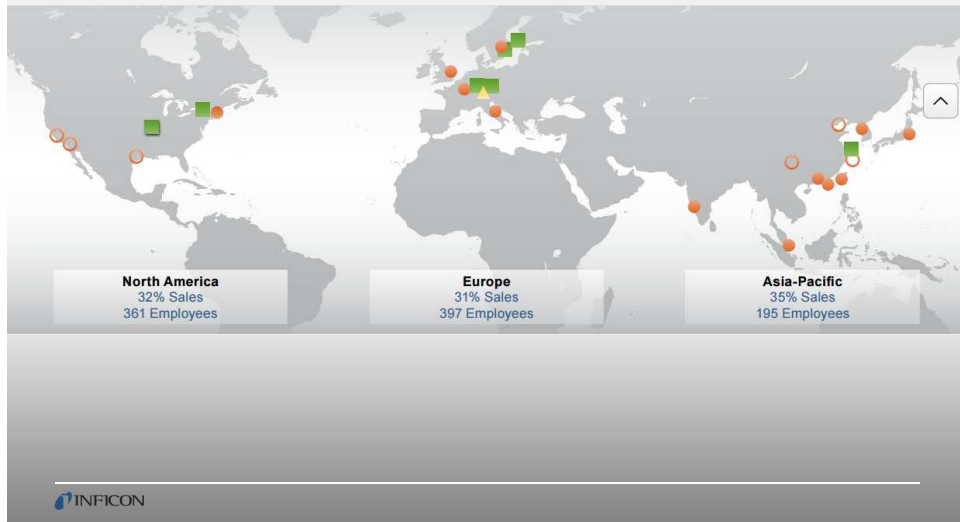




14:15 Vakuum-Sensoren für effiziente Prozesse in Produktionsanlagen – intelligente Systeme als Beispiel für skalierende Effekte
Christian Berg, Senior Director of Global Programs, Inficon, Balzers (FL)



INFICON – ww



INFICON – Markets

Maximize Productivity and Yield

- Display Lighting
- Optics
- Semiconductor
- Solar

Bring the Lab to the Sample

- Emergency Response
- Military
- Environmental Health and Safety
- Alternative Energy and Petrochemical

