Declog Options Summary

TOF triggered declog, Maintenance Pages, Sacrificial pages

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memjet

Declog Options Summary

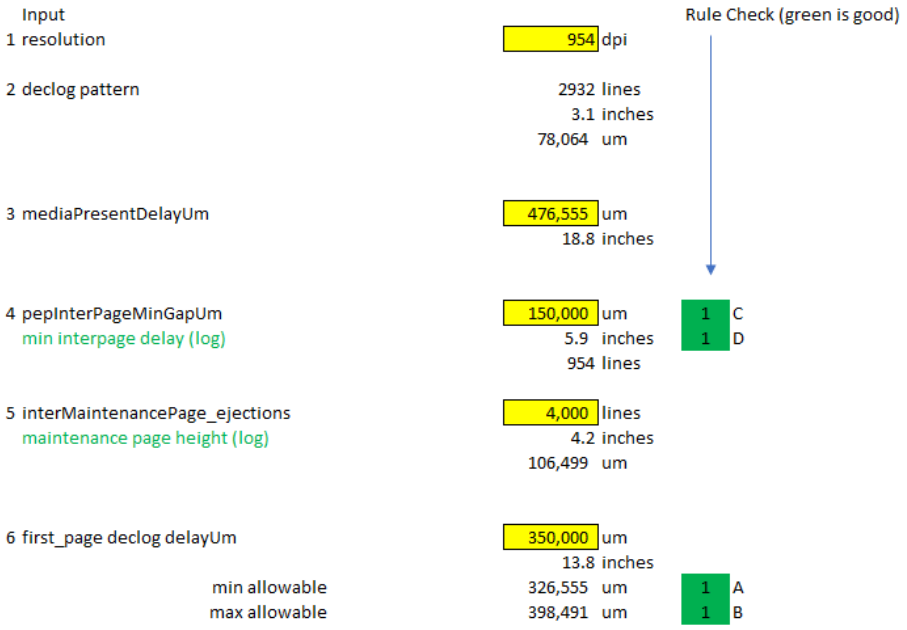
- This presentation describes the implementation of TOF triggered declog and the associated adjustable features (e.g., maintenance pages and sacrificial pages).
- Memjet will work with OEMs to optimize declog settings for different use cases.
- The next slide provides a quick guide for a roll to roll label, and a cut sheet system. Use the associated declog solver spreadsheet to find acceptable parameter values on cut sheet systems.
- Slides 7&8 show two cut-sheet example cases and describe the settings and resultant printed patterns.
  - Case1: First and Secondary TOF declog, no sacrificial page
  - Case 2: First and Secondary TOF declog, with a sacrificial page
- The declog settings are in the hwparamstore.json file.
- Declog will always occur in cap prior to the PH going to print position. The three declog options below occur after the PH is in print position:

  1) Pre job: Declog occurs after PH reaches print position
  2) First page: Declog occurs when 1st page TOF detected
     -this is likely the most used configuration, as it provides a more deterministic placement of the declog spit
  3) Secondary pages: Declog occurs when TOF detected on the 2nd page and on.
     -this configuration would use a lot of waste ink
- The last slide describes methods to minimize the size of the declog pattern.

Quick Guide

There are a multitude of declog configurations. This slide describes two common configurations for 1st page TOF declog.

- **Roll to Roll**
  - TOF Label Printing
    - Set the declog to happen on the **First Page TOF** and **enable a sacrificial page**. This will ensure the declog occurs immediately prior to printing (restores PH health) and reduces any blank labels between declog and printing.
    - Set json parameters
      - interMaintenancePage (remove comment symbol to enable maintenance pages)
      - mmSacrificialPageHeightUm = 100000 um (this will ensure the default declog pattern fits)
      - pepInterPageMinGapUm = 3000 um (setting it to smallest gap value allowable)
      - first_page declog delayUm = 0 um (declog starts at TOF of the sacrificial page with no delay)
      - interMaintenancePage_ejections = 8 lines
      - interMaintenancePage_density = 0 (no maintenance page pattern)
- **Cut Sheet**
  - OEM is fine with a sacrificial page
    - Set declog for First Page TOF and enable a sacrificial page.
    - Can use above settings. Adjust if sacrificial page <100mm long, or maintenance pattern is desired.
  - OEM wants to declog into a spittoon or equivalent. Spits will occur in the page gaps. Smaller solution space.
    - Set the declog to happen on the First Page TOF and disable a sacrificial page.
    - Set json parameters
      - # mmSacrificialPageHeightUm (add comment symbol to disable sacrificial page)
      - interMaintenancePage (remove comment symbol to enable maintenance pages)
      - Use the Declog Solver Spreadsheet to determine acceptable json settings
        - Input resolution
        - Input mediaPresentDelayUm
        - Input the minimum page gap; pepInterPageMinGapUm
        - Adjust first_page declog delayUm and minimum page gap, to achieve green in the rule check cells



