

Phase I Final Report for:

Media Sciences, Inc.

Phaser 850 Solid Ink Stick Evaluation

May 8, 2002



National Center for  
Remanufacturing &  
Resource Recovery

**R·I·T**

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## **Phase I Final Report**

### **Executive Summary**

The objective of this project is to determine if the solid ink sticks manufactured by Media Sciences have any functionally detrimental effects on the print head of the Tektronix/Xerox Phaser 850 printer series. The functional effects on the print head would manifest themselves as image quality defects on the prints produced during the evaluation.

In Phase I of the project, the National Center for Remanufacturing & Resource Recovery (NCR<sup>3</sup>) evaluated the effects of the Media Sciences solid ink sticks on the Tektronix/Xerox Phaser 850 printer through an accelerated life test. The evaluation consisted of running a minimum of 180 ink sticks each of cyan, magenta, yellow, and black through two Tektronix/Xerox Phaser 850 printers. Media Sciences indicated to NCR<sup>3</sup> that 180 ink sticks would represent approximately 5 years consumption under normal usage conditions.

There were no image quality issues related to the non-Tektronix ink or functional issues with the print head throughout the duration of this accelerated life test. There were some image quality defects observed during the life test, but these were related to the roller contained within the maintenance kit and were not related to the Media Sciences solid ink sticks. There were no occurrences of light stripes or missing colors, ink smears, or ink streaks on the prints. The actual solid ink stick consumption rates and any special events that occurred during the test are documented on the following pages for each printer.

### **NCR<sup>3</sup> Evaluation Procedure**

The evaluation was conducted in the NCR<sup>3</sup> Imaging Products test laboratory at Rochester Institute of Technology. The accelerated life test began on April 4, 2002 and concluded on May 1, 2002. The test parameters are outlined below.

### **Printers**

Media Sciences provided two (2) Tektronix/Xerox Phaser 850 printers for the accelerated life test. The printers were networked to a PC using a Dell Powernet local area hub.



All variable printer parameters were set to the default conditions except for the items listed. These parameters were setup, per Media Sciences request, in the following manner:

- Energy Star mode set to “on” and the timeout set to one hundred twenty (120) minutes.
- The printers were set to, and run, in transparency mode to maximize ink consumption.

### Printhead

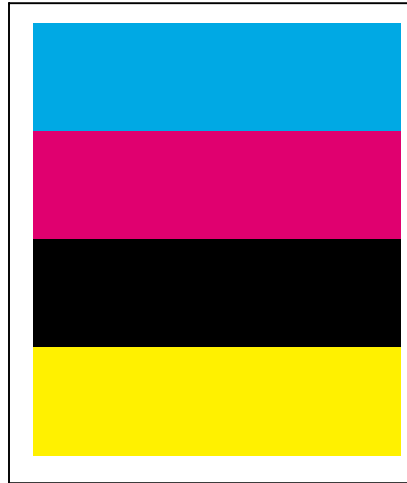
- The Tektronix/Xerox Phaser 850’s had new (OEM) print heads installed by Media Sciences prior to shipping to NCR<sup>3</sup>.

### Solid Ink Sticks

- NCR<sup>3</sup> used only solid ink sticks that were produced and provided by Media Sciences during the evaluation.
- The ink sticks were added in accordance to the process described in the “Phaser 850 Color Printer User Guide.” The ink sticks were added only when the printer front panel displayed “Out of Ink.”
- The ink was kept in its packaging until it was needed.
- No broken ink sticks (or fragments) were loaded into the ink-loading bins.
- Each ink stick is uniquely shaped to help ensure it is installed into the correct ink-loading bin as required. The top of the ink stick was considered to be the end closest to the removable seal on the ink stick package. The ink sticks were always inserted with the “bottom” end down.

## Test target

Media Sciences provided NCR<sup>3</sup> with the test target that was used for the evaluation. It consisted of four stripes- one stripe of each color –cyan, magenta, yellow and black. Each stripe has 100% area coverage. The target was intended to expose as much of the full width array (112 nozzles) print head as possible to the solid ink stick.



## Print Media

The print media used for the evaluation was Hammermill 20# white paper, Hammermill item number 10326-7.

