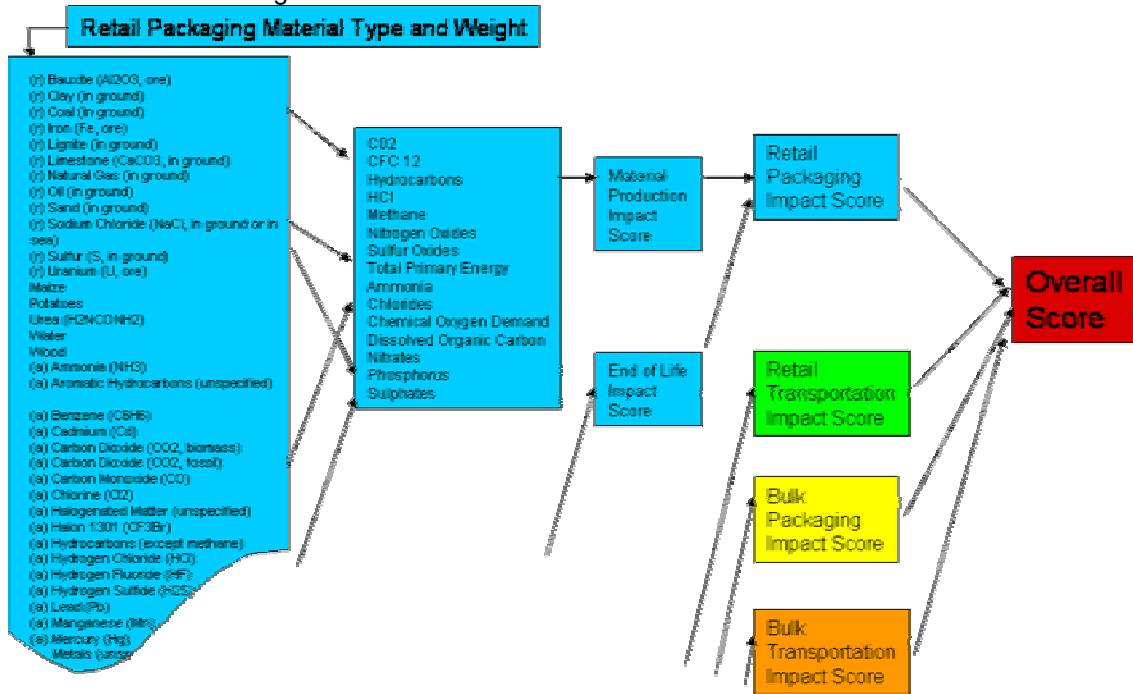
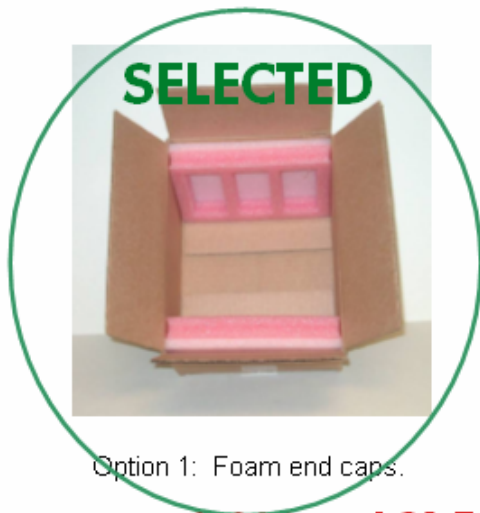


