

Headstrikes

On UV-Cure Printers



Definition

A headstrike is any event that causes the printheads or other parts of the carriage to come in contact with the media while printing.

Causes

Headstrikes usually happen when one or two conditions arise on the printer and/or the media. The first condition is a head height that is too low. Head height is the distance from the media surface to the lowest point of the carriage. On the UV-cure printers, the standard head height is 0.070". The printheads are recessed within the carriage an additional 0.015", creating a total distance between media and printheads of 0.085". Head height should be set by proper adjustment of the carriage using the supplied gauge and wrenches. Consult the printer *User Manual* for detailed steps on setting head height.

The second condition that can lead to headstrikes is unexpected deformation of the media, such that the media surface becomes higher than it was when the head height was set. This can occur when a roll-fed media bunches up on the platen, when a rigid media is not flat initially, or when an originally flat media deforms while printing, usually because of heat, and bows upward. All of these situations can lead to a headstrike by the carriage onto the media.

Not all headstrikes are obvious. When the otherwise flat media deforms during printing, it may be only slightly enough to graze the carriage. Printing may continue uninterrupted and the headstrike may even go undetected without close inspection of the output. Other headstrikes are more severe and lead to immediate cancellation of the print by the printer software, or shortly thereafter by the operator when the print defect caused by the headstrike is observed.

Potential Long-Term Effects

In all cases it is very important to take action promptly after the headstrike not only to correct the conditions that caused the strike, but to clean the printheads from any possible ink and media contact that could have occurred. The UV-cure printers have hardware features intended to protect the printheads from contact in the event of a headstrike, but there is no reliable method to know whether printhead contact has occurred. Therefore it is imperative that the printheads be cleaned immediately following any headstrike or suspected headstrike. The illustration on page 2 of this document shows the possible consequences of a headstrike that is not addressed.

Recovery

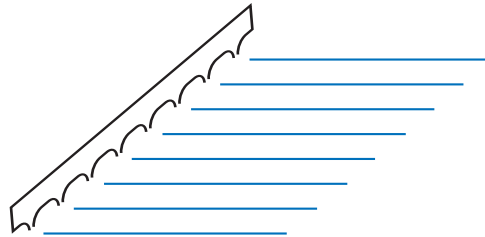
Cleaning the printheads after a headstrike is no different from the normal, routine cleaning that should be done daily. Consult Tech Note 2736, *DisplayMaker UVR & UVX: Daily Cleaning Procedures*, for these procedures. See also Tech Note 2739, *Recovering Jets on UV-Cure Printers*, and Tech Note 2738, *Maintaining Jetting & Evaluating Jetting Performance on UV-Cure Printers*, for related topics on printhead maintenance.

Anatomy of a Headstrike

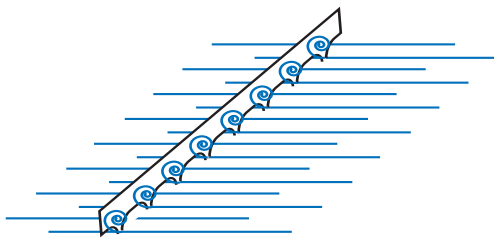
These illustrations show the possible series of events that can be caused by a headstrike. The ultimate result can be a permanent loss of jetting capacity on the affected printhead(s).



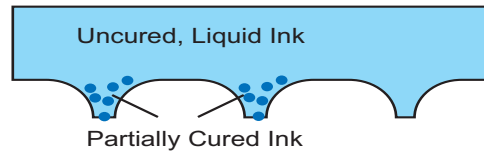
1. Each jetting orifice is punched through, creating small but very sharp projections.



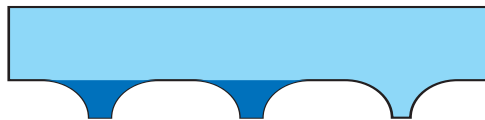
2. When printing under ordinary circumstances, the jets are 0.085" from the surface of the media.



3. When a headstrike occurs, those sharp orifice projections scrape printed ink and media particles and drive the particles into the orifices themselves.



