

## Benefits of Polycups Stock over Other Waste Paper Grades in Paper Recycling

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It is never too late or too early to invent alternative processes for the betterment of our routine life. For paper production, trees are being cut in huge quantities each day, and this directly affects our day to day life by making atmospheric conditions less favorable. Waste paper can be recycled on average 4 to 6 times while maintaining acceptable qualities in recycled paper. To save forest resources, we should move ahead towards using more and more waste paper for paper production. A wasted resource can be recycled either to make the same product or by manufacturing new products, e.g. cardboard boxes, newspaper, writing and printing papers, and paper bags, etc. Several waste paper grades are not being fully utilized, and their use might allow increased paper recycling to produce new recovered paper with specified paper qualities. Polycup stock is an example of an under-utilized type of wastepaper that has the potential to substitute effectively for virgin pulp production.

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### Recycle more to save our environment, but is it really easy to do?

This editorial considers a way to minimize waste by using a neglected waste paper grade for the manufacture of paper. Ordinarily, for this to happen, adequate deinking of recycled fibre is needed to remove all ink and other unwanted materials from the secondary fibres. Deinking is based on the proper raw material selection and chemical usages during the recycling. Selection of an appropriate waste paper grade is a crucial step in recycling of paper for deinking and/or paperboard paper mills. Numerous waste paper grades are available for making new recycled paper. Fiber can be obtained from discarded paper materials, waste paper material discarded after consumer use, and paper scraps from a paper mill. Old newspapers and magazines are the common known papers that are being used for producing recycled papers. Other forms of wastepaper, such as polycups (printed or unprinted), mixed paper and board (unsorted and sorted), grey board, corrugated paper and board, old corrugated containers, mixed office waste, white cuttings, waste kraft papers, and other colored waste papers can be considered. These waste paper grades may be available at a cheaper price, but the processing becomes costly sometimes due to slushing problems and/or low quality of the product after recycling. Therefore, it sometimes becomes difficult to maintain quality in the final product and in achieving a cost-effective process.

Fibre becomes weaker and shorter each time that recycling occurs, which may require the addition of virgin pulp into the paper production to maintain the strength and quality of the recycled sheet. To produce a decent quality paper in terms of optical and physical strength properties, it would be better to use some percentage of white cutting

papers or other high quality papers each and every time with a maximum share of low-grade papers. But such an approach can be expensive, as white cuttings and quality paper will lead to a costlier process than other available waste paper grades. To overcome this problem, polycups may be a better option for the industrialist aiming for higher brightness and strength than can be achieved when using other waste paper grades.

Industrialists are currently using polycups as initial raw materials to maintain the desired brightness in final products. Polycups stock is also easily available in huge quantity at a very low cost. However, the use of polycups creates many hurdles during its slushing in the pulper. It consumes lots of energy to slush it, and the process takes more time than the repulping of other waste papers. Polycups stock is made of polyethylene coated paper; however it contains good fibres. A thin coating of wax and plastic makes the process much more difficult than other paper grades. The purpose of this lining is to provide a barrier even to hot liquids, preventing leakage and maintaining durability of cups for a longer time. Detachment of wax/plastic from fibres is not an easy task; it requires a huge consumption of power, which ultimately results in decreasing the production capacity and increasing the overall production cost of plant. In principle, the polyethylene that is recovered from polycups during paper recycling also can be used for certain recycled plastic products.

So this is the challenge for industrialists and researchers to achieve an easier usage of polycups for producing paper at low cost.

### **Can enzymes play an important role in increasing use of polycups in the recycling plant?**

Now-a-days, chemicals are being used for detaching wax or plastics from the fibre surface of polycups. It is well known that the use of chemicals in huge amounts has the potential to be environmentally harmful. Researchers are working on green technology to replace or to minimize the use of various hazardous chemicals. Enzymes are already well known and identified for their better use in the paper industry. For breaking or loosening bonds between wax/plastic and cellulose fibre, the use of enzymes may be a better choice for industrialists, even at the plant scale. Single or multiple enzymes could work for this particular mechanism. Use of limited portion of cellulase enzyme during slushing process has the potential to reduce slushing time by altering the surface configuration of cellulose fibres, leading to a loosening/breaking of the bonds between wax/plastic and the cellulose fibres. Easier detachment of wax/plastic from fibres would reduce the slushing time and power consumption.

Reduction in slushing time will also increase the number of pulper cycles in a day, and ultimately it has the potential to increase the production capacity of the plant. If slushing time can be reduced, then the power consumption will be less. If this can be achieved by introducing enzymes as a slushing aid, polycups may become an increasingly attractive waste paper grade for producing recycled paper with high optical and physical properties at a very low cost.

There are many advantages of waste paper recycling over use of virgin pulp for paper production. Several reports have pointed to advantages of using recycled paper in place of virgin pulp. As per the Bureau of International Recycling (BIR) report, by such a replacement, 65% of the energy consumption can be reduced to make new paper, with reductions of 35% and 74% water and air pollution, respectively.