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BUILDING A WASTE TIRE PROCESSING FACILITY

A **successful** waste tire processing facility is the result of careful research and detailed planning. Some start-up plants fail quickly because key evaluations are omitted or neglected in the early research phase.

The following outline is intended to assist the prospective waste tire recycler in the early planning phase of a new venture. It is not comprehensive in content but can serve as a basic guide for preliminary planning. The **main focus** of this guideline will be related to a SHREDDING Operation because it generally is the most successful and the most common type of facility. It is also the “entry” type of facility to the other technologies.

Although the following PRIMARY CONSIDERATIONS are discussed separately, it is important to note that they are interrelated and, in the final analysis, must be considered and weighted in accordance with the mission and goals of the company or persons involved in the venture.

PRIMARY CONSIDERATIONS

- A. TYPE OF FACILITY
- B. SIZE OF FACILITY
- C. FACILITY SITING
- D. REGULATORY CLIMATE
- E. END PRODUCT MARKETS

F. TYPE OF FACILITY.

The three most common methods of processing waste tires are MECHANICAL SHREDDING, CRYOGENIC PROCESSING and PYROLYSIS.

MECHANICAL SHREDDING is the most economical and most commonly used. It is accomplished by cutting and tearing the waste tire mechanically with shredders using a series of various sized rotating knives. This process has the greatest variety of potential end-product markets.

CRYOGENIC PROCESSING consists of freezing the waste tires and literally hammering them to pieces mechanically. This process incurs the added cost of purchasing and handling of a potentially dangerous freezing agent. It should also be noted that to be effective larger tires require some downsizing (shredding) prior to entry into the process.

PYROLYSIS is a process of heating waste tires to certain temperatures, causing a separation of ingredients into a variety of marketable components such as oils, carbon black, steel, etc. This process has not met with considerable commercial success because of the high capital investment and operating costs involved in the process itself. This method also requires preliminary shredding of whole tires.

TYPE OF FACILITY – General Comments:

There are two types of Shredding Facilities, mobile and permanent. Although it might seem practical and economical to consider a mobile shredding system to be placed in the vicinity of a large storage pile of waste tires, it usually turns out to be a failure. They require moving the tires to the shredder or moving the shredder to the pile on a daily basis. An adequate supply of water is not usually readily available and mud and debris usually clog the shredding site. Portable shredders are plagued by breakdowns and excessive down time. Weather & climate also play a part.

In addition to the specialized processing equipment required by each type of facility, including mobile systems, an array of other materials handling equipment is necessary. These include conveyor systems, loaders, utility vehicles, magnets, screening systems, certified scale, loading docks and holding/storage space, etc.

B. SIZE OF FACILITY

Depends primarily on availability and type of raw materials (waste tires).

1. Are you depending on stockpiles or current generation?
2. What is the expected annual tonnage?
3. What is the size of the trading area for new generation tires?
4. What types of tires (car, truck, OTR, mining)?
5. What size of equipment? (Depends on tire sizes and qty.)
6. What is availability of utilities, services, & transportation?
7. What markets or other disposal facilities are available?
8. What is the competition in your area?
9. Is the facility versatile and easily capable of change?

SIZE OF FACILITY – General Comments:

Tire sizes are important in determining facility size. If OTR and large mining tires are considered, larger handling equipment and larger, more complex, shredders are required.

When considering shredder types, capacities, sizes, performance, etc., it is well to remember that a single shredder seldom “fits-all”. Be aware of the difference between shredder “marketing” and shredder “performance”. Also be wary of the great deals in used equipment.

If your waste tire supply and trading area encompasses all sizes of waste tires, it is important to be aware that your customers want you to shred ALL of their tires, not just the ones that fit your equipment.

C. SITING A FACILITY:

In addition to all the factors listed in the previous section (facility size), these additional considerations must be incorporated in the planning phase. At this point the permit process should be accomplished. All the various local, state, and federal agencies should be brought into the process.

10. Environmental concerns such as proximity to lakes and streams have to be considered. Plant run-off may be of concern.
11. Local Zoning Ordinances should be studied.
12. What is the climate of your area?
13. How far is the proposed facility from end-markets.
14. Is the highway infrastructure adequate?
15. Is there adequate space for stockpiles of end products?
16. Are there adequate utilities such as water, electricity, etc.?
17. Is there an adequate labor force available?

SITING A FACILITY – General Comments:

Without careful planning this can be the most difficult and time-delaying phase of building a shredding facility. By initiating the permitting phase at this stage of planning, some time and expense can be saved by having a better estimate of the time required before actual operations can be commenced. The attitudes of local residents and officials should be determined at this time.

The extra time spent in adequately researching the details of the siting process can save a considerable amount of money in the initial placement, construction, and future operating costs of the facility.

D. REGULATORY CLIMATE;

All phases of the proposed facility will fall under some form of scrutiny from regulatory agencies. Each state has a different set of regulations and many times they conflict with local or federal rules. The following list contains the major areas to be explored.

