UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-Q

☑ **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the Quarterly Period ended September 30, 2024

or

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from _______________ to ______________

Commission File Number 000-31311

PDF SOLUTIONS, INC.

(Exact name of Registrant as Specified in its Charter)

Delaware	**25-1701361**
(State or Other Jurisdiction of Incorporation or Organization)	(I.R.S. Employer Identification No.)
2858 De La Cruz Blvd. **Santa Clara, California**	**95050**
(Address of Principal Executive Offices)	(Zip Code)

(408) 280-7900
(Registrant's Telephone Number, Including Area Code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $0.00015 par value	PDFS	The Nasdaq Stock Market LLC

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☑ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☑ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ☑	Accelerated filer ☐
Non-accelerated filer ☐	Smaller reporting company ☐
	Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☑

There were 38,772,864 shares of the Registrant's Common Stock outstanding as of November 1, 2024.

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PART I — FINANCIAL INFORMATION

Item 1. Financial Statements

PDF SOLUTIONS, INC.
CONDENSED CONSOLIDATED BALANCE SHEETS
(Unaudited)
(in thousands, except par value)

	September 30, 2024	December 31, 2023
ASSETS		
Current assets:		
Cash and cash equivalents	$ 96,428	$ 98,978
Short-term investments	23,724	36,544
Accounts receivable, net of allowance for credit losses of $890 as of September 30, 2024, and December 31, 2023	46,668	44,904
Prepaid expenses and other current assets	24,575	17,422
Total current assets	191,395	197,848
Property and equipment, net	46,019	37,338
Operating lease right-of-use assets, net	4,360	4,926
Goodwill	15,011	15,029
Intangible assets, net	13,133	15,620
Deferred tax assets, net	173	157
Other non-current assets	37,260	19,218
Total assets	$ 307,351	$ 290,136
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 7,504	$ 2,561
Accrued compensation and related benefits	13,191	14,800
Accrued and other current liabilities	6,510	4,633
Operating lease liabilities – current portion	1,706	1,529
Deferred revenues – current portion	28,728	25,750
Billings in excess of recognized revenues	91	1,570
Total current liabilities	57,730	50,843
Long-term income taxes	2,883	2,972
Non-current portion of operating lease liabilities	3,870	4,657
Other non-current liabilities	2,404	2,718
Total liabilities	66,887	61,190
Commitments and contingencies (Note 11)		
Stockholders' equity:		
Preferred stock, $0.00015 par value, 5,000 shares authorized, no shares issued and outstanding	—	—
Common stock, $0.00015 par value, 70,000 shares authorized; shares issued 50,668 and 49,749, respectively; shares outstanding 38,763 and 38,289, respectively	6	6
Additional paid-in capital	496,255	473,295
Treasury stock, at cost, 11,905 and 11,460 shares, respectively	(159,018)	(143,923)
Accumulated deficit	(94,527)	(98,045)
Accumulated other comprehensive loss	(2,252)	(2,387)
Total stockholders' equity	240,464	228,946
Total liabilities and stockholders' equity	$ 307,351	$ 290,136

See accompanying Notes to Condensed Consolidated Financial Statements (Unaudited)

PDF SOLUTIONS, INC.
CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
(Unaudited)
(in thousands, except per share amounts)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2024	**2023**	**2024**	**2023**
Revenues:				
Analytics	$ 44,750	$ 39,497	$ 121,327	$ 112,957
Integrated Yield Ramp	1,659	2,853	8,053	11,753
Total revenues	46,409	42,350	129,380	124,710
Costs and Expenses:				
Costs of revenues	12,484	14,282	38,243	38,555
Research and development	13,516	13,113	39,149	38,428
Selling, general, and administrative	18,094	15,611	50,851	46,022
Amortization of acquired intangible assets	196	328	714	979
Interest and other expense (income), net	(1,511)	(2,018)	(4,682)	(4,000)
Income before income tax expense	3,630	1,034	5,105	4,726
Income tax expense	(1,424)	(6,006)	(1,587)	(2,508)
Net income (loss)	2,206	(4,972)	3,518	2,218
Other comprehensive income (loss):				
Foreign currency translation adjustments, net of tax	975	(552)	123	(679)
Change in unrealized gain (loss) related to available-for-sale debt securities, net of tax	28	(5)	12	2
Total other comprehensive (income) loss	1,003	(557)	135	(677)
Comprehensive income (loss)	$ 3,209	$ (5,529)	$ 3,653	$ 1,541
Net income (loss) per share:				
Basic	$ 0.06	$ (0.13)	$ 0.09	$ 0.06
Diluted	$ 0.06	$ (0.13)	$ 0.09	$ 0.06
Weighted average common shares used to calculate net income (loss) per share:				
Basic	38,710	38,187	38,542	37,930
Diluted	39,105	38,187	39,028	38,977

See accompanying Notes to Condensed Consolidated Financial Statements (Unaudited)

PDF SOLUTIONS, INC.
CONDENSED CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(Unaudited)
(in thousands)

	Three-Month Periods in the Nine Months Ended September 30, 2024							
	Common Stock		Additional Paid-In	Treasury Stock		Accumulated	Accumulated Other Comprehensive	Total Stockholders'
	Shares	Amount	Capital	Shares	Amount	Deficit	Loss	Equity
Balances, December 31, 2023	38,289	$ 6	$ 473,295	11,460	$ (143,923)	$ (98,045)	$ (2,387)	$ 228,946
Repurchase of common stock	(202)	—	—	202	(6,899)	—	—	(6,899)
Issuance of common stock in connection with employee stock purchase plan	74	—	1,916	—	—	—	—	1,916
Issuance of common stock in connection with exercise of options	1	—	25	—	—	—	—	25
Vesting of restricted stock units	231	—	—	—	—	—	—	—
Purchases of treasury stock in connection with tax withholdings on restricted stock awards	—	—	—	118	(3,794)	—	—	(3,794)
Stock-based compensation expense	—	—	6,154	—	—	—	—	6,154
Comprehensive loss	—	—	—	—	—	(393)	(542)	(935)
Balances, March 31, 2024	38,393	6	481,390	11,780	(154,616)	(98,438)	(2,929)	225,413
Issuance of common stock in connection with exercise of options	4	—	67	—	—	—	—	67
Vesting of restricted stock units	34	—	—	—	—	—	—	—
Purchases of treasury stock in connection with tax withholdings on restricted stock awards	—	—	—	13	(468)	—	—	(468)
Stock-based compensation expense	—	—	5,762	—	—	—	—	5,762
Comprehensive income (loss)	—	—	—	—	—	1,705	(326)	1,379
Balances, June 30, 2024	38,431	6	487,219	11,793	(155,084)	(96,733)	(3,255)	232,153
Issuance of common stock in connection with employee stock purchase plan	82	—	2,157	—	—	—	—	2,157
Issuance of common stock in connection with exercise of options	2	—	22	—	—	—	—	22
Vesting of restricted stock units	248	—	—	—	—	—	—	—
Purchases of treasury stock in connection with tax withholdings on restricted stock grants	—	—	—	112	(3,934)	—	—	(3,934)
Stock-based compensation expense	—	—	6,857	—	—	—	—	6,857
Comprehensive income	—	—	—	—	—	2,206	1,003	3,209
Balances, September 30, 2024	38,763	$ 6	$ 496,255	11,905	$ (159,018)	$ (94,527)	$ (2,252)	$ 240,464

Continued on next page.

PDF SOLUTIONS, INC.
CONDENSED CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY - CONTINUED
(Unaudited)
(in thousands)

	Three-Month Periods in the Nine Months Ended September 30, 2023							
	Common Stock		Additional Paid-In	Treasury Stock		Accumulated	Accumulated Other Comprehensive	Total Stockholders'
	Shares	Amount	Capital	Shares	Amount	Deficit	Loss	Equity
Balances, December 31, 2022	37,431	$ 6	$ 447,415	11,182	$ (133,709)	$ (101,150)	$ (2,550)	$ 210,012
Issuance of common stock in connection with employee stock purchase plan	98	—	1,663	—	—	—	—	1,663
Issuance of common stock in connection with exercise of options	21	—	345	—	—	—	—	345
Vesting of restricted stock units	286	—	—	—	—	—	—	—
Purchases of treasury stock in connection with tax withholdings on restricted stock awards	—	—	—	133	(4,101)	—	—	(4,101)
Stock-based compensation expense	—	—	4,884	—	—	—	—	4,884
Comprehensive income	—	—	—	—	—	355	267	622
Balances, March 31, 2023	37,836	6	454,307	11,315	(137,810)	(100,795)	(2,283)	213,425
Issuance of common stock in connection with exercise of options	6	—	87	—	—	—	—	87
Vesting of restricted stock units	37	—	—	—	—	—	—	—
Purchases of treasury stock in connection with tax withholdings on restricted stock awards	—	—	—	11	(468)	—	—	(468)
Stock-based compensation expense	—	—	4,678	—	—	—	—	4,678
Comprehensive income (loss)	—	—	—	—	—	6,835	(387)	6,448
Balances, June 30, 2023	37,879	6	459,072	11,326	(138,278)	(93,960)	$ (2,670)	224,170
Issuance of common stock in connection with employee stock purchase plan	125	—	2,169	—	—	—	—	2,169
Issuance of common stock in connection with exercise of options	2	—	37	—	—	—	—	37
Vesting of restricted stock units	260	—	—	—	—	—	—	—
Purchases of treasury stock in connection with tax withholdings on restricted stock grants	—	—	—	102	(4,566)	—	—	(4,566)
Repurchase of common stock	(21)	—	—	21	(743)	—	—	(743)
Stock-based compensation expense	—	—	6,026	—	—	—	—	6,026
Comprehensive loss	—	—	—	—	—	(4,972)	(557)	(5,529)
Balances, September 30, 2023	38,245	$ 6	$ 467,304	11,449	$ (143,587)	$ (98,932)	$ (3,227)	$ 221,564

See accompanying Notes to Condensed Consolidated Financial Statements (Unaudited)

PDF SOLUTIONS, INC.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(Unaudited)
(in thousands)

	Nine Months Ended September 30, 2024	Nine Months Ended September 30, 2023
Cash flows from operating activities:		
Net income	$ 3,518	$ 2,218
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	2,895	3,778
Stock-based compensation expense	18,540	15,561
Amortization of acquired intangible assets	2,466	2,659
Amortization of costs capitalized to obtain revenue contracts	1,941	1,494
Net accretion of discounts on short-term investments	(1,239)	(734)
Accretion of unguaranteed residual assets	(488)	(51)
Deferred taxes	(35)	43
Other	(68)	(55)
Changes in operating assets and liabilities:		
Accounts receivable	(1,743)	1,185
Prepaid expenses and other current assets	(8,831)	(7,038)
Operating lease right-of-use assets	1,241	904
Other non-current assets	(11,478)	(928)
Accounts payable	2,995	(2,697)
Accrued compensation and related benefits	(1,608)	(5,342)
Accrued and other liabilities	(16)	393
Deferred revenues	2,771	3,681
Billings in excess of recognized revenues	(1,479)	(1,612)
Operating lease liabilities	(1,285)	(888)
Net cash provided by operating activities	8,097	12,571
Cash flows from investing activities:		
Proceeds from maturities and sales of short-term investments	57,125	28,800
Purchases of short-term investments	(43,054)	(32,250)
Purchase of convertible promissory note	(2,000)	—
Proceeds from sale of property and equipment	55	105
Purchases of property and equipment	(11,573)	(8,574)
Prepayment for the purchase of property and equipment	(365)	(343)
Purchases of intangible assets	—	(150)
Payment for business acquisition, net of cash acquired	—	(1,823)
Net cash provided by (used in) investing activities	188	(14,235)
Cash flows from financing activities:		
Proceeds from exercise of stock options	114	469
Proceeds from employee stock purchase plan	4,073	3,832
Payments for taxes related to net share settlement of equity awards	(8,196)	(9,135)
Repurchases of common stock	(6,899)	(743)
Net cash used in financing activities	(10,908)	(5,577)
Effect of exchange rate changes on cash and cash equivalents	73	(763)
Net change in cash and cash equivalents	(2,550)	(8,004)
Cash and cash equivalents at beginning of period	98,978	119,624
Cash and cash equivalents at end of period	$ 96,428	$ 111,620

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PDF SOLUTIONS, INC.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS – CONTINUED
(Unaudited)
(in thousands)

	Nine Months Ended September 30,	
	2024	**2023**
Supplemental disclosure of cash flow information:		
Cash paid during the year for income taxes	$ 2,064	$ 3,568
Cash paid for amounts included in the measurement of operating lease liabilities	$ 1,290	$ 1,160
Supplemental disclosure of noncash information:		
Property and equipment received and accrued in accounts payable and accrued and other current liabilities	$ 4,774	$ 697
Advances for purchase of property and equipment transferred from prepaid assets to property and equipment	$ 89	$ 66
Operating lease liabilities arising from obtaining right-of-use assets	$ 679	$ —
Property and equipment transferred to sales-type leases	$ 4,021	$ 6,002
Stock-based compensation capitalized as part of the cost of property and equipment, net	$ 233	$ —

See accompanying Notes to Condensed Consolidated Financial Statements (Unaudited)

PDF SOLUTIONS, INC.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

1. BASIS OF PRESENTATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Presentation

The interim unaudited condensed consolidated financial statements included herein have been prepared by PDF Solutions, Inc. (the "Company") pursuant to the rules and regulations of the Securities and Exchange Commission ("SEC"), including the instructions to the Quarterly Report on Form 10-Q and Article 10 of Regulation S-X. Certain information and footnote disclosures normally included in annual consolidated financial statements prepared in accordance with accounting principles generally accepted in the United States of America have been condensed or omitted. The interim unaudited condensed consolidated financial statements reflect, in the opinion of management, all adjustments necessary (consisting only of normal recurring adjustments) to present a fair statement of results for the interim periods presented. The operating results for any interim period are not necessarily indicative of the results that may be expected for other interim periods or the full fiscal year. The accompanying interim unaudited condensed consolidated financial statements should be read in conjunction with the audited consolidated financial statements and notes thereto included in the Company's Annual Report on Form 10-K for the year ended December 31, 2023, filed with the SEC on February 27, 2024.

The interim unaudited condensed consolidated financial statements include the accounts of the Company and its wholly-owned subsidiaries after the elimination of all intercompany balances and transactions.

