Varian Medical Systems

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Table of Contents

Introduction

Varian Medical Systems stands as a remarkable testament to American ingenuity, resilience, and vision in the relentless quest to conquer cancer. Established in the aftermath of World War II by a group of pioneering inventors—Russell and Sigurd Varian, William Webster Hansen, and Edward Ginzton—the company’s journey mirrors the broader narrative of American innovation throughout the twentieth and twenty-first centuries. What began with a single, groundbreaking invention for wartime radar

swiftly evolved into a revolution in medical technology that would touch millions of lives.

The company’s early foray with the klystron—a device that transformed radio frequency technology—set the stage for decades of innovation not only in defense and electronics, but ultimately in the medical arena. By laying foundations in what would become Silicon Valley, Varian was instrumental in driving the region’s transformation into a global center for high technology. As the decades unfolded, diversification marked the company’s path, navigating domains as varied as semiconductors and vacuum tubes before identifying its most lasting legacy: improving and saving lives with advanced radiotherapy and imaging solutions.

Varian Medical Systems’ evolution has been shaped by the ever-changing landscape of cancer care, demanding continual advancements in technology and patient-centered solutions. Over the years, its breakthroughs in linear accelerators, proton therapy, and sophisticated software platforms have established Varian as a global leader in radiation oncology. The company’s products are now integral to modern cancer treatment, enabling clinicians to deliver ever more precise and effective therapies, shaped by artificial intelligence and digital innovation.

Integral to Varian’s story is its commitment not just to technological excellence, but to corporate citizenship. Through philanthropy, partnership, and a drive for sustainability, the company pursues a mission larger than profits: a world without fear of cancer. This commitment has fostered a culture of ethical leadership, environmental stewardship, and relentless pursuit of better outcomes for patients and providers alike.

The strategic acquisition by Siemens Healthineers in 2021 marked a new chapter for Varian, offering the promise of integrated, end-to-end solutions for cancer care on a global scale. This union aims to harness the strengths of both entities to drive new frontiers in oncology, streamline clinical workflows, and bring lifesaving technologies to more people around the world. As Varian Medical Systems now faces its future as part of a healthcare powerhouse, its history offers valuable lessons in adaptability, innovation, and hope.

This book endeavors to chronicle the full arc of Varian’s journey: from its modest beginnings in postwar California, through decades of growth and transformation, to its present status as a leader in global healthcare innovation. Along the way, it will examine key milestones, breakthroughs, challenges, and the values that have propelled Varian to the forefront of cancer care. Ultimately, it is a story of a company—and its people—committed to changing the world, one patient at a time.

CHAPTER ONE: Origins: The Founding of Varian Associates

The story of Varian Medical Systems, now a prominent part of Siemens Healthineers, begins not in a gleaming corporate park but with the imaginative minds of two brothers, Russell and Sigurd Varian, whose early lives laid an unconventional groundwork for their future groundbreaking inventions. Born to Theosophist parents in the utopian community of Halcyon, California, the Varian brothers were raised in an environment brimming with creative influences, far removed from typical industrial settings. Their father, John Varian, was a mystic poet, and their mother, Agnes, also embraced theosophy, a blend of philosophy and religion that encourages a holistic view of the world and a search for universal truths. This upbringing fostered a unique perspective and an innate curiosity in the brothers, particularly concerning the unseen forces of electricity.

Russell, the elder brother, pursued a more formal academic path, earning both a bachelor's and a master's degree in physics from Stanford University by 1927. Despite initial challenges with reading and mathematics, his persistence led him to work for various companies, including Humble Oil, where he secured his first patent for a vibrating magnetometer, and later with Philo Farnsworth, delving into television tube technology. Sigurd, in contrast, was more of a self-taught engineer and an accomplished pilot, having flown for Pan-American World Airways. His experiences in aviation, particularly the formidable challenges of navigating and detecting other aircraft in low visibility or at night, ignited a deep concern for flight safety and a determination to find a solution.

The ominous rumblings of World War II, with the rising threat of Adolf Hitler, amplified Sigurd’s concerns. He envisioned a scenario where enemy planes could strike under the cloak of darkness, undetected. This drove him to approach his brother, Russell, with an ambitious idea: to devise a radio-based system that could detect aircraft in flight regardless of weather conditions or time of day. This shared vision brought the brothers together in 1935 at Halcyon, their childhood home, where they began to tinker with radio-based technology using microwaves.

