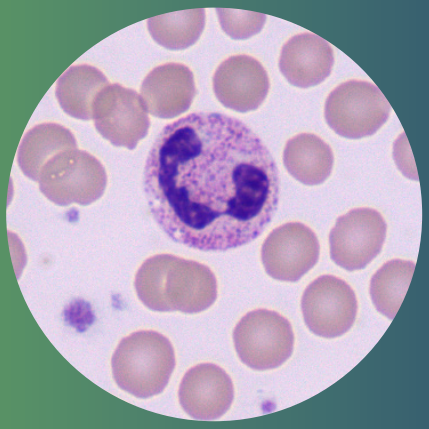
ELITechGroup
EMPOWERING IVD

WHITE PAPER

Streamline, Standardize, & Save: Comparing Aerospray Hematology Pro to Hematek 3000



Evaluating the customizability, ease of use, and time savings of the Aerospray Hematology Pro compared to Siemens' Hematek 3000.

Liam Mora, M.S.E. | Biomedical Engineer

Introduction

For more than a century, scientists have been using dyes to stain liquid samples[1]. Staining allows pathologists to accurately view and assess cells within patient samples using different stains and methods, depending on the sample type and what they are trying to see. Since that time, laboratory workers have used manual slide dipping and flooding methods for staining. While manual staining itself is not always particularly time-consuming, factors such as potential cross-contamination and lack of reproducibility leave room for quality control concerns, sometimes resulting in the need for re-staining one or more samples. Modern automated slide stainers, which began appearing on the market in the late 1960s to early 1970s, revolutionized laboratory workflows by standardizing this process for lab technicians[2]. Not all slide stainers are created equally, however. With labs now processing greater numbers of tests than ever before and turnaround times (TATs) growing ever shorter, staining slides *efficiently* is crucial—which makes the decision of which instrument to purchase of the utmost importance. This includes available features, cost (time and money), reliability, and ease-of-use.

Objective

The objective of this paper is to compare the features and benefits of ELITechGroup's Aerospray® Hematology Pro Slide Stainer/Cytocentrifuge to Siemens Healthineers' Hematek 3000 System. This paper will compare the two instruments in terms of slide throughput, total staining times, workflow, customization, maintenance, and waste disposal with data gathered from an internal ELITechGroup Biomedical Systems study.

Testing Methods

The Aerospray Hematology Pro Slide Stainer/Cytocentrifuge and Hematek 3000 System were run concurrently to compare functionality and features of the two. All setup and operation actions were based on the recommended out-of-box steps for each stainer. Blood smear slides were prepared, loaded, and stained. Various maintenance tasks and disposal steps were performed according to standard procedures provided in user manuals for both instruments.

DOC-02338A

 |

Materials

ELITechGroup's Aerospray Hematology Pro Slide Stainer/Cytocentrifuge Model 7152

- Aerospray Hematology Pro Reagent A Buffer (pH 6.8), SS-071A
- Aerospray Hematology Pro Reagent B Thiazin Stain, SS-071B
- Aerospray Hematology Pro Reagent C Eosin Stain, SS-071C

Siemens Healthineers' Hematek 3000 System

- Hematek Slide Stainer Pump Tube Set, 10312656
- Hematek Slide Stainer Underplaten Tubing, 10323320
- Hematek Slide Stainer Cannula Set, 10316256
- Hematek Stain Pak Wright Giemsa Stain, 10314755
- Hematek Stain Pak Modified Wright's Stain, 10310965

Aerospray Hematology Pro Slide Stainer/Cytocentrifuge

Hematek 3000 System

Results

Slide Throughput

The two instruments were compared in terms of slide throughput by directly measuring the number of slides each instrument could stain in one hour. The slide throughput of the Aerospray Hematology Pro varies according to the carousel used (12 or 30 slide capacity) and the particular program that is used. Figure 1 below shows the measured slide throughput for the Hematek 3000 and the measured slide throughputs for the Aerospray Hematology Pro when using its shortest and longest programs in conjunction with a 30-slide carousel. While the Hematek 3000 stained 50 slides per hour, the Aerospray Pro stained 120 slides per hour using the May Grunwald Giemsa program and 180 slides per hour using the Rapid 4 program. See the Customization section on the following page for details on the programs and settings of both models.

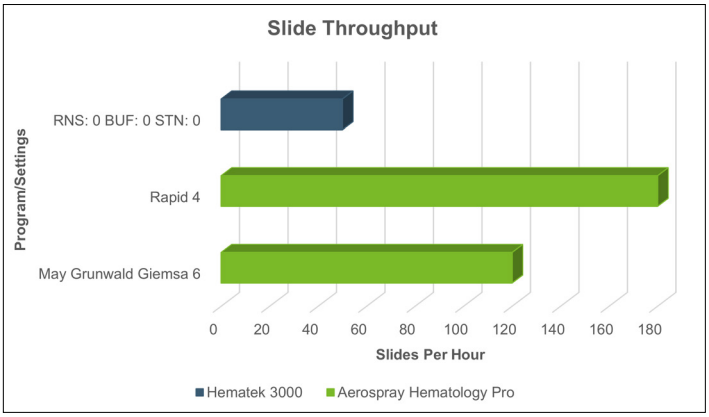


Figure 1. Hematek 3000 and Aerospray Hematology Pro measured slide throughput per hour.

