

ASM Technologies

An Overview of their Capabilities



ASM Technologies Limited

<https://www.asmltd.com/>

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For: ValuePickr Forum

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## 1. ASM Technologies – An Introduction

Established in 1992, ASM Technologies Limited is a publicly-listed company in India with a global presence in the USA, Singapore, UK, Canada, Mexico and Japan. With over two decades of experience, ASM has been providing world-class consulting and product development services in the areas of Engineering Services and Product R&D with successful Offshore Development & Support Centers in India and Overseas for its global clientele.

### 1.1 Vision

To be a global leader, committed to the customer in providing the technology solutions with the highest degree of excellence, quality and value by an agile team and efficient process.

### 1.2 Mission

To commit us to the highest degree of excellence and customer support with a view to providing superior value to clients.

## 2. Scope of Offerings

After reviewing the lists below, you will realize the breath of ASM's offerings, which will appear a little surprising given the size of the organization. What is clear is that ASM Technologies aims to be a cutting-edge engineering research and development (ER&D) company.

### 2.1 Industries Served

- Automotive
- Avionics
- High Tech
- Medical
- Semiconductor

### 2.2 Technology Focus Areas

- Wafer Metallization Packaging
- Digital Transformation
- Electric Vehicles
- Advanced Driver Assistance System (ADAS)
- Autonomous Vehicles
- Robotics

### 2.3 Services

- Automation Solutions
- Compromise Assessment
- Digital Engineering
- Internet of Things (IoT)
- IT Infrastructure Capabilities

- Product Life Cycle
- Product R&D
- Sustenance Life Cycle
- Virtual Reality/Augmented Reality

### 3. ASM Ventures

Outside of their core business, ASM Technologies operates a venture division. In their [own words](#), “We make key strategic investments in several emerging technology companies, while co-creating innovative new products in future-focused areas...”

This division has invested in a range of businesses, listed below.

#### 3.1 Forms and Gears



Asia’s leading fixtures manufacturer, with over 2700 designs in the company’s catalogue.

#### 3.2 PolyLogyx



**EclecticIQ** is a global provider of threat intelligence, hunting and response technology. It acquired PolyLogyx [in May 2020](#) for its expertise in endpoint and cloud workload threat detection and response technologies.

#### 3.3 Lavelle Networks



India's No.1 Software-Defined Wide Area Network (SD-WAN) solutions company. [In February this year](#), **Bharti Airtel** announced its acquisition of a 25% stake in Lavelle Networks, to boost its Network as a Service (NaaS) portfolio.

#### 3.4 SmartFix 4.0



The smartest way to transform your existing fixture/workholding into an intelligent, IoT enabled, Industry 4.0 fixture/workholding.

### 3.5 ASM Digital Engineering



ASM Digital Engineering is the product of **ASM's acquisition of Semcon India's** delivery centre [in October 2020](#). Semcon, headquartered in Sweden is an international technology company that helps customers in transforming technology into excellent user experiences, by uniting premium physical and digital solutions. This acquisition has also helped ASM get access to new clients in Northern and Central Europe.

### 3.6 Ideaspring Capital



Through its investment in Ideaspring Capital, ASM is able to keep tabs on the latest developments in a range of fields, including: Machine Learning, Big Data Analytics, IoT, AR/VR, Cyber Security, Computer Vision and Image Processing.

### 3.7 Kogence



Kogence is a cloud-native workflow orchestration engine for engineering modeling and simulation workflows.

### 3.8 Baro Vehicles



Baro Vehicles develops new generation machines to transport people and goods, employing AI-enabled robotics technology to replace traditional cars and vehicles.

## 4. Semiconductor Industry Offerings

While it is clear that ASM offers a range of services to a variety of industries, its capabilities in the semiconductor industry are of particular interest to me.

To begin with, the company offers the following services for capital process equipment in the semiconductor, solar and display verticals:

- **Design and Value Engineering,**
- **Complex Prototyping, and**
- **Competitive Manufacturing**

ASM has over **2000+ person years of experience** in serving reputed semiconductor equipment manufacturing companies. As of the financial year 2021, they counted Applied Materials as one of their clients.

For some context, Applied Materials supplies equipment, services and software for the manufacture of semiconductor (integrated circuit) chips for electronics, flat panel displays for computers, smartphones, televisions, and solar products.