The accompanying interim unaudited condensed consolidated balance sheet as of December 31, 2023, has been derived from the audited consolidated financial statements but does not include all disclosures required by accounting principles generally accepted in the United States of America.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Significant estimates in these condensed consolidated financial statements include revenue recognition, the estimated useful lives of property and equipment and intangible assets, fair value of convertible note receivable, assumptions made in analysis of allowance for credit losses, impairment of goodwill and long-lived assets, realization of deferred tax assets ("DTAs"), and accounting for lease obligations, stock-based compensation expense, and income tax uncertainties and contingencies. Actual results could differ from those estimates and may result in material effects on the Company's operating results and financial position.

Recent Accounting Standards

In November 2023, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2023-07, Segment Reporting (Topic 280): Improvements to Reportable Segment Disclosures, which requires disclosure of incremental segment information on an annual and interim basis. This ASU is effective for fiscal years beginning after December 15, 2023, and interim periods within fiscal years beginning after December 15, 2024, and requires retrospective application to all prior periods presented in the financial statements. Early adoption is permitted. The Company is currently evaluating the impact of the new standard on the consolidated financial statements and related disclosures.

In December 2023, the FASB issued ASU No. 2023-09, Income Taxes (Topic 740): Improvements to Income Tax Disclosures. This ASU is intended to improve the transparency of income tax disclosures by requiring (1) consistent categories and greater disaggregation of information in the rate reconciliation and (2) income taxes paid disaggregated by jurisdiction. It also includes certain other amendments to improve the effectiveness of income tax disclosures. The ASU's amendments are effective for public business entities for annual periods beginning after December 15, 2024. Entities are permitted to early adopt the standard for "annual financial statements that have not yet been issued or made available for issuance." Adoption is either prospectively or retrospectively, the Company will adopt this ASU on a prospective basis. The Company is currently evaluating the impact of the new standard on the consolidated financial statements and related disclosures.

Management has reviewed other recently issued accounting pronouncements issued or proposed by the FASB and does not believe any of these accounting pronouncements has had or will have a material impact on the condensed unaudited consolidated financial statements.

2. REVENUE FROM CONTRACTS WITH CUSTOMERS

The Company derives revenue from two sources: Analytics and Integrated Yield Ramp.

The Company recognizes revenue in accordance with FASB Accounting Standards Codification ("ASC") Topic 606, Revenue from Contracts with Customers, and its related amendments (collectively known as "ASC 606"). ASC 606 outlines a single comprehensive model to use in accounting for revenue arising from contracts with customers. Revenue is recognized when control of products or services is transferred to customers, in an amount that reflects the consideration the Company expects to be entitled to in exchange for those promised products or services.

The Company determines revenue recognition through the following five steps:

- Identification of the contract, or contracts, with a customer
- Identification of the performance obligations in the contract
- Determination of the transaction price
- Allocation of the transaction price to the performance obligations in the contract
- Recognition of revenue when, or as, performance obligations are satisfied

The Company accounts for a contract when it has approval and commitment from both parties, the rights of the parties are identified, payment terms are identified, the contract has commercial substance, and collectibility of consideration is probable.

Contracts with Multiple Performance Obligations

The Company enters into contracts that can include various combinations of licenses, products and services, some of which are distinct and are accounted for as separate performance obligations. For contracts with multiple performance obligations, the Company allocates the transaction price of the contract to each performance obligation on a relative basis using the standalone selling price ("SSP").

Analytics Revenue

Analytics revenue is derived from the following primary offerings: licenses and services for standalone software (which is primarily Exensio® and Cimetrix® products), software-as-a-service ("SaaS") (which is primarily Exensio® products), and Design-for-Inspection™ ("DFI™") systems and Characterization Vehicle® ("CV®") systems that do not include performance incentives based on customers' yield achievement.

Revenue from standalone software is recognized depending on whether the license is perpetual or time-based. Perpetual (one-time charge) license software is recognized at the time of the inception of the arrangement when control transfers to the customers if the software license is considered as a separate performance obligation from the services offered by the Company. Revenue from post-contract support is recognized over the contract term on a straight-line basis, because the Company is providing (i) support and (ii) unspecified software updates on a when-and-if available basis over the contract term. Revenue from time-based-licensed software is allocated to each performance obligation and is recognized either at a point in time or over time as follows. The license component is recognized at the time when control transfers to customers, with the post-contract support component recognized ratably over the committed term of the contract. For contracts with any combination of licenses, support, and other services, distinct performance obligations are accounted for separately. For contracts with multiple performance obligations, the Company allocates the transaction price of the contract to each performance obligation on a relative basis using the SSP attributed to each performance obligation.

Revenue from SaaS arrangements, which allow for the use of a cloud-based software product or service over a contractually determined period of time without the customer having to take possession of the software, is accounted for as a subscription and is recognized as revenue ratably, on a straight-line basis, over the subscription period beginning on the date the service is first made available to customers. For contracts with any combination of SaaS and related services, distinct performance obligations are accounted for separately. For contracts with multiple performance obligations, the Company allocates the transaction price of the contract to each performance obligation on a relative basis using the SSP attributed to each performance obligation.

Revenue from DFI systems and CV systems (including Characterization services) that do not include performance incentives based on customers' yield achievement is recognized primarily as services are performed. Where there are distinct performance obligations, the Company allocates revenue to all deliverables based on their SSPs. For those contracts with multiple performance obligations, the Company allocates the transaction price of the contract to each performance obligation on a relative basis using the SSP attributed to each performance obligation. Where there are not discrete performance obligations, historically, revenue is primarily recognized as services are performed using a percentage of completion method based on costs or labor-hours inputs, whichever is the most appropriate measure of the progress towards completion of the contract. The estimation of percentage of completion method is complex and subject to many variables that require significant judgment. Please refer to the "Significant Judgments" section of this Note for further discussion.

The Company also leases some of its DFI system and CV system assets to some customers. The Company determines the existence of a lease when the customer controls the use of these identified assets for a period of time defined in the lease agreement and classifies such leases as operating leases or sales-type leases. A lease is classified as a sales-type lease if it meets certain criteria under ASC Topic 842, Leases; otherwise, it is classified as an operating lease. Operating lease revenue is recognized on a straight-line basis over the lease term. Sales-type lease revenue and corresponding lease receivables are recognized at lease commencement based on the present value of the future lease payments, and related interest income on lease receivable is recognized over the lease term and are recorded under Analytics revenue in the accompanying unaudited condensed consolidated statements of comprehensive income (loss). Payments under sales-type leases are discounted using the interest rate implicit in the lease. When the Company's leases are embedded in contracts with customers that include non-lease performance obligations, the Company allocates consideration in the contract between lease and non-lease components based on their relative SSPs. Assets subject to operating leases remain in property and equipment and continue to be depreciated. Assets subject to sales-type leases are derecognized from property and equipment, net at lease commencement and a net investment in the lease asset is recognized in prepaid expenses and other current assets and other non-current assets in the accompanying unaudited condensed consolidated balance sheets.

Integrated Yield Ramp Revenue

Integrated Yield Ramp revenue is derived from the Company's fixed-fee engagements that include performance incentives based on customers' yield achievement (which consists primarily of Gainshare royalties) typically based on customer's wafer shipments, pertaining to these fixed-price contracts, which royalties are variable.

Revenue under these project-based contracts, which are delivered over a specific period of time, typically for a fixed-fee component paid on a set schedule, is recognized as services are performed using a percentage of completion method based on costs or labor-hours inputs, whichever is the most appropriate measure of the progress towards completion of the contract. Where there are distinct performance obligations, the Company allocates revenue to all deliverables based on their SSPs and allocates the transaction price of the contract to each performance obligation on a relative basis using the SSP. Similar to the services provided in connection with DFI systems and CV systems that are contributing to Analytics revenue, due to the nature of the work performed in these arrangements, the estimation of percentage of completion method is complex and subject to many variables that require significant judgment. Please refer to the "Significant Judgments" section of this Note for further discussion.

The Gainshare contained in Integrated Yield Ramp contracts is a variable fee related to continued usage of the Company's intellectual property after the fixed-fee service period ends, based on a customer's yield achievement. Revenue derived from Gainshare is contingent upon the Company's customers reaching certain defined production yield levels. Gainshare periods are generally subsequent to the delivery of all contractual services and performance obligations. The Company records Gainshare as a usage-based royalty derived from customers' usage of intellectual property and records it in the same period in which the usage occurs.

Disaggregation of Revenue

The Company disaggregates revenue from contracts with customers into the timing of the transfer of goods and services and the geographical regions. The Company determined that disaggregating revenue into these categories achieves the disclosure objective to depict how the nature, amount, timing, and uncertainty of revenue and cash flows are affected by economic factors.

The Company's performance obligations are satisfied either over time or at a point-in-time. The following table represents a disaggregation of revenue percentage by timing of revenue:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2024	2023	2024	2023
Over time	64 %	68 %	67 %	74 %
Point-in-time	36 %	32 %	33 %	26 %
Total	100 %	100 %	100 %	100 %

International revenues accounted for approximately 55% and 42% of the Company's total revenues during the three months ended September 30, 2024 and 2023, respectively, and approximately 55% and 44% of the Company's total revenues during the nine months ended September 30, 2024 and 2023, respectively. See Note 9, *Customer and Geographic Information*.

Significant Judgments

Judgments and estimates are required under ASC 606. Due to the complexity of certain contracts, the actual revenue recognition treatment required under ASC 606 for the Company's arrangements may be dependent on contract-specific terms and may vary in some instances.

For revenue under project-based contracts for fixed-price services, revenue is recognized as services are performed using a percentage-of-completion method based on costs or labor-hours input method, whichever is the most appropriate measure of the progress towards completion of the contract. Due to the nature of the work performed in these arrangements, the estimation of percentage of completion method is complex, subject to many variables and requires significant judgment. Key factors reviewed by the Company to estimate costs to complete each contract are future labor and product costs and expected productivity efficiencies. If circumstances arise that change the original estimates of revenues, costs, or extent of progress toward completion, revisions to the estimates are made. These revisions may result in increases or decreases in estimated revenues or costs, and such revisions are reflected in revenue on a cumulative catch-up basis in the period in which the circumstances that gave rise to the revision become known.

The Company's contracts with customers often include promises to transfer products, software licenses and provide services, including professional services, technical support services, and rights to unspecified updates to a customer. Determining whether licenses and services are distinct performance obligations that should be accounted for separately, or not distinct and thus accounted for together, requires significant judgment. The Company rarely licenses software on a standalone basis, so the Company is required to estimate the range of the SSPs for each performance obligation. In instances where the SSP is not directly observable because the Company does not license the software or sell the service separately, the Company determines the SSP using information that may include market conditions and other observable inputs.

The Company is required to record Gainshare revenue in the same period in which the usage occurs. Because the Company generally does not receive the acknowledgment reports from its customers during a given quarter within the time frame necessary to adequately review the reports and include the actual amounts in quarterly results for such quarter, the Company accrues the related revenue based on estimates of customers underlying sales achievement. The Company's estimation process can be based on historical data, trends, seasonality, changes in the contract rate, knowledge of the changes in the industry and changes in the customer's manufacturing environment learned through discussions with customers and sales personnel. As a result of accruing revenue for the quarter based on such estimates, adjustments will be required in the following quarter to true-up revenue to the actual amounts reported.

Contract Balances

The Company performs its obligations under a contract with a customer primarily by licensing software or providing services in exchange for consideration from the customer. The timing of the Company's performance often differs from the timing of the customer's payment, which results in the recognition of a receivable, a contract asset or a contract liability.

The Company classifies the right to consideration in exchange for software or services transferred to a customer as either a receivable or a contract asset. A receivable is a right to consideration that is unconditional, as compared to a contract asset, which is a right to consideration that is conditional upon factors other than the passage of time. The majority of the Company's contract assets represent unbilled amounts related to fixed-price service contracts when the revenue recognized exceeds the amount billed to the customer.

The contract assets are recorded on a net basis with deferred revenue (i.e., contract liabilities) at the contract level. The contract assets consist of the following (in thousands):

	September 30, 2024	December 31, 2023
Current portion included in prepaid expenses and other current assets	$ 9,193	$ 6,787
Non-current portion included in other non-current assets	611	933
Total contract assets	$ 9,804	$ 7,720

The Company did not record any asset impairment charges related to contract assets for the periods presented.

Deferred revenues and billings in excess of recognized revenues consist substantially of amounts invoiced in advance of revenue recognition and are recognized as the revenue recognition criteria are met. Deferred revenues that will be recognized during the succeeding twelve-month period are recorded as current deferred revenues and the remaining portion is recorded in other non-current liabilities in the accompanying condensed consolidated balance sheets.

Deferred revenues were the following (in thousands):

	September 30, 2024	December 31, 2023
Current portion	$ 28,728	$ 25,750
Non-current portion (1)	1,599	1,802
Total deferred revenues	$ 30,327	$ 27,552

(1) Included in other non-current liabilities.

Revenue recognized that was included in the deferred revenues and billings in excess of recognized revenues balances at the beginning of each reporting period was the following (in thousands):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2024	2023	2024	2023
Revenue recognized that was included in the deferred revenues and billings in excess of recognized revenues balances at the beginning of each period	$ 12,040	$ 13,129	$ 24,669	$ 23,836

As of September 30, 2024, the aggregate amount of the transaction price allocated to the remaining performance obligations related to customer contracts that were unsatisfied or partially unsatisfied was approximately $239.2 million. Given the applicable contract terms with customers, more than half of this amount is expected to be recognized as revenue over the next two years with the remainder to be recognized thereafter. This amount does not include insignificant contracts to which the customer is not committed, nor significant contracts for which the Company recognizes revenue equal to the amount the Company has the right to invoice for services performed, or future sales-based or usage-based royalty payments in exchange for a license of intellectual property. This amount is subject to change due to future revaluations of variable consideration, terminations, other contract modifications, or currency adjustments. The estimated timing of the recognition of remaining unsatisfied performance obligations is subject to change and is affected by changes to the scope, change in timing of delivery of products and services, or contract modifications.