Imaging & Printing Group

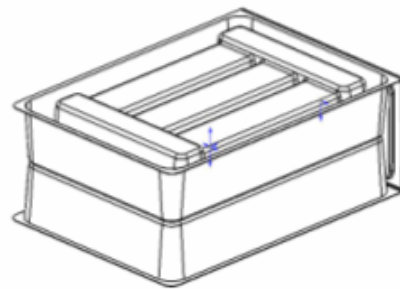
- IPG Supplies - Bulk Tray Reuse Project – (HP contact: Deirdre Sharkey)
  - o Often, HP’s engineers are working behind the scenes on increasing supply chain efficiencies that directly relate to environmental improvements. For example, our ink jet cartridges are manufactured in various locations around the world and shipped in bulk to regional completion centers, where the final retail packaging is added. Moving the pens in high density bulk helps HP save money on shipping and improves the environment by using fewer transportation resources (planes, boats, train, and trucks). A team of HP people did an analysis to determine when it makes sense to reuse the inkjet cartridge bulk shippers. They determined that there is a greater impact on the environment for long return journeys but would be perfect for short return routes. This analysis resulted in a repurposing of the bulk tray to reuse it 5 times on short round trip shipment which eliminated the need to purchase 5.3 million pounds of new corrugated paper, and a savings over \$1 million.
- IPG Supplies - EcoVision – (HP Contact: Russ Moore)
  - o Many times it is difficult to determine which packaging design is the best solution for the environment. Meeting this challenge, HP developed a software tool called EcoVision that measures the environmental impact of any HP inkjet cartridge packaging concept. The EcoVision tool uses a scientifically based model -- a Life Cycle Assessment (LCA) model -- to calculate the many environmental impacts of the complete packaged solution. Our Inkjet Supplies Business has used this tool to set environmental targets & limits for all new packaging designs. The EcoVision tool enables HP packaging engineers and managers to set and achieve environmental goals. It also gives them the ability to track & communicate progress towards these goals using scientifically based facts & data. The following graph of EcoVision scores clearly shows the relative merits of several candidate designs.



## Design Decision – Cartridge Tri-Pack



Option 1: Foam end caps.



Option 2: Clamshell.

**0.062 LCA Tool Scores 0.17**

(Low EcoVision scores are good. Low score = small environmental impact)

- Personal Inkjet Printers - Thermoform Clamshell – (HP Contact: Kevin Howard)
  - o Sometimes our customers want to see what they are getting for their money. Clear plastic thermoform clamshells are the best way to do that. Packaging engineer Kevin Howard was challenged to develop the first Hewlett-Packard inkjet printer ever packaged in a thermoformed clamshell. One of the main objectives of this project was to instantaneously convey to consumers the new, small size of the printer, along with the ability for the users to create their own personalized artwork on the printer's cover. A plastic clamshell package was the perfect fit for these needs, but Kevin had several issues to resolve.
    - Material selection: HP would prefer not to use PVC (polyvinyl chloride) materials for packaging because of environmental concerns. As an alternative, Kevin went with all PET-based (polyethylene terephthalate) materials. The benefits of this approach include: no chlorine compounds used (chlorine depletes the ozone layer); post-consumer recycled content is possible; and PET-based plastics are more readily collected for recycling than is PVC. To further encourage recycling, all four of the thermoformed components were made with PET-based materials. The final design incorporated a small amount of post-consumer recycled content (recycled beverage bottles) as well.
    - Protection: It is rare to find larger and/or heavier computer products in thermoform packages. The problem revolves around the thermoform package's thin plastic walls which may have difficulty in providing adequate protection when dropped, surviving high temperature storage conditions, or assisting in stacking one product on top of another. Extensive package design effort was required to develop a solution that could survive all the hazards of distribution, yet minimize the overall size for better warehouse and shipping efficiencies.