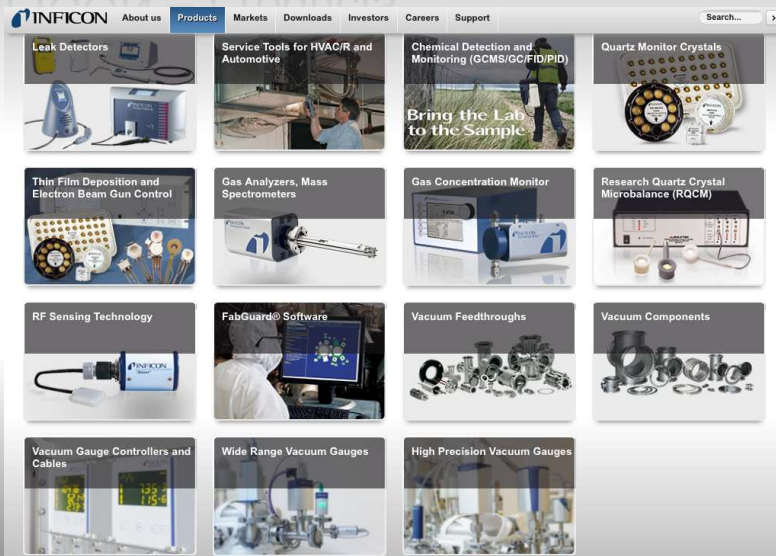
Assuring Quality

- Refrigeration
- Automotive
- Air Conditioning
- Public Utilities

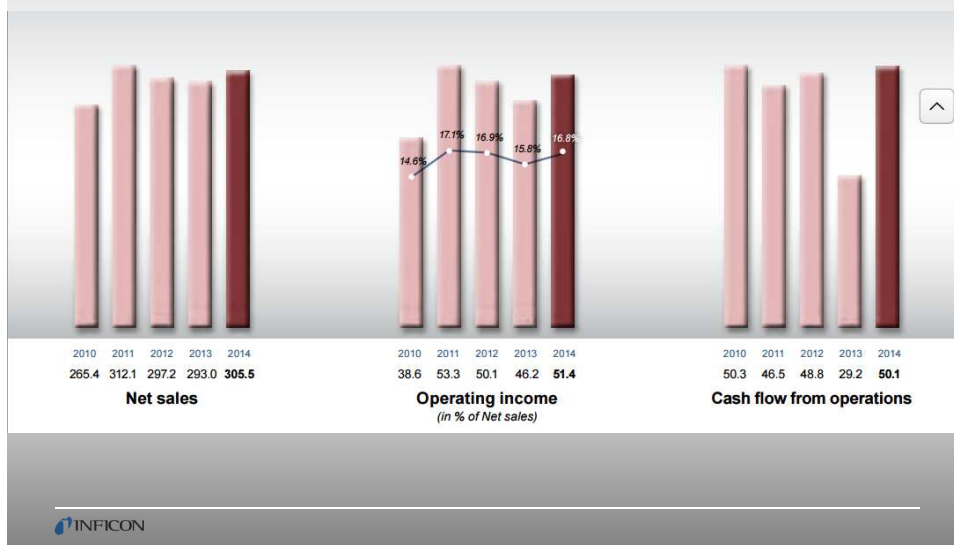
Precise Measurement, Analysis and Control

- Research and Development
- Vacuum Furnace and Metallurgy
- Industrial Vacuum Coating

