

ASPEN TECHNOLOGY INC /DE/
Form 10-K
August 08, 2018

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

FORM 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended June 30, 2018

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: 001-34630

Aspen Technology, Inc.

(Exact name of registrant as specified in its charter)

Delaware

04-2739697

(State or other jurisdiction of
incorporation or organization)

(I.R.S. Employer
Identification No.)

20 Crosby Drive

01730

Bedford, MA

(Zip Code)

(Address of principal executive offices)

Registrant's telephone number, including area code: 781-221-6400

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

None

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

Common stock, \$0.10 par value per share

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

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 checkmark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted 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 and post such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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 (Do not check if
a smaller reporting
company) 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 Act). Yes No
As of December 31, 2017, the aggregate market value of common stock (the only outstanding class of common equity of the registrant) held by non-affiliates of the registrant was \$4,245,574,876 based on a total of 64,132,551 shares of common stock held by non-affiliates and on a closing price of \$66.20 on December 31, 2017 for the common stock as reported on The NASDAQ Global Select Market.

There were 71,009,111 shares of common stock outstanding as of August 1, 2018.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement related to its 2018 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Form 10-K are incorporated by reference in Part III, Items 10-14 of this Form 10-K.

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Our registered trademarks include aspenONE and Aspen Plus. All other trademarks, trade names and service marks appearing in this Form 10-K are the property of their respective owners.

Our fiscal year ends on June 30, and references to a specific fiscal year are the twelve months ended June 30 of such year (for example, "fiscal 2018" refers to the year ended June 30, 2018).

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS AND INDUSTRY DATA

This Form 10-K 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. Forward-looking statements relate to future events or our future financial performance. We generally identify forward-looking statements by terminology such as "anticipate," "believe," "could," "estimate," "expect," "intend," "may," "potential," "should," "target," or the negative of these terms or other similar words. These statements are only predictions. The outcome of the events described in these forward-looking statements is subject to known and unknown risks, uncertainties and other factors that may cause our, our customers' or our industry's actual results, levels of activity, performance or achievements expressed or implied by these forward-looking statements, to differ. "Item 1. Business," "Item 1A. Risk Factors" and "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" as well as other sections in this Form 10-K, discuss some of the factors that could contribute to these differences. The forward-looking statements made in this Form 10-K relate only to events as of the date on which the statements are made. We undertake no obligation to update any forward-looking statement to reflect events or circumstances after the date on which the statement is made or to reflect the occurrence of unanticipated events. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments we may make. The industry in which we operate is subject to a high degree of uncertainty and risk due to variety of factors, including those described in "Item 1A. Risk Factors." Unless the context indicates otherwise, references in this report to "we", "us", "our" and other similar references mean Aspen Technology, Inc. and its subsidiaries.

PART I

Item 1. Business.

Overview

We are a leading global supplier of asset optimization solutions that improve asset design, operations and maintenance in complex, industrial environments. We combine decades of process modeling and operations expertise with big data machine-learning and analytics. Our purpose-built software solutions improve the competitiveness and profitability of our customers by increasing throughput, energy efficiency, and production, reducing unplanned downtime, enhancing capital efficiency, and decreasing working capital requirements over the entire asset lifecycle to support operational excellence.

Our software incorporates our proprietary mathematical and empirical models of manufacturing and planning processes and reflects the deep domain expertise we have amassed from focusing on solutions for the process and other capital-intensive industries for over 35 years. We have developed our applications to design and optimize processes across three principal business areas: engineering, manufacturing and supply chain, and asset performance management. We are a recognized market and technology leader in providing process optimization and asset performance management software solutions for each of these business areas.

We have established sustainable competitive advantages based on the following strengths:

- Innovative products that can enhance our customers' profitability and productivity;
- Long-term customer relationships;
- Large installed base of users of our software; and
- Long-term license contracts.

We have approximately 2,200 customers globally. Our customers consist of companies in the process and other capital-intensive industries such as energy, chemicals, engineering and construction, as well as pharmaceuticals, transportation, power, metals and mining, pulp and paper, and consumer packaged goods.

Industry Background

The process manufacturing industries consist of companies that typically manufacture finished products by applying a controlled chemical process either to a raw material that is fed continuously through the plant or to a specific batch of raw material.

Process industry characteristics and dynamics are complex; therefore, any small improvement in the high-volume feedstocks used, or to the chemical process applied, can have a significant impact on the efficiency and cost-effectiveness of manufacturing operations. As a result, process manufacturers, as well as the engineering and construction firms that partner with these manufacturers, have extensive technical requirements and need

sophisticated, integrated software to help design,

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operate and maintain complex manufacturing assets. The unique characteristics associated with process manufacturing create special demands for business applications that frequently exceed the capabilities of generic or non-process manufacturing software packages.

Industry Specific Challenges Facing the Process Industries

Companies in different segments of the process industries face specific challenges that drive the need for software solutions that design, operate and maintain manufacturing environments more effectively:

Energy. Our energy markets are comprised of three primary sectors: Exploration and Production, also called "upstream," Oil and Gas Production and Processing, also called "midstream," and Refining and Marketing, also called "downstream":

Companies engaged in Exploration and Production explore for and produce hydrocarbons. They target reserves in increasingly diverse geographies involving geological, logistical and political challenges. They need to design and develop ever larger, more complex and more remote production, gathering and processing facilities as quickly as possible with the objective of optimizing production and ensuring regulatory compliance.

- Companies engaged in Oil and Gas Production and Processing produce and gather oil and natural gas from well heads, clean it, process it, and separate it into oil, dry natural gas, and natural gas liquids in preparation for transport to downstream markets. The number of oil and gas processing plants in North America has increased significantly in recent years to process the oil and gas extracted from shale deposits.

Companies engaged in Refining and Marketing convert crude oil through a thermal and chemical manufacturing process into end products such as gasoline, jet and diesel fuels and into intermediate products for downstream chemical manufacturing companies. These companies are characterized by high volumes and low operating margins. In order to deliver better margins, they focus on optimizing feedstock selection and product mix, reducing energy and capital costs, maximizing throughput, and minimizing inventory, all while operating safely and in accordance with regulations.

Chemicals. The chemicals industry includes both bulk and specialty chemical companies:

Bulk chemical producers manufacture commodity chemicals and compete primarily on price; they seek to achieve economies of scale and manage operating margin pressure by building larger, more complex plants located near feedstock sources.

Specialty chemical manufacturers, which primarily manufacture highly differentiated customer-specific products, face challenges in managing diverse product lines, multiple plants, complex supply chains and product quality.

Engineering and construction. Engineering and construction firms that work with process manufacturers compete on a global basis by bidding on and executing on complex, large-scale projects. They need a digital environment in which optimal plant designs can be produced quickly and efficiently, incorporating highly accurate modeling, analysis and cost estimation technology. In addition, these projects require software that enables significant collaboration internally, with the manufacturer, and in many cases, with other engineering and construction firms.

Companies in the consumer packaged goods, power, metals and mining, pulp and paper, pharmaceuticals and biofuels industries are also seeking asset optimization solutions that help them deliver improved financial and operating results in the face of varied process manufacturing challenges.

Complexity of the Process Industries

Companies in the process industries constantly face pressure on margins causing them to continually seek ways to operate more efficiently. At the same time, these manufacturers face complexity as a result of the following:

Globalization of markets. Process manufacturers are continuously expanding their operations to take advantage of growing demand and more economically viable sources of feedstocks. Process manufacturers must be able to design, build and operate plants efficiently and economically while managing and optimizing ever broadening supply chains.

Market volatility. Process manufacturers must react quickly to frequent changes in feedstock prices, temporary or longer-term feedstock shortages, and rapid changes in finished product prices. Unpredictable commodity markets strain the manufacturing and supply chain operations of process manufacturers, which must evaluate and implement changes in inventory levels, feedstock inputs, equipment usage and operational processes to remain competitive.

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Environmental and safety regulations. Process companies must comply with an expanding array of data maintenance and reporting requirements under governmental and regulatory mandates, and the global nature of their operations can subject them to numerous regulatory regimes. These companies are increasingly relying upon software applications to model potential outcomes, store operating data and develop reporting capabilities in response to heightened scrutiny and oversight because of environmental, safety and other implications of their products and manufacturing processes.

Market Opportunity

Technology solutions play a major role in helping companies in the process industries improve their manufacturing productivity. In the 1980s, process manufacturers implemented distributed control systems, or DCS, to automate the management of plant hardware. DCS use computer hardware, communication networks and industrial instruments to measure, record and automatically control process variables. In the 1990s, these manufacturers adopted enterprise resource planning, or ERP, systems to streamline back office functions and interact with DCS. These systems allowed process manufacturers to track, monitor and report the performance of each plant, rather than rely on traditional paper and generic desktop spreadsheets.

Many process manufacturers have implemented both DCS and ERP systems but have realized that their investments in hardware and back-office systems are inadequate. DCS are only able to control and monitor processes based on fixed sets of parameters and cannot dynamically react to changes in the manufacturing process unless instructed by end users. ERP systems can only record what is produced in operations. Although DCS and ERP systems help manage manufacturing performance, neither of these systems can optimize what is produced, how it is produced or where it is produced. Moreover, neither can help a process manufacturer understand how to improve its processes or how to identify opportunities to decrease operating expenses.

Asset optimization software focuses on the optimum design, operation, and maintenance of the manufacturing process; how the design is optimized for operations and reliability, how the process is operated for optimal economic performance, and how the design and operations impact the longevity and reliability of the equipment. By connecting DCS and ERP systems with intelligent, dynamic applications, asset optimization software allows a manufacturer to make better, faster economic decisions. Examples of how asset optimization software can optimize a manufacturing environment include incorporating process manufacturing domain knowledge, supporting real-time decision making, predicting equipment failure, and providing the ability to respond and adapt to operational changes. Furthermore, these solutions can optimize the supply chain by helping a manufacturer to understand the operating conditions in each plant, enabling more efficient and optimized production decisions.

Process manufacturers employ highly skilled technical personnel specializing in areas such as process design, equipment design, control engineering, manufacturing operations, analytics, planning, scheduling, and supply chain management. To drive efficiency and improve operating margins, these personnel need to collaborate across functional areas and increasingly rely on software to enable this collaboration as well as automate complex tasks associated with their jobs. Process companies must adapt to the changing nature of the technical workforce. A generation of highly experienced plant operators and engineers is nearing retirement. As a result, we believe there is increasing demand for intelligent software applications that capture and automate expert knowledge and are intuitive and easy-to-learn.

aspenONE Solutions

We provide integrated asset optimization software solutions designed and developed specifically for the process and other capital-intensive industries. Customers use our solutions to improve their competitiveness and profitability by increasing throughput and productivity, reducing operating and maintenance costs, increasing reliability, enhancing capital efficiency, enabling collaboration among different functions and decreasing working capital requirements. Our aspenONE solutions are organized into three suites: 1) engineering; 2) manufacturing and supply chain; and 3) asset performance management, or APM:

Engineering. Our engineering software is used to develop process designs of new plants, re-vamp existing plants, and simulate and optimize existing processes.