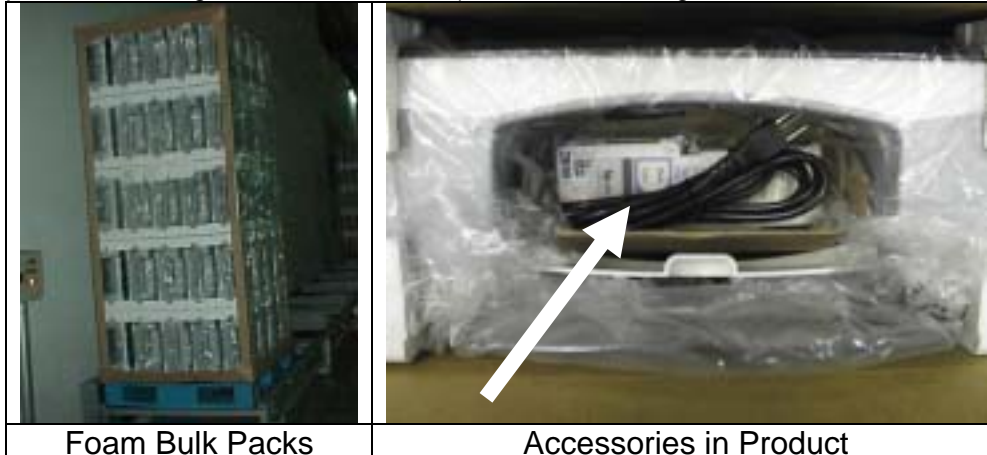


## HP 2003 Environmental Packaging Whitepaper

- IPG Supplies - Media Set-Up Box master Carton re-use – (HP Contact: Gregory Hash)
  - o This is a story of material optimization. HP Photo, Brochure, and Flyer Paper are delivered to our operations in bulk and then repackaged for retail consumption. Greg Hash and Susan O’Boyle devised a way to reuse the inbound product containers as outbound master cartons. The benefit of re-using the cartons is a cost savings estimated at \$8,000 year, eliminating the need to obtain new cartons, and removing the need to track/inventory various outbound master carton sizes.
- IPG Supplies - reduced sleeve – (HP Contact: Thomas Beilman)
  - o Minor changes to inner packaging on high volume products can yield big benefits. One of HP’s popular inkjet cartridge pens uses an internal protective paperboard sleeve. Our worldwide engineers took on the challenge to redesign the sleeve to improve the customer experience by making it easy to open and at the same time eliminate any superfluous materials. The team had to overcome numerous technical and design issues as not to impact the global high speed packing lines. The results, a lighter internal sleeve which used less material, the ability to inspect date codes, and an easier opening feature. All leading to reduced shipping & material costs in addition to eliminating of 3.7 million pounds (1.7 million kg) of paperboard over the next 5 years.



- All-in-One Personal Inkjet - Bulk/Single Package – (HP Contact: Don Clugston)
  - o Working with product designers and supply chain engineers, HP packaging engineer Don Clugston was able to develop an All-in-One package designed so that all the accessories could be held and shipped “inside” the product (pens, power cord, etc). That helped reduce the amount of foam and box material required for each product and created “The Worlds Smallest All-In-One Product” on the retail shelf. The efficiency of the single unit foam design also allowed HP to use the foam end caps as the bulk pack tray element. This eliminated almost all of the previous bulk packaging components and costs. The result in foam reduction was 216,000 cu. ft. (270,000 lbs) of EPS per year (equivalent to 1333 dumpsters stacking 1.5 miles high) and the elimination of the corrugated paper bulk sleeves and trays estimated at 5,400,000 lbs. per year (equivalent to 103 cargo 747 planes stretching 5.8 miles nose to tail). Worldwide savings on all this exceeded \$2.7 million.



## HP 2003 Environmental Packaging Whitepaper

- IPG Europe - Bulk to Blister – (HP Contact: Bernd Kuhn)
  - o HP's inkjet cartridge supplies in Europe are packaged and sold in plastic blister shells at the request of the retailer. The old process was to take pre-packaged FGI Cartridges (first production step) and over package them with a plastic blister foil (second step production). This was done on manual feed blister lines. Now, a new fully automated Bulk to Blister packaging line processes ink cartridges directly from the incoming bulk tray into finished blister product packaging. Thus, the old 2- step process was replaced by a very efficient 1-step process. This new process helps the environment by using significantly less energy (1 less production line), packaging material (50% reduction equal to 95 tons less of paperboard/corrugated/foil per year), and is a major cost savings (several million dollars). Another way to look at it – there will be 349 less dumpsters of material in Europe to recycle.



- Personal Inkjet Printers - Molded pulp endcaps – (HP Contact: Frank Woodbery)
  - o Using renewable materials for cushioned packaging is always a desire but the challenges of the distribution environment (drops, shocks, vibration, humidity, etc.) many times limit the packaging engineer's options. However, packaging engineer Frank Woodbery saw a perfect application in one of HP's light weight printers. Frank developed a molded pulp design that is made from re-pulped paper (from either post-consumer newspaper or post-industrial newsprint waste). This material is easily disposed of in curb side recycling programs and can be re-pulped into other paper products. This solution has very little environmental impact and lower European take back fees when compared to similar cushion designs made from EPS foam. Since molded pulp is a thin and nest-able material, incoming pallet densities are increased more than 7 times when compared to similar EPS foam designs. This saves on freight costs, reduces the number of trucks on the road, and reduces material handling at the various HP distribution centers.

