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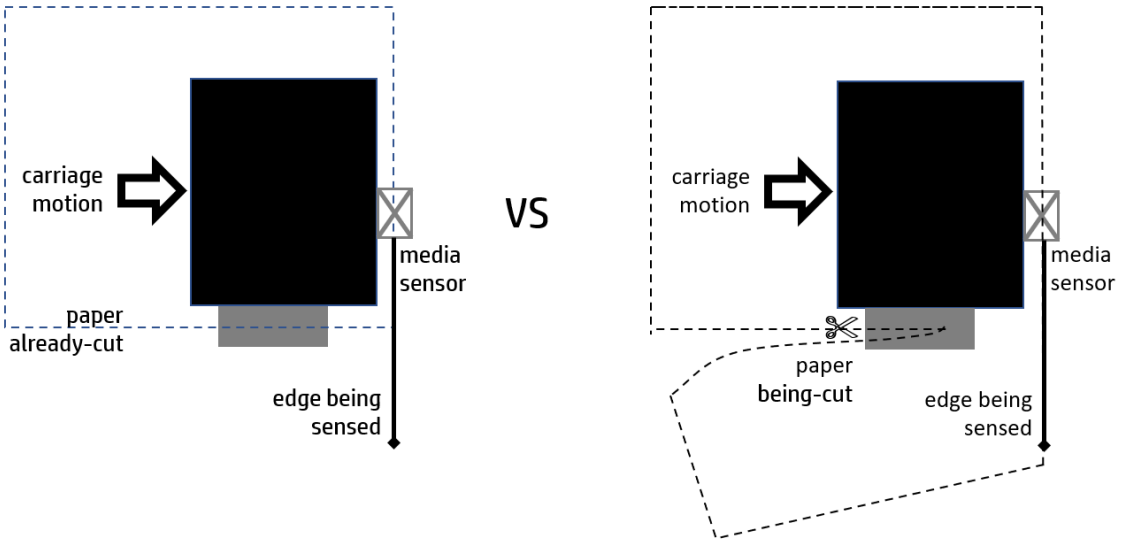
OUT-OF-ORDER MEDIA CHECKS & PREPARATION FOR ROLL MEDIA

HP INC

Out-of-Order Media Checks & Preparation for Roll Media

In 2013, entry level printers, based on a brand-new Entry Level print-engine platform, were launched that is >33% smaller and more cost effective than the immediate predecessor. This was followed by higher price points, in certain models.

8 years later, one clear mandate was to push the absolute limits of performance for the successors. In the area of productivity throughput to match the far more expensive and more capable platforms from other vendors in the same price points. In short: minimally crossing the 100 A1 pages / hour mark (the Century barrier).



1.1: normally, edge sensing happens just before printing starts. Roll media would already be cut by then

1.2: however, we could sense during cutting, removing 1 (set) of sensing motion prior to printing. It happens, both motions share the same ideal carriage speed of operation, and must pass the media edge to complete...

