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NEW MAINTENANCE CARTIDGE LIFE TRACKING METHOD AND WEB WIPE ADVANCED LENGTH CHARACTERIZATION FOR BIG INK WASTE FLOWS AS SHIPPING FLUID PURGE

HP INC

Title

New maintenance cartridge life tracking method and web wipe advanced length characterization for big ink waste flows as shipping fluid purge

Abstract

A maintenance cartridge has a spittoon with a limited volume and a web wipe roll and it is used to keep the printheads in good shape. The tracking of the life of the maintenance cartridge is done by printed lines on the web wipe detected by a sensor. It causes that waste of ink has to be compensated with web advances for a correct tracking.

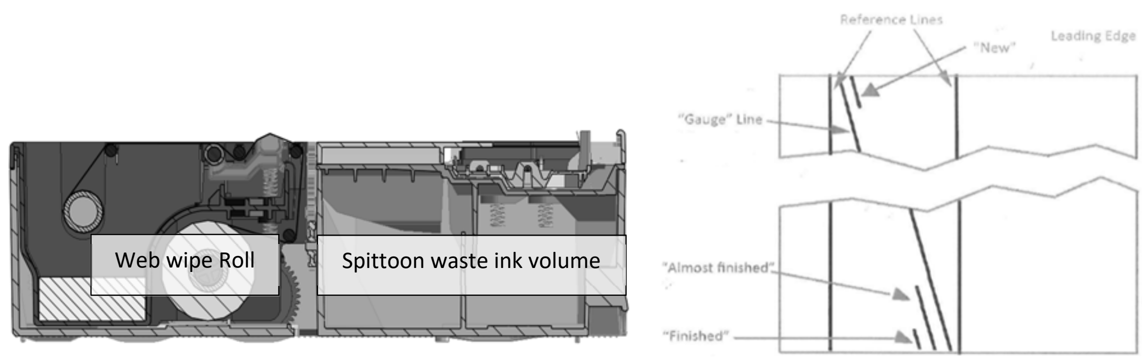

Figure 1 Maintenance cartridge scheme and tracking lines

Compensating algorithms for maintenance cartridges took advantage that the flow of waste was low and used cartridge life checks and corrections on the teeth engaged to advance the web wipe.

Some thermal inkjet printheads uses a special fluid (shipping fluid) for the very first installation of the printheads into a printer. The printheads are shipped with this fluid inside because it is more stable in storage condition. On the installation this shipping fluid needs to be purged and replaced by ink to use the printhead. This generates a higher waste flow that does not allow previous compensating algorithms as those need more time for the routine and because due to the number of advances needed it prevents the correct adjustment on the teeth engaged.

Previous compensating algorithms without several maintenance cartridge life checks lead into ink overflows or into an inefficient use, depending if the length advanced has been less or more than desired one. Those situations are generated because the systems have different length advances depending on the maintenance cartridge life.

Those different length advances are caused because the used web wipe is rolled into an output roll by turning the core of this roll. So as more web is used the output diameter

increases generating different advances. This is compensated with checks and the number of teeth engaged, so making a smaller movement on the drive roll.

The new solution proposes a more accurate way of compensating the unbalance use of the spittoon and web wipe in the maintenance cartridge during high ink waste flows. The method is based on a prediction of the number of advances needed to be perform depending on the status of the maintenance cartridge.

Another characteristic of the method is a faster process by the usage of the maximum possible engaged teeth. The big amount of ink spitted enables long advances that are not used on current systems. The new solution obtains the accuracy from the web advances characterization.

Instead of aiming for a constant distance of advance, for high flow waste it uses the characterization of the web wipe advances and it generates an adaptive number of advances depending on the current life status. The movements are done using always the maximum number of gear teeth, so maximizing the length advanced and minimizing time. The new characterization of the advances compared with the previous is:

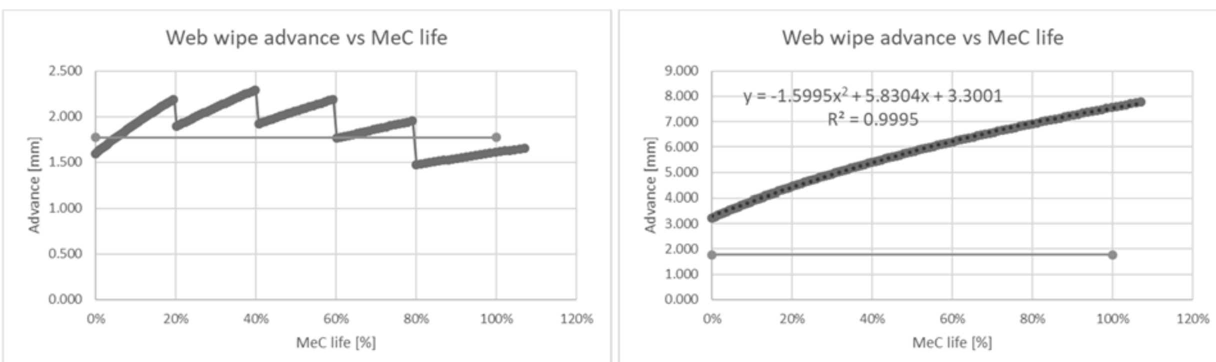

Figure 2 Previous web advances vs new solution

As it is shown the advanced web wipe for cycle is increased considerably with the new systems leading on a faster compensation. At the beginning of the maintenance the advance is the double, but it is multiplied by five at the end of it reducing the needed time.

The graph also shows that the advances can be perfectly approximated with a polynomial curve of order two. It guarantees the first objective that is the robustness of the life tracking and avoids maintenance cartridge waste as the number of advances can be adapted for each case.

The implementation of the described solution will be using an algorithm that calculates the number of web advances needed for each case. The inputs of this algorithm are the number of PH to be purge (n), the life status of the maintenance cartridge (l), the capacity of it (C)

and the amount of ink spitted for each purge (S). Using those inputs, the final life status can be calculated easily (F=I+(n*S)/C).

As the web wipe advances have been characterised along the maintenance cartridge life, the relation between number of advances and life can be calculated and approximated too. This is shown on figure 3.

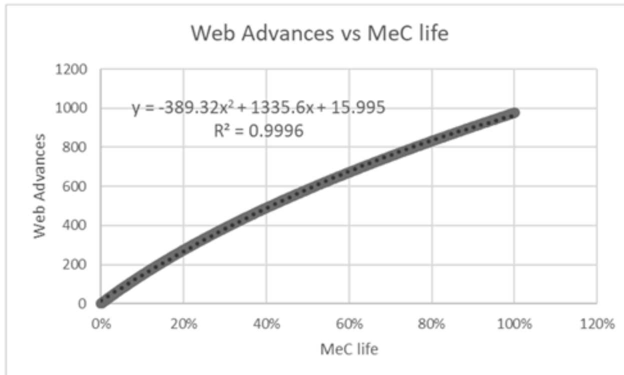

Figure 3 Web advances vs Maintenance cartridge life

It generates the needed formula for the calculation of web wipes advances needed (Y):

$$Y = -389.32 \cdot (F^2 - I^2) + 1335.6 \cdot (F - I)$$

Alternatively, this can be implemented by the usage of lookup tables.

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