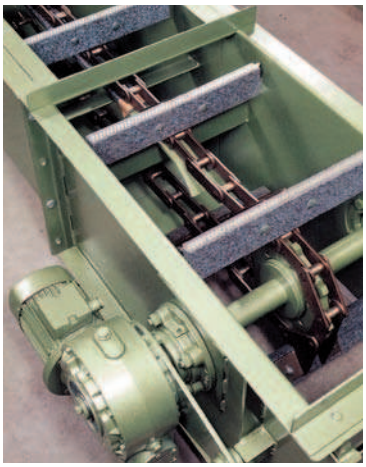
Granulated Rubber - 1/2" - 1/4"

Vecoplan - Your Total System Solution

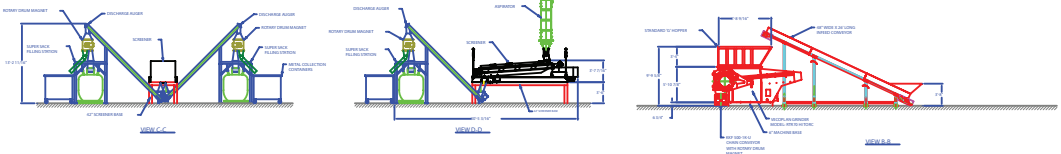
Vecoplan is known for providing complete turn-key solutions.

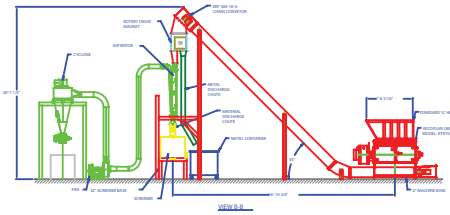
We provide complete material handling systems and design engineering including conveyors, pneumatics, metal detection and separation. American electrical control panels and components are available and may be fabricated to your specifications.

Vecoplan understands that installing new equipment can disrupt production operations. New equipment can create new demands on your present electrical system. That's why we include a review and analysis of your present electrical components.



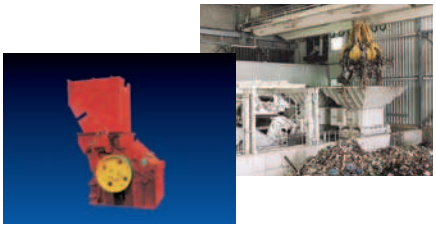
Vecoplan will help you plan for the additional equipment and prepare your present system to minimize any disruption to your operation.





Our Complete Range of Products

- Single and Multiple Rotor Shredders
- Conveying Technologies
- Air Classification Systems
- Refiners
- Rotary Trommels
- Vibratory Feeders
- Oscillating, Roller and Star Screeners
- Ferrous and Non-Ferrous Detection and Separation
- Bulk Material Handling, Metering and Loading
- Turn-key Recycling and Waste Processing Systems



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