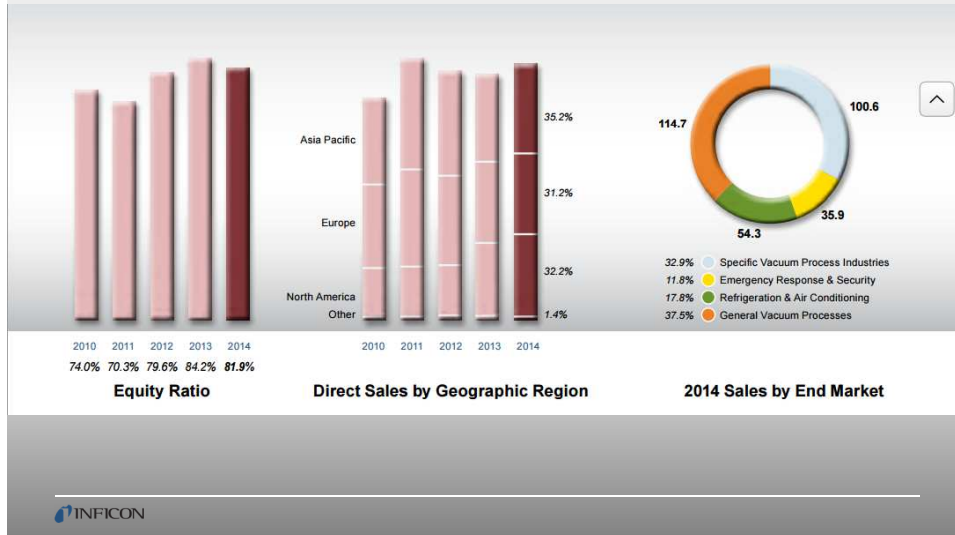
INFICON – Products



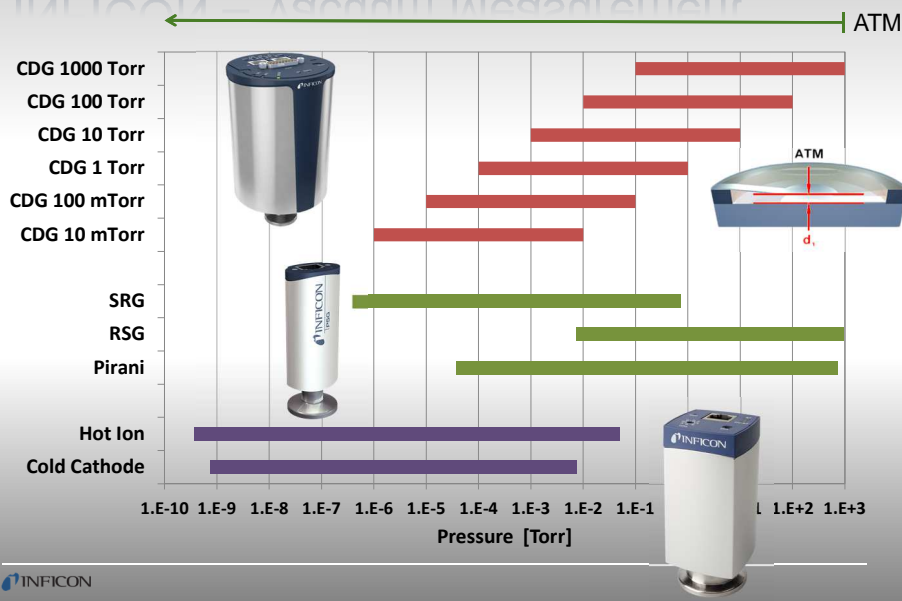
INFICON – Financials



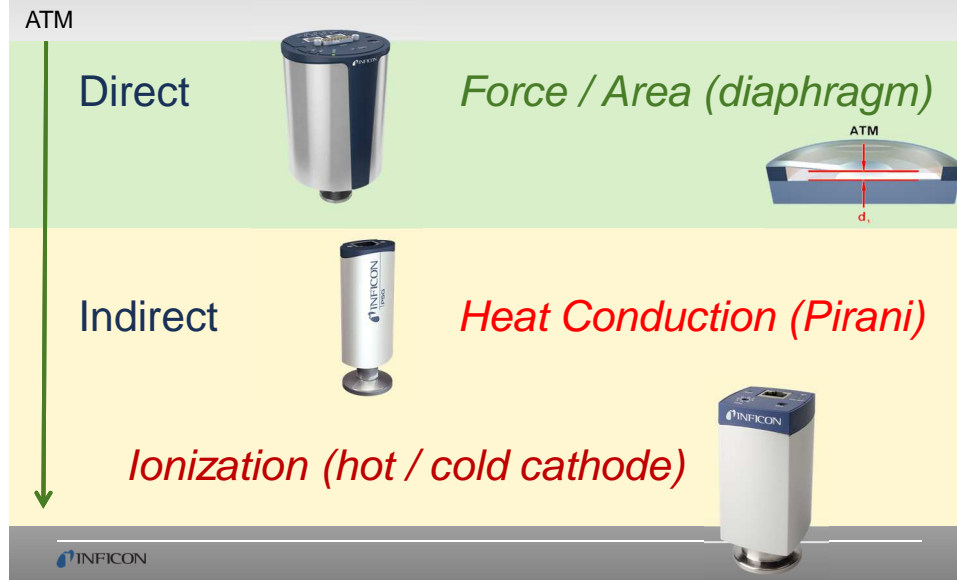
INFICON – by Regions



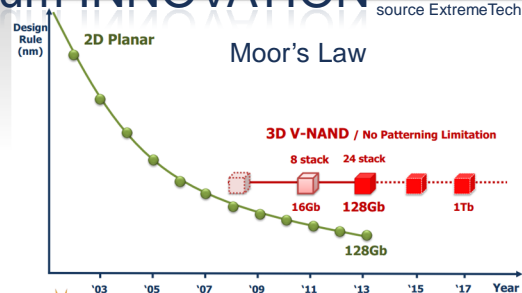
INFICON – Vacuum Measurement



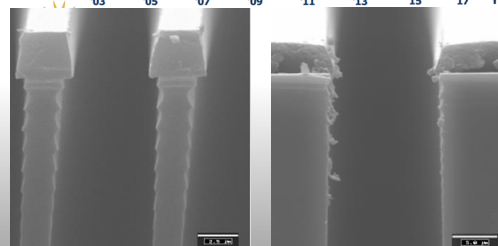
INFICON – Measurement Principle



INFICON – Vacuum INNOVATION



STRIPE
20 x faster
10 x sensitiver
 than any conventional
 vacuum gauge

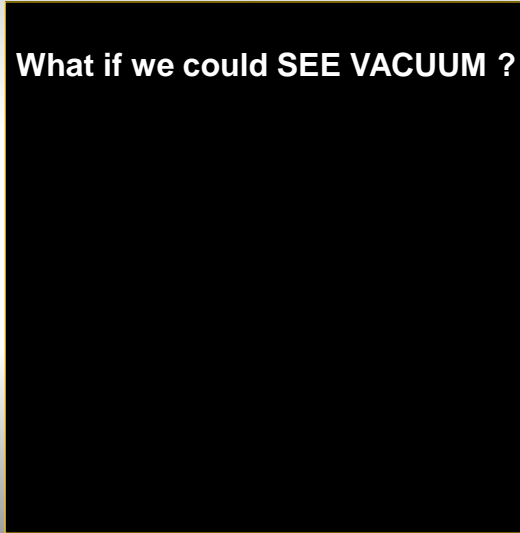


rough walls¹⁾

clean walls¹⁾

Vacuum Measurement – *key to nothingness*

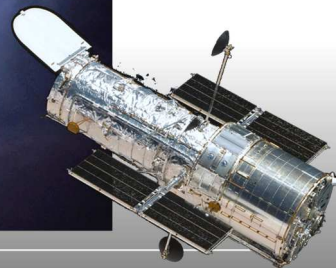
What if we could SEE VACUUM ?