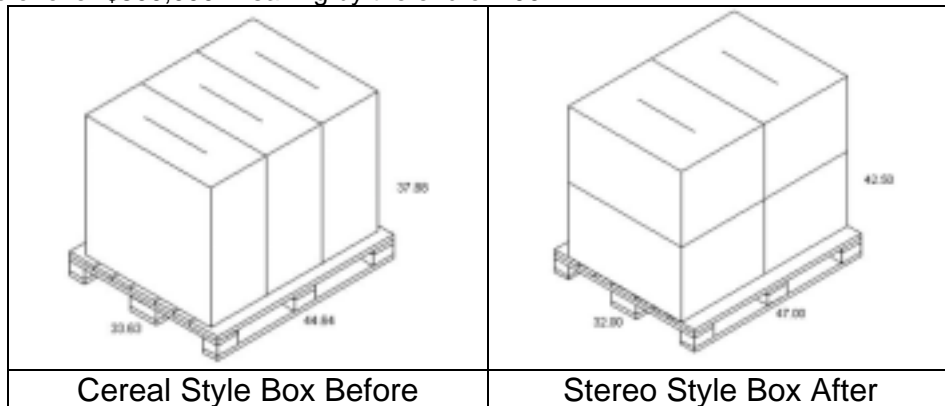
### Enterprise Systems Group

- Industry Standard Servers - Hot Plug Hard Drive – (HP Contact: Beth Feldkamp)
  - o Got milk? Well do you still have the jug it came in? If so, recycle it - as it might end up in HP's Industry Standard Servers Hot Plug Hard Drives packaging. Beth Feldkamp took another look at the old disk drive design that initially was in fabricated urethane foam with corrugated paper inserts. She then developed a new solution that eliminated the need for this bulky foam material and replaced it with a thermoform plastic cushion. This new design concept nested nicely together which reduced inbound material transportation and storage (3 truckloads less a month). The new cushions are made up of about 80% recycled material - a combination of Post Consumer (predominantly milk jugs) and Industrial (post manufacturing PE waste) materials which can be easily recycled again. Better yet – this new design saves HP a little over a million dollars a year in material and transportation / warehousing costs.

HP 2003 Environmental Packaging Whitepaper



- Industry Standard Servers - ML350 Stereo Pack – (HP Contact: Scott Longtin)
  - o A simple orientation change from a stand-up 'cereal' style box to a flat 'stereo' style package can lead to huge packaging material efficiencies. Packaging engineer Scott Longtin realized that changing the package's orientation would significantly reduce the amount of packaging needed (32% less material) and increase warehouse/logistics efficiencies (89 fewer trailers on the roads) to the tune of over \$800,000 in saving by the end of 2004.



- Industry Standard Servers - Recycling HD Packaging – (HP Contact: Chris Taylor)
  - o HP uses a lot of hard drives in its products and many times our parts suppliers design their packaging for one way single unit shipments requiring more protective packaging. An engineering group in Houston decided to take on this challenge and use it as their Six Sigma Green Belt certification project. They developed a cost saving multiple unit bulk pack solution that can be reused several times to replace the single pack design. This resulted in a direct material reduction of 53% and when the package system is reused 10 times – a result of 95% material reduction when compared to the one-way single packs. The excess material removed from the waste stream is equivalent to 57 truck trailers or a little over a half a mile of trucks.

## HP 2003 Environmental Packaging Whitepaper



10 Single packs vs. 1 Bulk pack (10 drives)

### Personal Systems Group

#### - Consumer PCs - Foam to Toys – HP Contact: Bill Kropf)

- o In an effort to keep our prices low, HP sometimes moves its assembly operations to rural lower cost areas of the world. In one case this year, our consumer PCs were located in a city that did not have a foam recycling infrastructure. HP was receiving huge amounts of incoming components, many of which were packaged in expanded polystyrene (EPS) foam bulk pack trays. Not having a local recycling / recovery option meant the only option was to dispose of it in local landfills. However, that was not the right answer for packaging engineer Bill Kropf. Working with one of HP's preferred packaging suppliers, they found several local businesses that could use this excess material. One such company is now using this material to stuff carnival toys, bean bags, and reuse it as voidfill packaging. The team then leveraged in-bound supply trucks to provide transportation for this excess material by back hauling it to the local companies on their return trips. The result removes more than 200 truck loads of EPS foam from the landfill per year, a savings of \$120,000 in disposal costs. It also provides a free source of material to these companies. If HP didn't put in this effort, the local companies would have had to procure new foam. Other HP sites that receive similar amounts of foam materials have installed foam densifiers and made other arrangements for collection and reclaiming of their in process packaging waste.

