

Case Study



SparkNano use full carbon air bearings at high temperatures to enable groundbreaking Spatial ALD



SPARKNANO

SparkNano is an OEM equipment supplier which uses Spatial Atomic Layer Deposition technology for deposition of high-quality ultrathin layers. The company designs, manufactures and sells Spatial ALD tools that precisely deposit nano-scale thin film materials onto a surface. They continuously work to support their customers by solving problems related to scarce material use and performance of batteries, electrolyzers, fuel cells and displays.

“From the design phase to the final product, we experienced a genuine partnership with IBS, which greatly aided SparkNano in the process of scaling up and industrialising our Spatial ALD lab and fab equipment.”

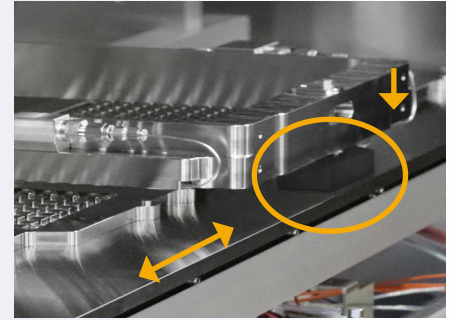
Jeroen Smeltink
System Architect, SparkNano

- **Industry:** OEM equipment manufacturing
- **Technology:** Spatial Atomic Layer Deposition for green energy applications
- **Application:** High temperature motion control
- **Product:** Full carbon air bearings (custom made) and flat round air bearings

Target

Emerging as a spin-off from TNO (Dutch organisation for applied scientific research), SparkNano's roots lie in Spatial ALD research. The company is industrialising and commercialising this technology by manufacturing lab and fab equipment to deliver solutions for generating, storing, and converting energy sustainably. Having prior experience with air bearings, the company was keen to integrate them into their machine design.

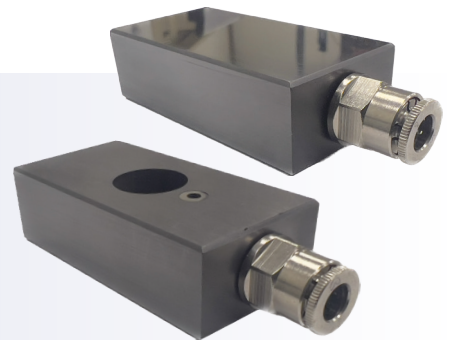
- SparkNano aimed to create an accurate, scalable and cost-effective machine design featuring a mechanically stiff structure and a consistent process gap between the substrate and injector head. To achieve this, they required a solution where the substrate moved beneath the static injector head at a constant Z-height. By supporting the static injector head frame with air bearings on the movable substrate table, they could guarantee the process gap during the Spatial ALD process and maintain the required stability.
- They needed components that met the necessary specifications for the application's ecosystem. This involved handling maximum application temperatures of 250°C, maintaining a particle-free production environment and preventing contamination from greases.



The static injector head frame supported on the moveable substrate table using air bearings

Solution

- Traditional air bearings are lubricant- and particle-free. For high temperature applications a monolithic air bearing design (excluding housing) is required.
- IBS Precision Engineering supported SparkNano with the integration of custom made full carbon air bearings, withstanding up to 250°C. These non-contact air bearings without housing, produce a stable and frictionless air gap of 5 µm between the injector frame and the moving substrate table, facilitating a stable Z-height between the injector and the substrate.



Full carbon flat air bearings (IBS)

Results

- SparkNano is delighted with the robust air bearing system integrated into its machinery, resulting in a stable, lubricant and particle free process gap at high temperature, with infinite life time performance, requiring zero maintenance. It also aligns well with SparkNano's financial objectives, as the company aims to provide scalable solutions for the commercialisation of their Spatial ALD equipment.
- The smooth iteration process from design to delivery was highly valued by SparkNano, as was the guidance provided by IBS throughout, leaving no room for uncertainty. It signified a genuine partnership between the two companies.



Labline system (SparkNano)

Contact IBS Precision Engineering today to find out how non-contact air bearings can improve your application and join companies like SparkNano experiencing the benefits of high temperature air bearings.