Figure 1: Edge Sensing; vs Edge Sensing & Cutting

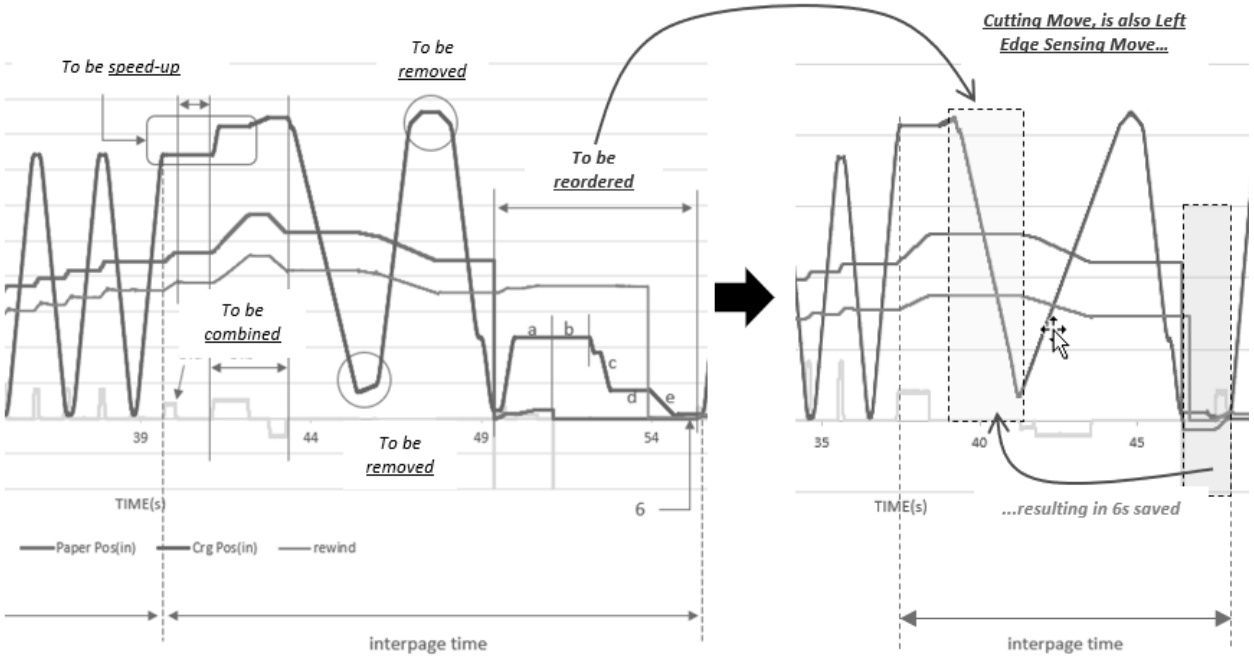


Figure 2: Diagram of Non-Printing actions (focused on Carriage) re-ordered and/or reduced

To this end, it was found that, with deeper understanding of roll sheet behavior during the printing and cutting process, it was possible to reorder execution of key non-printing actions. The key learning was, that it was possibly to not just re-order the Left Edge Sensing action to coincide with Cutting (see how this is safe, in Figure 3), but also do it with significant direct and indirect benefits.

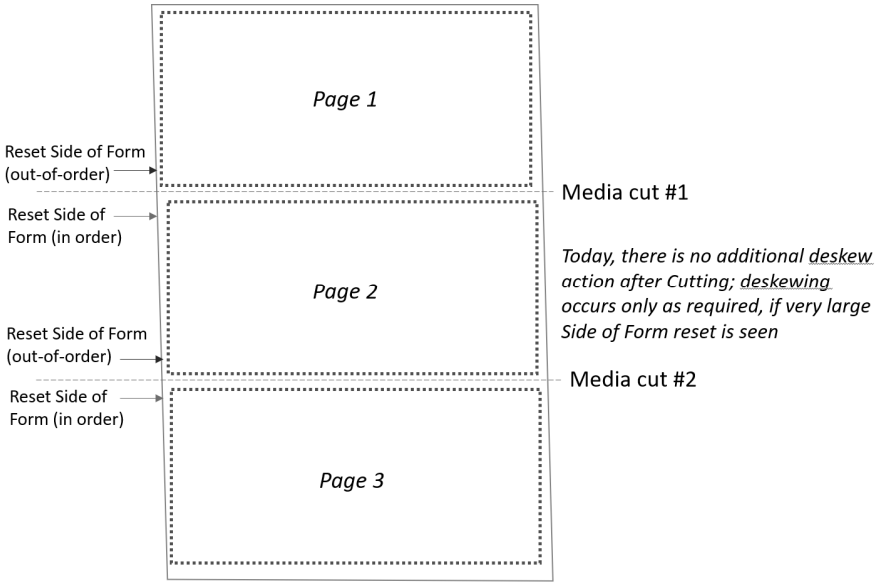


Figure 3: Diagram showing how re-sensing Left Edge on Roll-Media does not need to be in-order

1. Re-ordering Edge Sensing during cutting allows us to save 6 full seconds vs Design T730/T830 giving an equivalent of 13 A1 pages / hour on its own.

2. Optimal plain paper cutting and sensing speeds coincide in the target platform.

3. Sensing during cutting is optimal from a paper shape aspect, for better sense repeatability.

4. Additional redundancy is built-in, by allowing 2 additional chances for edge sensing in case of happy-path failures. See next diagram to see flow sequence.