Manufacturing and Supply Chain. Our manufacturing software is used to optimize day-to-day processing activities, enabling process manufacturers to make better, more profitable decisions and to improve plant performance. Our supply chain management software is designed to enable process manufacturers to reduce inventory levels, increase

asset efficiency, respond rapidly to market demands and optimize supply chain operations.

Asset Performance Management. Our asset performance management software is used to understand and predict the reliability of a system; be it multiple assets, a single asset, or equipment in a plant. The factors that impact reliability include how operating conditions degrade equipment performance over time, or how process conditions lead to equipment failure, and the ability to predict when the equipment will fail and prescribe actions to avoid such occurrences. The APM suite is a comprehensive suite of machine learning and analytics technologies when used on a standalone or integrated manner with historical and real time asset and equipment data which can help our customers improve their return on capital employed.

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Our aspenONE licensing model is a subscription offering under which customers receive access to all the products within the aspenONE suite(s) they license, including the right to any new unspecified future software products and updates that may be introduced into the licensed aspenONE software suite. This affords customers the ability to use our software whenever required and to experiment with different applications to best solve whatever critical business challenges they face.

We offer customer support, professional services and training services to our customers. Under our aspenONE licensing model, software maintenance and support is included for the term of the arrangement. Professional services are offered to customers as a means to further implement and extend our technology across their corporations.

The key benefits of our aspenONE solutions include:

Broad and comprehensive software suites. We believe we are the only software provider that has developed comprehensive suites of software applications addressing the engineering, manufacturing and supply chain and maintenance requirements of process manufacturers. While some competitors offer solutions in one or two principal business areas, no other vendor can match the breadth of our aspenONE offerings. In addition, we have developed an extensive array of software applications that address extremely specific and complex industry and end user challenges, such as feedstock selection and production scheduling for petroleum companies.

Integrated software solutions. aspenONE provides a standards-based framework that integrates applications, data and models within each of our software suites. Process manufacturers seeking to improve their business operations can use the integrated software applications in the aspenONE Manufacturing and Supply Chain suite to support real-time decision making both for individual production facilities and across multiple sites.

Flexible commercial model. Our aspenONE licensing model provides a customer with access to all of the applications within and across the aspenONE suite(s) the customer licenses, including the right to any new unspecified future software products and updates that may be introduced into the licensed aspenONE software suite. The customer can change or alternate the use of multiple applications in a licensed suite through the use of exchangeable units of measurement, or tokens, licensed in quantities determined by the customer. This enables the customer to use those applications whenever required and to experiment with different applications to best solve whatever critical business challenges the customer faces. The customer can easily increase its usage of our software as their business requirements evolve.

Our Competitive Strengths

In addition to the breadth and depth of our integrated aspenONE software and the flexibility of our aspenONE licensing model, we believe our key competitive advantages include the following:

Industry-leading innovation based on substantial process expertise. Over the past 35 years, our significant investment in research and development has led to a number of major process engineering advances considered to be industry-standard applications. Our development organization is comprised of software engineers, chemical engineers and data scientists. This combination of expertise has been essential to the development of leading products embedded with chemical engineering principles, optimization and machine learning algorithms, analytics, and the process industries' workflows and best practices.

Rapid, high return on investment. Many customers purchase our software because they believe it will provide rapid, demonstrable and significant returns on their investment and increase their profitability. For some customers, economic benefits in the first year following installation have exceeded the total cost of our software. For many customers, even a relatively small improvement in performance can generate substantial recurring benefits due to the large production volumes and limited profit margins typical in process industries. In addition, our solutions can generate organizational efficiencies and operational improvements that can further increase a process company's profitability.

Growth Strategy

We seek to maintain and extend our position as a leading global provider of process optimization software and related services to the process industries. We have introduced a new strategy to evolve our scope of optimization from the process units in a plant to the process and the equipment in the plant or entire asset. We plan to expand our reach in optimization from conceptualization and design, operations, and supply chain to the maintenance aspects of the plant. We plan to build on our expertise in process optimization, our installed base, and long term customer relationships to

expand our reach in the maintenance area of the plant. By focusing on asset optimization, we would be able to optimize the design and operations of a plant considering the performance and constraints of process equipment so as to optimize the full asset lifecycle. Our primary growth strategy is to expand organically within our core verticals by leveraging our market leadership position and driving increased usage and product adoption of the broad capabilities in our aspenONE offerings. Additionally, we seek acquisitions to

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accelerate our overall growth in the design and operations of the process, and acquisitions that will expand our maintenance solution to deliver asset optimization. To accomplish these goals, we will pursue the following activities: Continue to provide innovative, market-leading solutions. Our recent innovations include adaptive process control, modeling of solids and batch processes, rundown blending optimization, crude assay characterization using molecular science, electrolyte and biofuel characterizations, process safety, sulfur recovery, methodologies for carbon management, multivariate analysis, process reliability, and equipment and process analytics. Most recently we introduced integrated steady state and batch process modeling capabilities for specialty chemical and pharmaceutical processes and a solution for operator training, as well as solutions for Industrial IoT Edge and enterprise data collection. We intend to continue to invest in research and development in order to develop and offer new and enhanced solutions for our aspenONE suites. We have pioneered a number of industry standard and award-winning software applications. For example, Aspen Plus, our process modeling tool for the chemicals industry, has won the Chemical Processing magazine Readers' Choice Award for "Process Simulation Software" multiple times. We have also been recognized by R&D Magazine for innovation in out of the box modeling capabilities that we developed with the National Institute of Standards and Technology.

Further penetrate existing customer base. We have an installed base of approximately 2,200 customers. Many of our customers only use a fraction of our products. We work with our customers to identify ways in which they can improve their business performance by using the entire licensed suite of aspenONE solutions, both at an individual user level and across all of their plant locations. Our customers are segmented based on their size and complexity. Our large complex customers are serviced by our Field Sales organization, while our other customers are serviced by our inside sales group. Additionally, we regularly enhance our products to make them easier to use and seek to increase productivity of users by offering more integrated workflows.

Adoption and usage in customer base. We strive for our customers to adopt and sustain the use of our products by maximizing the consumption of their token entitlement. We do so by focusing our go-to-market resources through specific customer success management activities that generate and sustain the value from our products by ensuring that customers are using the latest version of our products, that our software is deployed in the most optimum manner in their IT networks, and that our customers are familiar with the latest value enhancing functionality in our products.

Asset Performance Management (APM) expansion. In fiscal year 2017, we introduced a new suite of products focused on improving the reliability of our customers' assets and equipment using a combination of machine learning, data science and process modeling together with historical and real time asset and equipment data. We have increased our investment in the research and development, sales and marketing, and channel sales functions to build out the capabilities that will enable us to grow this new business area and deliver value for our customers. In addition, we target additional capital-intensive industries with the APM functionality that we refer to as the global economy industries. These include transportation, power, pulp and paper, wastewater treatment, and consumer products goods. Scale through digital channels. We have a broad user base spanning our vertical industries and geographies, and they possess a variety of skills, experience and business needs. To reach our user base in an effective, productive and leveraged manner, we utilize digital customer engagement solutions including webinars, digital communities, social media, videos, email and other digital means that target each of the specific users that use our different products. We intend to capitalize increasingly on segmentation to ensure we deliver targeted messages intended to address the specific needs of each market, customer and user.

Build an ecosystem. The relevance of our solutions in the markets we serve means that we have the opportunity to leverage third parties interested in building or expanding their businesses to increase our market penetration. The breadth of relationships that we establish will depend on the profile of the third-party company and the objectives specified to be achieved from the promotion and implementation of our products and solutions.

Pursue acquisitions. As part of our make-vs-buy analyses, we regularly explore and evaluate acquisitions. We have made several acquisitions in recent years and believe the opportunity exists to do more, especially as we seek to evolve our strategy to asset optimization and the maintenance area of the plant.

Expand our total addressable market. Our focus on innovation also means introducing product capabilities or new product categories that create value for our customers and therefore expand our total addressable market.

Products

Our integrated asset optimization software solutions are designed and developed specifically for the process industries. Customers use our solutions to improve their competitiveness and profitability by increasing throughput and productivity, reducing operating costs, enhancing capital efficiency, and decreasing working capital requirements. We have designed and developed our software applications across four principal business areas:

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Engineering. Our engineering software applications are used during both the design and the ongoing operation of plant facilities to model and improve the way engineers develop and deploy manufacturing assets. Process manufacturers must address a variety of challenges including design, operational improvement, collaborative engineering and economic evaluation. They must, for example, determine where they should locate facilities, how they can lower capital and manufacturing costs, what they should produce and how they can maximize plant efficiency.

Manufacturing. Our manufacturing software products focus on optimizing day-to-day processing activities, enabling customers to make better, faster decisions that lead to improved plant performance and operating results. These solutions include desktop and server applications that help customers make real-time decisions, which can reduce fixed and variable costs and improve product yields. Process manufacturers must address a wide range of manufacturing challenges such as optimizing execution efficiency, reducing costs, selecting the right raw materials, scheduling and coordinating production processes, and identifying an appropriate balance between turnaround times, delivery schedules, product quality, cost and inventory.

Supply Chain Management. Our supply chain management solutions include desktop and server applications that help customers optimize critical supply chain decisions in order to reduce inventory, increase asset efficiency, and respond more quickly to changing market conditions. Process manufacturers must address numerous challenges as they strive to effectively and efficiently manage raw materials inventory, production schedules and feedstock purchasing decisions. Supply chain managers face these challenges in an environment of ever-changing market prices, supply constraints and customer demands.

Asset Performance Management. Our asset performance management products are used to understand and predict the reliability of a system; be it multiple assets, a single asset, or equipment in a plant. Factors that impact reliability include how operating conditions degrade equipment performance over time, or how process conditions can lead to equipment failure. The APM suite is a comprehensive suite of machine learning and analytics technologies which can be used in a standalone or integrated manner with historical and real time asset and equipment data to help our customers predict when the equipment will fail and prescribe actions to avoid such occurrences, thereby improving return on capital employed.