Their early work, however, quickly revealed the need for external expertise. They sought out William W. Hansen, Russell’s former college roommate and a physics professor at Stanford University. Hansen was already a pioneer in microwave theory and had, in 1935, invented the microwave cavity resonator, which he ingeniously named “rumbatrons”. He had long harbored his own ambition to use high-frequency waves to accelerate particles to high energy, a vision that would later align perfectly with the Varians' work.

Hansen’s involvement was pivotal. He introduced the Varian brothers to David Webster, the head of Stanford’s physics department, who recognized the immense

potential of their collaborative efforts. A clever arrangement was forged: the brothers could utilize Stanford’s physics laboratory without cost, and in return, the university would receive a share of the royalties from any patents that stemmed from their work. This mutually beneficial partnership, established in 1937, marked the true genesis of their revolutionary invention.

Working in the basement of Stanford’s old physics building, the trio embarked on a journey that would redefine microwave technology. Their focus was on generating strong microwave signals for the purpose of improving air navigation and providing early warning systems against aerial threats. Russell's ingenious idea revolved around the concept of "bunching" the electron stream to produce microwaves, a fundamentally different approach from existing methods at the time.

On August 30, 1937, their persistence paid off. Russell and Sigurd, working with Hansen's "rumbatrons," successfully constructed a prototype of a two-cavity oscillator, the first modern microwave tube. This groundbreaking device, capable of generating electromagnetic waves at microwave frequencies, was named the "klystron" – a term derived from the Ancient Greek verb "klyzo," evocative of waves washing upon a shore. Though initially low-powered for direct radar application, the klystron proved the viability of their inventive concept.

The klystron’s demonstration in 1937 was a significant milestone, proving that their invention would indeed work. News of this remarkable breakthrough quickly spread beyond the confines of Stanford. By spring 1939, Stanford President Ray Lyman Wilbur publicly announced the invention of this "powerful new radio tube," signaling its profound implications for various technologies.

The early success of the klystron attracted the attention of Sperry Gyroscope, a company that quickly recognized the immense value of the Varians' efforts. Sperry offered the brothers a contract to continue their research and development, particularly for military applications, which led them to move to New York during World War II. Their work at Sperry, along with parallel efforts in the UK, greatly influenced the development of radar technology during the war, providing a critical edge for the Allied forces.

Among the first Stanford scientists to work extensively with the new high-power klystron tube was an electrical engineering student named Edward Ginzton. Ginzton, who would later earn his Ph.D. in electrical engineering from Stanford in 1941, became a key member of the Varian-Hansen group at Sperry Gyroscope Company. His work involved rigorous testing of the klystron's capabilities across various applications, including radio networks and radar systems. Ginzton would later recall that "Almost everything we tried worked immediately and quite well," a testament to the klystron's transformative potential.

As the war concluded, the founders harbored a new vision: to establish an independent entity that could commercialize the klystron and explore its broader applications beyond wartime necessities. With the war behind them, the Varian brothers returned to California, determined to embark on this new venture. This collective ambition culminated in the formal establishment of Varian Associates in San Carlos, California, in April 1948. The founding team was a cohesive group, having worked together for years on the klystron project at Stanford and later at Sperry.

Varian Associates began with a modest capital of $22,000 and a team of six full-time employees. The initial directors were Russell and Sigurd Varian, Russell’s wife Dorothy Varian, William Webster Hansen, Edward Ginzton, H. Myrl Stearns, Richard M. Leonard, Leonard I. Shiff, and Paul B. Hunter. The company’s name, "Varian," was chosen in recognition of Russell Varian's prominence in the scientific community as the inventor of the klystron.

The founders shared a unique philosophy for their new company. They envisioned Varian Associates as a science-based enterprise, managed by scientists, where the critical decisions would be made by the very individuals who conducted the research and engineering work. This ethos, prioritizing scientific inquiry and a collaborative, employee-centric approach, would shape the company’s culture for decades to come. Indeed, Varian Associates was noted for pioneering profit-sharing, stock-ownership, insurance, and retirement plans for its employees long before such benefits became commonplace.

With its incorporation, Varian Associates set its sights on commercializing the klystron and exploring its vast potential. Their early goals extended beyond radar to include developing technologies such as small linear accelerators for external beam radiation therapy and advancing nuclear magnetic resonance (NMR) technology. Little did they know that these early explorations would lay the groundwork for a future where Varian Medical Systems would become a global leader in cancer care, a testament to the enduring vision and ingenuity of its founders.