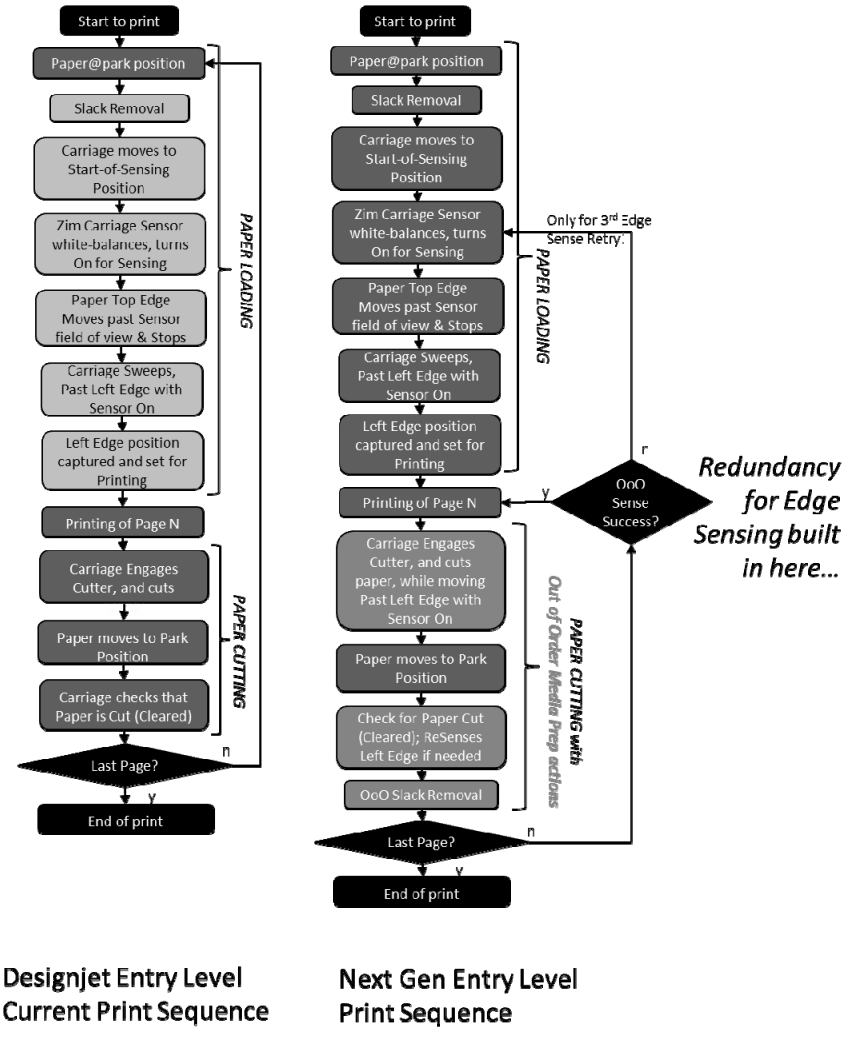


Figure 4: Flowchart comparing In-order and out-of-order print

sequence; with redundancies to sensing

5. Building upon this, we start off stronger, and therefore allow all further incremental speeds and action removals to have a higher contribution, as illustrated in Figure 5.

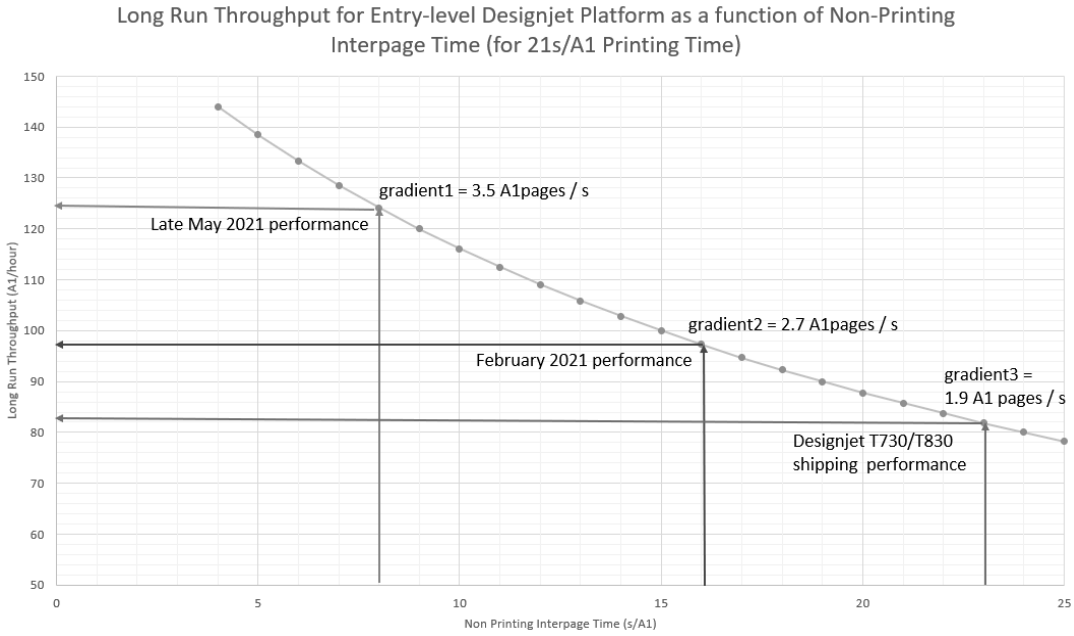


Figure 5: Partial Trade-off Curve, diagraming productivity throughput as a function of non-printing time; and illustrating incremental savings

Having said that, we are also mindful of the limitations this scheme may bring for the nearest future, as most physical characterization known so far will hold true for Plain Paper.

1. Having said that, since the performance improvements are significant only for Plain Paper Econofast mode (since throughput is inversely proportional to time saved), we can clearly choose only at this time, to only be turned on for Plain Econofast;

2. Future support on all plain and non-plain paper with more characterization data, will better benefit Technical Printing customers,

3. More critically, should further work suggest that more media is supportable, this feature could be spread upwards the Product Lines to higher end products as a significant cost reduction enabler, as it could allow the use of a shared-powered Horizontal Cutter, rather than the required auto-Horizontal Cutter, that will add significant cost to the mechanism.

Disclosed by Guannan, Xu; Zixing, Yao; Chee Loong, Yap; Wei Lit, Teoh, HP Inc.