Maintenance Pages

- Maintenance page **must be enabled** before TOF triggered declog can be used. This can be done by removing the comment symbol before “interMaintenancePage” in the json file. Example to right shows an enabled state.
- A maintenance page will be generated in the inter-page gap preceding each page.
- The example to the right will result in 10% ink loading on all four colors for a total of 500 ejected lines.
- **If no maintenance page printing is needed, then just set the density to 0%**, and no ink will be ejected.
- Note that:
  - the bottom margin of the maintenance region will be aligned to the top of the form (TOF, not TOF trigger) and the top maintenance margin effectively expanded to fill the specified minimum inter-page gap. Margin units are in lines.
  - the specified densities must be a multiple of 10 i.e. 0,10,20,..., 100
  - the length of the region is specified in ejected lines so will depend on the DPI of the print job, so:
  - 3920 ejected lines @1600DPI = 2.45 inches of maintenance (6.223cm)

```
"#": "An empty struct will disable the inter-maintenance page.",
"interMaintenancePage": {
    "topMargin": 0,
    "ejections": 500,
    "bottomMargin": 0,
    "density": [10, 10, 10, 10]
},
```

Sacrificial Pages

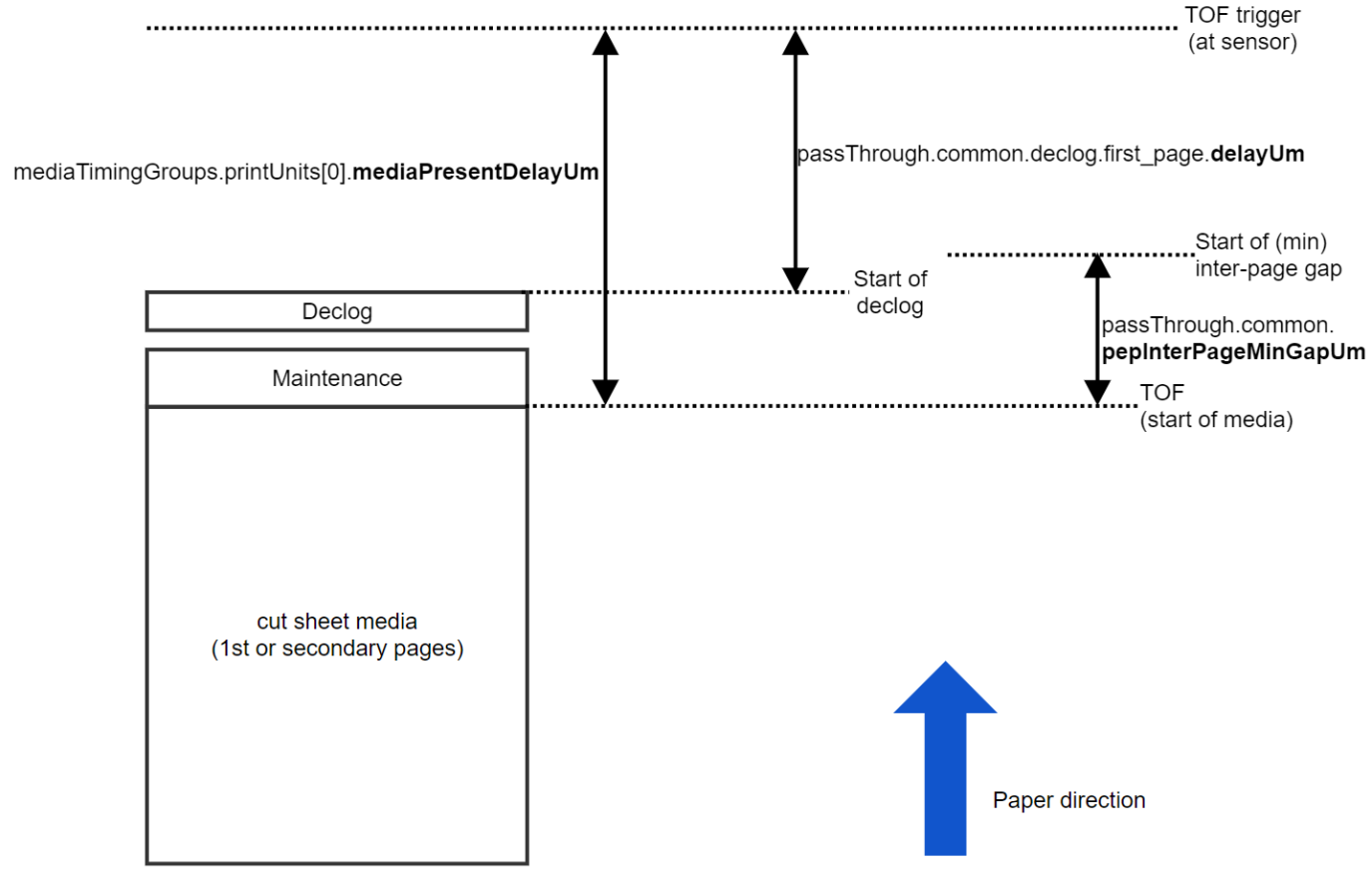
- A sacrificial page simply means that the 1st page (TOF) of the job will be used to eject declog maintenance ejections. A maintenance page pattern will not fire on the sacrificial page.
- A sacrificial page can be enabled by setting a sacrificial page height in the json file. Remove the comment symbol before “mmSacrificalPageHeightUm”
- Enabling a sacrificial page has no effects on subsequent pages (pages 2 to N)