## Image Quality Defect Criteria

In the event that an image quality issue arose during the evaluation, it was agreed that the Tektronix/Xerox user manual and the NTI (Non Tektronix Ink) checklist version 2.2 would be used to determine the mode of failure. The prints were examined on a visual basis only, as requested by Media Sciences.

There are several common image quality defects that are listed by Tektronix/Xerox in the Phaser 850 Color Printer User Guide.

### Light Stripes or missing colors

Light bands running the length of the print or colors missing from a print characterize these image quality defects. Tektronix/Xerox recommends cleaning the printhead as the first step to remedy these problems.



#### Ink Smears

Blotches or smears of ink on the front, back or edges of the print characterize ink smears. Tektronix/Xerox recommends cleaning the internal paper path of the printer for this image quality defect.

#### Ink Streaks

Ink streaks may appear on the top edge (leading edge), front or back of the print. Tektronix/Xerox recommends cleaning the exit rollers in the printer's paper path.

### Environmental Conditions

The evaluation was conducted at ambient temperature and relative humidity, 70<sup>0</sup>F and 45% RH. The ink sticks and paper were also stored under these same conditions.

### Accelerated Life Test Operating Procedure

The print jobs were sent to each printer in batches of 999 each, the maximum allowed by the software. This ensured that the printer was constantly producing prints and kept the down time to a minimum.

The printers were run for a minimum of eight (8) hours per day. The paper trays were filled at the end of each day and allowed to run until the paper tray was again empty.

The prints were constantly examined for image quality defects, e.g. streaks, deletions, voids, etc., throughout the test. NCR<sup>3</sup> has included samples of the prints in the Appendix of this report.

The ink sticks were consumed at slightly different rates and therefore replacement ink sticks were added in different quantities as required. For example, if the printer panel displayed "Ink out" and the black ink-loading bin was empty, it was filled with 3 ink sticks and the others were "topped off" to maximize the uptime of the printer. There was no pattern observed of consistently needing to refill the maximum amount of ink sticks (3) to the same ink-loading bin.



The light stripes test page was printed at the conclusion of the evaluation and is also included in the Appendix of this report. There were no missing stripes on the light stripes test page. The presence of light stripes, or miss-firing nozzles, would indicate a possible problem with the print head.

## Conclusions - Phase I Accelerated Life Testing

There were no image quality issues related to the non-Tektronix ink or functional issues with the print head throughout the duration of this accelerated life test. There were some image quality defects observed during the life test, but none were related to the non-Tektronix ink as determined by following the procedures outlined in the Tektronix/Xerox user manual and the NTI checklist version 2.2. The defects were related to the roller in the maintenance kit. There were no occurrences of light stripes or missing colors, ink smears, or ink streaks on the prints. The actual daily solid ink stick consumption and any special events that occurred during the test are documented in the Appendix for each printer.

	Occurrences Printer A	Occurrences Printer B
Printhead defect caused by ink stick per NTI checklist vs. 2.2	None	None
Image Quality Defect - Light stripes or missing colors	None	None
Image Quality Defect - Ink Smears	None	None
Image Quality Defect - Ink Streaks	None	None
False "Out of Ink" messages	None	None
Inks Stick failing to properly feed	None	None



## Phase II – Long Term Life Testing Status

Phase 2 of this project involves simulating actual customer usage. This evaluation utilizes smaller print jobs as well as varying the dwell time between print jobs. Phase 2 is expected to be completed by June 15, 2002 and will be reported on at that time.

- Concurrent with Phase I, Phase II is also being conducted using a Tektronix/Xerox Phaser 850 printer.
- Only solid ink supplied by Media Sciences is being used.
- 180 cyan, magenta, yellow, and black solid ink sticks will be run through the printer.
- The evaluation is also being conducted at ambient temperature and relative humidity (70<sup>0</sup> F, 45% RH).
- Energy Star mode has been set to on and the timeout set to one hundred twenty (120) minutes.
- Media Sciences provided the print test target file. The target is equally divided into four (4) parts – one of each color –cyan, magenta, yellow and black.
- Each part (color) has 100% area coverage.
- The printers are running 20# white Hammermill paper.
- The printers are set to and run in transparency mode.
- Two hundred prints will be run each shift, 2 shifts per day.
- The print matrix is being randomly generated by a software routine created by NCR<sup>3</sup> and consists of
  - 200 prints per shift
  - The job size is selected randomly from 1- 25 prints
  - The job interval is selected randomly from 1 second to 30 minutes
  - The actual job matrix that was run is printed at the end of each job and will be provided at the conclusion of the evaluation.
  - The Tektronix/Xerox user manual and the NTI checklist version 2.2 will be used in the event of an issue with the print head to determine the mode of failure.