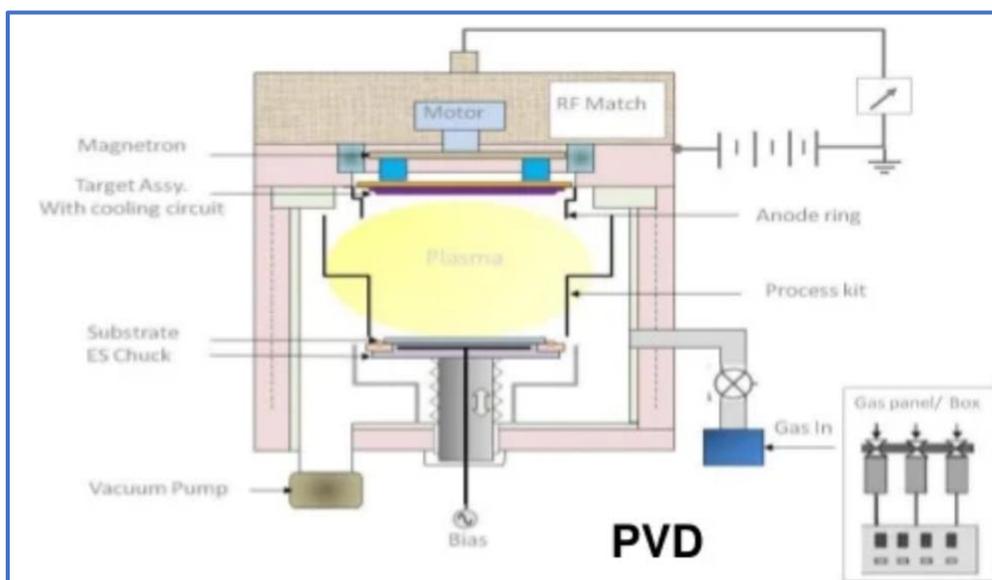
### 4.1 Systems/Subsystem Expertise

The company has experience providing solutions for just about every aspect of the semiconductor manufacturing process. Though this is not an exhaustive list, see below for the systems/subsystems where I could find schematics on the company website.

While going through the descriptions, you may start to appreciate the immense complexity and the level of precision involved in the work that the company does.

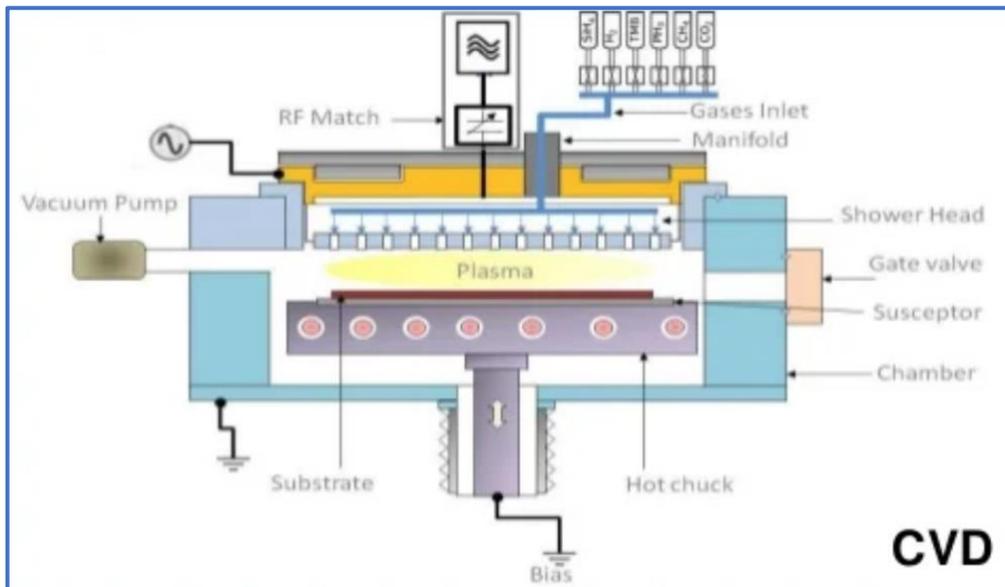
#### 4.1.1 Physical Vapour Deposition (PVD)

PVD describes a range of vacuum deposition methods which can be used to produce thin films and coatings. Vacuum deposition methods refer to processes that deposit layers of material on an atom-by-atom basis on a solid surface.