"mmSacrificialPageHeightUm": 300000,

- Note: with R4.2.X there is a unique behavior. If the physical page gap is varying and may drop below the interpage setting (pepInterPageMinGapUm), then a sacrificial page must be used for the 1st page TOF.

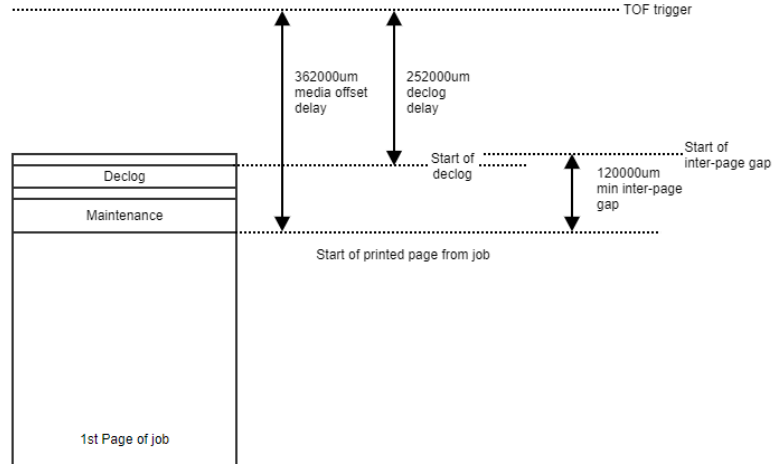
Declog and Maintenance page Positioning

- The Top Of Form (TOF) is described as the point(s) on the media where each page of the print job is expected to start - this is usually (but not always) the leading edge of the cut sheet medium.
- The TOF *trigger* is the point in time and space when the sensor detecting the TOF (leading edge or otherwise suitable mark on the media) is physically triggered as the media travels towards the print zone.
- Some time after the *TOF trigger* the system will begin printing the job with the expectation that the TOF will have travelled the physical distance from the sensor to the start of the print zone.
- Maintenance and declog printing are timed from the TOF trigger. By default, these are expected to complete *before* the physical media enters the print zone.
- But they can also be configured to print on the media. For example, the OEM may not want to spit on the transport belt.
  - If it desirable to have these print on the paper, the mediaPresentDelayUm can be increased to allow this. The printed pages would then consist of declog pattern, maintenance page pattern, followed by the printed image.



