

# Status of the MEMS Industry

INDUSTRY & MARKET REPORT - SEPTEMBER 2010

*Growth is back, but only a limited number of players benefit*

## MARKET TRENDS

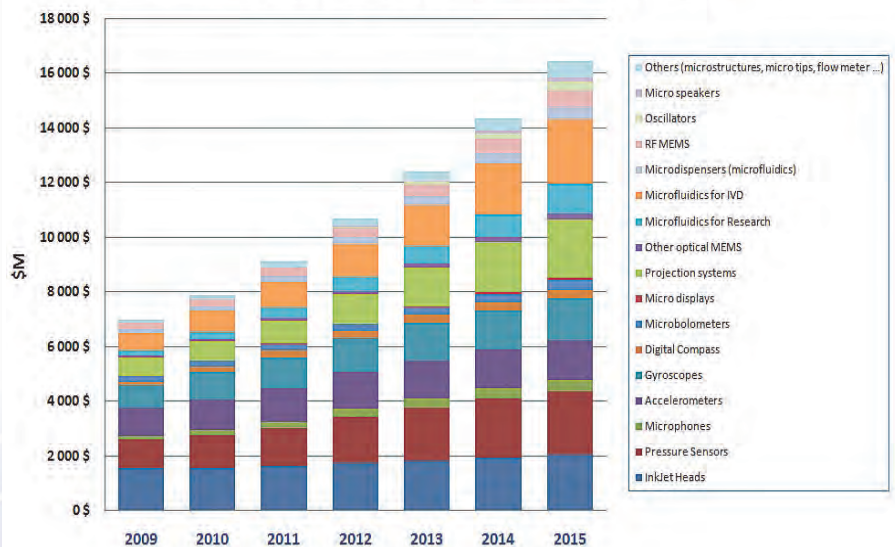
The growth is back, but the industry infrastructure has changed: a limited number of companies are taking full benefit of the growth of the market. Industry is undergoing structural changes...

MEMS business was almost flat since 2007: this is good news compared to the semiconductor industry that has collapsed during that time, but as many companies have made production infrastructure investments from 2006 to 2008, 2009 has been really difficult for several MEMS manufacturers.

Growth is back, but the growth has changed: only a few companies have 8" production infrastructure in place and it provides them a very strong cost benefit, helping them to target lower price consumer electronics applications. STM, Bosch, InvenSense (as a fabless) are taking full advantage of these changes. Now the question is: what will be the reaction of their competitors...

In parallel to this industrial situation, MEMS foundries are exiting stronger from the crisis: more system manufacturers have decided to stop internal MEMS manufacturing, so in addition to the organic growth of the MEMS fabless companies these system companies are now working with MEMS foundries. As such, MEMS foundries are extremely active at the moment with new customers looking to outsource MEMS manufacturing. This growth is attracting new players in MEMS foundry business, like TSMC, UMC... In addition, the Si interposer business opportunities, wafer level packaging and the 3D chip stacking using through silicon vias (TSV) are also growth drivers for the MEMS foundries.

MEMS market Forecast 2009-2015 in \$M



Innovation in MEMS is changing: brand new devices are now launched on the market and a complete family of totally new MEMS devices are under development. The digital compass, the IR and thermography cameras, the oscillator... are driving these new generation of MEMS products.

In addition, most of the new applications are linked to new usage of existing devices (human machine interface, replacement of existing technologies...). Strong efforts are put into the packaging adaptation in order to have a cost adapted structure (packaging is more than 40% of the cost of a MEMS device on average) and enter new applications (like mobile applications). New ways to package and integrate MEMS devices in a system are fueling the growth of MEMS industries.

**«Status of the MEMS industry 2010» is providing a unique 360° analysis of the evolutions of the MEMS applications and markets, with updated data on MEMS markets, analysis of the evolution of the industry from the manufacturing and innovation points of views, analysis of the strategies of the main players... For the 7th consecutive year, «Status of the MEMS industry» is the only publication which is analyzing the MEMS industry and its evolution, from key technical aspects to business strategies of the TOP30 MEMS companies.**

## MARKET METRICS

The MEMS market reached \$6.9B in 2009 and will be around \$8B in 2010. So 2010 is the start of the re-growth of The MEMS business.