Our software applications are currently offered in three suites: aspenONE Engineering, aspenONE Manufacturing and Supply Chain, and aspenONE Asset Performance Management. These suites are integrated applications that allow end users to design process manufacturing environments, monitor operational performance, respond and adapt to operational changes, predict asset reliability and equipment failure, and manage planning and scheduling activities as well as collaborate across these functions and activities. The three suites are designed around core modules and applications that allow customers to design, operate and maintain their process manufacturing environments, as shown below:

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aspenONE Engineering

Business Area	aspenONE Module	Major Products	Product Description
Engineering	Process Simulation for Energy	Aspen HYSYS	Process modeling software for the design and optimization of hydrocarbon processes, including flow assurance, refinery reactors, acid gas clean-up, and sulfur recovery
		Aspen Operator Training	Solution for developing and deploying dynamic plant simulations for the purpose of training plant operators to respond to operational and safety scenarios in a virtual training environment
	Process Simulation for Chemicals	Aspen Plus	Process modeling software for the design and optimization of chemical processes, including solids and batch processes
	Economic Evaluation	Aspen Economic Evaluation	Economic evaluation software for estimating project capital costs and lifecycle asset economics - from conceptual definition through detailed cost estimation
	Equipment Design & Rating	Aspen Exchanger Design and Rating	Software for the design, simulation and rating of various types of heat exchangers
	Basic Engineering	Aspen Basic Engineering	Collaborative platform for managing process engineering data and producing front-end design deliverables such as multi-disciplinary datasheets, process flow diagrams, piping and instrument diagrams, and equipment lists
	Operation Support	Aspen Online	Solution that connects process models to real-time plant data for expedited decisions, operational guidance, and optimization

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aspenONE Manufacturing and Supply Chain

Business Area	aspenONE Module	Major Products	Product Description
Manufacturing	Advanced Process Control	Aspen DMC3	Multi-variable controller software for maintaining processes at their optimal operating point under changing process conditions
		Aspen Watch Performance Monitor	Real-time monitoring and diagnostic information software to help engineers and operators focus on the problems that erode margins
	Manufacturing Execution Systems	Aspen Info Plus.21	Data historian software for storing, visualizing and analyzing large volumes of data to improve production execution and enhance performance management
		AspenONE Process Explorer	Software for combining process measurements, product characteristics, alarms, events and unstructured data for a complete view of production
Supply Chain	Refinery Planning & Scheduling	Aspen Production Record Manager	Easy and fast segmentation of production data into batches, campaigns or other logical groupings for easier analysis and production reporting
		Aspen Production Execution Manager	Workflow, order and recipe management software per cGMP guidelines that ensures operational consistency for improved yields, higher quality and lower production costs
		Aspen PIMS Advanced Optimization	Refinery planning software for optimizing feedstock selection, product slate and operational execution
	Supply & Distribution	Aspen Petroleum Scheduler	Refinery scheduling software for scheduling and optimization of refinery operations with integration to refinery planning, blending and dock operations
		Aspen Petroleum Supply Chain Planner	Economic planning software for optimizing the profitability of the petroleum distribution network, including transportation, raw materials, sales demands, and processing facilities
	Supply Chain Management	Aspen Fleet Optimizer	Software for inventory management and truck transportation optimization in secondary petroleum distribution
		Aspen Collaborative Demand Manager	Software for forecasting market demand and managing forecast through changes in the business environment by combining historical and real time data
Aspen Plant Scheduler		Software for generating optimal production schedules to meet total demand	
		Aspen Supply Planner	Software for determining the optimal production plan taking into account labor and equipment, feedstock, inbound /outbound transportation, storage capacity, and other variables

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aspenONE Asset Performance Management

Business Area	aspenONE Module	Major Products	Product Description
Asset Performance Management	Risk Analysis	Aspen Fidelis Reliability	Software for predicting the future performance of any system and quantifying the change in performance due to changes in design, capacity, operations, maintenance, logistics, market dynamics, and weather
	Process Analytics	Aspen ProMV	Multivariate analysis software for analyzing interrelated process data for continuous and batch processes, to identify the minimum critical set of variables driving product quality and process performance, and identifying optimal set points
	Equipment Analytics	Aspen Asset Analytics	Software for analyzing plant operations in real time to identify causal precursors that can lead to an unplanned downtime event
		Aspen Mtell	Software for recognizing unique data patterns as predictions of future equipment behavior
	Connect	Aspen Edge Connect	Software to collect data from assets, enterprise data sources, and MES systems using Industrial IoT technology, and integrating the data into enterprise systems on-premise or in the cloud
		Aspen Cloud Connect	

Our product development activities are currently focused on strengthening the integration of our applications and adding new capabilities that address specific operational business processes in each industry. As of June 30, 2018, we had a total of 505 employees in our research and development group, which is comprised of product management, software development and quality assurance. Research and development expenses were \$82.1 million in fiscal 2018, \$79.5 million in fiscal 2017 and \$67.2 million in fiscal 2016.

Sales and Marketing

We employ a value-based sales approach, offering our customers a comprehensive suite of software and services that enhance the efficiency and productivity of their engineering, manufacturing and supply chain and maintenance operations. We have increasingly focused on positioning our products as a strategic investment and therefore devote an increasing portion of our sales efforts to our customers' senior management, including senior decision makers in manufacturing, operations, maintenance and technology. Our aspenONE solution strategy supports this value-based approach by broadening the scope of optimization across the entire enterprise over its lifecycle, expanding the use of process models in the operations environment, and enabling the use of analytics and data science to enhance equipment and process reliability. We offer a variety of training programs focused on illustrating the capabilities of our applications as well as online training built into our applications. We have implemented incentive compensation programs for our sales force to reward efforts that increase customer usage of our products. Furthermore, we believe our aspenONE licensing model enables our sales force to develop consultative sales relationships with our customers. Historically, most of our license sales have been generated through our direct Field Sales organization. In order to market the specific functionality and other technical features of our software, our account managers work with specialized teams of technical sales personnel and product specialists organized for each sales and marketing effort. Our technical sales personnel typically have degrees in chemical engineering or related disciplines and actively consult with a customer's plant engineers. Product specialists share their detailed knowledge of the specific features of our software solutions as they apply to the unique business processes of different vertical industries. In addition to our direct Field Sales organization, we employ an inside sales team that targets customers in certain market segments. We have established channel relationships with select companies that we believe can help us pursue opportunities in non-core target markets. We also license our software products to universities that agree to use our products in teaching and research. We believe that students' familiarity with our products will stimulate future demand once the students enter the workplace.

We supplement our sales efforts with a variety of marketing initiatives, including industry analyst and public relations activities, campaigns to promote product usage and adoption, user group meetings and customer relationship programs. Our broad user base spans multiple verticals and geographies and these users possess a variety of skills, experience and business needs. In order to reach each of them in an effective, productive and leveraged manner we will increasingly capitalize on digital customer engagement solutions. Using webinars, digital communities, social media, videos, email and other digital means, we

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seek to engage our extensive user base with targeted messages intended to address the specific needs of each market, customer and user.

Our overall sales force, which consists of sales account managers, technical sales personnel, indirect-channel personnel, inside sales personnel, and marketing personnel, consisted of 453 employees as of June 30, 2018.

Software Maintenance and Support, Professional Services and Training

Software maintenance and support (“SMS”) consists primarily of providing customer technical support and access to software fixes and upgrades. Customer technical support services are provided throughout the world by our three global call centers as well as via email and through our support website. For license term arrangements entered into subsequent to our transition to a subscription-based licensing model, SMS is included with the license arrangement. For license arrangements that don’t include SMS, customers can purchase standalone SMS.

We offer professional services focused on implementation of our solution. Our professional services team primarily consists of project engineers with degrees in chemical engineering or a similar discipline, or who have significant relevant industry experience. Our employees include experts in fields such as thermophysical properties, distillation, adsorption processes, polymer processes, industrial reactor modeling, the identification of empirical models for process control or analysis, large-scale optimization, supply distribution systems modeling and scheduling methods. Our primary focus is the successful implementation and usage of our software, and in many instances, this work can be professionally performed by qualified third parties. As a result, we often compete with third-party consulting firms when bidding for professional services contracts, particularly in developed markets. We offer our services on either a time-and-material or fixed-price basis.

We offer a variety of training solutions ranging from standardized training, which can be delivered in a public forum, on-site at a customer's location or over the Internet, to customized training sessions, which can be tailored to fit customer needs. We have also introduced a wide range of online computer-based training courses offering customers on-demand training in basic and advanced features of our products directly from within the products. As of June 30, 2018, we had a total of 283 employees in our customer support, professional services and training groups.

Business Segments

We have two operating and reportable segments: i) subscription and software and ii) services. The subscription and software segment is engaged in the licensing of asset optimization software solutions and associated support services. The services segment includes professional services and training.

Competition

Our markets in general are competitive, and we expect the intensity of competition in our markets to increase as existing competitors enhance and expand their product and service offerings and as new participants enter the market. Increased competition may result in price reductions, reduced profitability and loss of market share. We cannot ensure that we will be able to compete successfully against existing or future competitors. Some of our customers and companies with which we have strategic relationships also are, or may become, competitors.

Many of our current and potential competitors have greater financial, technical, marketing, service and other resources than we have. As a result, these companies may be able to offer lower prices, additional products or services, or other incentives that we cannot match or offer. These competitors may be in a stronger position to respond more quickly to new technologies and may be able to undertake more extensive marketing campaigns. We believe they also have adopted and may continue to pursue more aggressive pricing policies and make more attractive offers to potential customers, employees and strategic partners. For example, some competitors may be able to initiate relationships through sales and installations of hardware and then seek to expand their customer relationships by offering asset optimization software at a discount. In addition, competitors with greater financial resources may make strategic acquisitions to increase their ability to gain market share or improve the quality or marketability of their products. Furthermore, we face challenges in selling our solutions to large companies in the process industries that have internally developed their own proprietary software solutions.

We seek to develop and offer integrated suites of targeted, high-value vertical industry solutions that can be implemented with relatively limited service requirements. We believe this approach provides us with an advantage over many of our competitors that offer software products that are point solutions or are more service-based. Our key competitive differentiators include:

• breadth, depth and integration of our aspenONE software offering;
• rapid return on investment and increase in profitability;

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- domain expertise of chemical engineering personnel;
- focus on software for the process industries;
- flexibility of our usage-based aspenONE licensing model; and
- consistent global support.

Proprietary Rights

Our software is proprietary and fundamental to our business. We rely on a combination of copyright, patent, trademark and trade secret laws in the United States and other jurisdictions, and on license and confidentiality agreements and technology measures to protect our proprietary technology and brand, and prevent unauthorized use of our software. We generally seek to protect our trade secrets by entering into non-disclosure agreements with our employees and customers, and historically have restricted access to our software and source code, which we regard as proprietary information. We have obtained or applied for patent protection with respect to some of our intellectual property and have registered or applied to register some of our trademarks in the United States and in selected other countries. We actively monitor use of our intellectual property and have enforced, and will continue to enforce, our intellectual property rights. In the United States, we are generally able to maintain our patents for up to 20 years from the earliest effective filing date, and to maintain our trademark registrations for as long as the trademarks are in use. The laws of many countries in which our products are licensed may not protect our intellectual property rights to the same extent as the laws of the United States. While we consider our intellectual property rights to be valuable, we do not believe that our competitive position in the industry can depend solely on obtaining legal protection for our software products and technology. Instead, we believe that the success of our business also depends on our ability to maintain a leadership position by continuing to develop innovative software products and technology. Our proprietary rights are subject to risks and uncertainties described under Item 1A. "Risk Factors" below. You should read that discussion, which is incorporated into this section by reference.

Licenses

In connection with our acquisition of Hyprotech Ltd. and related subsidiaries of AEA Technology plc in May 2002 and the consent decree we entered into with the Federal Trade Commission in December 2004 to resolve allegations that the acquisition was improperly anticompetitive, we and certain of our subsidiaries entered into a purchase and sale agreement with Honeywell International Inc. and certain of its subsidiaries, pursuant to which we sold intellectual property and other assets to Honeywell relating to our operator training business and our Hyprotech engineering software products. Under the terms of the transactions, we retained a perpetual, irrevocable, worldwide, royalty-free non-exclusive license to the Hyprotech engineering software and have the right to continue to develop, license and sell the Hyprotech engineering products.