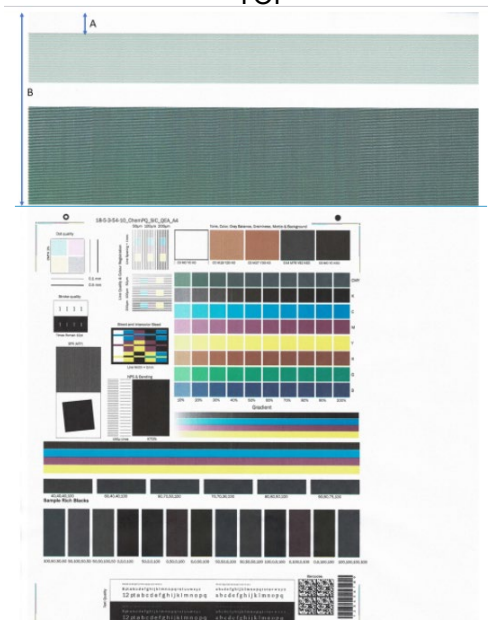
Example Cutsheet Case 1: First and secondary TOF declog with maintenance pages. No sacrificial page.

- In this case a cut-sheet printer is setup with maintenance pages and declog ejections for both first and secondary pages (pages 2 to N).
- All maintenance ejections (both declog and maintenance page) occur during the interpage gap.
- *However, to prevent the maintenance ejections from landing on the belt, the media present delay has been extended by several centimeters to capture the maintenance ejections on the actual media. This helps to visually show what is occurring.*
- The bottom right image shows the first printed page
- Note, if no maintenance page is desired, just set the densities to zero (slide 3), and then only the declog will be printed.
- Hwparamstore.json settings are included as a reference (below left). These don't include the declog standard parameters, which should remain unchanged.



Pg1

TOF



All pages declog + maint page

[json file settings]

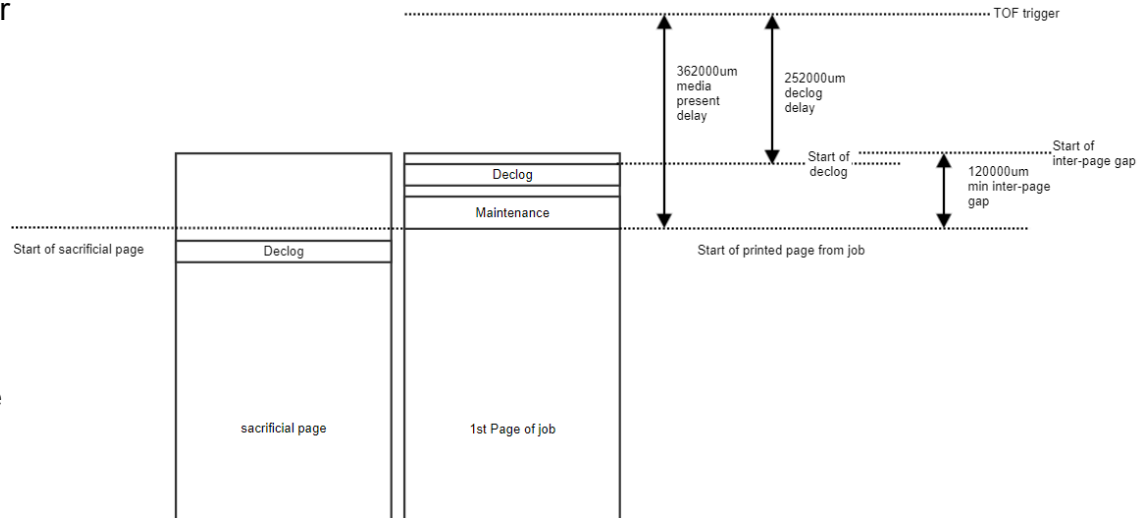
```
"tofSyncModeDefault": "all_pages",
"mediaPresentDelayUm": 362000,
"passThrough":
    "pre_job": {},
    "first_page": {
      "delayUm": 252000,
    "secondary_pages": {
      "delayUm": 252000,
  "interMaintenancePage": {
    "ejections": 3920,
    "density": [10, 10, 10, 10]
  "pepInterPageMinGapUm": 120000,
```

