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Applied Materials Inc

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Introduction

The story of Applied Materials Inc. is, at its core, the story of American ingenuity and industrial evolution in the digital age. Born in the heart of Silicon Valley in 1967, Applied Materials started with a handful of engineers and a vision: to develop the tools and technologies that would make microelectronics possible. In a world just beginning to realize the vast potential of the silicon chip, the founders saw both a challenge and an opportunity—to create the materials foundation for the next generation of technology.

Over the ensuing decades, Applied Materials has played a central, if sometimes underappreciated, role in the global technology ecosystem. From chemical vapor deposition machines enabling early semiconductor breakthroughs to advanced systems that now coat and etch chips at atomic scales, the company's innovations have quietly powered the information revolution. Every smartphone, computer, and connected device owes a debt, in part, to the processes and equipment pioneered by Applied Materials.

Yet the journey was not straightforward. Navigating the volatile cycles of the semiconductor industry, overcoming fierce international competition, and expanding relentlessly across continents, Applied Materials faced moments of existential struggle and triumphant resurgence. Strategic decisions—whether to double down on core technologies, diversify into new markets like displays and solar, or pursue ambitious acquisitions—have repeatedly reshaped the company and the broader sector it serves.

Today, Applied Materials stands as a global leader, with over 35,000 employees and a presence spanning Asia, Europe, and the Americas. It is recognized not just for its technological prowess, but also for its commitment to sustainability, community investment, and cultivating a culture where innovation thrives. Its financial performance consistently places it among the elite S&P 500, while its products touch nearly every modern electronic device.

This book traces the evolution of Applied Materials from its humble beginnings to its present-day stature, examining both the internal dynamics and broader industry currents that have shaped its destiny. It also explores how, in an era of rapid change and mounting environmental challenges, the company is positioning itself for continued leadership through bold investments in research, collaborative innovation, and a steadfast focus on the future.

Through the story of Applied Materials, we explore more than the history of a corporation—we encounter the dynamic interplay of technology, people, and purpose

that continues to drive progress in the 21st century. The legacy of Applied Materials is still being written, as it adapts, innovates, and aspires to develop the materials and systems that will define the electronics—and society—of tomorrow.

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CHAPTER ONE: The Origins of Applied Materials: Silicon Valley in the 1960s

The 1960s in Northern California was a decade of profound societal shifts, from counterculture movements to technological revolutions. While San Francisco pulsed with the psychedelic beat of flower power, just a few miles south, the Santa Clara Valley was quietly undergoing its own, equally transformative, metamorphosis. Once known as the "Valley of Heart's Delight" for its sprawling fruit orchards and agricultural bounty, this region was rapidly becoming the epicenter of a new industrial age: the age of silicon. This fertile ground of innovation, soon to be dubbed "Silicon Valley" by a journalist in 1971, was where Applied Materials Inc. would take root.

The genesis of Silicon Valley can be traced back to the post-World War II era, fueled by military demand for electronics and the presence of forward-thinking institutions like Stanford University. Stanford's eager embrace of industry collaboration, coupled with a steady stream of engineering talent, created an ideal environment for nascent technology companies. Early pioneers like Hewlett-Packard, founded in a Palo Alto garage, laid some of the initial groundwork, but it was the invention of the transistor that truly ignited the valley's future.

The transistor, co-invented at Bell Laboratories in 1947, was a tiny electronic switch that could amplify or control electrical signals, a revolutionary leap beyond bulky vacuum tubes. This invention paved the way for smaller, more reliable, and more energy-efficient electronic devices. In 1956, William Shockley, one of the transistor's co-inventors, moved to Mountain View, California, to establish Shockley Semiconductor Laboratory. His vision was to develop silicon transistors, a material he believed superior to germanium, which was then commonly used.

Shockley's lab, despite his brilliance, suffered from a challenging management style. This led to a pivotal moment in Silicon Valley's history: in 1957, eight of his brightest engineers, famously dubbed the "Traitorous Eight" by Shockley, departed to form Fairchild Semiconductor. This spin-off, funded by venture capitalist Arthur Rock, marked a crucial turning point, establishing a precedent for entrepreneurial spirit and the fluid movement of talent that would define the region.

Fairchild Semiconductor quickly became a hotbed of innovation. Robert Noyce, one of the "Traitorous Eight," is credited with co-inventing the integrated circuit (IC) in 1958. This groundbreaking invention allowed multiple transistors to be placed on a single "chip" of semiconductor material, exponentially increasing complexity while reducing size and cost. Fairchild's pioneering work in silicon-based integrated circuits and the

"planar process," which vastly improved the reliability and manufacturability of transistors, solidified its place as a cornerstone of the burgeoning industry.

The success of Fairchild Semiconductor had a ripple effect across the Santa Clara Valley. Its employees, often referred to as "Fairchildren," frequently left to establish their own ventures. This prolific spawning of new companies, including future giants like Intel and National Semiconductor, created a dense network of expertise and a culture of open exchange and collaboration. This unique ecosystem, characterized by venture capital funding and a constant flow of talent and ideas, was unprecedented.

By the mid-1960s, the valley was booming. Thousands of young engineers and scientists poured into the region, drawn by the promise of innovation and the rapidly expanding electronics and defense industries. The demand for semiconductor devices—from simple integrated circuits for calculators and early computers to more complex military electronics—was insatiable. However, the manufacturing of these intricate silicon chips was far from simple.

In the early days, semiconductor companies often had to build much of their own equipment in-house. This was a testament to the nascent state of the semiconductor equipment industry itself. Manufacturing processes such as thermal oxidation, thin-film deposition, and etching required highly specialized tools, and there simply wasn't a robust external market for them. Companies like Fairchild and Texas Instruments developed their own custom machinery, essentially becoming pioneers in both chip design and equipment fabrication.

However, as more and more semiconductor startups emerged, particularly those too small to develop their own elaborate manufacturing lines, a critical need arose for readily available, off-the-shelf equipment. This created a vacuum, a clear opportunity for companies that could specialize in designing and building the sophisticated machinery required for chip fabrication. It was into this dynamic and demanding environment that Applied Materials would soon step, recognizing the untapped potential in providing the essential tools for the microelectronics revolution.

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