4. The ink scraped from the media by the headstrike has already been exposed to some UV light, so it is partially cured and is looking for other ink molecules to bind with. Inside the orifice, the partially-cured ink finds the unexposed, liquid ink and initiates curing with those molecules.



5. If the partially-cured ink is not cleaned promptly, the curing process will continue, ultimately rendering the affected nozzles permanently blocked by cured ink.

Other Lingering Effects

The blocked nozzles described and illustrated on the previous pages are one lasting effect of a headstrike. Others include the following:

Intermittent Jets

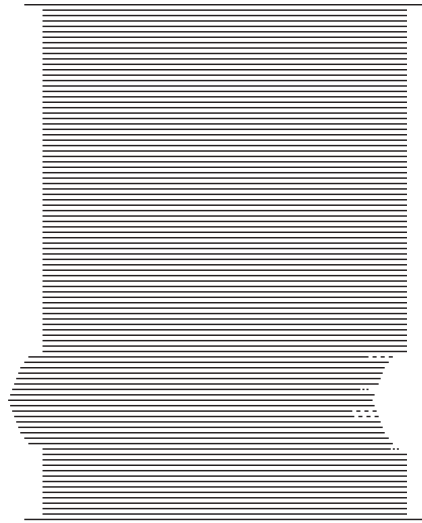
These jets may pass an AutoJet or AutoSet calibration, but when printing begins they drop out. The jets have some small solid particle lodged within the jetting nozzle or orifice. As the particle moves around, it can alternately allow the jet to fire or it can block the jet completely. Printing a Manual Jet Mapping page immediately after canceling a print job will often reveal the intermittent jet as missing or as producing a wavy line in the Manual Jet Mapping pattern, as shown below at jets 62 and 77.

Head 1		
96	95	94
93	92	91
90	89	88
87	86	85
84	83	82
81	80	79
78	77 ~	76
75	74	73
72	71	70
69	68	67
66	65	64
63	62 ~	61
60	59	58
57	56	55
54	53	52
51	50	49
48	47	46
45	44	43
42	41	40
39	38	37
36	35	34
33	32	31
30	29	28
27	26	25
24	23	22
21	20	19
18	17	16
15	14	13
12	11	10
9	8	7
6	5	4
3	2	1

Jets showing this phenomenon are usually unrecoverable. Because AutoJet may continue to find them as usable, the best option is to use Manual Jet Mapping to identify them as “Hard” jet outs, so that AutoJet will not no longer attempt to evaluate them and mark them as good. Once manually mapped out as “hard”, the jets will remain on the bad jet list until such time that an operator deliberately clears the Hard Jet-Out list.

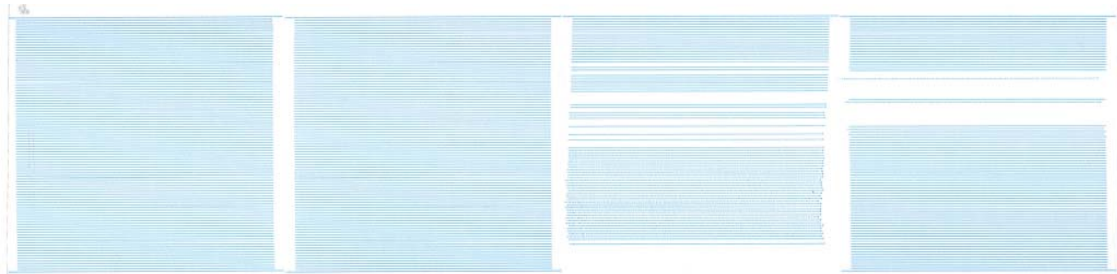
“Late” Jets

These jets appear to fire late (or early, depending on the direction of the carriage). Headstrikes or other damage, such as improper cleaning of the printhead, have created small scratches on the orifice plate around the jets. Small amounts of ink accumulate within the scratches (held in place by surface tension) and create a film of ink that must be penetrated by new ink droplets when the jet fires. The required effort to penetrate through this film is enough to delay the drop, creating the characteristic parabola shape in one area of the Prime Bars pattern for that head.



Additional Evidence

The photographs below are actual prime bar patterns printed by heads that sustained damage in a headstrike. These images are characteristic of printheads that have suffered a headstrike.



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