In March 1982, we entered into a System License Agreement with the Massachusetts Institute of Technology, or MIT, granting us a worldwide, perpetual non-exclusive license (with the right to sublicense) to use, reproduce, distribute and create derivative works of the computer program known as "ASPEN" which provides a framework for simulating the steady-state behavior of chemical processes that we utilize in the simulation engine for our Aspen Plus product. MIT agreed that we would own any derivative works and enhancements. MIT has the right to terminate the agreement if: we breach it and do not cure the breach within 90 days after receiving a written notice from MIT; we cease to carry on our business; or certain bankruptcy or insolvency proceedings are commenced and not dismissed. In the event of such termination, sublicenses granted to our customers prior to termination will remain in effect.

Employees

As of June 30, 2018, we had a total of 1,466 full-time employees, of whom 789 were located in the United States. None of our employees is represented by a labor union, except for one employee of our subsidiary Hyprotech UK Limited who belongs to the Prospect union for professionals. We have experienced no work stoppages and believe that our employee relations are satisfactory.

Corporate Information

Aspen Technology, Inc. was formed in Massachusetts in 1981 and reincorporated in Delaware in 1998. Our principal executive offices are at 20 Crosby Drive, Bedford, MA 01730, and our telephone number at that address is (781) 221-6400. Our website address is <http://www.aspentech.com>. The information on our website is not part of this Form 10-K, unless expressly noted.

Available Information

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We file reports with the Securities and Exchange Commission, or the SEC, which we make available on our website free of charge. These reports include annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to such reports, each of which is provided on our website as soon as reasonably practicable after we electronically file such materials with or furnish them to the SEC. You can also read and copy any materials we file with the SEC at the SEC's Public Reference Room at 100 F Street, N.E., Washington, DC 20549. You can obtain additional information about the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330. In addition, the SEC maintains a website (<http://www.sec.gov>) that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC, including us.

Item 1A. Risk Factors.

Investing in our common stock involves a high degree of risk. You should carefully consider the risks and uncertainties described below before purchasing our common stock. The risks and uncertainties described below are not the only ones facing our company. Additional risks and uncertainties may also impair our business operations. If any of the following risks actually occurs, our business, financial condition, results of operations or cash flows would likely suffer. In that case, the trading price of our common stock could fall, and you may lose all or part of your investment in our common stock.

Risks Related to Our Business

If we fail to increase usage and product adoption of our aspenONE engineering and manufacturing and supply chain offerings and grow our aspenONE APM business, or fail to continue to provide innovative, market-leading solutions, we may be unable to implement our growth strategy successfully, and our business could be seriously harmed.

The maintenance and extension of our market leadership and our future growth is largely dependent upon our ability to increase usage and product adoption of our aspenONE engineering and manufacturing and supply chain offerings and grow our aspenONE APM business, and to develop new software products that achieve market acceptance with acceptable operating margins. Enterprises are requiring their application software vendors to provide greater levels of functionality and broader product offerings. We must continue to enhance our current product line and develop and introduce new products and services that keep pace with increasingly sophisticated customer requirements and the technological developments of our competitors. Our business and operating results could suffer if we cannot successfully execute our strategy and drive usage and product adoption.

We have implemented a product strategy that unifies our software solutions under the aspenONE brand with differentiated aspenONE vertical solutions targeted at specific capital-intensive industries. We cannot ensure that our product strategy will result in products that will continue to meet market needs and achieve significant usage and product adoption. If we fail to increase usage and product adoption or fail to develop or acquire new software products that meet the demands of our customers or our target markets, our operating results and cash flows from operations will grow at a slower rate than we anticipate and our financial condition could suffer.

Our business could suffer if we do not grow our aspenONE APM business or if the demand for, or usage of, our other aspenONE software declines for any reason, including declines due to adverse changes in the process and other capital-intensive industries.

We have introduced the aspenONE APM suite, and our aspenONE engineering and manufacturing and supply chain suites account for a significant majority of our revenue and will continue to do so for the foreseeable future. If we do not grow our aspenONE APM business or if demand for, or usage of, our other suites declines for any reason, our operating results, cash flows from operations and financial position would suffer. Our business could be adversely affected by:

- insufficient growth in our aspenONE APM business;
- any decline in demand for or usage of our aspenONE suites;
- the introduction of products and technologies that serve as a replacement or substitute for, or represent an improvement over, our aspenONE suites;
- technological innovations that our aspenONE suites do not address;
- our inability to release enhanced versions of our aspenONE suites on a timely basis; and
- adverse changes in capital intensive industries or otherwise that lead to reductions, postponements or cancellations of customer purchases of our products and services, or delays in the execution of license agreement renewals in the same

quarter in which the original agreements expire.

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Because of the nature of their products and manufacturing processes and their global operations, companies in the process and other capital-intensive industries are subject to risk of adverse or even catastrophic environmental, safety and health accidents or incidents and are often subject to changing standards and regulations worldwide.

In addition, worldwide economic downturns and pricing pressures experienced by energy, chemical, engineering and construction, and other capital-intensive industries have led to consolidations and reorganizations. In particular, we believe that the volatility in oil prices has impacted and may continue to impact the operating levels and capital spending by certain of our customers in the engineering and construction market, which has resulted and could continue to result in less predictable and lower demand for our products and services.

Any such adverse environmental, safety or health incident, change in regulatory standards, or economic downturn that affects the capital-intensive industries, including continued challenges and uncertainty among customers whose business is adversely affected by volatility in oil prices, as well as general domestic and foreign economic conditions and other factors that reduce spending by companies in these industries, could harm our operating results in the future. Unfavorable economic and market conditions or a lessening demand in the market for asset optimization software could adversely affect our operating results.

Our business is influenced by a range of factors that are beyond our control and difficult or impossible to predict. If the market for asset optimization software grows more slowly than we anticipate, demand for our products and services could decline and our operating results could be impaired. Further, the state of the global economy may deteriorate in the future. Our operating results may be adversely affected by unfavorable global economic and market conditions, including significant volatility in oil prices, as well as a lessening demand for asset optimization software generally.

Customer demand for our products is linked to the strength of the global economy. If weakness in the global economy persists, many customers, including those whose businesses are negatively impacted by lower oil prices, may delay or reduce technology purchases. This could result in reductions in sales of our products, longer sales cycles, slower adoption of new technologies, increased price competition or reduced use of our products by our customers. We will lose revenue if demand for our products is reduced because potential customers experience weak or deteriorating economic conditions, catastrophic environmental or other events, and our business, results of operations, financial condition and cash flow from operations would likely be adversely affected.

The majority of our revenue is attributable to operations outside the United States, and our operating results therefore may be materially affected by the economic, political, military, regulatory and other risks of foreign operations or of transacting business with customers outside the United States.

As of June 30, 2018, we operated in 32 countries. We sell our products primarily through a direct sales force located throughout the world. In the event that we are unable to adequately staff and maintain our foreign operations, we could face difficulties managing our international operations.

Customers outside the United States accounted for the majority of our total revenue during the fiscal years ended June 30, 2018, 2017 and 2016. We anticipate that revenue from customers outside the United States will continue to account for a significant portion of our total revenue for the foreseeable future. Our operating results attributable to operations outside the United States are subject to additional risks, including:

- unexpected changes in regulatory or environmental requirements, tariffs and other barriers, including, for example, changes in climate regulations, sanctions or other regulatory restrictions imposed by the United States or foreign governments; and the effects of the United Kingdom European Union membership referendum in June 2016 and the subsequent withdrawal process initiated in March 2017;
- less effective protection of intellectual property;
- requirements of foreign laws and other governmental controls;
- delays in the execution of license agreement renewals in the same quarter in which the original agreements expire;
- difficulties in collecting trade accounts receivable in other countries;
- adverse tax consequences; and
- the challenges of managing legal disputes in foreign jurisdictions.

Fluctuations in foreign currency exchange rates could result in declines in our reported revenue and operating results.

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During fiscal 2018, 2017 and 2016, 9.7%, 9.8% and 11.5% of our total revenue was denominated in a currency other than the U.S. dollar, respectively. In addition, certain of our operating expenses incurred outside the United States are denominated in currencies other than the U.S. dollar. Our reported revenue and operating results are subject to fluctuations in foreign exchange rates. Foreign currency risk arises primarily from the net difference between non-U.S. dollar receipts from customers outside the United States and non-U.S. dollar operating expenses for subsidiaries in foreign countries. Currently, our largest exposures to foreign exchange rates exist primarily with the Euro, Pound Sterling, Canadian Dollar and Japanese Yen against the U.S. dollar. During fiscal 2018, 2017 and 2016, we did not enter into, and were not a party to any, derivative financial instruments, such as forward currency exchange contracts, intended to manage the volatility of these market risks. We cannot predict the impact of foreign currency fluctuations, and foreign currency fluctuations in the future may adversely affect our revenue and operating results. Any hedging policies we may implement in the future may not be successful, and the cost of those hedging techniques may have a significant negative impact on our operating results.

Competition from software offered by current competitors and new market entrants, as well as from internally developed solutions by our customers, could adversely affect our ability to sell our software products and related services and could result in pressure to price our products in a manner that reduces our margins.

Our markets in general are competitive and differ among our principal product areas: engineering, manufacturing, supply chain management and asset performance management. We face challenges in selling our solutions to large companies that have internally developed their own proprietary software solutions, and we face competition from well-established vendors as well as new entrants in our markets. Many of our current and potential competitors have greater financial, technical, marketing, service and other resources than we have. As a result, these companies may be able to offer lower prices, additional products or services, or other incentives that we cannot match or offer. These competitors may be in a stronger position to respond more quickly to new technologies and may be able to undertake more extensive marketing campaigns. We believe they also have adopted and may continue to pursue more aggressive pricing policies and make more attractive offers to potential customers, employees and strategic partners. For example, some competitors may be able to initiate relationships through sales and installations of hardware and then seek to expand their customer relationships by offering asset optimization software at a discount. In addition, many of our competitors have established, and may in the future continue to establish, cooperative relationships with third parties to improve their product offerings and to increase the availability of their products in the marketplace. Competitors with greater financial resources may make strategic acquisitions to increase their ability to gain market share or improve the quality or marketability of their products.

Competition could seriously impede our ability to sell additional software products and related services on terms favorable to us. Businesses may continue to enhance their internally developed solutions, rather than investing in commercial software such as ours. Our current and potential commercial competitors may develop and market new technologies that render our existing or future products obsolete, unmarketable or less competitive. In addition, if these competitors develop products with similar or superior functionality to our products, we may need to decrease the prices for our products in order to remain competitive. If we are unable to maintain our current pricing due to competitive pressures, our margins will be reduced and our operating results will be negatively affected. We cannot ensure that we will be able to compete successfully against current or future competitors or that competitive pressures will not materially adversely affect our business, financial condition and operating results.

Defects or errors in our software products could harm our reputation, impair our ability to sell our products and result in significant costs to us.

