

Smart & Sustainable



M. Arnold
Managing Director
Peer Group, Dresden, Germany



Biography

Dr. Michael Arnold, Managing Director at PEER Group, has over 25 years industrial experiences in high-tech industries.

From 1981 - 1986 he studied Physics at the Friedrich-Schiller-University in Jena, Germany, where he obtained his PhD in 1994.

Michael gained broad experiences in system simulations, software design and development, optical inspection systems, and product development for the aerospace and defense industry. Michael has been involved with factory automation software solutions for the semiconductor and solar industry since 2001 in the Operations Manager position of TRW and since in 2003 as Managing Director of PEER Group GmbH in Dresden.

Wait-Time-Waste improvement opportunities and 'smart manufacturing' in legacy 200mm fabs



J. Driessen
principal industrial engineer
NXP Semiconductors, ICN8, building FB1.132,
Nijmegen, Netherlands



Abstract

Since 2009 the ITRS (International Technology Roadmap for Semiconductors) includes the concept of "wait-time-waste" (WTW), dealing with the systematic identification and elimination of time waste at critical points in the lifecycle of a product. The SEMATECH activities concentrate on the 300mm and 450mm roadmap. However, significant gains can also be expected in existing legacy 200mm fabs, an arena widely ignored by industrial standards and solutions. To raise the equipment (and fab) efficiency in legacy high-mix fabs, one needs to 1) integrate modern IT-solutions into the existing Factory Information and Control System (FICS) and 2) increase the industrial engineering effort to enable wait-time-waste methodology to identify hidden efficiency losses.

In our high mix fab in Nijmegen (NXP-ICN8) we have created 'smart manufacturing solutions' which make use of available SECS/GEM events from legacy 200mm equipment. As expected, the integration of modern IT-solutions on top of existing IT-tooling in legacy high mix fabs is a

daunting task but not impossible. Additional tweaking and tuning is required to make the 'smart solutions' compatible with current way-of-working (partial implementation, island solutions, self-made elements)

The lack of standards to measure time with 200mm SECS/GEM events requires extra resources to configure the data-collection and determine the effective analytical model(s). A raised level of manufacturing science (high-mix compatible) and a robust data-collection (synchronization, detection missed events) are essential for a successful implementation and acceptance by the end-user. The intensive collaboration through INTEGRATE provided many examples (different tool-sets, issues with hardware/software versions) which lowered the threshold for 'copy-paste' actions. The results demonstrate that significant gains can be expected by developing 'smart solutions' and integrating them into the IT-architecture of existing semiconductor fabs.

Biografie

Jan Driessen received his Ph.D. in Physics from Eindhoven University of Technology in 1989, The Netherlands. From 1990-1996 he continued fundamental research at various scientific institutes in the USA and NL. Since 1997 he works in industry. During 4 years in Display Manufacturing (many visits for Display fabs in Asia) he learned to appreciate the importance of industrial engineering (data-collection, problem-solving, creating enablers for efficiency improvement). Since 2000 he works at NXP Semiconductors, where he initiated successfully with IT-colleagues various data-collection programs (APC, OEE & wait-time-waste). In his current role as principal industrial engineer he is responsible for driving the equipment efficiency improvement program at NXP-ICN8. Since 2012 he has presented and published this efficiency improvement activity at various conferences (APCM, ASMC) and papers (IEEE proceedings).

Semiconductor manufacturing vs. Industry 4.0: Is the glass half-full or half-empty?



P. Vialletelle
Senior Member of Technical Staff
STMicroelectronics, Front End Technology &
Manufacturing, Crolles, France



Abstract

The opportunities identified for European leadership in the electronics industry (i.e. Smart Mobility, Smart Society, Smart Energy, Smart Health and Smart Production) typically address markets where volumes will range from several thousands to several millions of pieces with heavy customized products for each targeted application. Mass customization and flexibility thus represent the keys to the future of Semiconductor Manufacturing in Europe and companies will have to adapt their organizations, structures and systems to this new speed of market changes.

One of the main challenges there is that due to their size and history, European Fabs face problems and complexity that higher volume facilities largely ignore, even when in high mix, thanks to scaling. This means that standard, off the shelf, solutions do not exist and that existing solutions have to be so heavily customized that their cost of deployment is very often overwhelming. That's where the development of "Industrie 4.0" should be an opportunity. As most semiconductor fabs have already deployed state-of-the-art solutions in terms of Manufacturing Execution System, Automation, Advanced Process Control, etc. they experience today "second stage challenges", i.e. those linked to interoperability, complex decision making, advanced diagnostic or global optimization.