The adjustment to revenue recognized from performance obligations satisfied (or partially satisfied) in previous periods was a decrease of $0.7 million and a decrease of $0.6 million during the three months ended September 30, 2024 and 2023, respectively, and a decrease of $1.4 million and an increase of $4.3 million during the nine months ended September 30, 2024 and 2023, respectively. These amounts primarily represent changes in estimated percentage-of-completion based contracts and changes in actual versus estimated Gainshare.

Costs to Obtain or Fulfill a Contract

The Company capitalizes the incremental costs to obtain or fulfill a contract with a customer, including direct sales commissions and related fees, when it expects to recover those costs. Amortization expense related to these capitalized costs is recognized over the period associated with the revenue from which the cost was incurred.

Total capitalized direct sales commission costs were the following (in thousands):

	September 30, 2024	December 31, 2023
Current portion included in prepaid expenses and other current assets	$ 2,566	$ 1,954
Non-current portion included in other non-current assets	3,059	2,587
Total capitalized direct sales commission costs	$ 5,625	$ 4,541

Amortization of capitalized direct sales commission costs was the following (in thousands):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2024	2023	2024	2023
Amortization of capitalized direct sales commission costs	$ 667	$ 532	$ 1,941	$ 1,494

There was no impairment loss in relation to the costs capitalized for the periods presented.

Practical Expedient

The Company does not adjust the transaction price for the effects of a significant financing component when the period between the transfers of the promised good or service to the customer and payment for that good or service by the customer is expected to be one year or less. The Company assessed each of its revenue generating arrangements in order to determine whether a significant financing component exists, and determined its contracts did not include a material significant financing component during the three and nine months ended September 30, 2024 and 2023.

3. BALANCE SHEET COMPONENTS

Accounts Receivable

Accounts receivable include amounts that are unbilled at the end of the period that are expected to be billed and collected within a 12-month period. Unbilled accounts receivable, included in accounts receivable, totaled $20.7 million and $16.4 million as of September 30, 2024, and December 31, 2023, respectively. Unbilled accounts receivable that are not expected to be billed and collected during the succeeding 12-month period are recorded in other non-current assets and totaled $10.2 million and $1.1 million as of September 30, 2024, and December 31, 2023, respectively.

The Company performs ongoing credit evaluations of its customers' financial condition. An allowance for credit losses is maintained for probable credit losses based upon the Company's assessment of the expected collectibility of the accounts receivable. The allowance for credit losses is reviewed on a quarterly basis to assess the adequacy of the allowance.

Property and Equipment

Property and equipment, net consist of the following (in thousands):

	September 30, 2024	December 31, 2023
Computer equipment	$ 11,919	$ 12,515
Software	5,647	5,596
Furniture, fixtures, and equipment	2,543	2,501
Leasehold improvements	6,705	6,475
Laboratory and other equipment	5,621	4,891
Test equipment	26,286	25,044
Property and equipment in progress:		
DFI™ system assets	27,991	22,864
CV® system and other assets	7,324	6,977
	94,036	86,863
Less: Accumulated depreciation and amortization	(48,017)	(49,525)
Total	$ 46,019	$ 37,338

Test equipment mainly includes DFI™ system and CV® system assets at customer sites that are contributing to revenue. Property and equipment in progress represent the development or construction of property and equipment that have not yet been placed in service for the Company's intended use and are not depreciated.

Depreciation and amortization expense was $0.8 million and $1.2 million for the three months ended September 30, 2024 and 2023, respectively, and $2.9 million and $3.8 million for the nine months ended September 30, 2024 and 2023, respectively.

Goodwill and Intangible Assets, Net

As of each of September 30, 2024, and December 31, 2023, the carrying amount of goodwill was $15.0 million.

Intangible assets, net, consisted of the following (in thousands):

		September 30, 2024			December 31, 2023		
	Amortization Period (Years)	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Acquired identifiable intangibles:							
Customer relationships	1-10	$ 9,506	$ (7,772)	$ 1,734	$ 9,508	$ (7,335)	$ 2,173
Developed technology	4-9	34,631	(23,983)	10,648	34,650	(22,094)	12,556
Tradename and trademarks	2-10	1,598	(1,100)	498	1,598	(1,025)	573
Patent	6-10	2,100	(1,847)	253	2,100	(1,782)	318
Noncompetition agreements	3	848	(848)	—	848	(848)	—
Total		$ 48,683	$ (35,550)	$ 13,133	$ 48,704	$ (33,084)	$ 15,620

The weighted average amortization period for acquired identifiable intangible assets was 4.6 years as of September 30, 2024. The following table summarizes intangible assets amortization expense in the accompanying condensed consolidated statements of comprehensive income (loss) (in thousands):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2024	2023	2024	2023
Amortization of acquired technology included under costs of revenues	$ 584	$ 574	$ 1,752	$ 1,680
Amortization of acquired intangible assets presented separately under costs and expenses	196	328	714	979
Total amortization of acquired intangible assets	$ 780	$ 902	$ 2,466	$ 2,659

The Company expects annual amortization of acquired identifiable intangible assets to be as follows (in thousands):

Year Ending December 31,	Amount
2024 (remaining three months)	$ 767
2025	3,069
2026	2,900
2027	2,747
2028	2,442
2029 and thereafter	1,208
Total future amortization expense	$ 13,133

There were no impairment charges for goodwill and intangible assets during the three and nine months ended September 30, 2024 and 2023.

Other Non-current Assets

Other non-current assets consisted of the following (in thousands):

	September 30, 2024	December 31, 2023
Costs capitalized to obtain revenue contracts – non-current (1)	$ 3,059	$ 2,587
Unbilled accounts receivable – non-current (2)	10,216	1,069
Contract assets – non-current (1)	611	933
Net investments in sales-type leases – non-current (3)	18,778	12,196
Other	4,596	2,433
Total other non-current assets	$ 37,260	$ 19,218

(1) See Note 2, *Revenue from Contracts with Customers*.
(2) See Note 3, *Balance Sheet Components – Accounts Receivable*.
(3) The Company had net investments in sales-type leases for its DFI™ system and CV® system assets. The following table summarizes the components of the Company's net investments in sales-type leases in the accompanying condensed consolidated balance sheets (in thousands):

	September 30, 2024	December 31, 2023
Lease receivables	$ 16,455	$ 9,460
Unguaranteed residual assets	7,525	4,717
Net investments in sales-type leases	23,980	14,177
Less: Current portion of lease receivables under prepaid expenses and other current assets	(5,202)	(1,981)
Net investments in sales-type leases – non-current	$ 18,778	$ 12,196

Maturities of leases payments under sales-type leases as of September 30, 2024, were as follows (in thousands):

Year Ending December 31,	Amount
2024 (remaining three months)	$ 1,541
2025	8,048
2026	7,672
2027	2,718
2028	68
Total future sales-type lease payments	20,047
Less: Present value adjustment (a)	(3,592)
Present value of lease receivables	$ 16,455

(a) Calculated using the rate implicit in the lease determined for each lease.

There was no allowance for credit losses on lease receivables as of September 30, 2024, and December 31, 2023. The Company's ongoing risk management strategy for residual assets includes performing regular reviews of estimated residual values.

4. LEASES

The Company leases administrative and sales offices and certain equipment under non-cancellable operating leases, which contain various renewal or termination options and, in some cases, require payment of common area costs, taxes and utilities. These operating leases expire at various dates through 2028. The Company had no leases that were classified as a financing lease as of September 30, 2024, and December 31, 2023.

Lease expense was comprised of the following (in thousands):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2024	2023	2024	2023
Operating lease expense	$ 401	$ 382	$ 1,161	$ 1,153
Short-term lease and variable lease expense (1)	268	239	754	673
Total lease expense	$ 669	$ 621	$ 1,915	$ 1,826

(1) Leases with an initial term of 12 months or less are not recorded on the accompanying condensed consolidated balance sheets, and the Company recognizes lease expense for these leases on a straight-line basis over the lease term. Variable lease expense for the periods presented primarily included common area maintenance charges.

Supplemental condensed consolidated balance sheets information related to operating leases was as follows:

	September 30, 2024	December 31, 2023
Weighted average remaining lease term under operating leases (in years)	3.5	4.4
Weighted average discount rate for operating lease liabilities	5.98 %	4.96 %

Maturities of operating lease liabilities as of September 30, 2024, were as follows (in thousands):

Year Ending December 31,	Amount
2024 (remaining three months)	$ 492
2025	1,850
2026	1,551
2027	1,490
2028	847
Total future minimum lease payments	6,230
Less: Interest (1)	(654)
Present value of future minimum lease payments under operating lease liabilities (2)	$ 5,576

(1) Calculated using incremental borrowing interest rate for each lease.
(2) Includes the current portion of operating lease liabilities of $1.7 million as of September 30, 2024.

5. STOCKHOLDERS' EQUITY

Stock Repurchase Program

On April 11, 2022, the Board of Directors adopted a stock repurchase program (the "2022 Program") to repurchase up to $35.0 million of the Company's common stock both on the open market and in privately negotiated transactions, including through Rule 10b5-1 plans, from time to time, over the next two years. During the nine months ended September 30, 2024, 201,561 shares were repurchased by the Company under the 2022 Program at an average price of $34.23 per share for an aggregate total price of $6.9 million. In total, the Company repurchased 937,501 shares under the 2022 Program at an average price of $25.96 per share for an aggregate total price of $24.3 million.

The 2022 Program expired on April 11, 2024, and on April 15, 2024, the Board of Directors adopted a new program (the "2024 Program") to repurchase up to $40.0 million of the Company's common stock both on the open market and in privately negotiated transactions, including through Rule 10b5-1 plans, from time to time, over the next two years. The Company has not repurchased any shares under the 2024 Program.

6. EMPLOYEE BENEFIT PLANS

On September 30, 2024, the Company had the following stock-based compensation plans:

Employee Stock Purchase Plan

On June 15, 2021, the Company's stockholders initially approved the 2021 Employee Stock Purchase Plan, which has been amended and restated by the Board of Directors and approved by the Company's stockholders since then (as amended through the date of this report, the "2021 Purchase Plan").

Under the 2021 Purchase Plan, eligible employees can contribute up to 10% of their compensation, as defined in the 2021 Purchase Plan, towards the purchase of shares of PDF common stock at a price of 85% of the lower of the fair market value at the beginning of the offering period or the end of the purchase period. The 2021 Purchase Plan commenced on August 1, 2021, and provided for twenty-four-month offering periods with four six-month purchase periods in each offering period.

The Company estimated the fair value of purchase rights granted under the 2021 Purchase Plan during the period using the Black-Scholes-Merton option-pricing model with the following weighted average assumptions, resulting in the following weighted average fair values:

	Nine Months Ended September 30,	
	2024	**2023**
Expected life (in years)	1.25	1.25
Volatility	40.97 %	43.66 %
Risk-free interest rate	4.61 %	5.15 %
Expected dividend	—	—
Weighted average fair value of purchase rights granted during the period	$ 10.91	$ 15.71

During the three months ended September 30, 2024, a total of 81,974 shares were issued under the 2021 Purchase Plan, at a weighted average purchase price of $26.31 per share. During the three months ended September 30, 2023, a total of 125,392 shares were issued under the 2021 Purchase Plan, at a weighted average purchase price of $17.30 per share. During the nine months ended September 30, 2024, a total of 155,828 shares were issued under the 2021 Purchase Plan, at a weighted average purchase price of $26.14 per share. During the nine months ended September 30, 2023, a total of 223,608 shares were issued under the 2021 Purchase Plan, at a weighted average purchase price of $17.14 per share. As of September 30, 2024, unrecognized compensation cost related to the 2021 Purchase Plan was $2.5 million. This estimated unrecognized cost is expected to be recognized over a weighted average period of 1.4 years.

As of September 30, 2024, 638,481 shares were available for future issuance under the 2021 Purchase Plan.

Stock Incentive Plans

On November 16, 2011, the Company's stockholders initially approved the 2011 Stock Incentive Plan, which has been amended and restated by the Board of Directors and approved by the Company's stockholders a number of times since then (as amended through the date of this report, the "2011 Plan"). Under the 2011 Plan, the Company may award stock options, stock appreciation rights ("SARs"), stock grants or stock units covering shares of the Company's common stock to employees, directors, non-employee directors and contractors. The aggregate number of shares reserved for awards under the 2011 Plan is 14.6 million shares, plus up to 3.5 million shares previously issued under the 2001 Stock Plan adopted by the Company in 2001, which expired in 2011 (the "2001 Plan") that are either (i) forfeited or (ii) repurchased by the Company or are shares subject to awards previously issued under the 2001 Plan that expire or that terminate without having been exercised or settled in full on or after November 16, 2011. In case of awards other than options or SARs, the aggregate number of shares reserved under the 2011 Plan will be decreased at a rate of 1.33 shares issued pursuant to such awards. The exercise price for stock options must generally be at prices no less than the fair market value at the date of grant. Stock options generally expire ten years from the date of grant and become vested and exercisable over a four-year period.

As of September 30, 2024, 15.1 million shares of common stock were reserved to cover stock-based awards under the 2011 Plan, of which 3.6 million shares were available for future grant. The number of shares reserved and available under the 2011 Plan includes 0.5 million shares that were subject to awards previously made under the 2001 Plan and were forfeited, expired, or repurchased by the Company after the adoption of the 2011 Plan through September 30, 2024. As of September 30, 2024, there were no outstanding awards that had been granted outside of the 2011 Plan.

The Company estimated the fair value of share-based awards granted under the 2011 Stock Plan during the period using the Black-Scholes-Merton option-pricing model. There were no stock options granted during the three and nine months ended September 30, 2024 and 2023.

Stock-Based Compensation

Stock-based compensation is estimated at the grant date based on the award's fair value and is recognized on a straight-line basis over the vesting periods, generally four years. Stock-based compensation expense before taxes related to the Company's stock plan and employee stock purchase plan was allocated as follows (in thousands):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2024	2023	2024	2023
Costs of revenues	$ 1,366	$ 1,120	$ 3,751	$ 3,022
Research and development	2,375	2,196	6,640	5,609
Selling, general, and administrative	2,989	2,683	8,149	6,930
Stock-based compensation expense	$ 6,730	$ 5,999	$ 18,540	$ 15,561

Additional information with respect to options under the 2011 Plan during the nine months ended September 30, 2024, is as follows:

	Outstanding Options			
	Number of Options (in thousands)	Weighted Average Exercise Price per Share	Weighted Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value (in thousands)
Outstanding, January 1, 2024	38	$ 15.92		
Granted	—	—		
Exercised	(7)	16.20		
Canceled	—	—		
Expired	—	—		
Outstanding, September 30, 2024	31	$ 15.85	3.53	$ 493
Vested and expected to vest, September 30, 2024	31	$ 15.85	3.53	$ 493
Exercisable, September 30, 2024	31	$ 15.85	3.53	$ 493

The aggregate intrinsic value in the table above represents the total intrinsic value based on the Company's closing stock price of $31.68 per share as of September 30, 2024.

