Advanced Manufacturing

Industry 4.0 driving business model transformation in Advanced Manufacturing Facilities

B. Kennedy
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Abstract
Though the semi-conductor industry can rightly claim to have led the charge in the development and implementation of the technologies driving the Industry 4.0 revolution, it is now seeing wider affects happening with new business model transformation and emerging manufacturing technologies transforming the ways businesses are managed and run. This is driven by the products the Semiconductor industry make and the relentless drive to deliver these products with more capability and less cost allowing the wider manufacturing base to design these technologies into their manufacturing plants.
Are these emerging technologies now being used back in semiconductor facilities or is there opportunities to engage with them. This paper will put a mirror onto the industry.

Biography
Barry is currently CEO of Irish Manufacturing Research, Irelands leading cutting edge industrially focused research centre for advanced manufacturing.
Barry qualified with an MSc from University of Dublin, Trinity College Dublin in 1996.

He has worked as New Business and Strategic Program director for Ireland Fab Operations in Intel.
Prior to this he has held many senior management roles in Failure Analysis, Process Integration, Device, Process Control and Statistics, Yield Analysis, Quality and Reliability, Yield Q&R.
He started his career in Intel working in many senior engineering roles as senior Process Integration and Failure Analysis engineer.

Barry has worked in a research environment in Trinity College Dublin for 10 years before commencing work with Intel.

Predictive maintenance for plasma tools

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Abstract
Plasma processes are widely used in the semiconductor industry, they are completely distinct from mechanical manufacturing. Plasma processes are running in vacuum chambers and there are opened every month or quarter for maintenance. Each maintenance measure at a production chamber causes costs in the order of some 10 k€. Therefore, the prediction of the right time for maintenance can reduce manufacturing costs dramatically.
On the other hand, plasma processes are usually treated as black box due to their complexity. All important process parameter as uniformity, rate, selectivity, and stability depend of the plasma's parameters as flux of ions and reactive species. Thus, the main peculiarity of plasma processes can be compressed is one sentence: 'The plasma is the tool'.
Beyond this we have to take into account that plasmas can run in different modes, can oscillate, cause breakdowns at the chamber wall and depend on the state of the chamber wall. In particular the chamber wall changes its surface properties by the deposition of byproducts. So the only realistic approach for the predictive maintenance for plasma tools must be based on the plasma's properties.
It will be shown how plasma parameter can describe plasma and so also the effective chamber state, chamber differences and show undesired instabilities as arcing and wear of chamber parts. The early detection of changes and undesired effects are here the key for predictive maintenance.
Examples show the early detection of process faults, real-time process characterization, and preconditions and methods for chamber matching.

Biography
Objective:
CEO, Plasmetrex GmbH

Education:
Ph.D. in Plasma Physics, Ernst-Moritz-Arndt-University
Greifswald, 1992
Dipl.-Ing., Technology of Electronic Devices, 1987

Grants and Fellowships:
Lecturer at Ruhr University Bochum since 2010: Plasma technology for semiconductor, MEMS, and PV applications

Research and manufacturing skills:
Plasma etch process development
Nonlinear Modeling of industrial RF Plasmas
Development of Plasma Sensor Systems for Etch and Deposition

20 years experience in joined projects with semiconductor fabs