



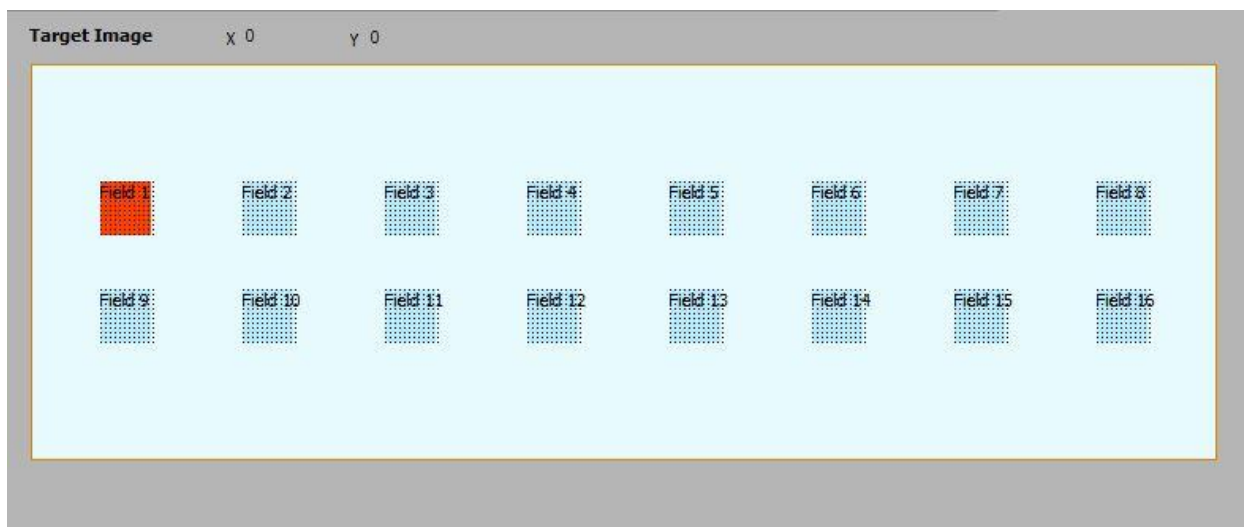
## SPOT-F (SPOT on the Fly): Speeding up array printing

### Abstract

The SPOT on the Fly (SPOT-F) dispense mode of SCIENION's sciFLEXARRAYER enables high-speed dispensing of microvolumes. Unlike traditional Stop and Drop printing, which prints one spot at a time in the forward direction, SPOT-F ejects drops while moving in both forward and reverse flight paths without stopping. Using SPOT-F significantly reduces print duration while maintaining accuracy, showcased in a high-throughput run of 322,560 dispensed spots on 140 glass slides with six different probes.

### Case Study

The set-up of this case study using the sciFLEXARRAYER SX is summarized in Figure 1. To calculate relative efficiency, the total print time of each run with SPOT-F mode at 100 mm/s, 200 mm/s, and 300 mm/s speed was compared to the reference Stop and Drop run at 300 mm/s speed. To measure accuracy, scatter plots of the printed spots were compared at 300 mm/s speed when SPOT-F or Stop and Dispense mode was used (Figure 2).



**Figure 1: Run Setup:** A full sciFLEXARRAYER SX deck with 140 glass slides (one glass slide is visualized) was used. Each glass slide contained 16 fields (red), containing 144 spots each. In total 322,560 spots were printed with 6 different probes with SPOT-F (at 100 mm/s, 200 mm/s, 300 mm/s speed) versus normal Stop and Drop mode (300 mm/s speed).

