

TECHNICAL TRAINING - SWAPPING DOWNTIME FOR PRODUCTIVITY!

Semi-Conductor Vacuum Technology – Syllabus [Detailed]

1. Theory of Vacuum

Manufacturing in a Vacuum Environment

Atmospheric pressure

Conversions within common ways of expressing pressure:

- Pascal, Kilopascal, Mega Pascal
- Atmospheres
- PSI
- Bar
- KG/CM²
- mm / Inches Mercury
- Torr

Practical on conversions

Gauge pressure, absolute pressure and their applications

Practice conversions

Comparison of pressure and vacuum scales

Introduction to vacuum:

- Introduction
- Uses
- History

Torrillian vacuum:

Numbers: decimal & powers of ten

Vacuum quality:

- Atmospheric pressure
- Low vacuum
- Medium vacuum
- High vacuum
- Ultra high vacuum
- Deep space
- Perfect vacuum

Vacuum measurement:

- Mean free path (MFP)
- Relative Measurement
- Absolute Measurement

Vacuum measuring instruments - Overview:

- Hydrostatic gauges
- McLeod gauge
- Mechanical gauges
- Capacitance manometer
- Thermal conductivity gauges

Ion gauges

2. Vacuum Gauges - Specific to the Semiconductor Industry

Principal of the Wheatstone Bridge

Pirani Gauges

Convectron Gauges

Thermocouple Gauges

Capacitive Manometer (Baratron)

Hot Cathode Ionization Gauges

Penning and Magnetron Gauges

3. Vacuum Fittings, Components & Techniques

Klein Flange (KF/NW)

ISO Fittings (ISO-K/ISO LF)

Using O-Rings in Vacuum Systems:

- Static or Dynamic
- Materials
- Vacuum Grease & Types
 - Krytox®
 - Fomblin
 - TorrLube®
 - Braycote
- O-ring and O-ring Trench Cleaning

Process Control (Throttle) Valves – PCV's

- Principal of operation
- Maintenance
- Failure modes

Ferrofluidic Rotary Feedthroughs

- What is a ferrofluid?
- Principal of operation
- Maintenance

- Pressure ranges

Differential Pumping

- What is differential pumping?

Why is it used

4. Vacuum Pumps: Types, Characteristics & Techniques

Piston Vacuum Pumps, Vacuum Generators and Vacuum Ejectors

Scroll Pumps:

- Principal of operation
- Operating Ranges
- Applications
- Limitations
- Special considerations

Dry Pumps:

- Principal of operation
- Operating Ranges
- Applications
- Limitations
- Special considerations

Turbo Pumps:

- Principal of operation
- Operating Ranges
- Applications
- Limitations
- Special considerations

Cryo Pumps:

- Principal of operation
- Operating Ranges
- Applications
- Limitations

Special considerations

5. Question & Answer Session 1

In-Process Vacuum - Q&A Time

6. Leak Checking – Practical Session!

Helium leak checking principals:

- Why do we need it?
- What are common causes of poor vacuum?
 - Outgassing

- Permeation
- Virtual leaks
- Other miscellaneous leak types
- What methods are commonly used?
 - Rate of Rise
 - Rate of Fall
 - Pressurised Snoop testing
 - Helium leak checking
- Why use Helium?
- SAFETY FIRST!
- How the INFICON UL1000 works
- Component parts of the INFICON UL1000
- How to do a helium check
- Best known methods (BKM's)
- Where to connect the helium leak checker
- Using the Zero function
- Performing an Internal Calibration

Icons and Screen Menus

7. Vacuum Pump Testing & Fault Finding – Practical Session!

Measuring vacuum and understanding the reading

Causes of incorrect level of vacuum

Procedure for restarting a vacuum pump

Roughing pumps

Using the Gate valve

Outgassing

How to correctly start up a vacuum pump

How to safely shut down a vacuum pump

How to know the correct level of vacuum for a particular pump type

How to read the vacuum values

What level of vacuum is expected in a pump in sub-fab