The total intrinsic value of options exercised during the nine months ended September 30, 2024 and 2023 was as follows (in thousands):

	Nine Months Ended September 30,	
	2024	2023
Intrinsic value of options exercised	$ 124	$ 608

Total fair value of shares vested during the nine months ended September 30, 2024, was immaterial. As of September 30, 2024, there was no remaining unrecognized compensation cost related to unvested stock options.

Nonvested restricted stock unit ("RSU") activities during the nine months ended September 30, 2024, were as follows:

	Shares (in thousands)	Weighted Average Grant Date Fair Value Per Share
Nonvested, January 1, 2024	1,995	$ 30.03
Granted	734	35.42
Vested	(756)	27.37
Forfeited	(42)	30.64
Nonvested, September 30, 2024	1,931	$ 33.11

The weighted average grant date fair values of RSUs granted during the nine months ended September 30, 2024 and 2023 were $35.42 and $43.92, respectively.

The total fair value of RSUs vested during the nine months ended September 30, 2024 and 2023 was as follows (in thousands):

	Nine Months Ended September 30,	
	2024	2023
Fair value of restricted stock units vested	$ 25,483	$ 31,162

As of September 30, 2024, there was $52.3 million of total unrecognized compensation cost related RSUs. That cost is expected to be recognized over a weighted average period of 2.6 years. RSUs do not have rights to dividends prior to vesting.

7. INCOME TAXES

Income tax expense decreased by $0.9 million for the nine months ended September 30, 2024, to $1.6 million as compared to $2.5 million for the nine months ended September 30, 2023. The Company's effective tax rate was 31.1% and 53.1% for the nine months ended September 30, 2024 and 2023, respectively. The Company's effective tax rate decreased in the nine months ended September 30, 2024, as compared to the same period in 2023, primarily due to changes in the foreign and state taxes and year-to-date recognition of worldwide pre-tax income in relation to their forecasted amounts for full years. The Company's provision for income taxes for the nine months ended September 30, 2024, was primarily attributable to foreign and state taxes.

The Company's total amount of unrecognized tax benefits, excluding interest, as of September 30, 2024, was $16.6 million, of which $2.0 million, if recognized, would affect the Company's effective tax rate. The Company's total amount of unrecognized tax benefits, excluding interest, as of December 31, 2023, was $15.9 million, of which $2.0 million, if recognized, would affect the Company's effective tax rate. As of September 30, 2024, the Company has recorded unrecognized tax benefits of $2.6 million, including interest of $0.6 million, as long-term taxes payable in the accompanying condensed consolidated balance sheet. The remaining $14.6 million has been recorded within the Company's DTAs, which is subject to a full valuation allowance.

The valuation allowance was approximately $64.2 million as of September 30, 2024, and December 31, 2023, which was related to U.S. net federal and state DTAs. The worldwide net DTAs balance as of September 30, 2024, and December 31, 2023, were not significant.

The Company conducts business globally and, as a result, files numerous consolidated and separate income tax returns in the U.S. federal and various state and foreign jurisdictions. For U.S. federal and California income tax purposes, the statute of limitations currently remains open for the tax years ended 2020 to present and 2019 to present, respectively. In addition, due to net operating loss carryback claims, the tax years 2013 through 2015 may be subject to federal examination and all of the net operating loss and research and development credit carryforwards that may be utilized in future years may be subject to federal and state examination. The Company is not currently under income tax examinations in the U.S. or any other of its major foreign subsidiaries' jurisdictions.

8. NET INCOME (LOSS) PER SHARE

Basic net income (loss) per share is computed by dividing net income (loss) by the weighted average number of common shares outstanding for the period (excluding outstanding stock options, nonvested restricted stock units and shares subject to repurchase). Diluted net income (loss) per share is computed using the weighted average number of common shares outstanding for the period plus the potential effect of dilutive securities which are convertible into common shares (using the treasury stock method), except in cases in which the effect would be anti-dilutive. The following is a reconciliation of the numerators and denominators used in computing basic and diluted net income (loss) per share (in thousands except per share amount):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2024	2023	2024	2023
Numerator:				
Net income (loss)	$ 2,206	$ (4,972)	$ 3,518	$ 2,218
Denominator:				
Basic weighted average shares outstanding	38,710	38,187	38,542	37,930
Effect of dilutive stock options, unvested restricted stock units, and shares of common stock expected to be issued under employee stock purchase plan	395	—	486	1,047
Diluted weighted average shares outstanding	39,105	38,187	39,028	38,977
Net income (loss) per share:				
Basic	$ 0.06	$ (0.13)	$ 0.09	$ 0.06
Diluted	$ 0.06	$ (0.13)	$ 0.09	$ 0.06

For the three months ended September 30, 2023, because the Company was in a loss position, diluted net loss per share is the same as basic net loss per share as the inclusion of the potential common shares would have been anti-dilutive.

The following table sets forth the potential shares of common stock that were not included in the diluted net income (loss) per share calculation above because to do so would be anti-dilutive for the periods indicated (in thousands):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2024	2023	2024	2023
Outstanding options	—	23	—	—
Non-vested restricted stock units	1,078	1,391	740	223
Employee Stock Purchase Plan	—	38	—	—
Total	1,078	1,452	740	223

9. CUSTOMER AND GEOGRAPHIC INFORMATION

Operating segments are defined as components of an enterprise about which separate financial information is available that is evaluated regularly by the chief operating decision maker, or group, in deciding how to allocate resources and in assessing performance.

The Company's chief operating decision maker, the chief executive officer, reviews discrete financial information presented on a consolidated basis for purposes of regularly making operating decisions, allocation of resources, and assessing financial performance. Accordingly, the Company considers itself to be in one operating and reporting segment, specifically the provision of services for differentiated data and analytics solutions to the semiconductor and electronics industries.

Revenues from an individual customer that are approximately 10% or more of the Company's consolidated total revenues are as follows:

Customer	Three Months Ended September 30, 2024	Three Months Ended September 30, 2023	Nine Months Ended September 30, 2024	Nine Months Ended September 30, 2023
A	19 %	38 %	21 %	36 %
B	* %	* %	12 %	* %
D	13 %	* %	* %	* %

* represents less than 10%

Gross accounts receivable balances (including amounts that are unbilled) from individual customers that are approximately 10% or more of the Company's gross accounts receivable balance are as follows:

Customer	September 30, 2024	December 31, 2023
A	29 %	39 %
D	16 %	11 %

Revenues from customers by geographic area based on the location of the customers' work sites are as follows (amounts in thousands):

	Three Months Ended September 30,			
	2024		2023	
	Revenues	Percentage of Revenues	Revenues	Percentage of Revenues
United States	$ 21,065	45 %	$ 24,477	58 %
Japan	6,275	14 %	3,135	7 %
Taiwan	6,273	14 %	1,296	3 %
China	5,673	12 %	7,549	18 %
Rest of the world	7,123	15 %	5,893	14 %
Total revenue	$ 46,409	100 %	$ 42,350	100 %

	Nine Months Ended September 30,			
	2024		2023	
	Revenues	Percentage of Revenues	Revenues	Percentage of Revenues
United States	$ 58,021	45 %	$ 70,090	56 %
Japan	25,495	20 %	8,005	6 %
China	17,526	14 %	21,927	18 %
Taiwan	8,107	6 %	4,660	4 %
Rest of the world	20,231	15 %	20,028	16 %
Total revenue	$ 129,380	100 %	$ 124,710	100 %

Long-lived assets, net by geographic area are as follows (in thousands):

	September 30, 2024	December 31, 2023
United States (1)	$ 56,216	$ 45,619
Rest of the world	1,688	1,362
Total long-lived assets, net	$ 57,904	$ 46,981

(1) Includes assets deployed at customer sites which could be outside the U.S.

10. FAIR VALUE MEASUREMENTS

Fair value is the exit price, or the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants as of the measurement date. The multiple assumptions used to value financial instruments are referred to as inputs, and a hierarchy for inputs used in measuring fair value is established, that maximizes the use of observable inputs and minimizes the use of unobservable inputs by requiring that the most observable inputs be used when available. Observable inputs reflect assumptions market participants would use in pricing an asset or liability based on market data obtained from independent sources while unobservable inputs reflect a reporting entity's pricing based upon its own market assumptions. These inputs are ranked according to a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value into three broad levels.

Level 1 - Inputs are quoted prices in active markets for identical assets or liabilities.

Level 2 - Inputs are quoted prices for similar assets or liabilities in an active market, quoted prices for identical or similar assets or liabilities in markets that are not active, inputs other than quoted prices that are observable and market-corroborated inputs which are derived principally from or corroborated by observable market data.

Level 3 - Inputs are derived from valuation techniques in which one or more significant inputs or value drivers are unobservable.

The following table represents the Company's assets measured at fair value on a recurring basis as of September 30, 2024, and December 31, 2023, and the basis for those measurements (in thousands):

	Fair Value Measurements Using			
Assets	**September 30, 2024**	**Quoted Prices in Active Markets for Identical Assets (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Cash equivalents				
Money market mutual funds	$ 80,830	$ 80,830	$ —	$ —
Short-term investments (available-for-sale debt securities)				
U.S. Government securities (1)	23,724	23,724	—	—
Non-current assets				
Convertible note receivable (available-for-sale debt security) (2)	2,013	—	—	2,013
Total	$ 106,567	$ 104,554	$ —	$ 2,013

	Fair Value Measurements Using			
Assets	**December 31, 2023**	**Quoted Prices in Active Markets for Identical Assets (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Cash equivalents				
Money market mutual funds	$ 83,810	$ 83,810	$ —	$ —
Short-term investments (available-for-sale debt securities)				
U.S. Government securities (1)	36,544	36,544	—	—
Total	$ 120,354	$ 120,354	$ —	$ —

(1) As of September 30, 2024, and December 31, 2023, the amortized cost of the Company's investments in U.S. Government securities approximated their fair value due to their short-term maturities, and there have been no events or changes in circumstances that would have had a significant effect on the fair value of these securities in the periods presented. For the three and nine months ended September 30, 2024, there were no material realized or unrealized gains or losses, either individually or in the aggregate.

(2) In August 2024, the Company purchased a $2.0 million non-marketable convertible promissory note from an unrelated third party (the "convertible note"). The convertible note bears a 5% interest rate annually and will mature in August 2026 and is included in other non-current assets in the accompanying condensed consolidated balance sheet as of September 30, 2024. As of September 30, 2024, the cost of the convertible note approximated its fair value as there have been no events or changes in circumstances that would have had a significant effect on its fair value from its issuance date to reporting period end.

11. COMMITMENTS AND CONTINGENCIES

Strategic Partnership with Advantest — See Note 12, *Strategic Partnership Agreement with Advantest and Related Party Transactions*, for the discussion about the Company's commitments under the strategic partnership with Advantest.

Operating Leases — Refer to Note 4, *Leases*, for the discussion about the Company's lease commitments.

Indemnifications — The Company generally provides a warranty to its customers that its software will perform substantially in accordance with documented specifications typically for a period of 90 days following initial delivery of its products. The Company also indemnifies certain customers from third-party claims of intellectual property infringement relating to the use of its products. Historically, costs related to these guarantees have not been significant. The Company is unable to estimate the maximum potential impact of these guarantees on its future results of operations.

Purchase Obligations — The Company has purchase obligations with certain suppliers for the purchase of goods and services entered into in the ordinary course of business. As of September 30, 2024, total outstanding purchase obligations were $34.1 million, the majority of which is due within the next 9 months.

Indemnification of Officers and Directors — As permitted by the Delaware general corporation law, the Company has included a provision in its certificate of incorporation to eliminate the personal liability of its officers and directors for monetary damages for breach or alleged breach of their fiduciary duties as officers or directors, other than in cases of fraud or other willful misconduct.

In addition, the Bylaws of the Company provide that the Company is required to indemnify its officers and directors even when indemnification would otherwise be discretionary, and the Company is required to advance expenses to its officers and directors as incurred in connection with proceedings against them for which they may be indemnified. The Company has entered into indemnification agreements with its officers and directors containing provisions that are in some respects broader than the specific indemnification provisions contained in the Delaware general corporation law. The indemnification agreements require the Company to indemnify its officers and directors against liabilities that may arise by reason of their status or service as officers and directors other than for liabilities arising from willful misconduct of a culpable nature, to advance their expenses incurred as a result of any proceeding against them as to which they could be indemnified, and to obtain directors' and officers' insurance if available on reasonable terms. The Company has obtained directors' and officers' liability insurance in amounts comparable to other companies of the Company's size and in the Company's industry. Since a maximum obligation of the Company is not explicitly stated in the Company's Bylaws or in its indemnification agreements and will depend on the facts and circumstances that arise out of any future claims, the overall maximum amount of the obligations cannot be reasonably estimated.

Legal Proceedings — From time to time, the Company is subject to various claims and legal proceedings that arise in the ordinary course of business. The Company accrues for losses related to litigation when a potential loss is probable, and the loss can be reasonably estimated in accordance with FASB requirements. As of September 30, 2024, the Company was not party to any material legal proceedings for which a loss was probable or an amount was accrued. From time to time, the Company may enter into contingent fee arrangements with external legal firms that may represent the Company in legal proceedings related to disputes. Contingent legal fees are accrued by the Company when they are probable and reasonably estimable.

On May 6, 2020, the Company initiated an arbitration proceeding with the Hong Kong International Arbitration Center against SMIC New Technology Research & Development (Shanghai) Corporation ("SMIC") due to SMIC's failure to pay fees due to the Company under a series of contracts. The Company seeks to recover the unpaid fees, a declaration requiring SMIC to pay fees under the contracts in the future (or a lump sum payment to end the contract), and costs associated with bringing the arbitration proceeding. SMIC denies liability and an arbitration hearing was held in February 2023. Final written submissions were submitted by the parties at the end of August 2023, and the parties submitted answers to the Tribunal's final questions on August 2, 2024.