## Results

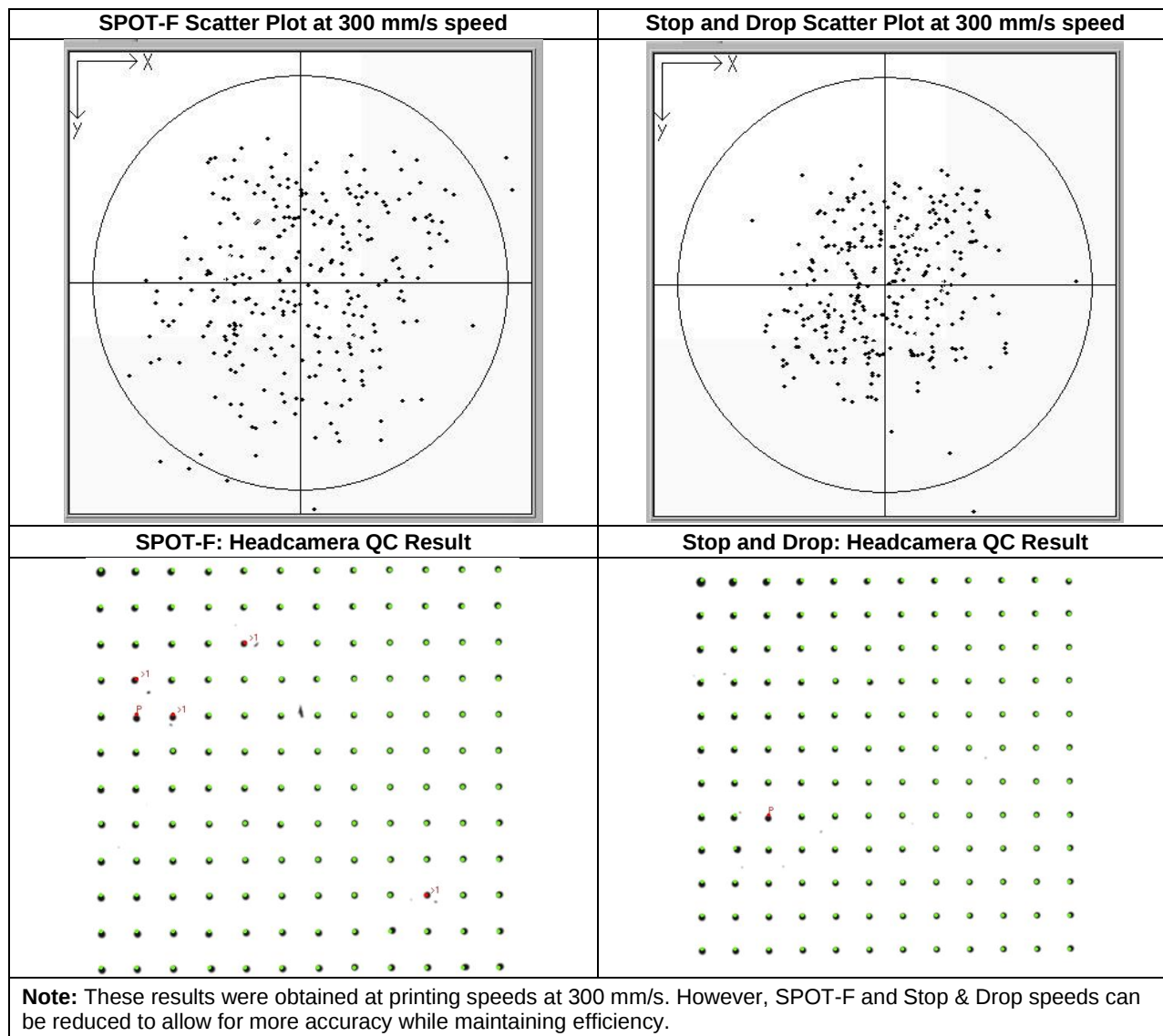
Table 1 summarizes the results of the case study according to speed and relative efficiency of the run. Applying SPOT-F significantly reduces print duration with print times of 45 minutes, 34 minutes, and 30 minutes at 100 mm/s, 200 mm/s, and 300 mm/s speed, respectively, compared to a staggering 8 plus hours for the Stop-and-Drop method.

**Table 1: Run Completion Time Comparison: SPOT-F at Different Speeds vs. Stop-and-Drop Method**

|                                                                                                                                                                                                                                           | SPOT-F at<br>100 mm/s | SPOT-F at<br>200 mm/s | SPOT-F at<br>300 mm/s | Stop and Drop<br>300 mm/s |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|---------------------------|
| <b>Total print time:</b>                                                                                                                                                                                                                  | 45 minutes            | 34 minutes            | 30 minutes            | 8 hours and 9 minutes     |
| <b>Relative efficiency compared to Stop&amp;Drop</b>                                                                                                                                                                                      | 10X Faster            | 14X Faster            | 16X Faster            | N/A                       |
| <b>Note:</b> Print duration can vary depending on the array pattern and number of probes. SCIENION offers contract development and manufacturing services to maximize the efficiency and accuracy of your contract manufacturing process. |                       |                       |                       |                           |

In addition to faster print times, SPOT-F offers unparalleled accuracy, as demonstrated by the analysis of deviations from the expected spot area (Figure 2). When compared with the Stop-and-Drop method, SPOT-F has a minimal accuracy difference.





**Figure 2: A Comparison of Spot Accuracy Between SPOT-F and Stop & Drop Method**

## Conclusion

SPOT-F allows customers to perform fast and accurate runs, making it a smart choice for any operation looking to save time and money while increasing production volume.

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