18. Local zoning issues and citizen concerns.
19. State Permit requirements.
20. Bonding and financial assurance requirements.
21. Local and State Fire prevention requirements.
22. Environmental Impact Study.
23. Availability of Government funding or subsidies.
24. Local building codes and ordinances.

REGULATORY CLIMATE – General Comments

This phase of building a waste tire shredding facility can be the most frustrating and time consuming of the entire process. Generally, if the need for a facility exists, the Bureaucratic Climate will be friendly. However, from time to time you will find that person, with little knowledge and lots of power, who seems to take pleasure in thwarting the process. This can usually be overcome by honestly presenting your case in a pleasant and knowledgeable manner.

Be prepared for an exercise in patience and persistence.

A. END PRODUCT MARKETS;

Shredded waste tires can supply a variety of end markets of which the most common is TDF (Tire Derived Fuel). This product is usually shredded to a 1 to 3 inch size and is used in power plants, cement kilns, septic systems, etc. It is a good broad market because, when added to coal, it generally burns hotter and cleaner than coal and, as a result, lowers the overall emissions from coal burning facilities. Other markets usually require a more extensive facility with some specialized equipment. The following is a list of some of the more usual markets:

1. TDF (Tire Derived Fuel).
2. Civil Engineering (6 to 10 inch shreds for road projects, etc).
3. Rubber for playgrounds, golf courses, running tracks, etc.).
4. Specialty Sizes (custom grinding for specialty markets).
5. Crumb Rubber (for molding into other products).
6. Residuals (Inner Tubes- Steel & Aluminum Rims- Reusable Tires).
7. Highway Resurfacing (Rubber & Asphalt Mix)

MARKETS – General Comments

The average, standard size, shredder will take whole car and truck tires down to a minus 2 inch shred with a little additional screening. The actual sizing is determined by the size of the knives, configuration in the shredder, and the subsequent size of the screens used in the screening system. A good rule of thumb is that the smaller the product desired, the longer the process takes. A smaller product reduces the facility input tonnage and requires additional screening and materials handling equipment. This significantly increases the cost of shredding.

Markets for shredded waste tire products are extremely volatile and should be pursued with caution.

SUMMARY

Building a Waste Tire Processing Facility is not for the faint hearted. There is no single manual or publication or training course that can prepare anyone for the problems inherent in tire recycling, or any recycling venture, for that matter.

Success is a combination of excellent research and pre-planning, combined with the proper equipment and experience. Experience is the biggest factor in a successful set-up and profitable operation. Experience dictates that equipment purchases CANNOT be left entirely in the hands of the salesman or a marketing department. No single stand-alone piece of shredding equipment will consistently take whole waste tires to crumb rubber in a single pass. The experienced processor knows that the output of a shredder decreases significantly and rather quickly as knife wear increases. He also knows that the quality of the end product deteriorates as the knives continue to wear. In addition to the best planning and best equipment, EXPERIENCE in the field is essential to success.

If the three key words to success are EXPERIENCE, EXPERIENCE, and EXPERIENCE, the question then remains, "Where do I get it?"

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BEFORE YOU LEAVE.....

Some common misconceptions about waste tires and the tire business:

TIRES ARE EASY TO SHRED.....Tires are one of the most difficult wastes to shred and process. They contain two opposite ingredients, rigid steel and flexible rubber. The bead steel is high carbon steel and in some larger tires is harder than the knives that cut them. The rubber is securely bonded to the bead steel and must be ripped from the wire.

INDIVIDUALS AND BUSINESSES ARE EAGER TO HAVE THEIR WASTE TIRES PROCESSED.....Generally speaking this is not true. They are reluctant to do so because of the cost and they require some regulatory pressure or financial incentives to bring them to a recycling facility.

WASTE TIRES ARRIVE AT A RECYCLING FACILITY IN A REASONABLY CLEAN CONDITION.....In addition to the usual accumulation of dirt, snow, ice or water, it is not uncommon to find that tires contain steel scrap, shop tools, garbage, animal dung, live cats and kittens, skunks, woodchucks, raccoons, poisonous snakes and other unpleasant living creatures. Monitor Tire Disposal has even had the unique experience of occasionally shredding live rifle and shotgun ammunition in addition to rest of the above items.

THE WASTE DISPOSAL FEE PAID TO THE TIRE DEALER GOES TO THE WASTE TIRE PROCESSOR AT TIME OF DELIVERY.....Not true. In the normal competitive market place the tire dealer pays the processor approximately one third to one half of what he receives for disposal. The rest is his.

END MARKETS FOR PROCESSED TIRES ARE PLENTIFUL.....The world is NOT waiting for crumb rubber or waste tire shreds. Contrary to most Public Relations Campaigns, many product manufacturers and most consumers would rather have virgin material. In the case of very fine crumb rubber, the cost of recycling can exceed that of virgin ingredients.

GOVERNMENT SUBSIDIES FOR RECYCLING WASTE TIRES GO TO THE PROCESSOR.....Unfortunately, the subsidies usually go to the end user of the recycled product, NOT to the processor. The waste tire shredder, who actually does the recycling, is caught between the dealers profit on the disposal fee and the subsidies to the end user of the recycled product.