Our software products are complex and may contain undetected defects or errors. We have not suffered significant harm from any defects or errors to date, but we have from time to time found defects in our products and we may discover additional defects in the future. We may not be able to detect and correct defects or errors before releasing products. Consequently, we or our customers may discover defects or errors after our products have been implemented. We have in the past issued, and may in the future need to issue, corrective releases of our products to remedy defects or errors. The occurrence of any defects or errors could result in:

- lost or delayed market acceptance and sales of our products;
- delays in payment to us by customers;

- product returns;
- injury to our reputation;
- diversion of our resources;
- increased service and warranty expenses or financial concessions;

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• increased insurance costs; and

• legal claims, including product liability claims.

Defects and errors in our software products could result in claims for substantial damages against us.

Potential acquisitions could be difficult to consummate and integrate into our operations, and they and investment transactions could disrupt our business, dilute stockholder value or impair our financial results.

As part of our business strategy, we may continue from time to time to seek to grow our business through acquisitions of or investments in new or complementary businesses, technologies or products that we believe can improve our ability to compete in our existing customer markets or allow us to enter new markets. The potential risks associated with acquisitions and investment transactions include, but are not limited to:

• failure to realize anticipated returns on investment, cost savings and synergies;

• difficulty in assimilating the operations, policies and personnel of the acquired company;

• unanticipated costs associated with acquisitions;

• challenges in combining product offerings and entering into new markets in which we may not have experience;

• distraction of management's attention from normal business operations;

• potential loss of key employees of the acquired company;

• difficulty implementing effective internal controls over financial reporting and disclosure controls and procedures;

• impairment of relationships with customers or suppliers;

• possibility of incurring impairment losses related to goodwill and intangible assets; and

• other issues not discovered in due diligence, which may include product quality issues or legal or other contingencies

Acquisitions and/or investments may also result in potentially dilutive issuances of equity securities, the incurrence of debt and contingent liabilities, the expenditure of available cash, and amortization expenses or write-downs related to intangible assets such as goodwill, any of which could have a material adverse effect on our operating results or financial condition. Investments in immature businesses with unproven track records and technologies have an especially high degree of risk, with the possibility that we may lose our entire investment or incur unexpected liabilities. We may experience risks relating to the challenges and costs of closing a business combination or investment transaction and the risk that an announced business combination or investment transaction may not close. There can be no assurance that we will be successful in making additional acquisitions in the future or in integrating or executing on our business plan for existing or future acquisitions.

We may be subject to significant expenses and damages because of product-related claims.

In the ordinary course of business, we are, from time to time, involved in lawsuits, claims, investigations, proceedings and threats of litigation. These matters include an April 2004 claim by a customer that certain of our software products and implementation services failed to meet the customer's expectations. In March 2014, a judgment was issued by the trial court against us in the amount of approximately 1.9 million Euro ("€") plus interest and a portion of legal fees. We subsequently filed an appeal of that judgment. In March 2016, the appellate court determined that we are liable for damages in the amount of approximately €1.7 million plus interest, with the possibility of additional damages to be determined in further proceedings by the appellate court. In December 2017, the appellate court issued a final judgment against us in the amount of approximately €3.5 million, including interest, plus approximately €0.2 million in costs and legal fees. As of June 30, 2018, all payments associated with this judgment have been paid.

The amount of damages cannot be predicted with certainty, and could materially adversely affect our results of operations, cash flows or financial position.

Claims that we infringe the intellectual property rights of others may be costly to defend or settle and could damage our business.

We cannot be certain that our software and services do not infringe patents, copyrights, trademarks or other intellectual property rights, so infringement claims might be asserted against us. In addition, we have agreed, and may agree in the future, to indemnify certain of our customers against infringement claims that third parties may assert against our customers based on

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use of our software or services. Such claims may have a material adverse effect on our business, may be time-consuming and may result in substantial costs and diversion of resources, including our management's attention to our business. Furthermore, a party making an infringement claim could secure a judgment that requires us to pay substantial damages and could also include an injunction or other court order that could prevent us from selling our software or require that we re-engineer some or all of our products. Claims of intellectual property infringement also might require us to enter costly royalty or license agreements. We may be unable to obtain royalty or license agreements on terms acceptable to us or at all. Our business, operating results and financial condition could be harmed significantly if any of these events were to occur, and the price of our common stock could be adversely affected. We may not be able to protect our intellectual property rights, which could make us less competitive and cause us to lose market share.

Our software is proprietary. Our strategy is to rely on a combination of copyright, patent, trademark and trade secret laws in the United States and other jurisdictions, and to rely on license and confidentiality agreements and software security measures to further protect our proprietary technology and brand. We have obtained or applied for patent protection with respect to some of our intellectual property, but generally do not rely on patents as a principal means of protecting our intellectual property. We have registered or applied to register some of our trademarks in the United States and in selected other countries. We generally enter into non-disclosure agreements with our employees and customers, and historically have restricted third-party access to our software and source code, which we regard as proprietary information. In certain cases, we have provided copies of source code to customers for the purpose of special product customization or have deposited copies of the source code with a third-party escrow agent as security for ongoing service and license obligations. In these cases, we rely on non-disclosure and other contractual provisions to protect our proprietary rights.

The steps we have taken to protect our proprietary rights may not be adequate to deter misappropriation of our technology or independent development by others of technologies that are substantially equivalent or superior to our technology. Our intellectual property rights may expire or be challenged, invalidated or infringed upon by third parties or we may be unable to maintain, renew or enter into new licenses on commercially reasonable terms. Any misappropriation of our technology or development of competitive technologies could harm our business and could diminish or cause us to lose the competitive advantages associated with our proprietary technology, and could subject us to substantial costs in protecting and enforcing our intellectual property rights, and/or temporarily or permanently disrupt our sales and marketing of the affected products or services. The laws of some countries in which our products are licensed do not protect our intellectual property rights to the same extent as the laws of the United States. Moreover, in some non-U.S. countries, laws affecting intellectual property rights are uncertain in their application, which can affect the scope of enforceability of our intellectual property rights.

Our software research and development initiatives and our customer relationships could be compromised if the security of our information technology is breached as a result of a cyber-attack. This could have a material adverse effect on our business, operating results and financial condition, and could harm our competitive position. We devote significant resources to continually updating our software and developing new products, and our financial performance is dependent in part upon our ability to bring new products and services to market. Our customers use our software to optimize their manufacturing processes and manage asset performance, and they rely on us to provide updates and releases as part of our software maintenance and support services, and to provide remote on-line troubleshooting support. The security of our information technology environment is therefore important to our research and development initiatives, and an important consideration in our customers' purchasing decisions. We maintain cybersecurity policies and procedures, including employee training, to manage risk to our information systems, and we continually evaluate and adapt our systems and processes to mitigate evolving cybersecurity threats. We may incur additional costs to maintain appropriate cybersecurity protections in response to evolving cybersecurity threats, and we may not be able to safeguard against all data security breaches or misuses of data. If the security of our systems is impaired, our development initiatives might be disrupted, and we might be unable to provide service. Our customer relationships might deteriorate, our reputation in the industry could be harmed, and we could be subject to liability claims. This could reduce our revenues, and expose us to significant costs to detect, correct and avoid recurrences of any breach of security and to defend any claims against us. In addition, our insurance coverage may not

be adequate to cover all costs related to cybersecurity incidents and the disruptions resulting from such events.

Risks Related to Our Common Stock

Our common stock may experience substantial price and volume fluctuations.

The equity markets have from time to time experienced extreme price and volume fluctuations, particularly in the high technology sector, and those fluctuations often have been unrelated to the operating performance of particular companies. In addition, the market price of our common stock may be affected by other factors, such as: (i) our financial performance; (ii)

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announcements of technological innovations or new products by us or our competitors; and (iii) market conditions in the computer software or hardware industries.

In the past, following periods of volatility in the market price of a public company's securities, securities class action litigation has often been instituted against that company. This type of litigation against us could result in substantial liability and costs and divert management's attention and resources.

Our corporate documents and provisions of Delaware law may prevent a change in control or management that stockholders may consider desirable.

Section 203 of the Delaware General Corporation Law, our charter and our by-laws contain provisions that might enable our management to resist a takeover of our company. These provisions include:

• limitations on the removal of directors;

• a classified board of directors, so that not all members of the board are elected at one time;

• advance notice requirements for stockholder proposals and nominations;

• the inability of stockholders to act by written consent or to call special meetings;

• the ability of the board to make, alter or repeal our by-laws; and

• the ability of the board to designate the terms of and issue new series of preferred stock without stockholder approval.

These provisions could:

• have the effect of delaying, deferring or preventing a change in control of our company or a change in our management that stockholders may consider favorable or beneficial;

• discourage proxy contests and make it more difficult for stockholders to elect directors and take other corporate actions; and

• limit the price that investors might be willing to pay in the future for shares of our common stock.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

Our principal executive offices are located in leased facilities in Bedford, Massachusetts, consisting of approximately 143,000 square feet of office space to accommodate our product development, sales, marketing, operations, finance and administrative functions. The lease for our Bedford executive offices commenced in November 2014 and is scheduled to expire March 2025. Subject to the terms and conditions of the lease, we may extend the term of the lease for two successive terms of five years each.

We also lease approximately 63,000 square feet in Houston, Texas to accommodate sales, services and product development functions. In addition to our Bedford and Houston locations, we lease office space in Shanghai, Reading (UK), Singapore, Bahrain and Tokyo, to accommodate sales, services and product development functions.

In the remainder of our other locations, the majority of our leases have lease terms of one year or less that are generally based on the number of workstations required. We believe this facilities strategy provides us with significant flexibility to adjust to changes in our business environment. We do not own any real property. We believe that our leased facilities are adequate for our anticipated future needs.

Item 3. Legal Proceedings.

Refer to Note 15, "Commitments and Contingencies," to our Consolidated Financial Statements for information regarding certain legal proceedings, the contents of which are herein incorporated by reference.

Item 4. Mine Safety Disclosures

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None.

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PART II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Market Information

Our common stock currently trades on The NASDAQ Global Select Market under the symbol "AZPN." The closing price of our common stock on June 30, 2018 was \$92.74. The following table sets forth, for the periods indicated, the high and low sales prices per share of our common stock as reported by The NASDAQ Global Select Market:

Period	2018		2017	
	Low	High	Low	High
Quarter ended June 30	\$77.29	\$99.79	\$54.42	\$63.05
Quarter ended March 31	66.17	82.88	52.79	59.46
Quarter ended December 31	63.61	69.18	46.07	55.09
Quarter ended September 30	55.05	64.57	39.67	47.02

Holders

On August 1, 2018, there were 358 holders of record of our common stock. The number of record holders does not include persons who held our common stock in nominee or "street name" accounts through brokers.

Dividends

We have never declared or paid cash dividends on our common stock. We do not anticipate paying cash dividends on our common stock in the foreseeable future. On February 26, 2016, we entered into a \$250.0 million Credit Agreement (the "Credit Agreement") with JPMorgan Chase Bank, N.A., as administrative agent, Silicon Valley Bank, as syndication agent, and the lenders and other parties named therein (the "Lenders"). On August 9, 2017, we entered into an Amendment to increase the Credit Agreement to \$350.0 million. The Credit Agreement restricts us from declaring or paying dividends in cash on our capital stock if our Leverage Ratio is in excess of 2.75 to 1.00 (refer to "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" and Note 10, "Credit Agreement," to our Consolidated Financial Statements for further discussion of the Credit Agreement). Our Leverage Ratio is below 2.75 to 1.00 as of June 30, 2018. Any future determination relating to our dividend policy will be made at the discretion of the Board of Directors and will depend on a number of factors, including our future earnings, capital requirements, financial condition and future prospects and such other factors as the Board of Directors may deem relevant.