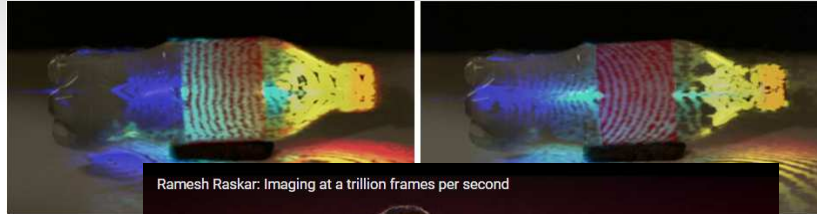
Excursion – *key to nothingness*

HUBBLE can see nothingness

... the past



Excursion – See *LIGHT*

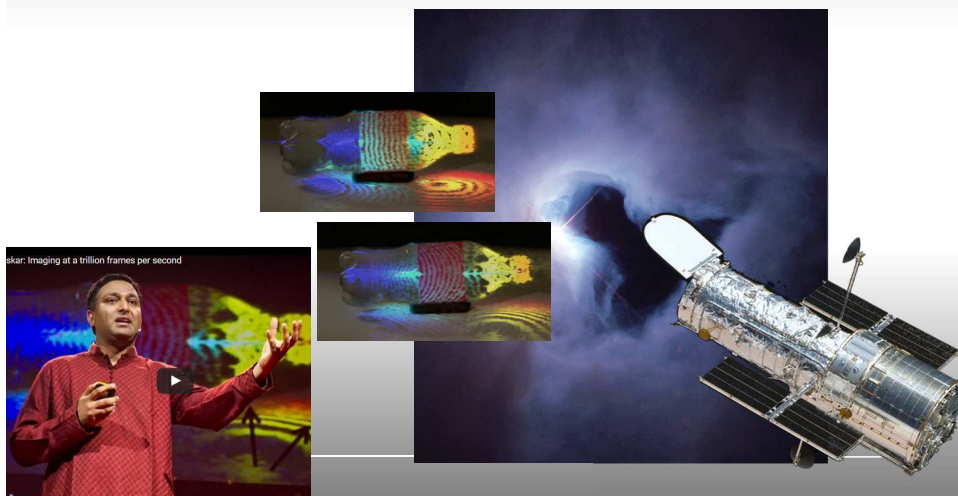


Ramesh Raskar: Imaging at a trillion frames per second



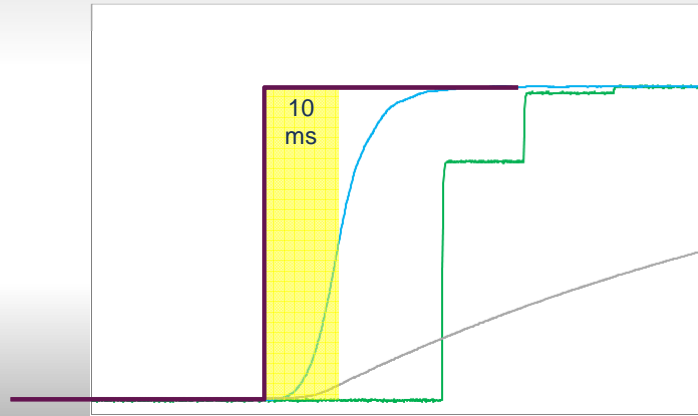
INFICON

Idea: *VISION* through *SPEED* Oversampling



VISION through SPEED

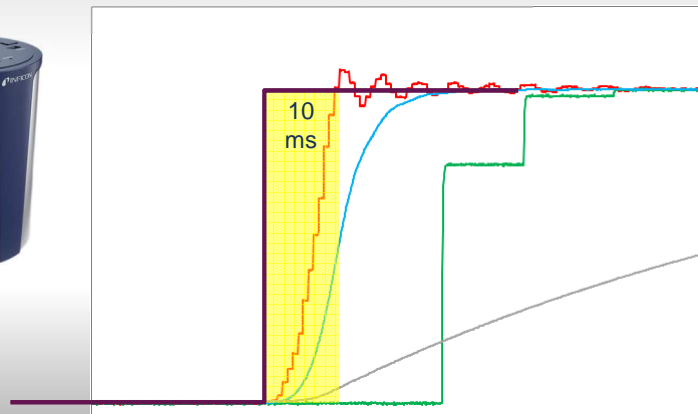
Conventional measurement is slower than change