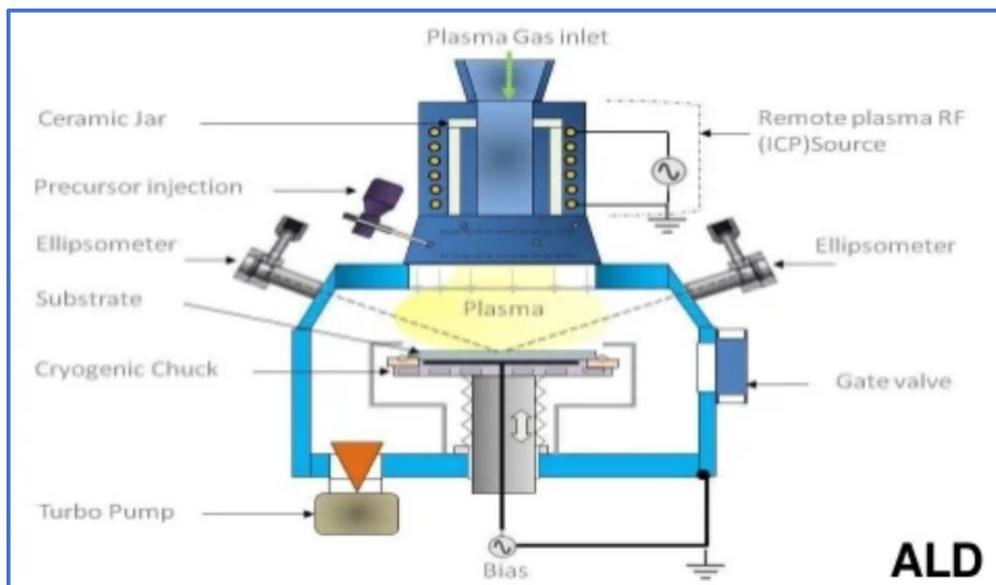


#### 4.1.2 Chemical Vapour Deposition (CVD)

CVD also describes a range of vacuum deposition methods which can be used to produce thin films and coatings. It differs from PVD because, in this case, the coating material will be in a gaseous state, unlike the solid state for PVD. And instead of merely being placed, the gaseous molecules react with the substrate.

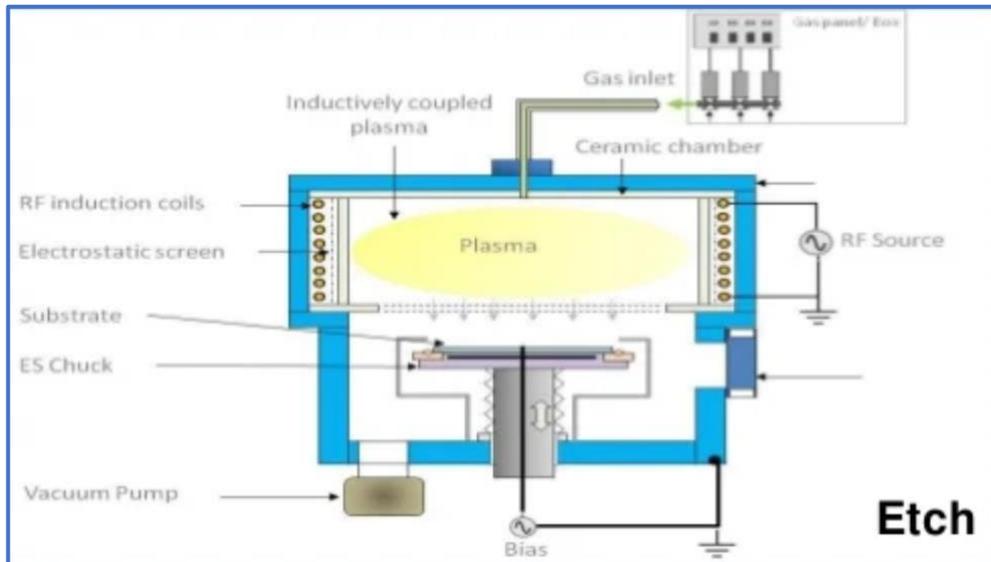


There are a variety of CVD techniques, and I also noticed a schematic for **atomic layer deposition (ALD)**, a subclass of CVD.