12. STRATEGIC PARTNERSHIP AGREEMENT WITH ADVANTEST AND RELATED PARTY TRANSACTIONS

In July 2020, the Company entered into a long-term strategic partnership with Advantest Corporation through its wholly-owned subsidiary, Advantest America, Inc. (collectively referred to herein as "Advantest"), which includes: (i) a Securities Purchase Agreement wherein the Company issued and sold to Advantest America, Inc., an aggregate of 3,306,924 shares of its common stock, for aggregate gross proceeds of $65.2 million; (ii) a significant agreement for its assistance in development of cloud-based applications for Advantest tools that leverages our Exensio analytics software; (iii) a commercial agreement providing for the license to third parties of solutions that result from the development work that combine Advantest's testing applications and our Exensio platform; and (iv) a 5-year cloud-based subscription for Exensio analytics software and related services.

Analytics revenue recognized from Advantest was $3.3 million and $2.6 million during the three months ended September 30, 2024 and 2023, respectively, and $9.2 million and $6.2 million during the nine months ended September 30, 2024 and 2023, respectively. There were no accounts receivable from Advantest as of September 30, 2024. Accounts receivable from Advantest were not material as of December 31, 2023. Deferred revenue amounted to $11.8 million and $9.4 million as of September 30, 2024, and December 31, 2023, respectively.

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations

Forward-Looking Statements

The following discussion of our financial condition and results of operations contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934. All statements other than statements of historical fact may be forward-looking statements. In some cases, you can identify forward-looking statements by terminology such as "may," "could," "projected," "should," "expect," "plan," "anticipate," "believe," "estimate," "predict," "potential," "target" or "continue," the negative effect of terms like these or other similar expressions. These statements include, but are not limited to, statements concerning: expectations about the effectiveness of our business and technology strategies; expectations regarding global economic trends; the impact of global inflation and changed interest rates, expectations regarding recent and future acquisitions; current semiconductor industry trends; expectations of continued adoption of our solutions by new and existing customers; project milestones or delays and performance criteria achieved; cost and schedule of new product development; the provision of technology and services prior to the execution of a final contract; the continuing impact of macroeconomic conditions and other trends on the semiconductor industry, our customers, our operations, and supply and demand for our products; supply chain disruptions; the success of the Company's strategic growth opportunities and partnerships; the Company's ability to successfully integrate acquired businesses and technologies; whether the Company can successfully convert backlog into revenue; customers' production volumes under contracts that provide Gainshare; possible impacts from the evolving trade regulatory environment and geopolitical tensions; our assessment of the sufficiency of our cash resources and anticipated funds from operations; our ability to obtain additional financing if needed and our ability to obtain support and updates for certain open-source software. These forward-looking statements are only predictions. Forward-looking statements are based on current expectations and projections about future events and are inherently subject to a variety of risks and uncertainties, many of which are beyond our control, which could cause actual results to differ materially from those anticipated or projected. All forward-looking statements and other information included in this document are based on information available to us on the date of filing and we further caution investors that our business and financial performance are subject to substantial risks and uncertainties. We assume no obligation to update publicly any such forward-looking statements. In evaluating these statements, you should specifically consider various factors, including the risk factors set forth in Item 1. "Business" and Item 7. "Management's Discussion and Analysis of Financial Condition and Results of Operations" in our Annual Report on Form 10-K for the year ended December 31, 2023, filed with the Securities and Exchange Commission ("SEC") on February 27, 2024. All references to "we," "us," "our," "PDF," "PDF Solutions" or "the Company" refer to PDF Solutions, Inc.

Cimetrix, CV, DFI, Exensio, PDF Solutions, and the PDF Solutions, Exensio, and Cimetrix logos are trademarks or registered trademarks of PDF Solutions, Inc. or its subsidiaries.

Overview

We offer products and services designed to empower organizations across the semiconductor and electronics ecosystems to connect, collect, manage, and analyze data about design, equipment, manufacturing, and test to improve the yield and quality of their products. We derive revenues from two sources: Analytics and Integrated Yield Ramp. Our offerings combine proprietary software, professional services using proven methodologies and third-party cloud-hosting platforms for software-as-a-service ("SaaS"), electrical measurement hardware tools, and physical intellectual property ("IP") for integrated circuit ("IC") designs. We primarily monetize our offerings through license fees and contract fees for professional services and SaaS. In some cases, especially on our historical Integrated Yield Ramp engagements, we also receive a value-based variable fee or royalty, which we call Gainshare. Our products, services, and solutions have been sold to integrated device manufacturers ("IDMs"), fabless semiconductor companies, foundries, out-sourced semiconductor assembly and test ("OSATs"), capital equipment manufacturers and system houses.

We are headquartered in Santa Clara, California and also operate worldwide with offices in Canada, China, France, Germany, Italy, Japan, Korea, and Taiwan.

Industry Trends

Certain trends may affect our Analytics revenue specifically. In particular, the confluence of Industry 4.0 (i.e. the fourth industrial revolution, or the automation and data exchange in manufacturing technologies and processes) and cloud computing (i.e. the on-demand availability of computing resources and data storage without direct active management by the user) is driving increased innovation in semiconductor and electronics manufacturing and analytics, as well as in the organization of information technology ("IT") networks and computing at semiconductor and electronics companies across the ecosystem. First, the ubiquity of wireless connectivity and sensor technology enables any manufacturing company to augment its factories and visualize its entire production line. In parallel, the cost per terabyte of data storage has generally decreased over time. The combination of these two trends means that more data is collected and stored than ever before. Further, semiconductor companies are striving to analyze these very large data sets in real-time to make rapid decisions that measurably improve manufacturing efficiency and quality. In parallel, the traditional practice of on-site data storage, even for highly sensitive data, is changing. The ability to cost-effectively and securely store, analyze, and retrieve massive quantities of data from the cloud versus on-premise enables data to be utilized across a much broader population of users, frequently resulting in greater demands on analytics programs. The combination of these latter two trends means that cloud-based, analytic programs that effectively manage identity management, physical security, and data protection are increasingly in demand for insights and efficiencies across the organizations of these companies. We believe that all these trends will continue for the next few years, and the challenges involved in adopting Industry 4.0 and secure cloud computing will create opportunities for our combination of advanced analytics capabilities, proven and established supporting infrastructure, and professional services to configure our products to meet customers' specialized needs.

Other trends may continue to affect our Characterization services business and Integrated Yield Ramp revenue specifically. For example, semiconductor manufacturers may experience lower wafer shipments due to weakness in the global economy, which would negatively impact the gainshare component of our Integrated Yield Ramp revenue. The logic foundry market at the leading-edge nodes, such as 7nm, 5nm, and smaller, underwent significant change over the past few years. The leading foundry continues to dominate market share. This trend will likely continue to impact our Characterization services business on these nodes. We expect most logic foundries to invest in derivatives of older process nodes, such as 28nm and 14nm, to extract additional value as many of their customers will not move to advanced nodes due to either technological barriers or restrictive economics. Foundries that participate at leading edge nodes are expected to continue to invest in new technologies such as memory, packaging, and multi-patterned and extreme ultraviolet lithography, as well as new innovations in process control and variability management. We expect China's investment in semiconductors to continue. Compliance with changing U.S. export restrictions limit our possible business with Chinese semiconductor manufacturers on advanced nodes. As a result of these market developments, we have chosen to focus our resources and investments in products (including differentiated data), services, and solutions for analytics.

There are other global or business trends that may affect our business opportunities generally as follows:

- *Macroeconomy, inventories, and demand*. The worldwide economic performance is uneven, and the possibility of a recession persists. Inventories of semiconductor devices remain elevated in some instances. The strength of demand for semiconductor products has varied by region and product segment. For example, demand for artificial intelligence ("AI") processing unit products is strong, while demand for smart phones remains weak. With high inventories and soft demand, some semiconductor fab utilization rates are also low and semiconductor capital equipment orders have been impacted for some vendors and market segments. As a result of these trends, customers are being cautious with their spend and some purchase cycles are lengthening and other purchase decisions are being delayed, particularly with respect to larger deals.

- *Changing export controls and sanctions*. The U.S. government continues to expand and intensify export controls and sanctions, with a major focus on the destinations of and/or entities in the People's Republic of China ("P.R.C."), Russian Federation, and Belarus. After an internal evaluation, we determined that a large percentage of our software products are not of U.S. origin and not subject to the U.S. Export Administration Regulations. Our standard operations include development, distribution processes, software download sites, and professional service centers and processes located in various geographies around the world to better serve our customers. Some customers in the P.R.C., in particular, have nonetheless expressed concerns to us that continued action by the U.S. government could potentially interrupt their ability to make use of our products or services, which has in some cases, and could in the future, negatively impact the demand for our products and services by these customers. Over the last two years, the U.S. government has issued a series of rules and guidance, with significant relevance to the P.R.C. market, adding novel and complex export control restrictions, including on some non-U.S. items, and on some U.S. person activities in certain cases, clarifications and corrections, and requests for further public comment. Current U.S. government regulatory agendas indicate that several additional rules are now in development to further control certain items, restrict U.S. person activity, and revise previously issued regulations. For example, on July 29, 2024, the U.S. government officially published three sets of proposed regulations that would add restrictions on U.S. items for certain end-uses and end-users. The proposals would also separately add restrictions on U.S. person activity, such as help for or transactional activity with such end-uses or end-users. This would relate to development, production, or service of military items, law enforcement and internal security, or intelligence services of certain countries. The proposal gives the example of U.S. person assistance to develop a high-end integrated circuit sought by the military. The proposed regulations, which are not yet final and issued, are complicated, would reach into commercial supply chains, and would be challenging to interpret. U.S. government policy and regulation remain fluid and uncertain, and could in the future impact segments of our business. Other countries and jurisdictions with important roles in our industry are updating some of their export control regulations to further align with those of the U.S. government and, in some cases, to counter U.S. regulations. For example, the P.R.C. has imposed restrictions on imports of certain memory integrated circuits ("ICs") offered by U.S. companies and has been developing its legal authorities to counter foreign sanctions. On April 12, 2024, the U.S. government renewed its caution that visitors to the P.R.C. are subject to arbitrary enforcement of local laws and wrongful detention, a risk that could deter or hinder certain business activities. Based on our current assessments, we expect the near-term impact of these expanded trade restrictions on our business to be limited, but revisions, clarifications, and proposals that are still in government development and open questions of interpretation leave much unknown. A change of political parties in the U.S. Presidential Administration in January 2025, could accelerate international trade restrictions, increase tariffs, and expand trade tensions, which could negatively impact our future sales. We will continue to monitor for any further trade restrictions, other regulatory or policy changes by the U.S. or foreign governments and any actions in response. The uncertainty caused by these recent regulations and the potential for additional future restrictions could negatively affect our future sales in the P.R.C. market.

- *Investments in semiconductor manufacturing*. In 2022, the U.S. Congress passed into law funding programs from the bipartisan CHIPS and Science Act of 2022 (the "CHIPS Act"), authorizing the Department of Commerce, Department of Defense, and Department of State to develop onshore domestic manufacturing of semiconductors considered critical to U.S. competitiveness and national security. It is expected that U.S. semiconductor companies, especially manufacturers, will increase spending as a result of receiving funds under these programs. Recipients of funding under such programs may be required to agree to separate restrictions on certain commercial activity in the P.R.C., where we currently commercially operate. If our customers engage us for projects funded by these programs, we will evaluate all restrictions, and their impact on our existing business, before entering into any contracts associated with these programs. Similarly, the National Defense Authorization Act for Fiscal Year 2024 requires the U.S. Department of Defense to develop acquisition regulations controlling contracting with certain types of companies that perform consulting services for certain types of P.R.C. entities. We will monitor the topic to assess whether the future regulations have any relevance to our business.

- *Geopolitical tensions/conflicts*. Geopolitical tensions and conflicts in various locations around the world continue to increase, including on the issue of Taiwan in Asia, Ukraine and Russia, and growing armed conflicts in the Middle East. These current situations have created volatility in the global financial markets and may have further global economic consequences, including potential disruptions of the global supply chain and heightened volatility of commodity and raw material prices. This has increased fears of a global recession. We have contractors located in the West Bank and in Israel, who are providing software development and customer technical support services, and we have developed contingency plans to use alternative resources to continue serving customers, if needed. Any escalations could lead to disruptions or reductions in international trade, deter or prevent purchasing activity of customers, and negatively impact our development timelines and customer support (with respect to the conflicts in the Middle East) or China sales (with respect to U.S.-P.R.C. tensions) and financial results in general (with respect to global tensions).

Financial Highlights

Financial highlights for the three months ended September 30, 2024, are as follows:

- Total revenues were $46.4 million, an increase of $4.1 million, or 10%, compared to the three months ended September 30, 2023. Analytics revenue was $44.8 million, an increase of $5.3 million, or 13%, compared to the three months ended September 30, 2023. The increase in Analytics revenue was driven by increases in revenues from Exensio and Cimetrix software licenses and CV systems, partially offset by a decrease in revenues from DFI systems. Integrated Yield Ramp revenue was $1.7 million, a decrease of $1.2 million, or 42%, compared to the three months ended September 30, 2023. The decrease in Integrated Yield Ramp revenue was primarily due to a decrease in hours worked on fixed-fees engagements, partially offset by higher Gainshare from increased customer wafer shipments at non-leading-edge nodes.

- Costs of revenues decreased $1.8 million, compared to the three months ended September 30, 2023, primarily due to decreases in hardware costs and facilities and IT-related costs including depreciation and amortization expense. These decreases were partially offset by increases in subcontractor costs, third-party cloud-delivery costs, and personnel-related costs.

- Net income was $2.2 million, compared to a net loss of $5.0 million for the three months ended September 30, 2023. The increase in net income was primarily attributable to (i) an increase in total revenues, (ii) a decrease in costs of revenues, and (iii) a decrease in income tax expense, partially offset by (a) increases in sales and marketing activities, and general and administrative expenses, which were primarily related to increases in personnel-related costs, legal expenses (excluding arbitration-related expenses), facilities and IT-related costs including depreciation expense, subcontractor fees, and trade conference-related expenses, partially offset by a decrease in fees related to the arbitration proceeding over a disputed customer contract, (b) an increase in research and development expenses, and (c) net unfavorable fluctuations in foreign currency exchange rates.