Purchases of Equity Securities by the Issuer

As of June 30, 2018, the total number of shares of common stock repurchased since November 1, 2010 under all programs approved by the Board of Directors was 31,943,599 shares.

On January 22, 2015, our Board of Directors approved a share repurchase program (the "Share Repurchase Program") for up to \$450 million worth of our common stock. On April 26, 2016, June 8, 2017, and April 18, 2018, the Board of Directors approved a \$400 million, \$200 million, and \$200 million increase in our current share repurchase plan, respectively. Under the share repurchase program, purchases can be made from time to time using a variety of methods, which may include open market purchases, accelerated buyback programs, and others. The specific timing, price and size of purchases will depend on prevailing stock prices, general market and economic conditions, and other considerations, including the amount of cash generated in the United States and other potential uses of cash, such as acquisitions. Purchases may be made through a Rule 10b5-1 plan pursuant to predetermined metrics set forth in such plan. The Board of Directors' authorization of the share repurchase program does not obligate us to acquire any particular amount of common stock, and the program may be suspended or discontinued at any time.

During fiscal 2018, we repurchased 2,797,623 shares of our common stock in the open market for \$200.0 million.

During fiscal 2017, we repurchased 5,185,257 shares of our common stock in the open market for \$275.0 million and 2,106,709 shares of our common stock for \$100.0 million as part of an accelerated share repurchase program. During fiscal 2016, we repurchased 4,750,692 shares of our common stock in the open market for \$180.1 million.

As of June 30, 2018, the total remaining value under the Share Repurchase Program was approximately \$346.3 million.

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The following table sets forth, for the month indicated, our purchases of common stock during the fourth quarter of fiscal 2018:

Issuer Purchases of Equity Securities

Period	Total Number of Shares Purchased (2)	Average Price Paid per Share (3)	Total Number of Shares Purchased as Part of Publicly Announced Program (1)	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Program (4)
April 1 to 30, 2018	176,900	\$ 83.11	176,900	
May 1 to 31, 2018	195,289	92.36	195,289	
June 1 to 30, 2018	180,447	95.66	180,447	
	552,636	\$ 90.48	552,636	\$ 346,292,952

(1) On January 22, 2015, our Board of Directors approved a share repurchase program (the "Share Repurchase Program") for up to \$450 million worth of our common stock. On April 26, 2016, June 8, 2017, and April 18, 2018, the Board of Directors approved a \$400 million, \$200 million, and \$200 million increase in our current share repurchase plan, respectively.

(2) As of June 30, 2018, the total number of shares of common stock repurchased under all programs approved by the Board of Directors was 31,943,599, including purchases under an accelerated share repurchase program.

(3) The total average price paid per share is calculated as the total amount paid for the repurchase of our common stock during the period divided by the total number of shares repurchased.

(4) As of June 30, 2018, the total remaining value under the Share Repurchase Program approved on January 22, 2015 and amended on April 26, 2016, June 8, 2017, and April 18, 2018 was approximately \$346.3 million.

Securities Authorized for Issuance Under Equity Compensation Plans

The following table provides information about the securities authorized for issuance under our equity compensation plans as of June 30, 2018:

Plan Category	Number of securities to be issued upon exercise of outstanding options, warrants and rights (a)	Weighted-average exercise price of outstanding options, warrants and rights (b)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (c)
Equity compensation plans approved by security holders	1,991,142	\$ 48.34	8,170,674

Equity compensation plans approved by security holders consist of our 2010 and 2016 equity incentive plans. Options issuable under the equity incentive plan have a maximum term of ten years.

Stockholder Return Comparison

The information included in this section is not deemed to be "soliciting material" or to be "filed" with the SEC or subject to Regulation 14A or 14C under the Securities Exchange Act or to the liabilities of Section 18 of the Securities Exchange Act, and will not be deemed to be incorporated by reference into any filing under the Securities Act or the Securities Exchange Act, except to the extent we specifically incorporate it by reference into such a filing.

The graph below matches the cumulative 5-year total return of holders of our common stock with the cumulative total returns of the NASDAQ Composite index and the NASDAQ Computer & Data Processing index. The graph assumes that the value of the investment in our common stock and in each of the indexes (including reinvestment of dividends) was \$100 on June 30, 2013 and tracks it through June 30, 2018.

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*\$100 invested on 6/30/13 in stock or index, including reinvestment of dividends.

Fiscal year ending June 30.

The stock price performance included in this graph is not necessarily indicative of future stock price performance.

	Year Ended June 30,					
	2013	2014	2015	2016	2017	2018
Aspen Technology, Inc.	\$100.00	\$161.17	\$158.21	\$139.77	\$191.94	\$322.13
NASDAQ Composite	\$100.00	\$132.45	\$151.00	\$148.88	\$189.66	\$233.12
NASDAQ Computer & Data Processing	\$100.00	\$136.90	\$148.29	\$172.95	\$226.96	\$300.54

Item 6. Selected Financial Data.

The following tables present selected consolidated financial data for Aspen Technology, Inc. The consolidated statements of operations data set forth below for fiscal 2018, 2017 and 2016 and the consolidated balance sheets data as of June 30, 2018, and 2017, are derived from our consolidated financial statements included beginning on page F-1 of this Form 10-K. The consolidated statements of operations data for fiscal 2015 and 2014 and the consolidated balance sheet data as of June 30, 2016, 2015, and 2014 are derived from our consolidated financial statements that are not included in this Form 10-K. The data presented below should be read in conjunction with our consolidated financial statements and accompanying notes beginning on page F-1 and "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations."

Our historical results should not be viewed as indicative of results expected for any future period.

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	Year Ended June 30,				
	2018	2017	2016	2015	2014
	(in Thousands, except per share data)				
Consolidated Statements of Operations Data:					
Revenue(1)	\$499,514	\$482,942	\$472,344	\$440,401	\$391,453
Gross profit	448,870	435,476	423,733	390,825	338,765
Income from operations	209,641	212,016	211,381	179,792	129,724
Net income	\$148,688	\$162,196	\$139,951	\$118,407	\$85,783
Basic income per share	\$2.06	\$2.12	\$1.69	\$1.34	\$0.93
Diluted income per share	\$2.04	\$2.11	\$1.68	\$1.33	\$0.92
Weighted average shares outstanding—Basic	72,140	76,491	82,892	88,398	92,648
Weighted average shares outstanding—Diluted	72,956	76,978	83,309	89,016	93,665

In July 2009, we introduced our aspenONE licensing model under which license revenue is recognized over the (1) term of a license contract. We previously recognized a substantial majority of our license revenue upfront, upon shipment of software. We substantially completed our transition to the aspenONE licensing model in fiscal 2015.

	Year Ended June 30,				
	2018	2017	2016	2015	2014
	(in Thousands)				
Consolidated Balance Sheet Data:					
Cash and cash equivalents	\$96,165	\$101,954	\$318,336	\$156,249	\$199,526
Marketable securities	—	—	3,006	62,244	98,889
Accounts receivable, net	21,910	27,670	20,476	30,721	38,532
Installments receivable, net	—	—	267	1,842	1,451
Total assets	264,924	247,942	419,738	315,361	407,972
Borrowings (1)	170,000	140,000	140,000	—	—
Deferred revenue	315,104	300,359	282,078	288,887	274,882
Working (deficit) capital	(371,103)	(321,057)	(71,300)	(32,836)	63,178
Total stockholders' (deficit) equity	(284,115)	(260,784)	(75,034)	(48,546)	83,676

In February 2016, we entered into a Credit Agreement. Refer to “Item 7. Management's Discussion and Analysis of (1) Financial Condition and Results of Operations” and Note 10, "Credit Agreement," to our Consolidated Financial Statements for further discussion of the Credit Agreement.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations.

You should read the following discussion in conjunction with our consolidated financial statements and related notes beginning on page F-1. In addition to historical information, this discussion contains forward-looking statements that involve risks and uncertainties. You should read “Item 1A. Risk Factors” for a discussion of important factors that could cause our actual results to differ materially from our expectations.

Our fiscal year ends on June 30, and references to a specific fiscal year are the twelve months ended June 30 of such year (for example, "fiscal 2018" refers to the year ended June 30, 2018).

Business Overview

We are a leading global supplier of asset optimization solutions that optimize asset design, operations and maintenance in complex, industrial environments. We combine decades of process modeling and operations expertise with big data machine-learning and analytics. Our purpose-built software solutions improve the competitiveness and profitability of our customers by increasing throughput, energy efficiency, and production, reducing unplanned downtime, enhancing capital efficiency, and decreasing working capital requirements over the entire asset lifecycle to support operational excellence.

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Our software incorporates our proprietary mathematical and empirical models of manufacturing and planning processes and reflects the deep domain expertise we have amassed from focusing on solutions for the process and other capital-intensive industries for over 35 years. We have developed our applications to design and optimize processes across three principal business areas: engineering, manufacturing and supply chain, and asset performance management. We are a recognized market and technology leader in providing process optimization and asset performance management software solutions for each of these business areas.

We have established sustainable competitive advantages based on the following strengths:

- Innovative products that can enhance our customers' profitability and productivity;
- Long-term customer relationships;
- Large installed base of users of our software; and
- Long-term license contracts.

We have approximately 2,200 customers globally. Our customers consist of companies engaged in the process and other capital-intensive industries such as energy, chemicals, engineering and construction, as well as pharmaceuticals, transportation, power, metals and mining, pulp and paper, and consumer packaged goods.

Business Segments

We have two operating and reportable segments: i) subscription and software and ii) services. The subscription and software segment is engaged in the licensing of asset optimization software solutions and associated support services. The services segment includes professional services and training.

Key Components of Operations

Revenue

We generate revenue primarily from the following sources:

Subscription and Software Revenue. We sell our software products to end users primarily under fixed-term licenses. We license our software products primarily through a subscription offering which we refer to as our aspenONE licensing model, which includes software maintenance and support, known as our Premier Plus SMS offering, for the entire term. Our aspenONE products are organized into three suites: 1) engineering; 2) manufacturing and supply chain; and 3) asset performance management. The aspenONE licensing model provides customers with access to all of the products within the aspenONE suite(s) they license. Customers can change or alternate the use of multiple products in a licensed suite through the use of exchangeable units of measurement, called tokens, licensed in quantities determined by the customer. This licensing system enables customers to use products as needed and to experiment with different products to best solve whatever critical business challenges they face. Customers can increase their usage of our software by purchasing additional tokens as business needs evolve.

We provide customers technical support, access to software fixes and updates and the right to any new unspecified future software products and updates that may be introduced into the licensed aspenONE software suite. Our technical support services are provided from our customer support centers throughout the world, as well as via email and through our support website.

We also license our software through point product arrangements with our Premier Plus SMS offering included for the contract term, as well as perpetual license arrangements.