Total Staining Time

Each instrument run was timed from the beginning of preparation, including priming the system, to the completion of the stain cycle. Three runs were performed on each instrument. Tables 1 and 2 on the following page detail the average time required to complete each instrument's workflow steps, and the average time required to stain a total of 12 blood smear slides. On average, the Aerospray Pro required 8.5 minutes to execute all workflow steps and stain a total of 12 blood smear slides. In contrast, the Hematek 3000 required 21.9 minutes; thus, the Aerospray Pro demonstrated a total staining time approximately three times faster than Hematek.

DOC-02338A

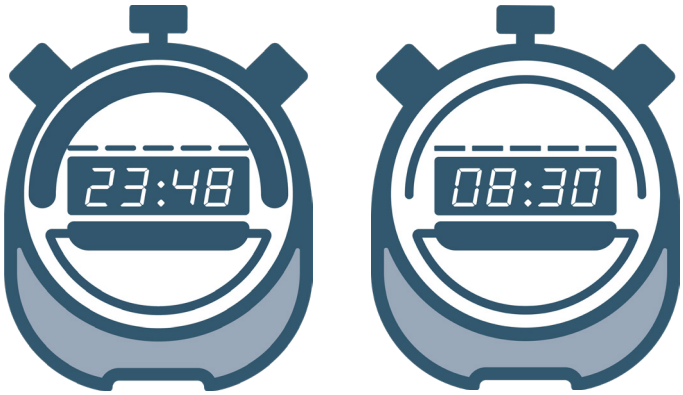
Table 1. Hematek 3000 workflow and total staining time.

Workflow Step	Observed Time
System startup	0.03 min
Pump priming	1.9 min
Staining bloodsmear slides (12 slides)	21.9 min
Total staining time: (12 slides)	**23.8 min**

Table 2. Aerospray Hematology Pro workflow and total staining time.

Workflow Step Staining Program	Observed Time
System startup	0.03 min
Carousel loading and program selection	0.73 min
Staining by Program	
Wright-Giemsa	7.6 min
May Grunwald Giemsa	9.1 min
Rapid	5.3 min
Custom	8.1 min
Unloading carousel	0.18 min
Total staining time by program	
Wright-Giemsa:	**8.5 min**
May Grunwald Giemsa:	**10 min**
Rapid:	**6.2 min**
Custom:	**9 min**
Total average staining time (12 slides):	**8.5 min**

Total Staining Time for 12 Slides



Hematek *Aerospray*

> *"Aerospray Pro demonstrated a total staining time approximately **3x faster** than Hematek."*

Customization

The following dimensions of programming and customization were compared between the Hematek 3000 and Aerospray Pro instruments: points of programmability, possible settings, and the total number of unique setting combinations. The Hematek 3000 relies on three manual setting controls: a rinse adjustment knob, a buffer adjustment knob, and a stain adjustment knob. Each of these points of programmability has 13 marked increments. Considering the two stain programs Hematek is capable of using (Wright-Giemsa and Wright-Giemsa Modified), there is a total of 4,394 potential unique settings.

Aerospray uses a touch screen interface and internal programmability to facilitate customization. There are four preprogrammed routines users can choose from, each with three possible settings, resulting in 12 built-in programs: Wright-Giemsa 4, 5, and 6, May Grunwald Giemsa 4, 5, and 6, Rapid 4, 5, and 6, and Custom 4, 5, and 6. There is further customization within each of these programs, referred to in Table 3 as points of programmability.

Table 3. Aerospray Hematology Pro points of programmability: Wright Giemsa and May Grunwald Giemsa programs.

Point of Programmability	Number of Possible Settings
Fixation	10
Intensity	9
Concentrate Red/Blue Ratio	19
Spin	10
Dilute Red/Blue Ratio	19
End Rinse	10

By multiplying each of these settings within the Wright-Giemsa program alone, the result is a staggering 3,249,000 potential unique settings. Even the least-customizable program (Rapid) is capable of a total of 171,000 settings. Compared to Hematek's 2,197 unique settings per Stain Pak, Aerospray clearly provides the best programmability.

Maintenance and Waste Disposal

Daily and weekly maintenance of the two instruments was determined by completing and timing required cleaning and maintenance activities prescribed in the respective user manuals. The time required for performing Hematek daily maintenance was approximately 16.6 minutes compared to Aerospray daily maintenance of only 4.1 minutes. For weekly maintenance tasks, Aerospray required approximately 7.9 minutes compared to Hematek's 2.8 minutes. While Hematek's weekly-only maintenance tasks take less time, Aerospray's *total* maintenance each week (weekly tasks and daily tasks for seven days) is approximately one-third (1/3) of Hematek's: 36.6 minutes versus 119 minutes (Figure 2).

