Refurbishing Steps for Success

Demanufacturing

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Creating a demanufacturing program

What is demanufacturing?
Considerations before starting a program
Tools and equipment needed
The results of demanufacturing.
Testing parts for reuse

Demanufacturing:
- Computers
- Monitors
- Printers

Aggregating the separated parts – bailing
Shipping pallets – banding

Container shipping of 40 foot truck or container considerations
Environmental concerns
What is demanufacturing?

- Demanufacturing electronics means to disassemble them to their basic parts such as motherboard, memory, power supply, hard drive, CD drive, DVD drive, video, audio and Ethernet adapters, cords and cables metals and plastics.
- Reuse is better than recycling – for the environment as well as income to your program. Computers can be taken apart so that the parts can still be used or sold. As an example, the memory may bring a greater value when reused as memory rather than sold as scrap.
- When the electronics are unusable, the best solution may be to part them out for their scrap value through recycling.
Considerations before starting a program

- When accepting donations for demanufacturing, it is very important to know where the parts and pieces will go. Electronics contain many elements that can be hazardous to your employees and to the environment.
- Computers contain lithium batteries that when broken and exposed to moisture will erupt in an intense fire.
- Monitors contain large quantities of lead that can be very harmful particularly when allowed to enter the ground water or inhaled when the glass is broken.
- Monitors may retain a large electrical charge so utmost care must be taken to reduce risk to those taking them apart. Vacuum tubes if broken will implode and then send broken glass everywhere at a great speed.
- Electronic dust can be harmful so workers should wear masks and goggles.
- Electronic waste has valuable components as well such as circuit boards and processors that contain more gold than a rich gold mine. Wire, steel, memory, plastics, aluminum, copper and other components can have value when processed by a specialized recycler.
- The best value comes by bailing and processing large quantities of the same materials. Investigate before accumulating large amounts of scrap to find out who will take them, how much they will pay (or charge), and how they want them prepared to get the best price.
- Check zoning and all of the regulations concerning hazardous materials and universal waste. You will come under various laws, inspections and reporting procedures.
Tools and equipment needed

• **Employee – tools include:**

• **Facility - equipment**
  - The tools needed depends upon the size and scope of your operation.
  - For larger operations important pieces of equipment include
    - a scale for weighing pallets
    - a banding tool to secure loads for shipping
    - a bailer to compress scrap that also bands it for shipping
    - a forklift to be able to move the bails
    - a pallet jack
    - pallets and shrink wrap or Gaylord boxes (heavy cardboard boxes)
The results of demanufacturing

- **Sales of parts** – If you can find a market for the parts you have removed from the computers for instance, you will make more money than sending the pieces as scrap. You may want to allow the public to buy excess parts.
- **Selling scrap for recycling.** Most e-scrap can be sold if there is enough of it to make it worth shipping. Recyclers may take your undesirable items such as large copiers and printers in return for your other more valuable items.
- **Demanufacture electronics and sort the parts into plastics, metals, glass, wire, batteries, circuit boards, processors, aluminum and copper.** The cleaner the sort, the higher the price offered.
- **Learn the best way of sorting to get the highest price.** Motherboards with processors are more valuable than those without processors. Plastics are often sorted by color.
Testing parts for reuse

• If you can sell a sound card, video card or Ram as a working component you can get a higher price than selling it as scrap. Before you can sell it, you must test it first. Your reputation is very important. Your customers will recommend you and give you return business if you sell working equipment. Test first.

• Set up a computer and use it to test the various adapters and memory. You will need more than one computer to test the various kinds of memory and video cards. Test and sell what your market needs. Sometimes clients will come to you because they have older equipment and can no longer find the parts or adapters they need even for business solutions. You will find the older memory often sells for more that the newest memory being produced. The smaller sticks of Ram should be sold for scrap such as 8 MB, 16 MB and 32 MB. Over time you will determine what to keep and what to scrap.
Using screwdrivers (torx, Phillips and flat head) remove all of the components from the case. A light weight power screw driver is recommended to reduce employee wear and tear.

Keep some parts for your use and sort the remaining to go for scrap. Have separate containers for motherboards, other circuit boards, thin wire such as IDE cables and other wires, plastics such as the case front and fan case, CPU processor, memory, floppy drive and cd drive, hard drive, a container for screws and a container for the on-board lithium battery.
Demanufacturing – monitors and televisions

- Monitors may retain an electrical charge that can be VERY dangerous if not handled correctly. They can hold a charge for months.
- A typical CRT monitor contains 7 pounds of lead that can be very dangerous if broken, the dust inhaled or if allowed to enter the ground water supply.
- Monitors are sometimes called vacuum tubes. Because of the vacuum the glass can first implode then explode with shards of glass flying everywhere. Take care that tools do not crack the glass.
- Supply your workers with the proper equipment for safe handling such as:
  - Goggles
  - Rubber handled pliers and wire cutters
  - Mask
  - Insulated gloves
  - Power screw driver (to prevent carpal tunnel disease)
  - Hammer to gently pry the yoke from the glass
  - Heavy clothes or leather apron to guard against explosive glass
With a power driver remove all screws and then the plastic case.

The dangerous part of the process is to discharge the electrical charge safely.

Using gloves and rubber handled wire cutters, cut the power cable near the transformer and ground it to the metal part of the case.
With pliers pull on grounded cable and remove it from the tube. Cut all wires and separate the metal parts from the case. Use wire cutters and the screw driver to continue freeing the tube. Remove the glue from the neck of the tube.