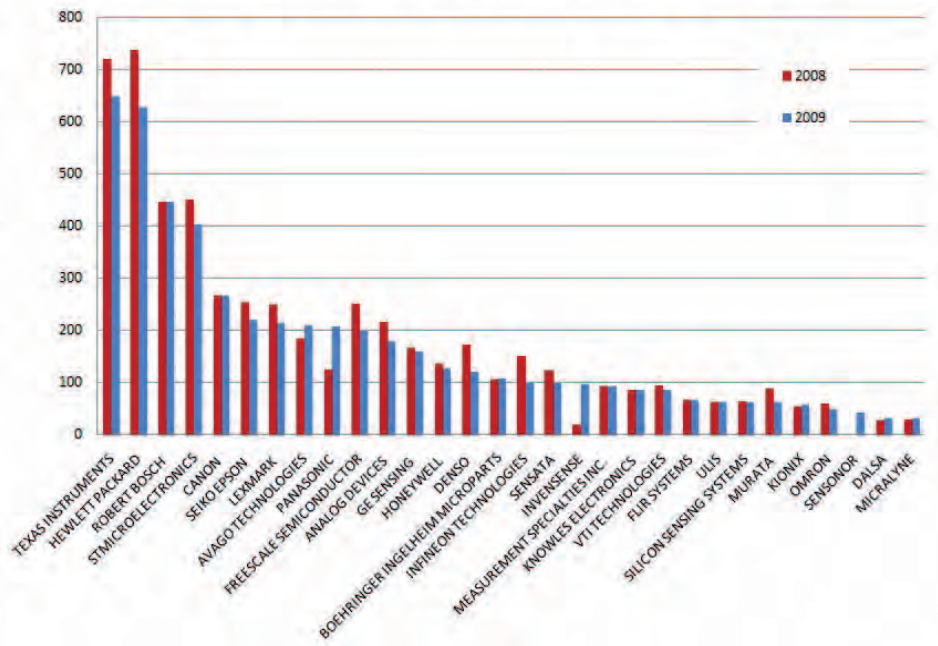
A restart of the growth is expected after 2010, with a CAGR of 13% in the next 5 years

The production equipment market remains low in 2009 at \$140M and will restart in 2011: 2010 will be a better year, mostly in the second half.

The production infrastructure in place is sufficient to absorb the growth for the next 2 years and we will have to wait 2011 for a significant restart of the MEMS production equipment market.

MEMS foundries are facing a vigorous growth and more than 25% CAGR expected in the next 5 years.

TOP 30 MEMS Company ranking 2009 - 2008



## REPORT HIGHLIGHTS

- Expected evolution of the MEMS markets applications by application
- Evolution of the MEMS foundry business
- Evolution of the MEMS production equipment business
- What is the strategy of each of the TOP30 MEMS manufacturers?
- What are the long term evolution of the MEMS markets and actual drivers of the changes of the industry
- How MEMS companies are taking benefit of changes in the packaging fields (TSV, WLP, Si Interposers...)
- Analysis of the business trends in the major 15 applications areas of MEMS devices: pressure sensor, ink jet, accelerometer, gyroscopes, silicon microphone, microfluidic devices, thermography, micro displays (including picoprojector), optical MEMS, RF MEMS...
- Long term vision of MEMS markets 2008-2020
- Analysis of the strategies of the TOP 30 MEMS manufacturers
- Technology and business trends at equipment and materials level
- Detailed analysis of the evolution of the MEMS foundries business and of the main players
- Evolution of the MEMS packaging
- Last 12 months M&A in MEMS
- Last 12 months venture capital investments in MEMS

## WHO SHOULD BUY THE REPORT

- The executives of MEMS companies to look at the complete MEMS business and the major evolution that could impact the industry in the long term
- The technology team of MEMS companies, looking to learn from the development of the other parts of the MEMS industry
- The end users, trying to understand the evolution of the MEMS industry and find data on each application and who is doing what
- The marketing and technology team of equipment and materials manufacturers, looking to have a complete picture of MEMS world and the key metrics of the industry

## REPORT METHODOLOGY

"Status of the MEMS Industry" is the result of the day to day contacts of the 20 full time analysts of YOLE, interviewing more than 2,500 companies per year, from system integrators to device manufacturers to technology developers.