Financial highlights for the nine months ended September 30, 2024, are as follows:

- Total revenues were $129.4 million, an increase of $4.7 million, or 4%, compared to the nine months ended September 30, 2023. Analytics revenue was $121.3 million, an increase of $8.4 million, or 7%, compared to the nine months ended September 30, 2023. The increase in Analytics revenue was driven by increases in revenues from Exensio and Cimetrix software licenses, partially offset by a decrease in revenues from CV and DFI systems. Integrated Yield Ramp revenue was $8.1 million, a decrease of $3.7 million, or 31%, compared to the nine months ended September 30, 2023. The decrease in Integrated Yield Ramp revenue was primarily due to lower hours worked on fixed-fees engagements and Gainshare from decreased customer wafer shipments at non-leading-edge nodes.

- Costs of revenues decreased $0.3 million, compared to the nine months ended September 30, 2023, primarily due to decreases in facilities and IT-related costs including depreciation and amortization expense, and hardware costs. These decreases were partially offset by increases in third-party cloud-delivery costs, subcontractor costs, and personnel-related costs.

- Net income was $3.5 million, compared to a net income of $2.2 million for the nine months ended September 30, 2023. The increase in net income was primarily attributable to (i) increases in total revenues and interest income, and (ii) decreases in income tax expense, costs of revenues, and amortization of acquired intangible assets, partially offset by increases in (a) sales and marketing activities, and general and administrative expenses, which were primarily related to increases in personnel-related costs, legal expenses (excluding arbitration-related expenses), facilities and IT-related costs including depreciation expense, trade conference-related expenses, tax and accounting services, and subcontractor fees, partially offset by decreases in fees related to the arbitration proceeding over a disputed customer contract, business acquisition costs, third-party cloud-services related costs, and (b) research and development expenses.

Critical Accounting Estimates

See Note 1, *Basis of Presentation and Summary of Significant Accounting Policies*, to our unaudited condensed consolidated financial statements in this Quarterly Report on Form 10-Q and the Notes to Consolidated Financial Statements in Part II, Item 8 of our Annual Report on Form 10-K for the year ended December 31, 2023, for the description of our significant accounting policies, estimates and methods used in the preparation of our condensed consolidated financial statements.

There were no material changes during the three and nine months ended September 30, 2024, to the items that we disclosed as our critical accounting policies and estimates in “Management’s Discussion and Analysis of Financial Condition and Results of Operations” in Part II, Item 7 of our Annual Report on Form 10-K for the year ended December 31, 2023, filed with the SEC on February 27, 2024.

The following is a brief discussion of the most significant accounting policies and methods that we use.

General

Our discussion and analysis of our financial conditions, results of operations and cash flows are based on our condensed consolidated financial statements, which have been prepared in conformity with accounting principles generally accepted in the United States of America. Our preparation of these condensed consolidated financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the dates of the financial statements and the reported amounts of revenues and expenses during the reporting periods. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances. The most significant estimates and assumptions relate to revenue recognition, valuation of long-lived assets including goodwill and intangible assets, stock-based compensation and the realization of deferred tax assets (“DTAs”). Actual amounts may differ from such estimates under different assumptions or conditions.

Revenue Recognition

We derive revenue from two sources: Analytics and Integrated Yield Ramp.

Analytics Revenue

Analytics revenue is derived from the following primary offerings: licenses and services for standalone Software (which consists primarily of Exensio and Cimetrix products), SaaS (which consists primarily of Exensio products), and DFI and CV systems (including Characterization services) that do not include performance incentives based on customers’ yield achievement.

Revenue from standalone software is recognized depending on whether the license is perpetual or time-based. Perpetual (one-time charge) license software is recognized at the time of the inception of the arrangement when control transfers to the customers, if the software license is distinct from the services offered by us. Revenue from post-contract support is recognized over the contract term on a straight-line basis, because we are providing (i) support and (ii) unspecified software updates on a when-and-if available basis over the contract term. Revenue from time-based-licensed software is allocated to each performance obligation and is recognized either at a point in time or over time as follows. The license component is recognized at the time when control transfers to customers, with the post-contract support component recognized ratably over the committed term of the contract. For contracts with any combination of licenses, support, and other services, distinct performance obligations are accounted for separately. For contracts with multiple performance obligations, we allocate the transaction price of the contract to each performance obligation on a relative basis using the standalone selling price (“SSP”) attributed to each performance obligation.

Revenue from SaaS arrangements, which allow for the use of a cloud-based software product or service over a contractually determined period of time without the customer having to take possession of the software, is accounted for as subscriptions and is recognized as revenue ratably, on a straight-line basis, over the subscription period beginning on the date the service is first made available to customers. For contracts with any combination of SaaS and related services, distinct performance obligations are accounted for separately. For contracts with multiple performance obligations, the Company allocates the transaction price of the contract to each performance obligation on a relative basis using the SSP attributed to each performance obligation.

Revenue from DFI systems and CV systems (including Characterization services) that do not include performance incentives based on customers’ yield achievement is recognized primarily as services are performed. Where there are distinct performance obligations, we allocate revenue to all deliverables based on their SSPs. For these contracts with multiple performance obligations, we allocate the transaction price of the contract to each performance obligation on a relative basis using the SSP attributed to each performance obligation. Where there are not discrete performance obligations, historically, revenue is primarily recognized as services are performed using a percentage of completion method based on costs or labor-hours inputs, whichever is the most appropriate measure of the progress towards completion of the contract. The estimation of percentage of completion method is complex and subject to many variables that require significant judgment.

The Company also leases some of its DFI system and CV system assets to some customers. The Company determines the existence of a lease when the customer controls the use of these identified assets for a period of time defined in the lease agreement and classifies such leases as operating leases or sales-type leases. A lease is classified as a sales-type lease if it meets certain criteria under ASC Topic 842, Leases; otherwise it is classified as an operating lease. Operating lease revenue is recognized on a straight-line basis over the lease term. Sales-type lease revenue and corresponding lease receivables are recognized at lease commencement based on the present value of the future lease payments, and related interest income on lease receivable is recognized over the lease term and are recorded under Analytics revenue in the accompanying condensed consolidated statements of comprehensive income (loss). Payments under sales-type leases are discounted using the interest rate implicit in the lease. When the Company's leases are embedded in contracts with customers that include non-lease performance obligations, the Company allocates consideration in the contract between lease and non-lease components based on their relative SSPs. Assets subject to operating leases remain in property and equipment and continue to be depreciated. Assets subject to sales-type leases are derecognized from property and equipment, net at lease commencement and a net investment in the lease asset is recognized in prepaid expenses and other current assets and other non-current assets in the accompanying condensed consolidated balance sheets.

Integrated Yield Ramp Revenue

Integrated Yield Ramp revenue is derived from our fixed-fee engagements that include performance incentives based on customers' yield achievement (which consists primarily of Gainshare royalties) typically based on customers' wafer shipments, pertaining to these fixed-fee contracts, which royalties are variable.

Revenue under these project-based contracts, which are delivered over a specific period of time typically for a fixed fee component paid on a set schedule, is recognized as services are performed using a percentage of completion method based on costs or labor-hours inputs, whichever is the most appropriate measure of the progress towards completion of the contract. Where there are distinct performance obligations, we allocate revenue to all deliverables based on their SSPs and allocate the transaction price of the contract to each performance obligation on a relative basis using the SSP. Similar to the services provided in connection with DFI systems and CV systems that are contributing to Analytics revenue, due to the nature of the work performed in these arrangements, the estimation of percentage of completion method is complex and subject to many variables that require significant judgment.

The Gainshare contained in Integrated Yield Ramp contracts is a variable fee related to continued usage of our IP after the fixed-fee service period ends, based on a customer's yield achievement. Revenue derived from Gainshare is contingent upon our customers reaching certain defined production yield levels. Gainshare periods are generally subsequent to the delivery of all contractual services and performance obligations. We record Gainshare as a usage-based royalty derived from customers' usage of intellectual property and records it in the same period in which the usage occurs.

Significant Judgments

Judgments and estimates are required under Accounting Standards Codification ("ASC") Topic 606, Revenue from Contracts with Customers, and its related amendments (collectively known as "ASC 606"). Due to the complexity of certain contracts, the actual revenue recognition treatment required under ASC 606 for the Company's arrangements may be dependent on contract-specific terms and may vary in some instances.

For revenue under project-based contracts for fixed-price services, revenue is recognized as services are performed using a percentage-of-completion method based on costs or labor-hours input method, whichever is the most appropriate measure of the progress towards completion of the contract. Due to the nature of the work performed in these arrangements, the estimation of percentage of completion method is complex, subject to many variables and requires significant judgment. Key factors reviewed by the Company to estimate costs to complete each contract are future labor and product costs and expected productivity efficiencies. If circumstances arise that change the original estimates of revenues, costs, or extent of progress toward completion, revisions to the estimates are made. These revisions may result in increases or decreases in estimated revenues or costs, and such revisions are reflected in revenue on a cumulative catch-up basis in the period in which the circumstances that gave rise to the revision become known.

The Company's contracts with customers often include promises to transfer products, software licenses and provide services, including professional services, technical support services, and rights to unspecified updates to a customer. Determining whether licenses and services are distinct performance obligations that should be accounted for separately, or not distinct and thus accounted for together, requires significant judgment. The Company rarely licenses software on a standalone basis, so the Company is required to estimate the range of SSPs for each performance obligation. In instances where the SSP is not directly observable because the Company does not license the software or sell the service separately, the Company determines the SSP using information that may include market conditions and other observable inputs.

The Company is required to record Gainshare revenue in the same period in which the usage occurs. Because the Company generally does not receive the acknowledgment reports from its customers during a given quarter within the time frame necessary to adequately review the reports and include the actual amounts in quarterly results for such quarter, the Company accrues the related revenue based on estimates of customers underlying sales achievement. The Company's estimation process can be based on historical data, trends, seasonality, changes in the contract rate, knowledge of the changes in the industry and changes in the customer's manufacturing environment learned through discussions with customers and sales personnel. As a result of accruing revenue for the quarter based on such estimates, adjustments will be required in the following quarter to true-up revenue to the actual amounts reported.

Income Taxes

We are required to assess whether it is "more-likely-than-not" that we will realize our DTAs. If we believe that they are not likely to be fully realizable before the expiration dates applicable to such assets, then to the extent we believe that recovery is not likely, we must establish a valuation allowance. Based on all available evidence, both positive and negative, we determined a full valuation allowance was still appropriate for our U.S. federal and state net DTAs, primarily driven by a cumulative loss incurred over the 12-quarter period ended September 30, 2024, and the likelihood that we may not utilize tax attributes before they expire. The valuation allowance was approximately $64.2 million as of September 30, 2024, and December 31, 2023. We will continue to evaluate the need for a valuation allowance and may change our conclusion in a future period based on changes in facts (e.g., 12-quarter cumulative profit, significant new revenue, etc.). If we conclude that we are more-likely-than-not to utilize some or all of our U.S. DTAs, we will release some or all of our valuation allowance and our tax provision will decrease in the period in which we make such determination.

We evaluate our DTAs for realizability considering both positive and negative evidence, including our historical financial performance, projections of future taxable income, future reversals of existing taxable temporary differences, tax planning strategies and any carryback availability. In evaluating the need for a valuation allowance, we estimate future taxable income based on management approved business plans. This process involves significant management judgment about assumptions that are subject to change from period to period based on changes in tax laws or variances between future projected operating performance and actual results. Changes in the net DTAs, less offsetting valuation allowance, in a period are recorded through the income tax provision and could have a material impact on the condensed consolidated statements of comprehensive income (loss).

Our income tax calculations are based on the application of applicable U.S. federal, state, and/or foreign tax law. Our tax filings, however, are subject to audit by the respective tax authorities. Accordingly, we recognize tax liabilities based upon our estimate of whether, and the extent to which, additional taxes will be due when such estimates are more-likely-than-not to be sustained. An uncertain income tax position will not be recognized if it has less than a 50% likelihood of being sustained. To the extent the final tax liabilities are different than the amounts originally accrued, the increases or decreases are recorded as income tax expense or benefit in the condensed consolidated statements of comprehensive income (loss). As of September 30, 2024, no deferred taxes have been provided on undistributed earnings from our international subsidiaries. We intend to reinvest the earnings of our non-U.S. subsidiaries in those operations indefinitely. As such, we have not provided for any foreign withholding taxes on the earnings of foreign subsidiaries as of September 30, 2024. The earnings of our foreign subsidiaries are taxable in the U.S. in the year earned under the Global Intangible Low-Taxed Income rules implemented under 2017 Tax Cuts and Jobs Act.

The CHIPS Act was signed into U.S. law on August 9, 2022. The CHIPS Act is intended to increase domestic competitiveness in semiconductor manufacturing capacity, increase research and development in computing, AI, clean energy, and nanotechnology through federal government programs and incentives over the next ten years. The CHIPS Act includes an advanced manufacturing tax credit equal to 25% of qualified investments in property purchased for an advanced manufacturing facility. We have begun to see some benefit from the CHIPS Act to our business, but the extent of future benefit is still unknown.

Stock-Based Compensation

We account for stock-based compensation using the fair value method, which requires us to measure stock-based compensation based on the grant-date fair value of the awards and recognize the compensation expense over the requisite service period. As stock-based compensation expense recognized is based on awards ultimately expected to vest, it has been reduced for estimated forfeitures. Forfeitures are estimated at the time of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates.

The fair value of our restricted stock units is equal to the market value of our common stock on the date of the grant. These awards are subject to time-based vesting which generally occurs over a period of four years.

The fair value of our stock options and purchase rights granted under employee stock purchase plan is estimated using the Black-Scholes-Merton option-pricing model, which incorporates various assumptions including volatility, expected life and interest rates. The expected volatility is based on the historical volatility of our common stock over the most recent period commensurate with the estimated expected life of our stock options and purchase rights granted under employee stock purchase plan. The expected life is based on historical experience and on the terms and conditions of the options granted and purchase rights granted under employee stock purchase plan. The interest rate assumption is based upon observed Treasury yield curve rates appropriate for the expected life of our stock options and purchase rights granted under employee stock purchase plan.