The final step is to squeeze the top of the tube with pliers so that the vacuum is released. You will hear the air rushing in. This will cause the internal capacitor to discharge fully so the tube can be safely transported.
The copper yoke

The yoke removed during the monitor stripping process can be sent as is to a smelter or processed further depending upon the cost of labor. Clean copper may bring better prices. **DO NOT BURN** the plastic as poisonous dioxin is emitted that is extremely toxic.
Ink Jet Printers – The cost of ink jet printers is very low because manufacturers make their money from the cost of the ink. There is little or no money in demanufacturing printers. The ink cartridges should be removed. There is a market to sell the cartridges to businesses that refill the cartridges.

Ink Jet Printers need to be separated into plastics and metals. The plastic used in printers should be separated from the other plastics so that you can get the best prices for your plastic. As with all demanufacturing separate the e-scrap into plastic, circuit boards, ribbon wire and metals. Bale it with other like products.

Laser Printers – Laser printers retain their value for longer periods and should be refurbished if possible.

Keep an eye out for jet direct networking adapters. They can be used to network printers. Also look for hard drives that are often installed next to jet direct cards. The hard drives are standard IDE hard drives and must be wiped using data wiping software.
Collect toner and ink cartridges

- For those printers being scrapped be sure to collect the ink and toner cartridges. When copiers or printers are donated ask if there are supplies the donor can no longer use. Often the donor will have new supplies on hand that will no longer be of use. They can be resold. Toners and ink can become old and no longer work properly in the printers. Toner is not good for the environment or your workers so handle carefully. Laws concerning toner cartridge and ink cartridges are changing and becoming more strict as to the proper handling of these items. Check with your local regulations.

Look for a buyer for your toner cartridges and toner.

Businesses that specialize in refilling ink cartridges will buy from you.
Sort to get the highest price

- **Plastics**
  - Plastics are further sorted into five categories for the best prices:
    - ABS – white plastic from monitors and computers
    - HIPS – black plastic from cases, monitors and television sets
    - Translucent plastic as commonly used in MAC computers
    - Plastic used in printers
    - Shrink Wrap
  - These categories may vary in your area. If you collect and bale a large quantity of plastic you should be able to find a buyer. We will discuss trucking and shipping later.

- **Motherboards**
  - Motherboards must have the lithium battery removed. The batteries will catch fire if broken and exposed to moisture.
  - Motherboards will bring a higher price if the CPU is still attached. Check prices with your buyers to see if you can get a higher price as separate items – boards including the CPU – or circuit boards and separate CPUs.
  - All other circuit boards can be packed together and will typically receive a lower value. The value for the circuit boards is for the gold content when a large quantity of boards are smelted. When assembled in large quantities there is a valuable gold content but the value is only there when using expensive processing equipment to process the boards.
  - Ask your recycler if fingers (adapters such as video cards),

- **Wire**
  - Wire must be separated into heavy wire such as power cords and fine wire such as audio cables, wire from monitors, and IDE cables. Talk to your buyer how best to prepare the wire for the highest price.

- **Metals**
  - Sort metals by type such as copper, aluminum and steel. Bale where practical for easier transport.
Sort and prepare your e-scrap for transportation

If you will be producing large quantities of e-scrap you will need to invest in a used bailer. This machine compresses plastics and metals while banding the bale into manageable cubes. The bale is then placed on a pallet for transportation.

Browse the web to find bailers in your area. You may want to price used ones.

A forklift would be needed to move the pallets that can weigh 1400 pounds or more.
Packing prior to shipping

Home made container

Boxes stacked shrink-wrapped and banded

Bailed plastic

Computers prior to shrink-wrapping and banding
Shipping

Container or truck shipping

- A container is 7.5 to 8 feet tall, 8 feet wide and 40 feet long.
- A pallet is 40 inches by 44 inches but it may vary. If the load can placed on the pallet so that it is a little less than 48 inches by 48 inches then 20 pallets will fit in the container. In the case of extra wide pallets, they may need to be staggered on the truck so that fewer pallets can be loaded.
- A 25 foot truck can handle 12 pallets – 2 x 6 pallets takes 8 feet by 24 feet. Check the height of the vehicle. Check the maximum load weight allowed.
- When shipping by container the goal is to load close to 40,000 pounds in the container to obtain the lowest cost per pound.

Pallet scale

Electric pallet turn table
Selling used parts

- Over time your organization will become known as a source for parts. If you have excess to sell you can try:
  - E-Bay or Craig’s List.
  - Your company web-site. By listing products on the Internet you will find buyers.
  - If you buy parts you may be able to barter or trade your extras for the parts you need.
  - A business that sells items you have may be willing to buy them from you.

- You may want to join with other similar programs in your area so that you can share the cost of some of the equipment or to be able to gather enough of similar items to be able to access other markets and to get better prices.
Environmental concerns

- Caring people everywhere are very concerned about the practices found throughout the world of dumping e-waste.
- Electronics contain many hazardous materials such as lead, mercury, cadmium, arsenic and PCBs. They can be harmful to employees as well as the environment.
- One of the worst practices that has been documented is the burning of wire and other components in the attempt to retrieve the wire by burning off the plastic coatings. Dioxin is released during the burning or acid baths that is very toxic and sure to shorten the lives of those involved as well as to poison the environment.
- As a collector of hazardous materials you must be aware of where they are going after they leave your facility so that people and the environment aren’t being harmed.
- You can get further information from the Basal Action Network at www.ban.org.
- You can perform a great service by gathering and sorting e-scraps that can add resources through reuse. Please, do it responsibly.
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