## Phase II Status

### Printer C

The printer has consumed the following number of ink sticks to date with zero image quality defects related to the printhead:

Cyan	Magenta	Yellow	Black
86	90	88	84

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National Center for  
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Media Sciences, Inc.  
Solid Ink Stick Evaluation  
Tektronix/Xerox Phaser 850

# APPENDIX

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## Printer A

### Event Log Sheet

The event log sheet lists the number of ink sticks added to the printer on a daily basis, as well as any special events that may have occurred.

Date	Cyan	Magenta	Yellow	Black	Comments
3/22/02	8	9	8	8	IQ sample
3/25/02	5	5	5	5	
3/26/02	10	15	10	7	
3/27/02	7	7	8	10	
3/28/02	6	10	9	8	
3/29/02	8	9	8	8	IQ sample
4/1/02	10	10	10	9	
4/2/02	7	8	7	6	
4/3/02	11	12	12	12	
4/4/02					Repeated paper jams, Media Sciences contacted*
4/10/02	7	9	7	10	Replaced maintenance kit, emptied waste tray. Cleaned the rapid release guide.
4/11/02	7	7	7	6	
4/12/02	9	10	7	8	IQ sample
4/15/02	10	10	10	9	
4/16/02	7	6	7	6	
4/17/02	9	10	9	9	
4/18/02	16	16	16	16	
4/19/02	10	10	10	10	IQ sample
4/24/02	7	7	8	6	
4/25/02	8	10	9	8	
4/26/01	6	7	7	6	
4/29/01	11	9	13	9	
4/30/02	4	5	4	5	IQ sample
<b>Total</b>	<b>183</b>	<b>201</b>	<b>191</b>	<b>181</b>	

\*The printer experienced frequent paper jams after approximately 70 solid ink sticks were consumed. NCR<sup>3</sup> consulted with Media Sciences to resolve the printer problem. The problem was remedied by replacing the maintenance kit. The maintenance kit consists of a roller and a print counter chip. A sample of the image quality defect is attached in the Appendix of this report. There were no other unusual events during the accelerated life test evaluation. There were no image quality defects that were related to the print head. Image quality samples were collected throughout the evaluation and are included with this report.



## Printer B

### Event Log Sheet

The event log sheet lists the number of ink sticks added to the printer on a daily basis, as well as any special events that may have occurred.

Date	Cyan	Magenta	Yellow	Black	Comments
3/22/02	8	8	7	8	IQ sample
3/25/02	10	10	10	10	
3/26/02	8	10	10	8	
3/27/02	7	8	5	7	Replaced Maintenance Kit (printer requested)
3/28/02	8	9	8	6	IQ sample
3/29/02	11	10	10	11	
4/1/02	7	7	7	6	
4/3/02	11	11	10	9	
4/3/02	4	5	5	4	
4/4/02	11	11	12	11	IQ sample
4/5/02	2	2	2	2	
4/8/02	16	15	16	15	
4/9/02	9	8	8	6	
4/10/02	10	10	10	10	
4/12/02	7	8	9	8	IQ sample
4/15/02	8	7	8	7	
4/16/02	10	8	10	9	
4/17/02	17	18	15	17	
4/18/02	9	9	10	9	
4/19/02	8	10	8	7	IQ sample
4/24/02	8	8	10	8	
4/25/02	9	9	9	8	IQ sample
<b>Total</b>	<b>209</b>	<b>201</b>	<b>199</b>	<b>186</b>	

In total, this printer consumed the above noted number of solid ink sticks with zero image quality defects related to the print head.

There were no unusual events for Printer B during the accelerated life test evaluation. There were no image quality defects that were related to the print head. Image quality samples were collected throughout the evaluation and are included with this report.