Various industrial use cases from STMicroelectronics Crolles300 wafer fab will be presented to illustrate both visions of the current status of European semiconductor manufacturing and evidence the interest of collaborative projects hence the need for developing a "Manufacturing Science" framework to propose standard interfaces, services and smart solutions easily adaptable to other industries.

Biografie

Philippe Vialletelle is Senior Member of Technical Staff at STMicroelectronics Crolles, France. After receiving an Engineering degree in Physics from the Institut National des Sciences Appliquées in 1989, he entered the semiconductor industry by working on ESD and physical characterization. His next experience was in Metrology before enlarging his scope of activities to Process Control. He finally integrated the Factory Integration world, through Industrial Engineering and is now responsible for the definition of advanced methodologies and tools for the Crolles 300mm production line. Expert in Manufacturing Sciences for Process and Production Control, he is now in charge of driving collaborative projects at European level. His email address is philippe.vialletelle@st.com.

i4.0 - semiconductor and "traditional" industry on a similar track



T. Schuler
senior expert
Robert Bosch GmbH, G3/PJ-C12, Stuttgart,
Germany



Abstract

As the methods and technologies of manufacturing are getting more complex, less transparent and closer to the edge of feasibility, the "traditional" industry is facing similar challenges as the semiconductor industry. Therefore tools like MES, material tracking (e.g. with RFID) and other enablers of connectivity become more important and widespread in the industry. The presentation will show the Bosch-strategy on i4.0 with examples of mass production as well as manufacturing of very diverse products in small quantities. Furthermore the dual strategy of Bosch as a lead operator and a lead provider will be highlighted.

Biografie

Thomas Schuler is senior expert at the "innovation cluster connected industry" at Bosch in Stuttgart. After receiving a doctorate degree in Physics from University of Stuttgart in 1998 he started his industrial career at the Bosch semiconductor production in Reutlingen (Germany). After several positions he was in charge of automation projects in the 200mm-wafer-fab which started production in 2010. After 6 years dealing with automation and connectivity in the semiconductor production he joined the "innovation cluster connected industry" in 2015.

Performance Improvement of Existing Automated Material Handling Systems by Control Optimization



C. Hammel
Head of Applications in Semiconductor Industry
Technische Universität Dresden, Chair of Logistics
Engineering, Dresden, Germany



Abstract

Existing AMHSs are facing ever rising requirements through higher flexibility demands, smaller lot sizes in production, etc. This paper focusses on the subsequent challenges for AMHS and presents approaches developed in close cooperation between GLOBALFOUNDRIES Dresden and Technische Universität Dresden improving overall performance by optimizing different areas of AMHS control:

As routing in these systems is mostly conducted based on some sort of shortest paths, adjusting the length parameters (or link weights) is an intuitive approach for manipulating traffic flows. A systematic approach balancing traffic in a large overhead hoisting transport network is presented. Its performance is demonstrated in an application where it was able to provide an increase in maximum throughput of 20% without negative impact to delivery times. Additionally, the fact that transport systems may be a bottleneck in production has to be accepted. Therefore, their limitations have to be incorporated into scheduling / dispatching. One such approach is presented especially suitable to limit the number of transports through bottlenecks linking definable production areas like bridges between different buildings or lifts between different levels. In a use case this method has proven success by decreasing transport load through such bottlenecks by up to 28%, again without negative impact to production. Finally a potential combination of different approaches will be sketched providing the ability to further improve system performance and to empower the system to handle new demands with little or no hardware manipulations.

Jointly presented by Christian Hammel (Technische Universität Dresden) and Jörg Lübke (GLOBALFOUNDRIES Dresden)

Biografie

Christian Hammel is a member of the scientific staff and head of applications in semiconductor industry at the Chair of Logistics Engineering at Technische Universität Dresden. Having received his Diploma (similar to M.S. degree) in Applied Mathematics (Technomathematik) in 2007 from Technische Universität Dresden he worked on various semiconductor projects since 2010 (both industrial and research) regarding analysis, simulation and optimization of AMHS control and related areas. His research interests include the application of analytical methods to optimize existing AMHS as well as to support the design phase.

Jörg Lübke is Senior Member of Technical Staff with GLOBALFOUNDRIES in Dresden and responsible for the AMHS Control Systems at the Dresden site. He holds a degree as Diplomingenieur for Electrical Engineering from the Technische Universität Dresden with a major in Automation and Control. He joined AMD in 1998 for the startup of AMD's first Fab in Europe in Dresden. He worked ever since in the Factory Automation department responsible for the AMHS Control Software from requirements definition, supplier selection to implementation and deployment of AMHS software as well as day-to-day operation and continuous improvement. From September 2011 to December 2013 he was with GLOBALFOUNDRIES' Fab 8 startup team in Malta, NY to support the implementation and ramp of the Automated Material Handling System in Fab 8.