Valuation of Long-lived Assets including Goodwill and Intangible Assets

We record goodwill when the purchase consideration of an acquisition exceeds the fair value of the net tangible and identified intangible assets as of the date of acquisition. We have one operating segment and one operating unit. We perform an annual impairment assessment of goodwill during the fourth quarter of each calendar year or more frequently, if required, to determine if any events or circumstances exist, such as an adverse change in business climate or a decline in the overall industry demand, that would indicate that it would more likely than not reduce the fair value of a reporting unit below its carrying amount, including goodwill. If events or circumstances do not indicate that the fair value of a reporting unit is below its carrying amount, then goodwill is not considered to be impaired and no further testing is required. If the carrying amount exceeds its fair value, an impairment loss would be recognized equal to the amount of excess, limited to the amount of total goodwill. There was no impairment of goodwill for the three and nine months ended September 30, 2024 and 2023.

Our long-lived assets, excluding goodwill, consist of property, equipment, intangible assets and unguaranteed residual assets under net investments in sales-type leases. We periodically review our long-lived assets for impairment. For assets to be held and used, we initiate our review whenever events or changes in circumstances indicate that the carrying amount of a long-lived asset group may not be recoverable. Recoverability of an asset group is measured by comparison of its carrying amount to the expected future undiscounted cash flows that the asset group is expected to generate. If it is determined that an asset group is not recoverable, an impairment loss is recorded in the amount by which the carrying amount of the asset group exceeds its fair value. There was no impairment of long-lived assets for the three and nine months ended September 30, 2024 and 2023.

Recent Accounting Pronouncements and Accounting Changes

See Note 1, *Basis of Presentation and Summary of Significant Accounting Policies*, to our unaudited condensed consolidated financial statements in this Quarterly Report on Form 10-Q, for a description of recent accounting pronouncements and accounting changes, including the expected dates of adoption and estimated effects, if any, on our condensed consolidated financial statements.

Results of Operations

Discussion of Financial Data for the Three and Nine months ended September 30, 2024 and 2023

Revenues, Costs of Revenues, and Gross Margin

	Three Months Ended September 30,		Change		Nine Months Ended September 30,		Change	
(Dollars in thousands)	**2024**	**2023**	**$**	**%**	**2024**	**2023**	**$**	**%**
Revenues:								
Analytics	$ 44,750	$ 39,497	$ 5,253	13 %	$ 121,327	$ 112,957	$ 8,370	7 %
Integrated Yield Ramp	1,659	2,853	(1,194)	(42)%	8,053	11,753	(3,700)	(31)%
Total revenues	46,409	42,350	4,059	10 %	129,380	124,710	4,670	4 %
Costs of revenues	12,484	14,282	(1,798)	(13)%	38,243	38,555	(312)	(1)%
Gross profit	$ 33,925	$ 28,068	$ 5,857	21 %	$ 91,137	$ 86,155	$ 4,982	6 %
Gross margin	73 %	66 %			70 %	69 %		
Analytics revenue as a percentage of total revenues	96 %	93 %			94 %	91 %		
Integrated Yield Ramp revenue as a percentage of total revenues	4 %	7 %			6 %	9 %		

Analytics Revenue

Analytics revenue increased $5.3 million for the three months ended September 30, 2024, compared to the three months ended September 30, 2023. The increase in Analytics revenue was driven by increases in revenues from Exensio and Cimetrix software licenses and CV systems, partially offset by a decrease in revenues from DFI systems.

Analytics revenue increased $8.4 million for the nine months ended September 30, 2024, compared to the nine months ended September 30, 2023. The increase in Analytics revenue was driven by increases in revenues from Exensio and Cimetrix software licenses, partially offset by a decrease in revenues from CV and DFI systems.

Integrated Yield Ramp Revenue

Integrated Yield Ramp revenue decreased $1.2 million for the three months ended September 30, 2024, compared to the three months ended September 30, 2023, primarily due to a decrease in hours worked on fixed-fees engagements, partially offset by higher Gainshare from increased customer wafer shipments at non-leading-edge nodes.

Integrated Yield Ramp revenue decreased $3.7 million for the nine months ended September 30, 2024, compared to the nine months ended September 30, 2023, primarily due to lower hours worked on fixed-fees engagements and Gainshare from decreased customer wafer shipments at non-leading-edge nodes.

Our Integrated Yield Ramp revenue may continue to fluctuate from period to period primarily due to the contribution of Gainshare, which is dependent on many factors that are outside our control, including among others, continued production of ICs by our customers at facilities at which we generate Gainshare, sustained yield improvements by our customers, and whether we enter into new contracts containing Gainshare.

Our Analytics and Integrated Yield Ramp revenues may also fluctuate in the future and are dependent on a number of factors, including the semiconductor industry's continued acceptance of our products, services and solutions, the timing of purchases by existing and new customers, cancellations by existing customers, and our ability to attract new customers and penetrate new markets, supply chain challenges and further penetration of our current customer base. Fluctuations in future results may also occur if any of our significant customers renegotiate pre-existing contractual commitments, including due to adverse changes in their own business.

Costs of Revenues

Costs of revenues consist primarily of costs incurred to provide and support our services, costs recognized in connection with licensing our software, IT and facilities-related costs and amortization of acquired technology. Service costs include material costs, hardware costs (including cost of leased assets under sales-type lease), personnel-related costs (including compensation, employee benefits, bonus and stock-based compensation expense), subcontractor costs, overhead costs, travel expenses, and allocated facilities-related costs. Software license costs consist of costs associated with third-party cloud-delivery related expenses and licensing third-party software used by us in providing services to our customers in solution engagements or sold in conjunction with our software products.

The decrease in costs of revenues of $1.8 million for the three months ended September 30, 2024, compared to the three months ended September 30, 2023, was primarily due to (i) a $2.0 million decrease in hardware costs and (ii) a $0.5 million decrease in facilities and IT-related costs including depreciation and amortization expense. These decreases were partially offset by (a) a $0.3 million increase in subcontractor costs, (b) a $0.3 million increase in third-party cloud-delivery costs, and (c) a $0.2 million increase in personnel-related costs mostly resulting from higher stock-based compensation expenses.

The decrease in costs of revenues of $0.3 million for the nine months ended September 30, 2024, compared to the nine months ended September 30, 2023, was primarily due to (i) a $0.8 million decrease in facilities and IT-related costs including depreciation and amortization expense, and (ii) a $0.6 million decrease in hardware costs. These decreases were partially offset by (a) a $0.5 million increase in third-party cloud-delivery costs, (b) a $0.4 million increase in subcontractor costs, and (c) a $0.2 million increase in personnel-related costs mostly resulting from higher stock-based compensation expenses, higher other compensation expenses (including employee benefit costs), increased headcount, and worldwide salary increases, partially offset by lower bonus expense.

Gross Margin

Gross margin increased seven percentage points for the three months ended September 30, 2024, to 73%, compared to 66% for the three months ended September 30, 2023. The higher gross margin during the three months ended September 30, 2024, was primarily due to higher Analytics revenue and lower cost of revenues for the three months ended September 30, 2024.

Gross margin increased one percentage point for the nine months ended September 30, 2024, to 70%, compared to 69% for the nine months ended September 30, 2023. The higher gross margin during the nine months ended September 30, 2024, was primarily due to higher Analytics revenue for the nine months ended September 30, 2024.

Operating Expenses:

Research and Development

	Three Months Ended September 30,		Change		Nine Months Ended September 30,		Change	
(Dollars in thousands)	2024	2023	$	%	2024	2023	$	%
Research and development	$ 13,516	$ 13,113	$ 403	3 %	$ 39,149	$ 38,428	$ 721	2 %
As a percentage of total revenues	29 %	31 %			30 %	31 %		

Research and development expenses consist primarily of personnel-related costs (including compensation, employee benefits, bonus, and stock-based compensation expense), outside development services, travel expenses, third-party cloud-services related costs, laboratory supplies, IT and facilities cost allocations to support product development activities.

Research and development expenses increased $0.4 million for the three months ended September 30, 2024, compared to the three months ended September 30, 2023, primarily due to (i) a $0.3 million increase in subcontractor fees primarily related to Cimetrix and Exensio software and (ii) a $0.2 million increase in personnel-related costs mostly resulting from higher stock-based compensation expenses, higher other compensation expenses (including employee benefit costs and bonuses), increased headcount, and worldwide salary increases.

Research and development expenses increased $0.7 million for the nine months ended September 30, 2024, compared to the nine months ended September 30, 2023, primarily due to (i) a $0.7 million increase in personnel-related costs mostly resulting from higher stock-based compensation expenses, higher other compensation expenses (including employee benefit costs), increased headcount, and worldwide salary increases, partially offset by lower bonus expense, (ii) a $0.2 million increase in third-party cloud-services costs, and (iii) a $0.1 million increase in travel expenses, partially offset by a $0.2 million decrease in laboratory supplies, facilities and IT-related costs including depreciation expense.

We anticipate our expenses in research and development will fluctuate in absolute dollars from period to period as a result of the size and the timing of product development projects.

Selling, General, and Administrative

	Three Months Ended September 30,		Change		Nine Months Ended September 30,		Change	
(Dollars in thousands)	2024	2023	$	%	2024	2023	$	%
Selling, general, and administrative	$ 18,094	$ 15,611	$ 2,483	16 %	$ 50,851	$ 46,022	$ 4,829	10 %
As a percentage of total revenues	39 %	37 %			39 %	37 %		

Selling, general, and administrative expenses consist primarily of personnel-related costs (including compensation, employee benefits, bonus, commission and stock-based compensation expense for sales, marketing, and general and administrative personnel), legal, tax and accounting services, marketing communications and trade conference-related expenses, third-party cloud-services related costs, travel, business acquisition costs, IT, and facilities cost allocations.

Selling, general, and administrative expenses increased $2.5 million for the three months ended September 30, 2024, compared to the three months ended September 30, 2023, primarily due to (i) a $1.6 million increase in personnel-related costs mainly resulting from higher stock-based compensation expenses, higher other compensation expenses (including commissions, employee benefit costs and bonuses), increased headcount, and worldwide salary increases, (ii) a $0.6 million increase in legal expenses (excluding arbitration-related expenses), (iii) a $0.3 million increase in facilities and IT-related costs including depreciation expense, (iv) a $0.1 million increase in subcontractor fees, and (v) a $0.1 million increase in trade conference-related expenses. These increases were partially offset by a $0.2 million decrease in legal fees related to the arbitration proceeding over a disputed customer contract.

Selling, general, and administrative expenses increased $4.8 million for the nine months ended September 30, 2024, compared to the nine months ended September 30, 2023, primarily due to (i) a $4.8 million increase in personnel-related costs mainly resulting from higher stock-based compensation expenses, higher other compensation expenses (including commissions and employee benefit costs), increased headcount, and worldwide salary increases, partially offset by lower bonus expense, (ii) a $2.1 million increase in legal expenses (excluding arbitration-related expenses), (iii) a $0.3 million increase in facilities and IT-related costs including depreciation expense, (iv) a $0.2 million increase in trade conference-related expenses, and (v) a $0.1 million increase in subcontractor fees. These increases were partially offset by (a) a $2.5 million decrease in legal fees related to the arbitration proceeding over a disputed customer contract, (b) a $0.2 million decrease in business acquisition costs, and (c) a $0.1 million decrease in third-party cloud-services costs.

We anticipate our selling, general, and administrative expenses will fluctuate in absolute dollars from period to period as a result of cost control initiatives and to support increased selling efforts in the future.

Amortization of Acquired Intangible Assets

	Three Months Ended September 30,		Change		Nine Months Ended September 30,		Change	
(Dollars in thousands)	**2024**	**2023**	**$**	**%**	**2024**	**2023**	**$**	**%**
Amortization of acquired intangible assets	$ 196	$ 328	$ (132)	(40)%	$ 714	$ 979	$ (265)	(27)%

Amortization of acquired intangible assets primarily consists of amortization of intangibles acquired as a result of certain business combinations.

Interest and Other Expense (Income), Net

	Three Months Ended September 30,		Change		Nine Months Ended September 30,		Change	
(Dollars in thousands)	**2024**	**2023**	**$**	**%**	**2024**	**2023**	**$**	**%**
Interest and other expense (income), net	$ (1,511)	$ (2,018)	$ (507)	(25)%	$ (4,682)	$ (4,000)	$ 682	17 %

Interest and other expense (income), net, primarily consists of interest income and foreign currency transaction exchange gains and losses.

Interest and other expense (income), net decreased $0.5 million for the three months ended September 30, 2024, compared to the three months ended September 30, 2023, primarily due to net unfavorable fluctuations in foreign currency exchange rates.

Interest and other expense (income), net increased $0.7 million for the nine months ended September 30, 2024, compared to the nine months ended September 30, 2023, primarily due to higher interest income resulting from higher interest rates and sales-type leases.

Income Tax Expense

	Three Months Ended September 30,		Change		Nine Months Ended September 30,		Change	
(Dollars in thousands)	**2024**	**2023**	**$**	**%**	**2024**	**2023**	**$**	**%**
Income tax benefit (expense)	$ (1,424)	$ (6,006)	$ (4,582)	(76)%	$ (1,587)	$ (2,508)	$ (921)	(37)%

Income tax expense decreased for the three and nine months ended September 30, 2024, compared to the three and nine months ended September 30, 2023, primarily due to changes in the foreign and state taxes and year-to-date recognition of worldwide pre-tax income in relation to their forecasted amounts for full years.

Any significant change in our future effective tax rates could adversely impact our consolidated financial position, results of operations and cash flows. Our future tax rates may be adversely affected by a number of factors including increase in expenses not deductible for tax purposes, new or changing tax legislation in the United States and in foreign countries where we are subject to tax jurisdictions, the geographic composition of our pre-tax income, the amount of our pre-tax income as business activities fluctuate, our ability to use tax attributes such as research and development tax credits and net operation losses, the tax effects of employee stock activity, audit examinations with adverse outcomes, changes in accounting principles generally accepted in the United States of America and the effectiveness of our tax planning strategies.