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VISION through SPEED

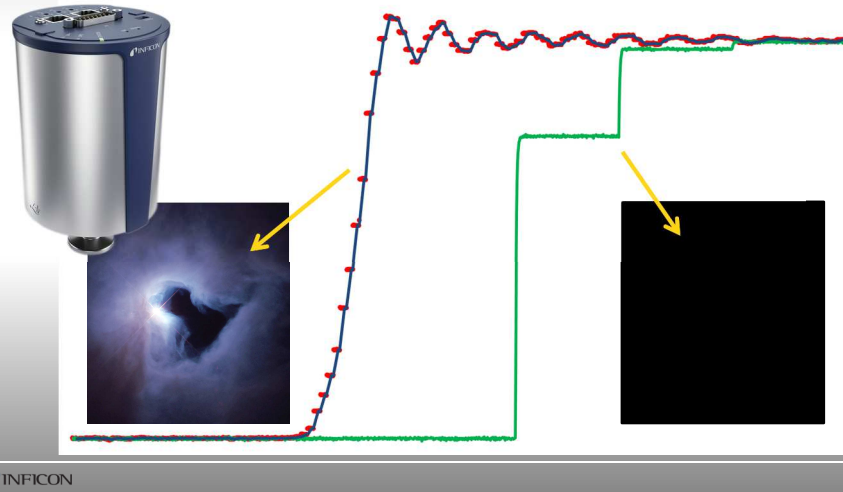
STRIPE brings oversampling capability



INFICON

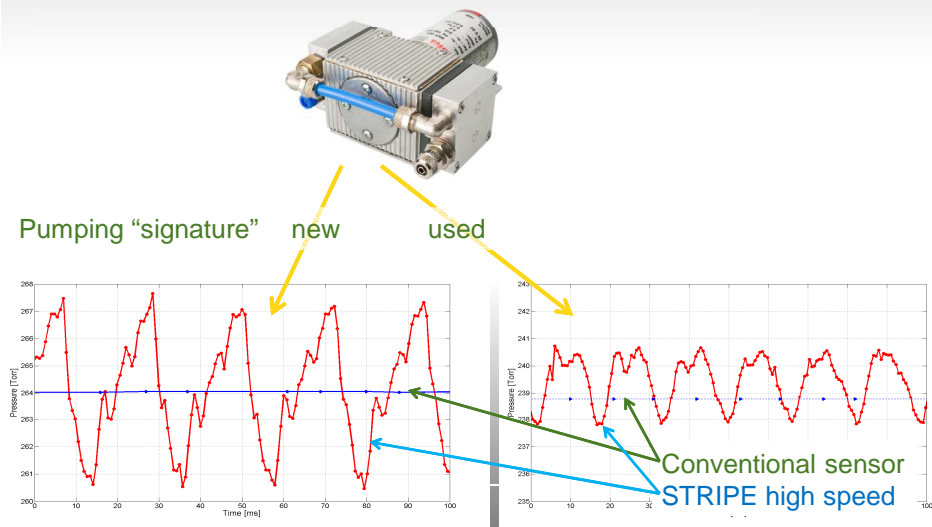
VISION through SPEED

STRIPE is 10 faster than fast pressure changes



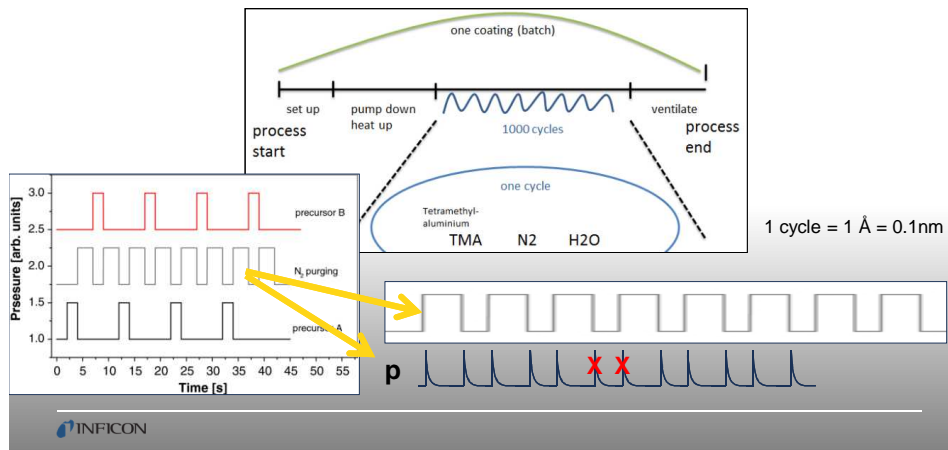
VISION through SPEED

See vacuum: Example Membrane Pump



VISION through SPEED

See vacuum: Example ALD (atomic layer deposition)



EcoDesign x.0

INFICON serves SEMI Industry

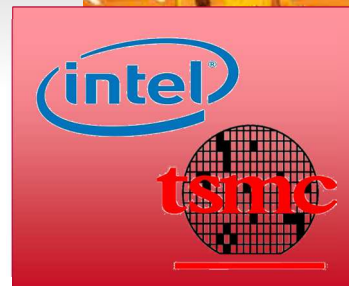
1.0



2.0
OEM Semiconductor
Tools



3.0
Semiconductor
Manufacturing



INFICON

EcoDesign 3.0

SEMI – one of the world's most mature industries

Statistics

- WW ca. 185 Semiconductor fabs
- 70x 200mm à 1 bUSD (Freescale)
- 65x 300mm à 5 bUSD (Intel)
- Annual 40-45 bUSD investment in SEMI equipment (source WW Chip Equipment Bookings)
- **100-200 MUSD/day burn rate 300mm (CapEx only, no operational costs)**



EcoDesign 3.0

See vacuum: STRIPE monitoring



Statistics

- **100-200 MUSD/day burn rate 300mm**
- Average 1 incident/fab/year
- 30% cause halt production 2 days
