Life Cycle Assessment

The Impact of Downgauging in Corrugated Printing and the Value Chain Benefits

June 2022

Executive Summary

Considering current environmental challenges that the world faces and the long-term projections from global environment organizations, DuPont has been among those leading an effort to help its packaging printing customers achieve a more sustainable level through flexographic printing and creative solutions for specific customer needs within the different packaging segments.

The recent successful launch of the soft durometer DuPont™ Cyrel® DLC plates was one of the results of this effort by enabling flexographic corrugated printer converters to shift from thicker to thinner liners, without compromising the structure of the board during the printing process; and allowing converters to use recycled boards and still achieve a uniform print with much-improved solids.

Intending to help its corrugated platemaking customers achieve an even higher sustainable level than may currently be in place, DuPont has conducted printing tests using the Cyrel® DLC plates with the removable blanket cylinder build-up combined with lead edge strip technology that allows moving away from thick .250" plates to a .155" plate mounted on a carrier sheet. In updating the study released in 2021 of the original DuPont Life Cycle Assessment (LCA)[1], using the Ecoinvent 3[2] database, the environmental impact of imaging and processing a .155" plate compared by DuPont to a .250" plate, has a 25% lower non-renewable energy use and 27% lower global warming potential impact.

Why Move to Thinner Plates and How to Do It

Downgauging is known among packaging customers to be one of the ways to become more sustainable, and the same logic can be applied to the printing plate as well. The thinner your plate is, less material will be used to make that plate, which makes it more environmentally sustainable since less material used means less waste.

However, most existing presses have a defined undercut which can be changed, in most of the cases, only when companies buy new presses. To address this gap, reusable foam blankets can be combined with the flexo plates, compensating for the thinner thickness of the plate (Figure 1).

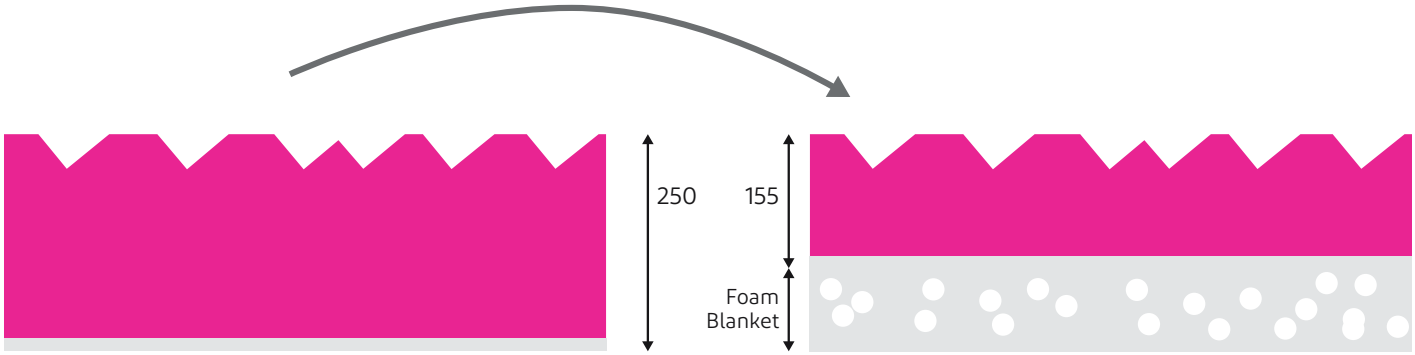

Figure 1: .250" thickness plate compared to a .155" plate with the foam blanket solution

Results

Flexographic Plate Manufacturing and Platemaking by Thickness

Figure 2 below shows the results of a comparison made by DuPont comparing non-renewable energy consumption and global warming potential for plate manufacturing and platemaking at the different flexographic digital plate thicknesses.

The plate manufacturing step footprint (grey) is presented as an aggregated number.

The environmental impact of plate manufacturing and platemaking as measured by DuPont using the Ecoinvent 3(²) database increases as the thickness of the plate increases. By migrating from a .250" plate to a .155" plate, DuPont measured a reduction by 30% of both non-renewable energy consumption and global warming potential.