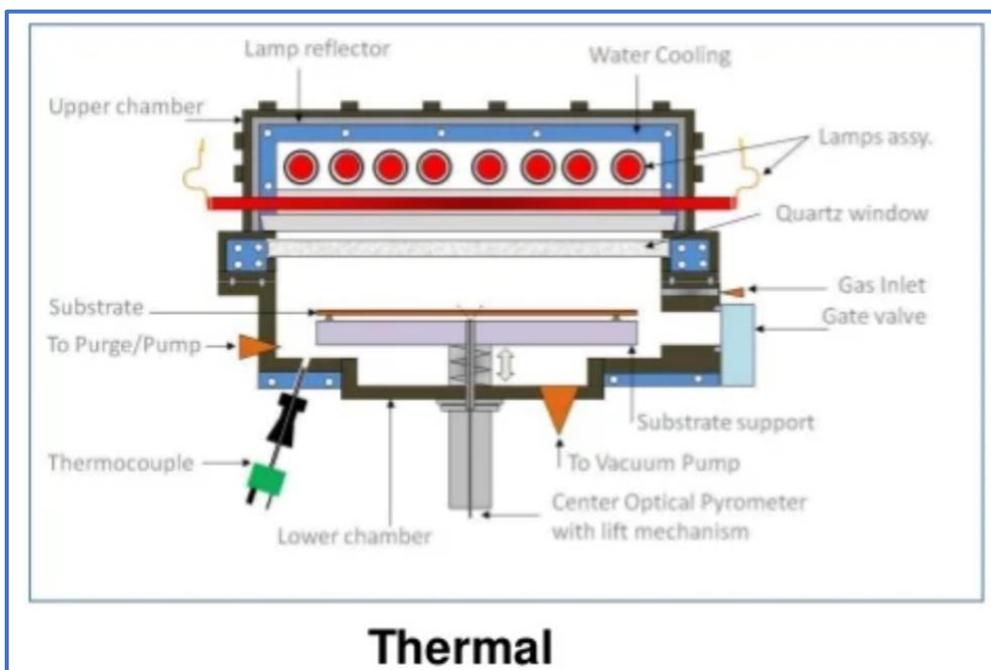
#### 4.1.3 Etching

In semiconductor device fabrication, etching refers to any technology that will selectively remove material from a thin film on a substrate (with or without prior structures on its surface) and by this removal create a pattern of that material on the substrate.



#### 4.1.4 Thermal Systems

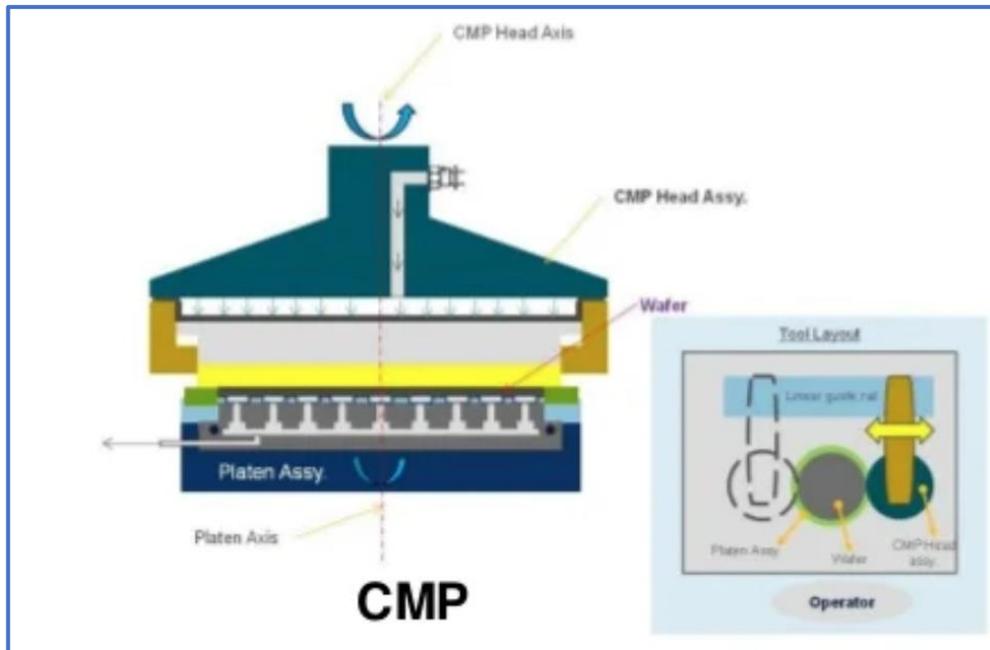
Thermal systems, which are used to heat silicon wafers are used for a wide variety of applications in semiconductor manufacturing including dopant activation, thermal oxidation, metal reflow and chemical vapor deposition.