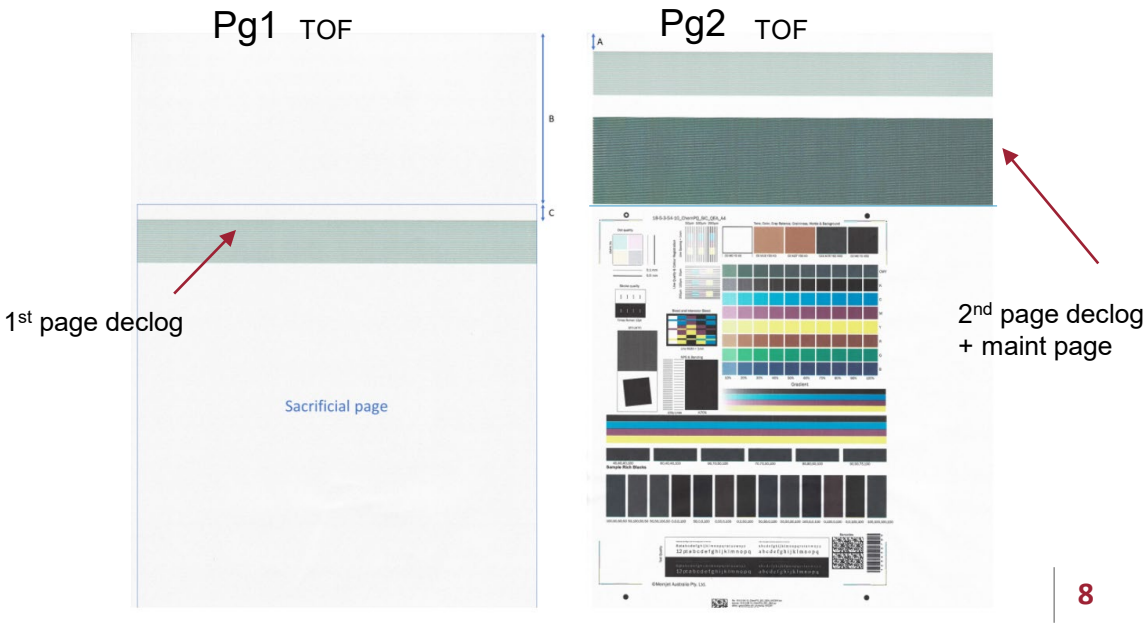
A: This measures 15mm from the top edge of the paper to the start of declog.
Since the physical distance from the TOF sensor to the start of the print zone is 237000um, the declog appears to be starting 237000um+15000um from the TOF sensor. 252000um is consistent with the delayUm set for the declog (offset from the TOF trigger).

B: This measures 125mm from the top edge of the paper to the start of the printed page (actual job data).
This is consistent with the mediaPresentDelayUm which has been set to 362000 as the true physical distance is 237000um between the TOF sensor and the print zone: 237000um + 125000um = 362000um.

Example Cutsheet Case 2: First and secondary TOF declog with maintenance pages, in *sacrificial mode*

- In this case, a cut-sheet printer is setup with maintenance pages and declog ejections for both first and secondary pages.
- Sacrificial mode has been enabled, **thus all maintenance ejections for the first (sacrificial) page occur on the media**. Then both declog and maintenance pages occur in the interpage gap on subsequent pages. Sacrificial page setting has no impact on pages 2 to N.
- *To prevent the maintenance ejections from landing on the belt, the media present delay has been extended by several centimeters to capture the maintenance ejections on the actual media. This helps to visually show what is occurring.*
- The bottom right image shows the first and second printed pages scanned side by side to emphasize the relative placement of the various print regions. The third printed page is the same as the second printed page so has been omitted.
- Note that the first page through the system is the *sacrificial page* and will consume a TOF.
- When printing the sacrificial page, the following should be observed:
  - the first page declog delay is now timed from the start of the sacrificial page (i.e., immediately after the media present delay)
  - the maintenance page is muted for the sacrificial page only
  - the sacrificial page has no effect on the secondary pages which continue printing as per normal





[json file settings]

```
"tofSyncModeDefault": "all_pages",
  "mediaPresentDelayUm": 362000,
"passThrough":
      "pre_job": {},
      "first_page": {
        "delayUm": 10000,
      "secondary_pages": {
        "delayUm": 252000,
  "interMaintenancePage": {
      "ejections": 3920,
      "density": [10, 10, 10, 10]
  "pepInterPageMinGapUm": 120000,
  "mmSacrificialPageHeightUm": 300000,
```