B. Capraro
Research Manager, Silicon Technology



Intel Research and Development Ireland Ltd, F24
Research, Leixlip, Ireland



Biography

Bernie Capraro graduated with a Masters Degree in Engineering with distinction from Newcastle upon Tyne Polytechnic in 1990. Bernie has worked in the semiconductor industry since 1987. He worked in Telefunken in Germany developing a liquid phase epitaxial growth process for GaAs based laser diodes. With Northern Telecom (Nortel), Bernie worked on the development, transfer and sustaining of numerous process technologies to manufacture state-of-the-art laser diodes and photo detectors based on GaAs and InP. In 1994, Bernie became a Customer Engineer for Applied Materials (AMAT), supporting AMAT toolsets (metal etch) located in various Customer fabs in Northern Europe. In 1995, Bernie moved from AMAT to Newport Wafer Fab (NWL) in Wales, where he became a Shift Engineer supporting all areas of the fabrication process. In 1997, Bernie moved to Intel Ireland and became the metal etch tool owner. Since that time, Bernie has held many roles within Process Engineering including Chemical Mechanical Polish (CMP) Equipment Engineer, Fab24 Non Copper and Copper CMP Process Engineering Group Leader. In January 2006, Bernie transitioned to a new Project Management role supporting EU collaborative Research, specifically in the Nanotechnology field. In this role, Bernie successfully developed and managed more than 20 collaborative projects in the region involving many partners from Research Centres, Academia and Industry. Since 2015, Bernie has been the Research Manager at Intel Research and Development Ireland responsible for all silicon nanotechnology research involving Intel in Ireland, helping to deliver potential solutions to Intel for materials, devices, equipment and processing techniques required for the future technology nodes.

Navigating the Regulatory Landscape: towards Compliance and Environmental Sustainability



O. Georgoutsakou
Director Public Policy for Europe
SEMI, Brussels, Belgium



Abstract

Sustainability not only makes business sense, it is also often a legal obligation. Companies wishing to do business on different markets need to navigate the local and international regulatory environment and make sure they are working with their upstream supply chains and their customers to comply with the law.

This presentation will provide an overview of the EU regulatory environment, looking at the laws that companies from across the supply chain (from materials to manufacturing equipment and device manufacturers) must comply with when manufacturing in Europe or placing their products on the EU market. Issues addressed include REACH, RoHS, Ecodesign, Machinery Directive, F-Gas regulation, the EU Circular Economy policy package and how SEMI is voicing the industry's views and helping members comply.

Biografie

Rania (Ourania) Georgoutsakou is Director of Public Policy for Europe with SEMI, the global industry association representing the manufacturing supply chain for the semiconductor and related industries. Her role is to support SEMI's global membership in evaluating and complying with European policies and legislation and to liaise with decision-makers to promote Europe's global competitiveness. Rania's areas of activity include EU institutional law, innovation, regional policy, health and social policy, Environment Health & Safety and EU market access rules.

She was previously Director for Lobbying and Thematic Coordination for the Assembly of European Regions, the largest European network of regional politicians, where for over 10 years she led the AER's work on the European Lisbon Treaty, health and social policy and e-innovation.

Rania holds a LL.M in European Law and a MSc.Econ in European policy making. She lives with her family in Brussels.

Smart Sustainability



C. Pophal
Senior Director
Infineon Technologies, Munich, Germany



Abstract

At Infineon we see the objective of sustainability as leaving future generations a world worth living in – a truly great responsibility. Similar to achieving of economic targets, sustainability is absolutely key to the way we operate.

Our products and innovations enable savings of approximately 36.5 million tons of CO₂ emissions during their useful lives in end-user products – a net reduction of approximately 35 million tons more than the CO₂ emissions generated during the manufacture of those products. We offer products that make our lives easier, safer and greener.

This goes hand in hand with optimizing our own ecologic footprint. Under the umbrella of our global Energy Efficiency Program we continuously assess energy efficiency potentials under ecologic and economic considerations. In 2015 we have implemented measures that saved an annual volume of 14.31 gigawatt hours of electricity and district heating at our frontend sites. In recognition of our achievements, in 2015 we were listed in the prestigious Dow Jones Sustainability Index for the sixth year in succession and, for the first time, we were the only European semiconductor manufacturer to be listed in the Dow Jones Sustainability™ World Index.