There are a variety of thermal processes that can be employed, and the company appears to have expertise in **rapid thermal processing (RTP)**, where silicon wafers are heated to temperatures exceeding 1,000°C for not more than a few seconds.

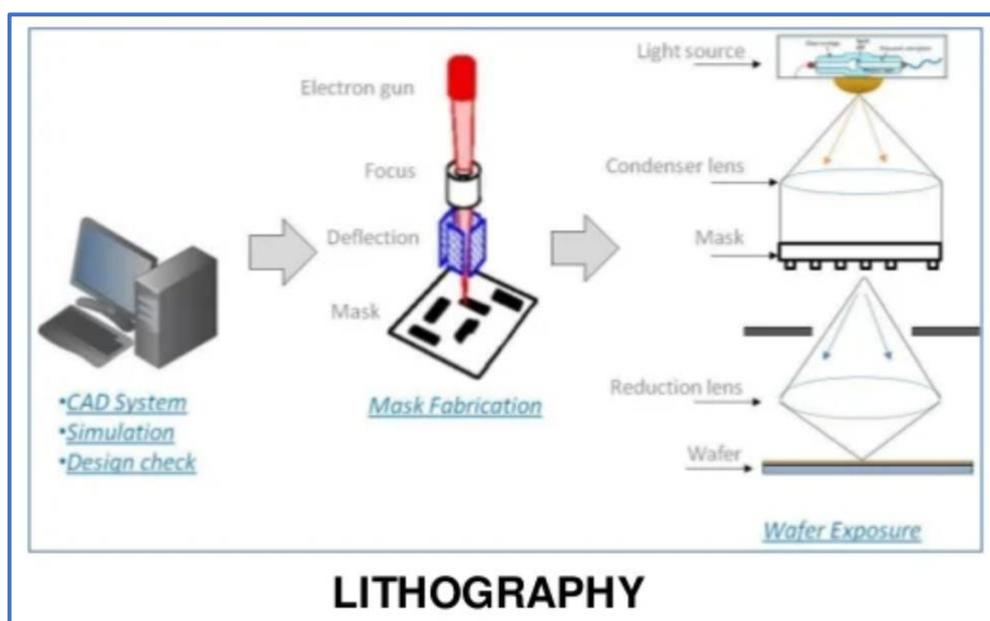
#### 4.1.5 Chemical Mechanical Planarization/Polishing (CMP)

CMP is a critical step that is used multiple times in the semiconductor manufacturing process at each layer of the wafer to remove excess materials and create a smooth surface. This is done through the interaction of a pad and slurry on a polishing tool.



#### 4.1.6 Lithography

Lithography (or more specifically photolithography), is a patterning process in chip manufacturing. The process involves transferring a pattern from a photomask to a substrate. This is primarily done using steppers and scanners, which are equipped with sources of electromagnetic radiation (light).



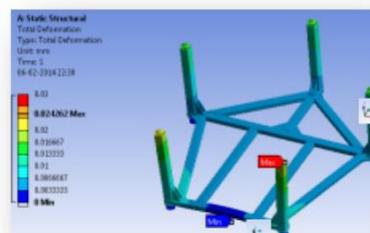
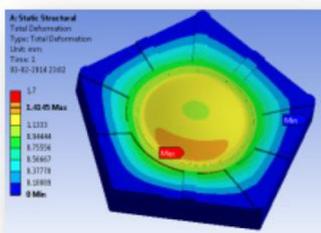
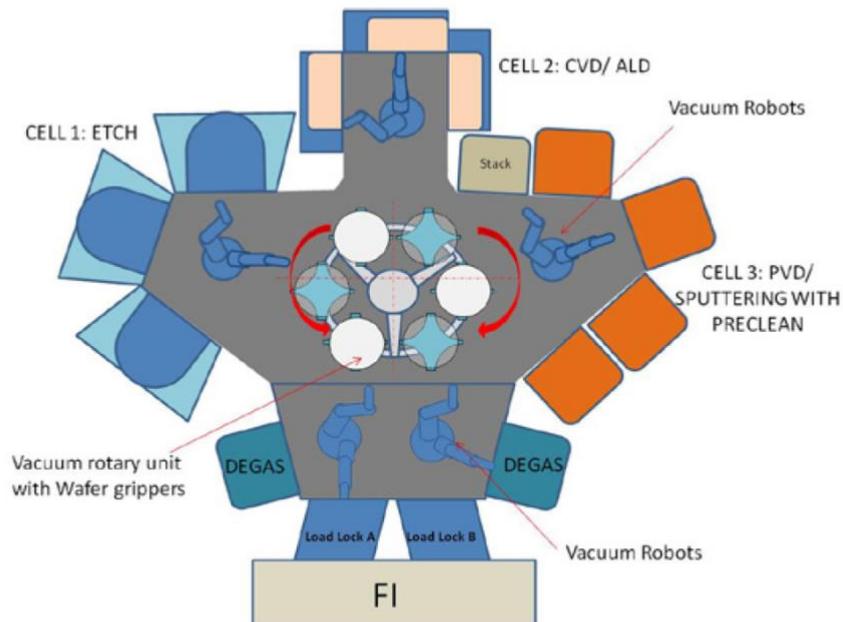
## 4.2 Examples of Equipment Design Expertise

