

Applied Seals N.A. (ASNA) Stirring the Semiconductor World with Smart Sealing Experience

The semiconductor industry is one of the major and busiest industries today, as its integrated circuits (IC chips) find usage in almost every device. From smartphones to the vast data centers and from the electric scooters to hypersonic aircraft, each one of these is powered by an impossibly small piece of a silicon IC chip. Thus necessarily, the manufacturing of these building blocks of modern computation has to be equally powerful to support—and extend—its vast capabilities. While only a year ago, a chip may have gone through 100 steps as underlying circuits were constructed, with an ever-rising level of capabilities (and complexities), a chip manufacturing process may go through more than 400 steps today.

What does this mean for a semiconductor OEM or the IC chip manufacturing market? More chances of errors during manufacture. Simply put, as the line widths or the width of the electrical pathways keep decreasing in order to pack more capacities into each chip, it increases the chances of contamination in the production equipment and seals, leading to chip malfunction and device-level “killer defects.”

So, how do we fix this? Dalia Vernikovsky, a maven in the field, and the president and CEO of Applied Seals N. A. (ASNA), shares her unique stance to respond to this challenge. “While a great deal of innovation is being brought on the software and process front in terms of identifying underlying systemic manufacturing issues, the hardware is the last frontier for any semiconductor manufacturing breakthroughs,” she mentions. Witnessing this gap in the market firsthand for years, Dalia wanted to change the status quo. She started collaborating with like-minded people to address this very ‘unsexy’ part of the semiconductor world called ‘hardware’ and laid the foundation of ASNA in 2009. In addition, she tenaciously worked to forge a Special Interest Group called SCIS (Semiconductor Components, Instruments and Subsystems) in the SEMI organization shining a light on this gap. The goal — finding common ground towards understanding the requirement and mitigating defects that impact yields from this area.

ASNA is a premier source for semiconductor seals, which are critical sealing solutions for many different processes in plasma, thermal, and wet semiconductor manufacturing applications. And to make its seals meet the stringent requirements of the world’s most sophisticated industries, such as pharmaceutical, biotechnology,



aerospace, or solar, ASNA provides a portfolio of specialty materials whole core today focuses on the semiconductor industry

However, ASNA is more than just producing cutting-edge seals. True to its vision of inspiring the world with ‘SMART sealing EXPERIENCE,’ the company lays a great deal of emphasis on educating its clients on the relevance of using the right seals, of the right design, for the right applications. “More often than not, the clients do not even realize the level of transformation they can bring into their manufacturing process by not just altering the sealing material but also the design of those seals to properly address the problem,” explains Dalia. This is because most engineers and technicians do not have a great deal of time or the training of the new materials. They apply the same methodologies that were invented



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for seals over 200 years ago to meet the Industrial Revolution and high- pressure environments. “Our absolute commitment to the industry is to work with the clients on what they need versus what they ask for,” she affirms. Striving to take this awareness a notch higher, ASNA also educates its clients on different best-known methods (BKM) via books and technical advice.

Under the Hood of ASNA’s SMART Sealing Solutions

ASNA’s design center in Fremont, CA, led by the company’s able engineering team, is dedicated to offer complete engineering analysis finite element analysis (FEA), FA and PA (Failure and Product Analyses), material recommendation, and sealing solutions to address any demands of this industry. From design and prototyping to its installation, test, and production, we offer the nimbleness as well as thorough analyses this Industry demands. Helping the ASNA team in this endeavor is its proprietary software, ASNA Calculated Engineering (ACE®), which help in determining the optimal hardware conditions possible for materials and result in the most reliable sealing solutions. Once the seals are designed and installed, ASNA’s team—through its performance analysis—checks for any thermal/mechanical degradation, plasma chemical attack, or any other inherent design flaws in their solution. Thus, in a nutshell, by delivering such custom-engineered solutions, ASNA delivers sealing solutions that minimize application-specific surface exposure to heat and chemical environments, thus significantly extending the lifetime of its seals.

To best explain how these capabilities help ASNA’s clients, Dalia shares an instance when a company was trying out different types of seals available in the market but without any luck. For instance, they were using Fluoro-elastomer (FFKM) seals that are chemical resistant but do not stretch (less than 3 percent). The seals were being applied in a high chemical, high-temperature environment. As a result, while the chemical was not affecting the seal, the wrong groove dimensions and over-stretch conditions

contributed to the imploding of the seal, which was observed as a melting effect but was actually extrusion outside the groove. “FFKMs by their very backbone structure cannot stretch more than 1-3 percent. Given the conditions of its application, this seal was both over-stretched and in a non-round formation,” states Dalia. After trying out different seals, they came to ASNA for help. “We started by evaluating the seals that were used inside the groove with the help of ACE® and performed a systematic check on the groove; then offered designs that included seals that are not only made of the right materials but are also of the proper size. This certainly changed the client’s perspective on how they should approach sealing solutions. Training the customer not only helped in reducing the mistakes but also mitigating the larger concerns of higher costs and the elusive hunt for defects that affect yields.

With many similar success stories, ASNA is indeed stirring a world of difference to the semiconductor landscape, especially when it comes to the hardware. The company wants to remain a trailblazer for its semiconductor-grade sealing solutions even moving forward. Thus, to move in that direction that Dalia laid out during the inception of the company, she has also co-founded a semiconductor, components, and instruments subsystems (SCIS) technology community—one of the Special Interest Groups (SIG) inside of the SEMI organization as reported previously. This specific community is indeed accelerating the semiconductor market in the right direction as its mission revolves around constantly conceptualizing, developing, and providing the right parameters for semiconductor applications, how to measure them, with specific guidelines aimed in utilizing the right methodology for evaluating and optimizing products that serve this market. At the same time, this special group is also connecting like-minded members for new ways to optimize performance of these products to improve yields and uptime in a very challenging manufacturing process. With such progressive strides, one would definitely say that the future shines bright for ASNA and the semiconductor market it proudly serves. 