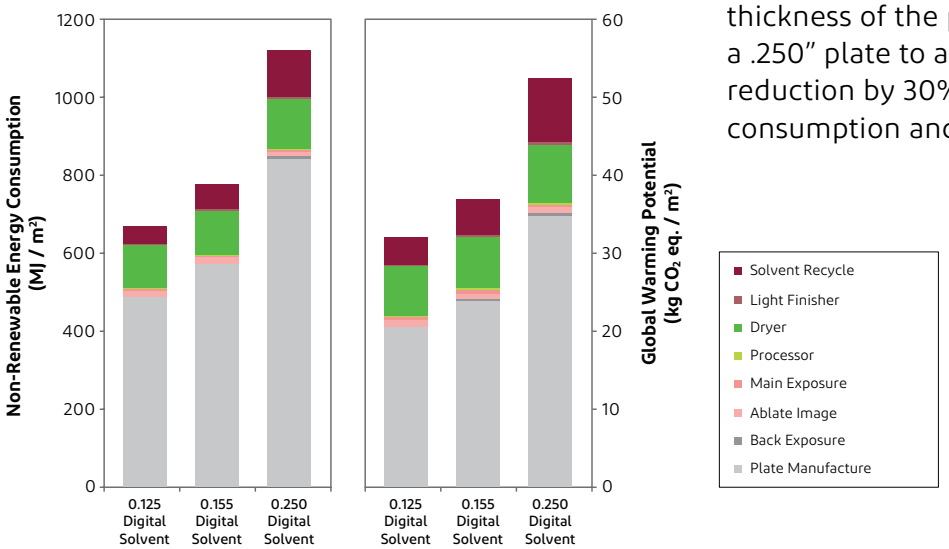

Figure 2: Digital solvent flexographic platemaking and manufacturing impact at different thicknesses

Flexographic Platemaking by Thickness

Figure 3 excludes the impact of the plate manufacturing presented in the previous graph highlighting only the platemaking footprint through the different thicknesses of plates.

As seen in figure 3, the impact of moving to a .155" plate has a 25% lower non-renewable energy consumption and 27% lower global warming potential compared to the .250" digital solvent platemaking.

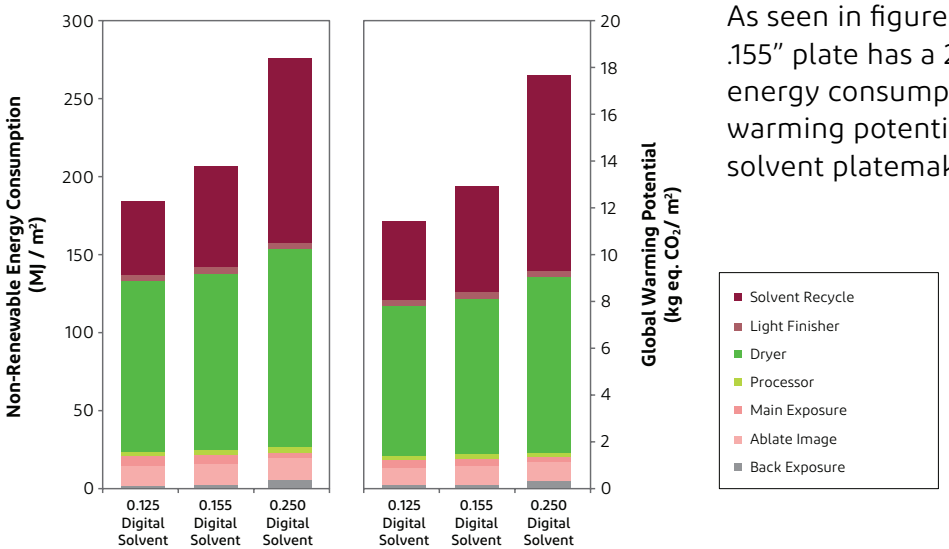

Figure 3: Digital solvent flexographic platemaking impact at different thicknesses

Other Benefits Through the Value Chain

The sustainability benefits described above are available not only to plate manufacturers and platemakers but also to printers. By utilizing the soft durometer Cyrel® DLC plates, thinner paper liners can be used while not jeopardizing board crush specifications. Also, less board and ink will be used to "come up to color" by using a .155" plate which allows for faster impression settings. Also, there will be fewer clean-ups on the press since less impression is needed with DLC thus preventing ink to be built up between the image areas.

Although the blanket concept is not new, the ease of use of the lead edge strip technology (Figure 4) and optimizing the foam blanket resiliency for multiple re-uses allows for printers to continue using their existing .250" mounts in inventory and then specifying .155" plates for all new designs.

Other benefits measured by DuPont include a 23% productivity improvement when making plates and a 38% weight reduction which can lead to shipping lighter mounts. ([3])

Consumer Package Goods companies (CPG) can also experience improved print quality for their finished corrugated boxes such as sharper bar codes for one-time scanning acceptance, finer text capabilities, and improved solid ink coverage.

Everyone in the value chain has the opportunity to see improvement and claim their contribution towards a more sustainable solution when downgauging is considered.

For more information, please contact your DuPont™ Cyrel® Solutions sales representative, your current box printer, or your tradeshop to learn more about this solution and reap the rewards of making the move to thinner Cyrel® plates.

Figure 4: Foam blanket image; foam blank mounted on the cylinder; and with the plate.

References

[1] S. Veith, S. Barr, DuPont, "Life Cycle Assessment: Flexographic and Rotogravure Printing Comparison & Flexographic Plate Imaging Technologies", 2008

S. Veith, S. Barr, DuPont, "Life Cycle Assessment: Flexographic Plate Imaging Technologies Update ", 2020

[2] Ecoinvent Version 3: Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, [online] 21(9), pp.1218–1230. Available at: (http://link.springer.com/10.1007/s11367-016-1087-8)

[3] Internal DuPont assessment made in partnership with North American corrugated tradeshops

Form No. LCACOR-NA202207-EN
July 2022