Outside of the systems expertise mentioned in the previous section, I wish to share some examples of customized equipment that has been designed by the company. These kinds of equipment can increase the overall efficiency in semiconductor manufacturing processes.

### 4.2.1 Modular Transfer Chamber

A chamber designed to reduce the overall footprint of a working area, and to facilitate the transfer of material from one stage of the process to the next.

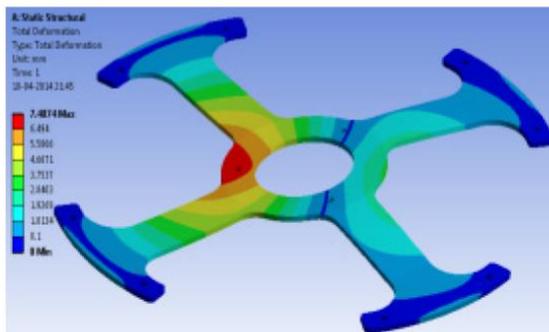
- ◆ ~80% of the common parts from current tools
- ◆ Allows to configure the system with single transfer chamber and multiple process chambers optimized for required recipe
- ◆ Productivity enhancement
- ◆ Reduced floor area
- ◆ Reduced system cost
- ◆ Modular for: 200mm/300mm substrate size



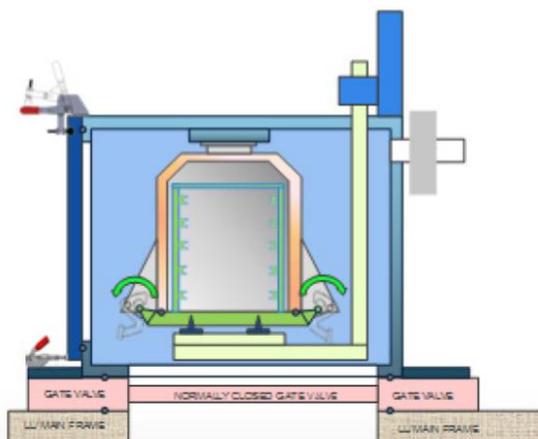
#### 4.2.2 Vacuum Cassette Unit

Material handling equipment for silicon wafers in a vacuum environment.

- ◆ To carry wafers in a vacuum environment
- ◆ It integrates tools in different facilities/ location/ country
- ◆ Will reduce preliminary processes on wafers
- ◆ Easy to carry