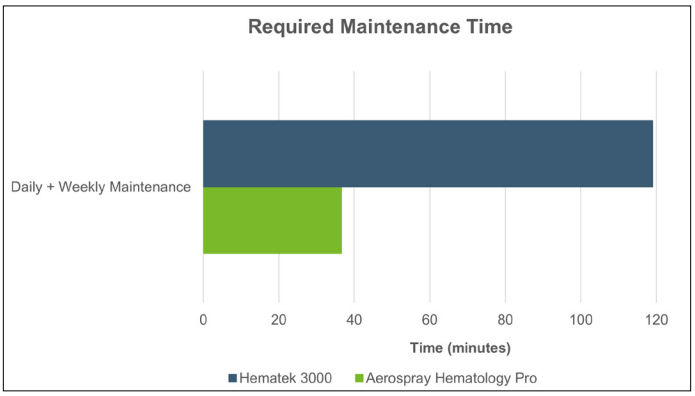


Figure 2. Required maintenance times for Hematek 3000 and Aerospray Hematology Pro.

Aerospray also surpassed Hematek in terms of waste disposal due to its ease of emptying, reduction of waste, and maximum waste capacity. Both instruments have the option of waste level alert functionality. Aerospray's larger capacity of 10 L compared to Hematek's 1.7 L means less frequent emptying is required, with Hematek only holding the capacity of one Stain Pak. In addition, the drawer-like bin in Hematek is more difficult to empty; with external storage or emptying to a drain, Aerospray requires less effort in disposing of waste.

> *"Aerospray's total maintenance each week is approximately **one-third** of Hematek's."*

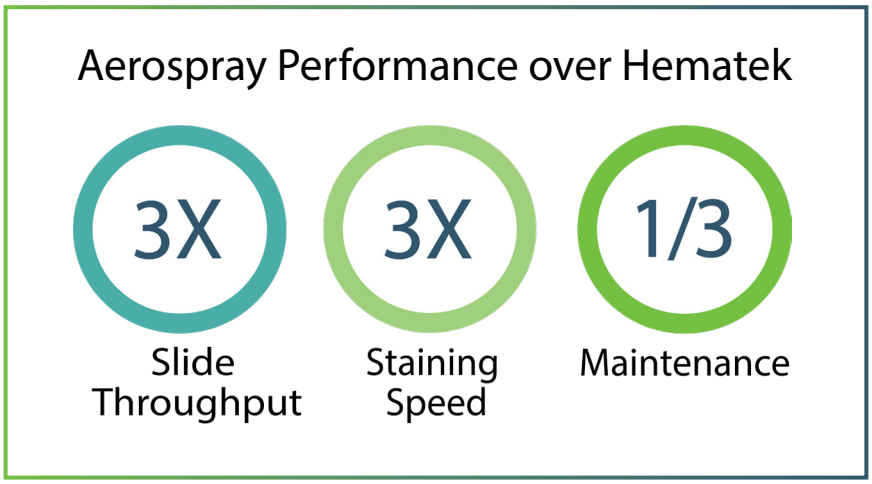
Conclusion

While both automated slide stainers are an improvement over manual hand-dipping methods, Aerospray offers users three times the speed and slide throughput of Hematek, in addition to requiring only one-third of the maintenance time. Aerospray Hematology Pro provides unmatched customization options, quick run times for up to 30 slides at a time, and straightforward setup, maintenance, and waste disposal procedures. Overall, Aerospray Hematology Pro enables laboratory professionals to improve efficiency by streamlining and standardizing processes while saving time and effort.

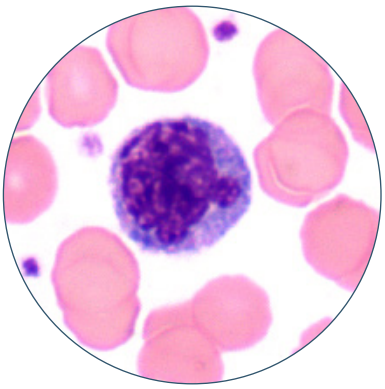
References

1. Javaeed A, Qamar S, Ali S, et al. (October 04, 2021) Histological Stains in the Past, Present, and Future. Cureus 13(10): e18486.

2. Dondelinger R. (March 01, 2013) The Fundamentals of Slide Stainers. Biomed Instrum Technol (2013) 47 (2): 157–162.

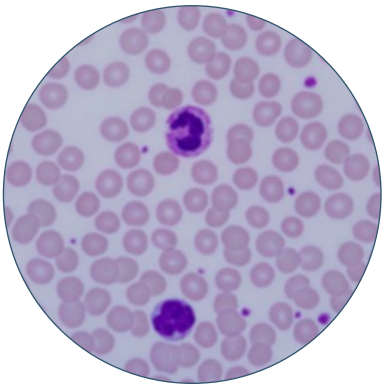


50 YRS+
ELITechGroup
Biomedical Systems



About ELITechGroup

ELITechGroup is a privately held group of worldwide manufacturers and distributors of in vitro diagnostic equipment and reagents for clinical systems, microbiology, molecular diagnostics, hematology, cytology, and sweat test systems. Our mission is to improve patient care by empowering laboratories to do more in less time, with accuracy, to enable rapid and accurate course of treatment for patients.



AerosprayStaining.com
marketing.egi@elitechgroup.com

DOC-02338A