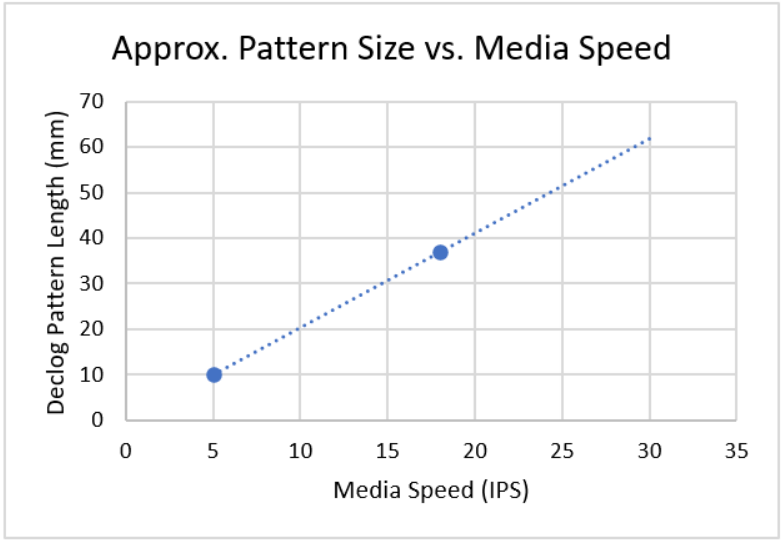
A: This measures 15mm from the top edge of the paper to the start of declog. Since the physical distance from the TOF sensor to the start of the print zone is 237000um, the declog appears to be starting 237000um+15000um from the TOF sensor. 252000um is consistent with the secondary_pages.delayUm set for the declog (offset from the TOF trigger).
B: This measures 125mm from the top edge of the paper to the start of the printed page (actual job data).
This is consistent with the mediaPresentDelayUm which has been set to 362000 as the true physical distance is 237000um between the TOF sensor and the print zone: 237000um + 125000um = 362000um.
C: This measures 10mm from the start of the sacrificial page to the start of declog. This is consistent with the first_page.delayUm.

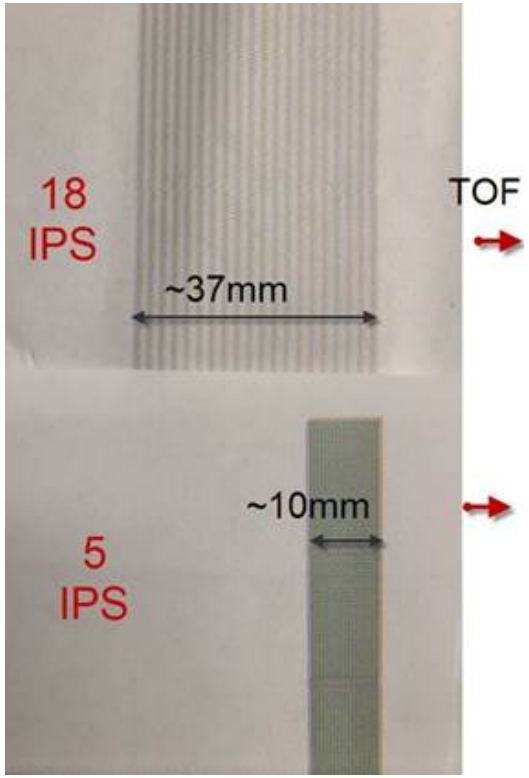
Shrinking the Declog Spit Pattern

- The declog spit is time based, and not encoder based
- There are two factors that can affect the length (paper-axis) of the pattern
  - Number of declog spit cycles (default 20)
  - Speed of the media
    - Slowing the media down will shrink the pattern

```
"declogSpits": 20,
"preheatOnDurationNsec": 27,
"preheatOffDurationNsec": 437,
"preheatPulseCycles": 25,
"mainPulseDurationNsec": 347,
"delayUm": 0,
"span": 20
```

- Changing the number of spit cycles is a risk because it may affect the efficacy of the declog spit. Validation testing would be required
- Changing the media speed is a possible option. In this case the OEM would need to delay the paper path start until the PH is in print position, and then ramp up to the desired print speed. The media speed when the 1st TOF is seen will determine the size of the pattern. Speed vs. pattern size is approximated in graph to right. This implies the 1st printed image (or more) will be printing on the ramp. OEM will need to ensure PQ meets their requirements.





Thank you.