Services and Other Revenue. We provide training and professional services to our customers. Our professional services are focused on implementing our technology in order to improve customers' plant performance and gain better operational data. Customers who use our professional services typically engage us to provide those services over periods of up to 24 months. We charge customers for professional services on a time-and-materials or fixed-price basis. We provide training services to our customers, including on-site, Internet-based and customized training.

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Our services and other revenue consists of revenue related to professional services and training. The amount and timing of this revenue depend on a number of factors, including:

- whether the professional services arrangement was sold as a single arrangement with, or in contemplation of, a new aspenONE licensing arrangement;
- the number, value and rate per hour of service transactions booked during the current and preceding periods;
- the number and availability of service resources actively engaged on billable projects;
- the timing of milestone acceptance for engagements contractually requiring customer sign-off;
- the timing of collection of cash payments when collectability is uncertain;
- and
- the size of the installed base of license contracts.

Cost of Revenue

Cost of Subscription and Software. Our cost of subscription and software revenue consists of (i) royalties, (ii) amortization of capitalized software and intangibles, (iii) distribution fees, and (iv) costs of providing Premier Plus SMS bundled with our aspenONE licensing and point product arrangements.

Cost of Services and Other. Our cost of services and other revenue consists primarily of personnel-related and external consultant costs associated with providing customers professional services and training.

Operating Expenses

Selling and Marketing Expenses. Selling expenses consist primarily of the personnel and travel expenses related to the effort expended to license our products and services to current and potential customers, as well as for overall management of customer relationships. Marketing expenses include expenses needed to promote our company and our products and to conduct market research to help us better understand our customers and their business needs.

Research and Development Expenses. Research and development expenses consist primarily of personnel expenses related to the creation of new software products, enhancements and engineering changes to existing products and costs of acquired technology prior to establishing technological feasibility.

General and Administrative Expenses. General and administrative expenses include the costs of corporate and support functions, such as executive leadership and administration groups, finance, legal, human resources and corporate communications, and other costs, such as outside professional and consultant fees and provision for bad debts.

Other Income and Expenses

Interest Income. Interest income is recorded for the accretion of interest on the investment in marketable securities and short-term money market instruments.

Interest Expense. Interest expense is primarily related to our Credit Agreement.

Other Income (Expense), Net. Other income (expense), net is comprised primarily of foreign currency exchange gains (losses) generated from the settlement and remeasurement of transactions denominated in currencies other than the functional currency of our operating units. During fiscal 2017, other income also included a \$0.7 million litigation related recovery receipt.

Provision for Income Taxes. Provision for income taxes is comprised of domestic and foreign taxes. We record interest and penalties related to income tax matters as a component of income tax expense. Our effective income tax rate may fluctuate between fiscal years and from quarter to quarter due to items arising from discrete events, such as tax benefits from the disposition of employee equity awards, settlements of tax audits and assessments and tax law changes. Our effective income tax rate is also impacted by, and may fluctuate in any given period because of, the composition of income in foreign jurisdictions where tax rates differ.

Key Business Metrics

Background

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We utilize certain key non-GAAP and other business measures to track and assess the performance of our business and we make these measures available to investors. We have refined the set of appropriate business metrics in the context of our evolving business and use the following non-GAAP business metrics in addition to GAAP measures to track our business performance:

• Annual spend;

• Free cash flow; and

• Non-GAAP operating income.

None of these metrics should be considered as an alternative to any measure of financial performance calculated in accordance with GAAP.

Annual Spend

Annual spend is an estimate of the annualized value of our portfolio of term license arrangements, as of a specific date. Management believes that this financial measure is a useful metric to investors as it provides insight into the growth component of license bookings during a fiscal period. Annual spend is calculated by summing the most recent annual invoice value of each of our active term license contracts. Annual spend also includes the annualized value of standalone SMS agreements purchased in conjunction with term license agreements. Comparing annual spend for different dates can provide insight into the growth and retention rates of our business, and since annual spend represents the estimated annualized billings associated with our active term license agreements, it provides insight into the future value of subscription and software revenue.

Annual spend increases as a result of:

• New term license agreements with new or existing customers;

• Renewals or modifications of existing term license agreements that result in higher license fees due to price escalation or an increase in the number of tokens (units of software usage) or products licensed; and

• Escalation of annual payments in our active term license contracts.

Annual spend is adversely affected by term license and standalone SMS agreements that are renewed at a lower entitlement level or not renewed and, to a lesser extent, by customer contracts that are terminated during the contract term due to the customer's business ceasing operations.

We estimate that annual spend grew by approximately 6.4% during fiscal 2018, from \$459.6 million at June 30, 2017 to \$489.3 million at June 30, 2018. We estimate that annual spend grew by approximately 4.1% during fiscal 2017, from \$441.4 million at June 30, 2016 to \$459.6 million at June 30, 2017. The growth was attributable primarily to an increase in the number of tokens or products sold.

Free Cash Flow

We use a non-GAAP measure of free cash flow to analyze cash flows generated from our operations. Management believes that this financial measure is useful to investors because it permits investors to view our performance using the same tools that management uses to gauge progress in achieving our goals. We believe this measure is also useful to investors because it is an indication of cash flow that may be available to fund investments in future growth initiatives or to repay borrowings under the Credit Agreement, and it is a basis for comparing our performance with that of our competitors. The presentation of free cash flow is not meant to be considered in isolation or as an alternative to cash flows from operating activities as a measure of liquidity.

Free cash flow is calculated as net cash provided by operating activities adjusted for the net impact of (a) purchases of property, equipment and leasehold improvements, (b) capitalized computer software development costs, (c) excess tax benefits from stock-based compensation, (d) non-capitalized acquired technology, and (e) other nonrecurring items, such as acquisition related payments and litigation related payments (receipts).

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The following table provides a reconciliation of GAAP cash flow from operating activities to free cash flow for the indicated periods:

	June 30,		
	2018	2017	2016
	(Dollars in Thousands)		
GAAP cash flow from operating activities	\$206,936	\$182,386	\$153,744
Purchase of property, equipment, and leasehold improvements	(331)	(2,720)	(3,483)
Capitalized computer software development costs	(329)	(405)	(269)
Excess tax benefits from stock-based compensation	—	5,965	2,208
Non-capitalized acquired technology	75	2,246	1,250
Litigation related payments (receipts)	4,546	(721)	3,040
Acquisition related fee payments	1,148	448	8,649
Free cash flow (non-GAAP)	\$212,045	\$187,199	\$165,139

Excess tax benefits are related to stock-based compensation tax deductions in excess of book compensation expense and reduce our income taxes payable. We have included the impact of excess tax benefits within free cash flow in fiscal 2017 and 2016 to be consistent with the treatment of other tax benefits. As a result of adopting ASU No. 2016-09, effective July 1, 2017, excess tax benefits from stock-based compensation are now reflected in the consolidated statements of operations as a component of the provision for income taxes, whereas they were previously a component of stockholders' deficit. For a more detailed description of the standard, refer to Note 2, "Significant Accounting Policies," to our Consolidated Financial Statements.

In fiscal 2018, 2017 and 2016, we have excluded payments of \$0.1 million, \$2.2 million, and \$1.3 million, respectively, for non-capitalized acquired technology (including \$0.1 million and \$0.5 million in fiscal 2018 and 2017, respectively, of final payments related to non-capitalized acquired technology from prior fiscal years) from free cash flow to be consistent with the treatment of other transactions where the acquired technology assets were capitalized. In fiscal 2018 and 2016, we have excluded litigation related payments of \$4.5 million and \$3.0 million, respectively. Refer to Note 15, "Commitments and Contingencies," to our Consolidated Financial Statements. In fiscal 2017, we have excluded a \$(0.7) million litigation related recovery receipt.

Fiscal 2018 Compared to Fiscal 2017

Total free cash flow increased \$24.8 million during fiscal 2018 as compared to the prior fiscal year primarily due to changes in working capital. For a more detailed description of these changes refer to "Liquidity and Capital Resources."

Fiscal 2017 Compared to Fiscal 2016

Total free cash flow increased \$22.1 million during fiscal 2017 as compared to the prior fiscal year primarily due to higher net income of \$22.2 million. For a more detailed description of these changes refer to "Liquidity and Capital Resources."

Non-GAAP Operating Income

Non-GAAP operating income excludes certain non-cash and non-recurring expenses, and is used as a supplement to operating income presented on a GAAP basis. We believe that non-GAAP operating income is a useful financial measure because removing certain non-cash and other items provides additional insight into recurring profitability and cash flow from operations.

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The following table presents our net income, as adjusted for stock-based compensation expense, non-capitalized acquired technology and amortization of purchased technology intangibles, and other items, such as litigation judgments and acquisition related expenses, for the indicated periods:

	June 30,			2018 Compared to		2017 Compared			
	2018	2017	2016	2017	%	to 2016	%		
GAAP income from operations	\$209,641	\$212,016	\$211,381	\$ (2,375)	(1.1)%	\$ 635	0.3	%	
Plus:									
Stock-based compensation	22,688	18,800	15,727	3,888	20.7 %	3,073	19.5	%	
Non-capitalized acquired technology	—	2,250	250	(2,250)	(100.0)%	2,000	800.0	%	
Amortization of intangibles	2,231	950	147	1,281	134.8 %	803	546.3	%	
Litigation judgment	1,689	—	—	1,689	100.0 %	—	—	%	
Acquisition related fees	721	1,754	5,213	(1,033)	(58.9)%	(3,459)	(66.4)%		
Non-GAAP operating income	\$236,970	\$235,770	\$232,718	\$1,200	0.5 %	\$3,052	1.3	%	

Non-GAAP operating income increased \$1.2 million, or approximately 1%, in fiscal year 2018 as compared to the prior year primarily due to a larger base of license arrangements recognized on a ratable basis amounting to \$17.5 million. Non-GAAP operating income increased \$3.1 million, or approximately 1%, in 2017 as compared to the prior year due to an increase in revenue primarily due to a larger base of license arrangements recognized on a ratable basis amounting to \$13.1 million.

In fiscal 2017 and 2016, we acquired technology that did not meet the accounting requirements for capitalization and therefore the cost of the acquired technology was expensed as research and development. We have excluded the expense of the acquired technology from non-GAAP operating income to be consistent with transactions where the acquired assets were capitalized. In fiscal 2018, we incurred an expense associated with a litigation judgment in the amount of \$1.7 million. In fiscal 2016, we incurred fees associated with an acquisition bid.