Liquidity and Capital Resources

As of September 30, 2024, our working capital, defined as total current assets less total current liabilities, was $133.7 million, compared to $147.0 million as of December 31, 2023. Total cash, cash equivalents, and short-term investments were $120.2 million as of September 30, 2024, compared to cash, cash equivalents, and short-term investments of $135.5 million as of December 31, 2023. As of September 30, 2024, and December 31, 2023, cash and cash equivalents held by our foreign subsidiaries were $12.2 million and $10.0 million, respectively. We believe that our existing cash resources and anticipated funds from operations will satisfy our cash requirements to fund our operating activities, capital expenditures, other obligations for at least the next twelve months, and thereafter for the foreseeable future; however, we will continue to evaluate if we require additional funding to meet our longer-term needs.

Repurchase of Company's Common Stock

On April 11, 2022, the Board of Directors adopted a stock repurchase program (the "2022 Program") to repurchase up to $35.0 million of the Company's common stock both on the open market and in privately negotiated transactions, including through Rule 10b5-1 plans, from time to time, over the next two years. During the nine months ended September 30, 2024, 201,561 shares were repurchased by the Company under the 2022 Program at an average price of $34.23 per share for an aggregate total price of $6.9 million. In total, the Company repurchased 937,501 shares under the 2022 Program at an average price of $25.96 per share for an aggregate total price of $24.3 million.

The 2022 Program expired on April 11, 2024, and on April 15, 2024, the Board of Directors adopted a new program to repurchase up to $40.0 million of the Company's common stock both on the open market and in privately negotiated transactions, including through Rule 10b5-1 plans, from time to time, over the next two years. The Company has not repurchased any shares under the 2024 Program.

Cash Flow Data

The following table summarizes our cash flows for the periods presented:

	Nine Months Ended September 30,		
(In thousands)	**2024**	**2023**	**$ Change**
Net cash flows provided by (used in):			
Operating activities	$ 8,097	$ 12,571	$ (4,474)
Investing activities	188	(14,235)	14,423
Financing activities	(10,908)	(5,577)	(5,331)
Effect of exchange rate changes on cash and cash equivalents	73	(763)	836
Net change in cash and cash equivalents	$ (2,550)	$ (8,004)	$ 5,454

Net Cash Flows Provided by Operating Activities

Cash flows provided by operating activities during the nine months ended September 30, 2024, consisted of net income, adjusted for certain non-cash items which primarily consisted of depreciation and amortization, stock-based compensation expense, amortization of acquired intangible expense, amortization of costs capitalized to obtain revenue contracts, net accretion of discounts on short-term investments, accretion of unguaranteed residual assets and net change in operating assets and liabilities.

Net cash flows provided by operating activities was $8.1 million for the nine months ended September 30, 2024, compared to $12.6 million for the nine months ended September 30, 2023. The decrease in cash provided by operating activities between the periods was driven primarily by lower collections from customers, partially offset by (i) a decrease in bonus payments under the Company's bonus plan, (ii) a decrease in payments of vendor invoices, (iii) an increase in interest income, and (iv) an increase in net income between comparable periods. Net income was $3.5 million for the nine months ended September 30, 2024, compared to $2.2 million for the nine months ended September 30, 2023.

The major contributors to the net change in operating assets and liabilities for the nine months ended September 30, 2024, were as follows:

- Accounts receivable increased by $1.7 million, primarily due to contractual invoicing activity and an increase in unbilled accounts receivables due to the timing of billing and revenue recognition, partially offset by collections from customers;

- Prepaid expense and other current assets increased by $8.8 million, primarily due to increases in lease receivables, contract assets, prepaid expenses and deferred commission, partially offset by a decrease in income tax receivable;

- Other non-current assets increased by $11.5 million primarily due to increases in non-current unbilled accounts receivables due to the timing of billing and revenue recognition, non-current assets from sales-type leases, non-current prepaid expenses and costs capitalized to obtain revenue contracts, partially offset by a decrease in non-current contract assets;

- Accounts payable increased by $3.0 million primarily due to the timing of payments of vendor invoices;

- Accrued compensation and related benefits decreased by $1.6 million primarily due to the payments of accrued bonuses net of new bonus accruals and exercise of purchase rights under the employee stock purchase plan, partially offset by increases in accrued commissions and other compensation, and new contributions to the employee stock purchase plan;

- Deferred revenue increased by $2.8 million primarily due to the timing of billing and revenue recognition; and
- Billings in excess of recognized revenues decreased by $1.5 million primarily due to the timing of billing and revenue recognition.

Net Cash Flows Provided by (Used in) Investing Activities

Net cash provided by investing activities was $0.2 million for the nine months ended September 30, 2024, compared to net cash used in investing activities of $14.2 million for the nine months ended September 30, 2023.

For the nine months ended September 30, 2024, cash provided by investing activities primarily related to proceeds from maturities and sales of short-term investments of $57.1 million, partially offset by purchases of short-term investments of $43.1 million, purchases of and prepayments for property and equipment of $11.9 million primarily related to our DFI systems, and purchase of a convertible promissory note of $2.0 million.

For the nine months ended September 30, 2023, cash used in investing activities primarily related to purchases of short-term investments of $32.3 million, purchases of and prepayments for property and equipment of $8.9 million primarily related to our DFI and CV systems, payment for business acquisition, net of cash acquired, of $1.8 million, partially offset by proceeds from maturities and sales of short-term investments of $28.8 million.

Net Cash Flows Used in Financing Activities

Net cash used in financing activities was $10.9 million for the nine months ended September 30, 2024, compared to $5.6 million for the nine months ended September 30, 2023.

For the nine months ended September 30, 2024, net cash used in financing activities primarily consisted of $8.2 million in cash payments for taxes related to net share settlement of equity awards, repurchases of common stock of $6.9 million, partially offset by $4.2 million of proceeds from our employee stock purchase plans and exercise of stock options.

For the nine months ended September 30, 2023, net cash used in financing activities primarily consisted of $9.1 million in cash payments for taxes related to net share settlement of equity awards, repurchases of common stock of $0.7 million, partially offset by $4.3 million of proceeds from our employee stock purchase plans and exercise of stock options.

Related Party Transactions

Refer to Note 12, *Strategic Partnership Agreement with Advantest and Related Party Transactions*, to our unaudited condensed consolidated financial statements in this Quarterly Report on Form 10-Q, for the discussion about related party transactions between the Company and Advantest (as defined therein).

Off-Balance Sheet Agreements

We do not have any off-balance sheet arrangements, investments in special purpose entities or undisclosed borrowings or debt.

Item 3. Quantitative and Qualitative Disclosures about Market Risk

The following discusses our exposure to market risk related to changes in interest rates and foreign currency exchange rates. We do not currently own any equity investments, nor do we expect to own any in the foreseeable future. This discussion contains forward-looking statements that are subject to risks and uncertainties. Actual results could vary materially as a result of a number of factors.

Interest Rate Risk. As of September 30, 2024, we had cash, cash equivalents and short-term investments of $120.2 million. Cash and cash equivalents consisted of cash and highly liquid money market instruments and short-term investments consisted of U.S. Government securities. We would not expect our operating results or cash flows to be affected to any significant degree by the effect of a sudden change in market interest on our portfolio. A hypothetical increase in market interest rates of 100 basis points from the market rates in effect as of September 30, 2024, would cause the fair value of these investments to decrease by an immaterial amount which would not have significantly impacted our financial position or results of operations.

As of September 30, 2024, and periodically throughout the year, we have maintained cash balances in various operating accounts in excess of federally insured limits. We limit the amount of credit exposure to any financial institution by evaluating the creditworthiness of the financial institutions with which we invest and investing through more than one financial institution.

Foreign Currency and Exchange Risk. Certain of our cash balances, receivables and payables for our international offices are denominated in the local currency, including the Euro, Yen, Chinese Yuan, New Taiwan Dollar and Canadian Dollar. Therefore, some of our activities including a portion of our revenues and operating expenditures are subject to foreign currency risks. From time to time, we enter into foreign currency forward contracts to reduce the exposure to foreign currency exchange rate fluctuations on certain foreign currency denominated monetary assets and liabilities. We do not use foreign currency forward contracts for speculative or trading purposes. We record these forward contracts at fair value. The counterparty to these foreign currency forward contracts, as applicable, is a financial institution that we believe is creditworthy, and therefore, we believe the credit risk of counterparty non-performance is not significant. The change in fair value of these contracts is recorded in earnings as a component of interest and other expense (income), net and offsets the change in fair value of foreign currency denominated monetary assets and liabilities, which is also recorded in other expense (income), net. As of September 30, 2024, we had no outstanding forward contracts.

Item 4. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our principal executive officer and principal financial and accounting officer, evaluated the effectiveness of our “disclosure controls and procedures” as defined in Exchange Act Rules 13a-15(e) and 15d-15(e) as of September 30, 2024, in connection with the filing of this Quarterly Report on Form 10-Q. Based on that evaluation as of September 30, 2024, our principal executive officer and principal financial and accounting officer concluded that our disclosure controls and procedures were effective to ensure that information we are required to disclose in reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the rules and forms of the SEC and is accumulated and communicated to our management as appropriate to allow timely decisions regarding required disclosure.

Changes in Internal Control over Financial Reporting

There were no changes in the Company's internal control over financial reporting during the three months ended September 30, 2024, that have materially affected, or are reasonably likely to materially affect, the Company's internal control over financial reporting.

PART II — OTHER INFORMATION

Item 1. Legal Proceedings

Refer to Note 11, *Commitments and Contingencies* to our condensed consolidated financial statements in this Quarterly Report on Form 10-Q, for information regarding our legal proceedings.

Item 1A. Risk Factors

As of the date of this Quarterly Report on Form 10-Q, except as set forth below, there have been no material changes from the risk factors disclosed in our Annual Report on Form 10-K for the year ended December 31, 2023, filed with the SEC on February 27, 2024. Any of such factors could result in a significant or material adverse effect on our result of operations or financial conditions. Additional risk factors not presently known to us or that we currently deem immaterial may also impair our business or results of operations. We may disclose changes to such factors or disclose additional factors from time to time in our future filings with the SEC.

Risks Related to Our Technology

Support and updates for open-source software that we currently use in providing our products and services may not be available to us in the future, which could negatively impact our financial results.

We use open-source software ("OSS") in delivering products and services to our customers. Change of terms for support for OSS, or lack of support or updates for such OSS, could also significantly increase our costs to deliver our products and services or cause a temporary or long-term disruption in our ability to use such OSS in our products and services or make it harder or impossible to mitigate vulnerabilities or risks associated with such software, which could negatively impact our financial results.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds

There were no stock repurchases during the third quarter of 2024.

Period	Total Number of Shares Purchased (in thousands)	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Programs (in thousands)	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Programs (in thousands)
July 1, 2024 through July 31, 2024	—	$ —	—	$ 40,000
August 1, 2024 through August 31, 2024	—	$ —	—	$ 40,000
September 1, 2024 through September 30, 2024	—	$ —	—	$ 40,000
Total	—	$ —	—	

Item 3. Defaults Upon Senior Securities

None.

Item 4. Mine Safety Disclosures

None.

Item 5. Other Information

Insider Adoption or Termination of Trading Arrangements

During the quarter ended September 30, 2024, none of our directors or officers informed us of the adoption or termination of a "Rule 10b5-1 trading arrangement" or "non-Rule 10b5-1 trading arrangement," as those terms are defined in Regulation S-K, Item 408.

Item 6. Exhibits

		Incorporated by Reference				
Exhibit Number	**Exhibit Description**	**Form**	**Filing Date**	**Exhibit Number**	**SEC File No.**	**Provided Herewith**
31.01	Certification of the principal executive officer pursuant to Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
31.02	Certification of the principal financial and accounting officer pursuant to Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
32.01	Certification pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.*					X
32.02	Certification pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.*					X
101	The following financial statements from the Company's Quarterly Report on Form 10-Q for the quarter ended September 30, 2024, formatted in Inline XBRL: (i) Condensed Consolidated Balance Sheets, (ii) Condensed Consolidated Statements of Comprehensive Income (Loss), (iii) Condensed Consolidated Statements of Stockholders' Equity, (iv) Condensed Consolidated Statements of Cash Flows and (v) Notes to Condensed Consolidated Financial Statements, tagged as blocks of text and including detailed tags.					X
104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101).					

* Furnished, and not filed.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

PDF SOLUTIONS, INC.

Date: November 7, 2024	By: /s/ JOHN K. KIBARIAN John K. Kibarian President and Chief Executive Officer (principal executive officer)
Date: November 7, 2024	By: /s/ ADNAN RAZA Adnan Raza Executive Vice President, Finance and Chief Financial Officer (principal financial and accounting officer)

Exhibit 31.01

CERTIFICATIONS

I, John K. Kibarian, certify that:

1. I have reviewed this quarterly report on Form 10-Q of PDF Solutions, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

By: /s/ John K. Kibarian
John K. Kibarian
President and Chief Executive Officer
(principal executive officer)

Date: November 7, 2024

Exhibit 31.02

CERTIFICATIONS

I, Adnan Raza, certify that:

1. I have reviewed this quarterly report on Form 10-Q of PDF Solutions, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant’s other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant’s disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant’s internal control over financial reporting that occurred during the registrant’s most recent fiscal quarter (the registrant’s fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant’s internal control over financial reporting; and

5. The registrant’s other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant’s auditors and the audit committee of registrant’s board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant’s ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant’s internal control over financial reporting.

By:/s/ Adnan Raza
Adnan Raza
Executive Vice President, Finance and Chief Financial Officer (principal financial and accounting officer)

Date: November 7, 2024

Exhibit 32.01

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report of PDF Solutions, Inc. (the "Company") on Form 10-Q for the quarter ended September 30, 2024, as filed with the Securities and Exchange Commission on November 7, 2024 (the "Report"), I, John K. Kibarian, President and Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to my knowledge:

(1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and result of operations of the Company.

By: */s/* John K. Kibarian
John K. Kibarian
President and Chief Executive Officer
(principal executive officer)

Date: November 7, 2024

Exhibit 32.02

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Quarterly Report of PDF Solutions, Inc. (the “Company”) on Form 10-Q for the quarter ended September 30, 2024, as filed with the Securities and Exchange Commission on November 7, 2024 (the “Report”), I, Adnan Raza, Executive Vice President, Finance and Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to my knowledge:

(1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and result of operations of the Company.

By: /s/ Adnan Raza
Adnan Raza
*Executive Vice President, Finance
and Chief Financial Officer
(principal financial and accounting
officer)*

Date: November 7, 2024