The ongoing identification and realization of further potentials for resource conservation in manufacturing requires new and innovative concepts towards smartification. Innovative approaches – such as big data analysis and industry 4.0 concepts – provide new opportunities. The initial results we gained from those approaches are very promising.

Biografie

Professional Career

Since 2004 Infineon Technologies AG, Munich

Current Position Senior Director Business Continuity

Global Head of Sustainability and Business Continuity Planning

- Energy Management
- Corporate Social Responsibility and Sustainability
- Environmental Protection and Technical Safety
- Business Continuity Planning

Member of the Board Committee for Energy Efficiency, Climate Protection and Environmental Protection of the German Electrical and Electronics Industry Association (ZVEI)

Member of the Committee Environment, Technology and Sustainability of the German Industry Association (BDI)

1999 – 2004 German Electrical and Electronics Industry Association (ZVEI)

1998-1999 Institute for Mikrotechnologie Mainz (IMM)

1998 PhD. in Material Science at the Technical University Darmstadt and the Sophia Universität

Tokio,
Japan

1994-1998 Studies of Chemistry at the Technical University Darmstadt

Waste gas treatment for dry etch processes: reduction of the environmental impact



A. Frenzel
Innovation Manager
DAS Environmental Expert GmbH, Dresden,
Germany



Abstract

An important aspect of the environmental impact of semiconductor manufacturing, and especially of photovoltaic solar cell manufacturing, are global warming related emissions. These consist of gases directly emitted from the production process and CO₂-equivalent energy consumption. Commonly used gases for dry etching, such as SF₆ or NF₃, have a high global warming potential and require abatement technology. This itself consumes energy and produces waste water that again needs to be treated. For specific processes elemental fluorine has been suggested as an environmentally friendly alternative because of its zero global warming potential. We investigated the feasibility and energy saving potential of wet scrubbers for the treatment of F₂-containing waste gases.

Biografie

Dr. Andreas Frenzel
Innovation Manager, Business Unit Gas Treatment

Since October 1999 Dr Andreas Frenzel has been employed by DAS Environmental Expert in a variety of positions including Director of Product Development. He is now holding the position of Innovation Manager evaluating future market developments. Alongside his professional commitment, he graduated as Master of Business Administration at the Donau-University Krems/Austria In 2011.

Previously he worked as a Postdoc at the Université des Sciences et Technologies de Lille/France and the National Institute of Resources and Environment in Tsukuba/Japan. He completed his Doctorate in Natural Sciences in 1997 at the University of Hannover and a diploma degree in Physics at the University of Heidelberg in 1993.

The Higher Education Graduate Pipeline, Meeting Industry Needs and the Challenges Ahead.



C. Keely
Senior Business Development Manager
Trinity College, The University of Dublin, Research
and Innovation Office, Dublin, Ireland



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Abstract

Trinity College researchers have a strong history and continued commitment to proactively seeing their research commercialized, and impacting society.

In tandem, the Higher Education institute itself must proactively and responsibly develop a talent pipeline to ensure economic success, aligning our graduates to industry needs.

Companies engage with Trinity College to access our talent pipeline, license our technologies, collaborate to develop new products or processes, access our world class research

infrastructure and expertise to provide technology and business solutions. Trinity engages with over 400 companies, nationally and internationally. Our industry partners are as varied and diverse as our research themes, ranging from well-known multinationals such as Intel, Google, IBM and Pfizer to innovative Irish SMEs like Sigmoid Pharma, Vitalograph and Welocalize.

Innovation at Trinity connects with society at many levels developing a vibrant start-up and entrepreneurial culture. The excellence of our graduates and staff is reflected in the success of our spin-outs and leading companies who employ them. The talk will disseminate best practices and identify programmes that significantly support Industry access to high quality graduate and research excellence.

Biografie

Chris Keely brings 20 years of experience working in and with, technology-focused multinational and indigenous Irish companies in the areas of new business generation and industry/academic engagement. In his current position as the Senior Business Development Manager at the Office of Corporate Partnership and Knowledge Exchange (OCPKE) at Trinity College Dublin, he champions and is responsible for the successful delivery of the college's industry strategy; enabling and supporting the linking and commercial exploitation of academic research with industry. Whilst working in industry, Chris has led large-scale international programmes in product development, advanced materials engineering, manufacturing technologies integration and reliability engineering. Chris graduated with a first class joint honours degree in Physics and Mathematics from the National University of Ireland, Maynooth. He continued his professional education at Trinity College and was awarded a PhD in Experimental Physics in 1996. Chris is a passionate advocate of the use of technology in society and of lifelong learning.