- SPEED finds every second case

Annual loss of 40 MUSD for 300mm fabs



EcoDesign 3.0

See vacuum: STRIPE monitoring

Annual loss of 40 MUSD for 300mm fabs

Against investments in STRIPE:

- 10x per fab, 65 fabs = 1 MUSD

This was CapEx only. Full running costs not published, but will contain:

- Operational costs such as maintenance, labor, material, energy with is considered 5x
- Waste due to bad quality (crucial in SEMI) 1x

Sum 300MUSD annual loss prevented by STRIPE



EcoDesign 3.0

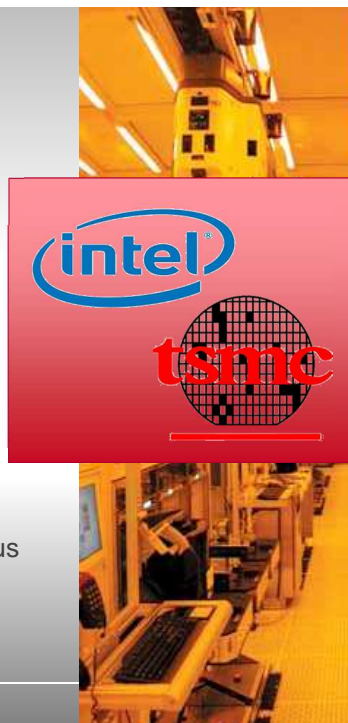
See vacuum: STRIPE monitoring

Sum 300MUSD annual loss prevented by STRIPE

**Against investment of 1 MUSD
a factor 300**

“low hanging fruit”

- No change in process, just monitoring
- No expensive installation. Tools have surplus flanges for monitoring
- Fab QA SW can handle such additional information (e.g. FabGuard)



EcoDesign x.0 in Vacuum

If you can SEE vacuum



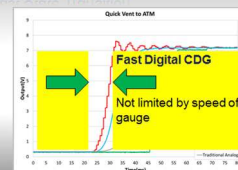
INFICON

EcoDesign x.0

But there are more dimensions



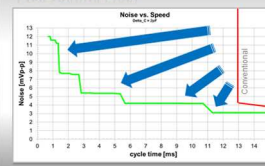
Fast State Transition



Process / Tool Monitoring



Fast Control Loop



INFICON