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Results of Operations

The following table sets forth the results of operations, percentage of total revenue and the year-over-year percentage change in certain financial data for fiscal 2018, 2017 and 2016:

	Year Ended June 30,						2018	2017		
	2018		2017		2016		Compared to 2017 %	Compared to 2016 %		
	(Dollars in Thousands)									
Revenue:										
Subscription and software	\$471,041	94.3 %	\$453,512	93.9 %	\$440,408	93.2 %	3.9 %	3.0 %		
Services and other	28,473	5.7	29,430	6.1	31,936	6.8	(3.3)	(7.8)		
Total revenue	499,514	100.0	482,942	100.0	472,344	100.0	3.4	2.2		
Cost of revenue:										
Subscription and software	23,228	4.7	21,051	4.4	20,376	4.3	10.3	3.3		
Services and other	27,416	5.5	26,415	5.5	28,235	6.0	3.8	(6.4)		
Total cost of revenue	50,644	10.2	47,466	9.9	48,611	10.3	6.7	(2.4)		
Gross profit	448,870	89.8	435,476	90.1	423,733	89.7	3.1	2.8		
Operating expenses:										
Selling and marketing	101,077	20.2	92,633	19.2	91,536	19.4	9.1	1.2		
Research and development	82,076	16.4	79,530	16.5	67,152	14.2	3.2	18.4		
General and administrative	56,076	11.2	51,297	10.6	53,664	11.4	9.3	(4.4)		
Total operating expenses	239,229	47.8	223,460	46.3	212,352	45.0	7.1	5.2		
Income from operations	209,641	42.0	212,016	43.9	211,381	44.8	(1.1)	0.3		
Interest income	231	—	808	0.2	441	0.1	(71.4)	83.2		
Interest expense	(5,691)	(1.1)	(3,787)	(0.8)	(1,212)	(0.3)	50.3	212.5		
Other (expense) income, net	(838)	(0.2)	1,309	0.3	29	—	(164.0)	4,413.8		
Income before provision for income taxes	203,343	40.7	210,346	43.6	210,639	44.6	(3.3)	(0.1)		
Provision for income taxes	54,655	10.9	48,150	10.0	70,688	15.0	13.5	(31.9)		
Net income	\$148,688	29.8 %	\$162,196	33.6 %	\$139,951	29.6 %	(8.3)%	15.9 %		

Revenue

Fiscal 2018 Compared to Fiscal 2017

Total revenue increased by \$16.6 million during fiscal 2018 as compared to the prior fiscal year. The increase was due to higher subscription and software revenue of \$17.5 million, partially offset by lower services and other revenue of \$1.0 million.

Fiscal 2017 Compared to Fiscal 2016

Total revenue increased by \$10.6 million during fiscal 2017 as compared to the prior fiscal year. The increase was due to higher subscription and software revenue of \$13.1 million, partially offset by lower services and other revenue of \$2.5 million.

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Subscription and Software Revenue

	Year Ended June 30,			2018 Compared to 2017		2017 Compared to 2016	
	2018	2017	2016	\$	%	\$	%
	(Dollars in Thousands)						
Subscription and software revenue	\$471,041	\$453,512	\$440,408	\$17,529	3.9%	\$13,104	3.0%
As a percent of total revenue	94.3	% 93.9	% 93.2	%			

Fiscal 2018 Compared to Fiscal 2017

The increase in subscription and software revenue of \$17.5 million during fiscal 2018 as compared to the prior fiscal year was primarily the result of the growth of our base of license arrangements being recognized on a ratable basis.

Fiscal 2017 Compared to Fiscal 2016

The increase in subscription and software revenue of \$13.1 million during fiscal 2017 as compared to the prior fiscal year was primarily the result of the growth of our base of license arrangements being recognized on a ratable basis.

Services and Other Revenue

	Year Ended June 30,			2018 Compared to 2017		2017 Compared to 2016	
	2018	2017	2016	\$	%	\$	%
	(Dollars in Thousands)						
Services and other revenue	\$28,473	\$29,430	\$31,936	\$(957)	(3.3)%	\$(2,506)	(7.8)%
As a percent of total revenue	5.7	% 6.1	% 6.8	%			

Services and other revenue consists primarily of revenue related to professional services and training.

Fiscal 2018 Compared to Fiscal 2017

The decrease in services and other revenue of \$1.0 million during fiscal 2018 as compared to the prior fiscal year was attributable to lower professional services revenue of \$1.4 million, partially offset by higher training revenue of \$0.5 million.

Under the aspenONE licensing model, revenue from committed professional service arrangements that are sold as a single arrangement with, or in contemplation of, a new aspenONE licensing transaction is deferred and recognized on a ratable basis over the longer of (a) the period the services are performed or (b) the term of the related software arrangement. As our typical contract term approximates five years, professional services revenue on these types of arrangements will usually be recognized over a longer period than the period over which the services are performed. Revenue from professional service arrangements bundled with and recognized over the term of aspenONE transactions was consistent year-over-year.

Fiscal 2017 Compared to Fiscal 2016

The decrease in services and other revenue of \$2.5 million during fiscal 2017 as compared to the prior fiscal year was attributable to lower professional services revenue of \$1.6 million and lower training revenue of \$0.8 million.

Cost of Revenue

Cost of Subscription and Software Revenue

	Year Ended June 30,			2018 Compared to 2017		2017 Compared to 2016	
	2018	2017	2016	\$	%	\$	%
	(Dollars in Thousands)						
Cost of subscription and software revenue	\$23,228	\$21,051	\$20,376	\$2,177	10.3%	\$675	3.3%
As a percent of subscription and software revenue	4.9	% 4.6	% 4.6	%			

Cost of subscription and software revenue increased by \$2.2 million during fiscal 2018 as compared with the prior fiscal year and increased by \$0.7 million during fiscal year 2017 as compared with the prior fiscal year. Subscription and software

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gross profit margin was 95.1% in fiscal 2018 and was consistent with 95.4% and 95.4% in fiscal years 2017 and 2016, respectively.

Cost of Services and Other Revenue

	Year Ended June 30,			2018 Compared to 2017		2017 Compared to 2016	
	2018	2017	2016	\$	%	\$	%
	(Dollars in Thousands)						
Cost of services and other revenue	\$27,416	\$26,415	\$28,235	\$1,001	3.8%	\$(1,820)	(6.4)%
As a percent of services and other revenue	96.3	% 89.8	% 88.4	%			

Cost of services and other revenue includes the cost of providing professional services and training.

Fiscal 2018 Compared to Fiscal 2017

Cost of services and other revenue increased by \$1.0 million during fiscal 2018 as compared to the prior fiscal year. The increase was due to higher cost of professional services revenue of \$0.7 million and higher cost of training revenue of \$0.3 million, both of which were primarily due to an increase in average headcount.

Gross profit margin on services and other revenue decreased from 10.2% during fiscal 2017 to 3.7% during fiscal 2018 primarily due to lower services and other revenue and higher associated costs.

Fiscal 2017 Compared to Fiscal 2016

Cost of services and other revenue decreased by \$1.8 million during fiscal 2017 as compared to the prior fiscal year. The decrease was due to lower cost of training revenue of \$1.7 million and lower cost of professional services revenue of \$0.1 million.

Gross profit margin on services and other revenue decreased from 11.6% during fiscal 2016 to 10.2% during fiscal 2017 primarily due to lower services and other revenue.

Gross Profit

	Year Ended June 30,			2018 Compared to 2017		2017 Compared to 2016	
	2018	2017	2016	\$	%	\$	%
	(Dollars in Thousands)						
Gross profit	\$448,870	\$435,476	\$423,733	\$13,394	3.1%	\$11,743	2.8%
As a percent of total revenue	89.8	% 90.1	% 89.7	%			

Fiscal 2018 Compared to Fiscal 2017

Gross profit increased by \$13.4 million during fiscal 2018 as compared to the prior fiscal year and gross profit margin remained consistent at 89.8% in fiscal 2018 compared to 90.1% in fiscal 2017. The year-to-year increase in gross profit was primarily attributable to the growth of our subscription and software revenue, while gross profit margin remained consistent.

Fiscal 2017 Compared to Fiscal 2016

Gross profit increased by \$11.7 million during fiscal 2017 as compared to the prior fiscal year and gross profit margin increased to 90.1% in fiscal 2017 from 89.7% in fiscal 2016. The year-to-year increase in gross profit was primarily attributable to the growth of our subscription and software revenue, while gross profit margin remained consistent.

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Operating Expenses

Selling and Marketing Expense

	Year Ended June 30,			2018		2017	
	2018	2017	2016	Compared to 2017	%	Compared to 2016	%
	(Dollars in Thousands)						
Selling and marketing expense	\$101,077	\$92,633	\$91,536	\$8,444	9.1%	\$1,097	1.2%
As a percent of total revenue	20.2	% 19.2	% 19.4	%			

Fiscal 2018 Compared to Fiscal 2017

The year-over-year increase in selling and marketing expense in fiscal 2018 as compared to the prior fiscal year was primarily the result of higher compensation costs of \$3.8 million related to an increase in average headcount attributable to our continued investment in asset performance management and acquisitions, higher commissions expense of \$2.1 million, and higher travel and sales training costs of \$1.6 million.

Fiscal 2017 Compared to Fiscal 2016

The year-over-year increase in selling and marketing expense in fiscal 2017 as compared to the prior fiscal year was primarily the result of higher commissions expense of \$1.2 million, higher marketing costs of \$1.0 million due to our biennial customer conference held in fiscal 2017, and higher professional fees of \$0.9 million, partially offset by lower sales conference costs of \$1.6 million due to the holding of one sales conference in the current fiscal year compared to two sales conferences in the prior fiscal year, and lower stock-based compensation of \$0.7 million.

Research and Development Expense

	Year Ended June 30,			2018		2017	
	2018	2017	2016	Compared to 2017	%	Compared to 2016	%
	(Dollars in Thousands)						
Research and development expense	\$82,076	\$79,530	\$67,152	\$2,546	3.2%	\$12,378	18.4%
As a percent of total revenue	16.4	% 16.5	% 14.2	%			

Fiscal 2018 Compared to Fiscal 2017

The year-over-year increase in research and development expense in fiscal 2018 as compared to the prior fiscal year was primarily the result of higher compensation costs of \$3.5 million related to an increase in average headcount attributable to our continued investment in asset performance management and acquisitions, and higher stock-based compensation of \$1.8 million, partially offset by lower acquisition and acquired technology costs of \$2.5 million.

Fiscal 2017 Compared to Fiscal 2016

Research and development expenses increase by approximately \$12.4 million during fiscal 2017 as compared to the prior fiscal year, which was primarily due to acquisitions and hiring related to our new asset performance management suite. The increase resulted primarily from higher compensation costs of \$5.2 million related to an increase in headcount, higher stock-based compensation of \$2.4 million, and higher overhead allocations of \$1.9 million, as well as higher costs of acquired technology of \$1.9 million and higher professional fees of \$1.0 million.

Overhead allocations consist of information systems costs, facility costs and certain benefit costs. The overhead expenses are allocated to departments based on relative headcount, geographic location and total salary.

In fiscal 2017 and 2016, we acquired technology in two separate transactions for \$2.3 million and \$0.3 million, respectively. At the time we acquired the technology, the projects to develop commercially available products did not meet the accounting definition of having reached technological feasibility and therefore the cost of the acquired technology was expensed as a research and development expense.

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General and Administrative Expense

	Year Ended June 30,			2018 Compared to 2017		2017 Compared to 2016	
	2018	2017	2016	\$	%	\$	%
	(Dollars in Thousands)						
General and administrative expense	\$56,076	\$51,297	\$53,664	\$4,779	9.3%	\$(2,367)	(4.4)%
As a percent of total revenue	11.2	% 10.6	% 11.4	%			