Control Panel

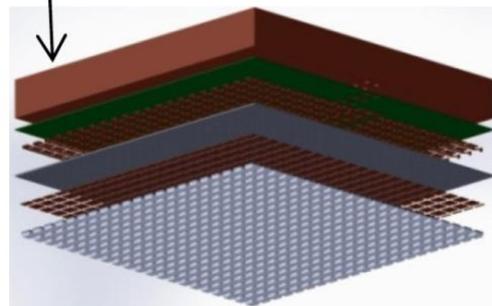
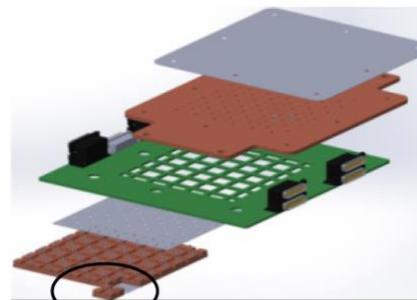
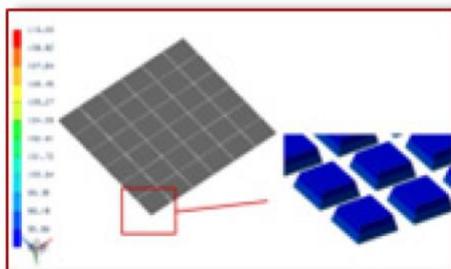
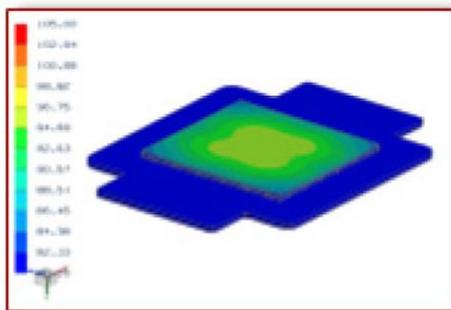


Controller Unit

#### 4.2.3 Chamber with Alternate Cost-Effective Heating Unit

An improvement to the existing thermal processing equipment that is available.

- ◆ Solid state heater (Up to 4000 C)
- ◆ Has considerable advantage over conventional heaters
- ◆ Increased efficiency as narrow band light is generated
- ◆ Selective heating mechanism to adopt as per required target area
- ◆ Modular construction for easy maintenance and system scaling
- ◆ Intelligent heating cell elements for diagnostics and control



## 5. Joint Venture with Hind High Vacuum

While ASM Technologies has proven itself in the design and prototyping of capital equipment required for the semiconductor industry, what is not clear is its ability to manufacture what it designs at scale.

At this point, I wish to introduce another company, **Hind High Vacuum (HHV)**. The company is India's premier thin film and vacuum technology company, with over 55 years of expertise in the design and manufacture of high vacuum equipment for research and industrial applications. HHV's products are integral to multiple sectors that include Aerospace, Automotive and Defense. HHV is a global developer and manufacturer of laboratory and industrial-scale vacuum coating systems for optical, decorative and functional coatings, astronomical telescope mirror coaters, thin film coatings, optics and special purpose vacuum equipment for complex metallurgical applications.

[In February this year](#), ASM and HHV entered into a 50:50 joint venture, named **ASM-HHV Engineering**. The new entity will undertake both design-led engineering and as well as the manufacturing of tools, sub-systems, sub-system components and other required components for the semiconductor and solar industries.

The JV enables ASM to add the best-in-class semiconductor manufacturing capabilities to its existing semiconductor engineering expertise. **With India's first semiconductor-focused equipment manufacturing facility**, management in both companies are hopeful that the new entity will play a pivotal role in the country's rapidly evolving semiconductor landscape.

## 6. References

<https://www.asmltd.com/>

<https://www.asmltd.com/asm-brochure-engineering-services/>

<https://www.asmltd.com/asm-ventures/>

<https://www.eclecticiq.com/news/27-may-2020-eclecticiq-joins-forces-with-endpoint-solution-provider-polylogyx>

<https://www.airtel.in/press-release/01-2022/airtel-acquires-25-percent-strategic-stake-in-sd-wan-startup-lavelle-networks>

<https://www.asmltd.com/wp-content/uploads/2020/10/ASM-SEMCON-PR.pdf>

<https://www.asmltd.com/semiconductor/>

<https://www.asmltd.com/semicon/>

<https://www.differencebetween.com/difference-between-pvd-and-vs-cvd/>

<https://www.mksinst.com/n/etch-overview>

[https://people.rit.edu/lffeee/lec\\_rtp.pdf](https://people.rit.edu/lffeee/lec_rtp.pdf)

<https://www.dupont.com/electronic-materials/semiconductor-cmp.html>

<https://hhv.in/about-us>

<https://hhv.in/news-and-new-developments/asm-and-hhv-form-a-joint-venture-for-semiconductor-equipment-manufacturing>

<https://www.asmltd.com/investor-relationships/>

<https://www.asmltd.com/wp-content/uploads/2022/02/ASM-Q3FY22-9M-Result-Highlights.pdf>

<https://www.asmltd.com/wp-content/uploads/2022/01/ASM-Technologies-Limited-Investor-Presentation-Jan-2022.pdf>

<https://www.icra.in/Rationale/ShowRationaleReport/?Id=106491>

<https://lavelle networks.com/about-us.php>