The market & technical information has been gathered directly at:

- System manufacturers: car equipment manufacturers, IT equipment and medical device manufacturers ...
- Device manufacturers : key MEMS inertial sensor manufacturers worldwide
- Equipment & materials suppliers for the MEMS industry

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**The report includes a complete Excel database of MEMS market forecasts for each component: 15 datasheets with forecast in unit/ASP/dollar from 2009 to 2015.**

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ADI, AKM, AMS, Avago Technologies, Bosch Sensortec, Canon, Colibrys, Continental, Dalsa Semiconductor, Delphi, Denso, Discera, Flir, Freescale, GE, Honeywell, HP, IMT, Infineon, Kionix, Knowles Acoustics, Lexmark, Melexis, Memsic, Micralyne, Murata, Olivetti, Omron, Panasonic, Qualtré, Rhom, Seiko Epson, Schneider Electric, Silex, Silicon Sensing Systems, Silverbrook, SiTime, STMicro, Systron Donner, TI, Uliis, VTI Technologies...

## BIO



**Jean-Christophe Eloy** is CEO and Founder of Yole Développement. Since 1991, he has been involved in the analysis of the evolution of MEMS markets at device, equipment and also materials suppliers' level. Jean-Christophe Eloy is also board member in several organisations in Europe and in North America.

# ORDER FORM

PLEASE ENTER MY ORDER FOR «STATUS OF THE MEMS INDUSTRY» REPORT IN:

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## ABOUT YOLE DÉVELOPPEMENT

Beginning in 1998 with Yole Développement, we have grown to become a group of companies providing market research, technology analysis, strategy consulting, media in addition to finance services. With a solid focus on emerging applications using silicon and/or micro manufacturing Yole Développement group has expanded to include more than 40 associates worldwide covering MEMS and microfluidics, Advanced Packaging, Compound Semiconductors, Power Electronics, LED, and Photovoltaic. The group supports companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to develop their business.

### CONSULTING

- Market data, market research and marketing analysis
- Technology analysis
- Reverse engineering and reverse costing
- Strategy consulting
- Corporate Finance Advisory (M&A and fund raising)

### REPORTS

- Collection of market & technology reports
- Players & market databases
- Manufacturing cost simulation tools
- Component reverse engineering & costing analysis

### MEDIA

- Critical news, Bi-weekly: Micronews, the magazine
- In-depth analysis & Quarterly Technology Magazines:
- MEMS Trends- 3D Packaging - PV Manufacturing - Efficien'Si
- Online disruptive technologies website: [www.i-micronews.com](http://www.i-micronews.com)
- Exclusive Webcasts
- Live event with Market Briefings

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Definitions: "Acceptance": Action by which the Buyer accepts the terms and conditions of sale in their entirety. It is done by ticking the box "I accept the conditions".

"Buyer": Any business user (i.e. any person acting in the course of its business activities, for its business needs) entering into the following general conditions to the exclusion of consumers acting in their personal interests.

"Contracting Parties" or "Parties": The Seller on the one hand and the Buyer on the other hand.

"Intellectual Property Rights" ("IPR") means any rights held by the Seller in its Products, including any patents, trademarks, registered models, designs, copyrights, commercial secrets and know-how, technical information, company or trading names and any other intellectual property rights or similar in any part of the world, notwithstanding the fact that they have been registered or not and including any pending registration of one of the above mentioned rights.

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"Products": Depending on the purchase order, reports or database on MEMS, CSC, Optics/MOEMS, Nano, bio... to be bought either on a unit basis or as an annual subscription. (i.e. subscription for a period of 12 calendar months). The annual subscription to a package (i.e. a global discount based on the number of reports that the Buyer orders or accesses via the service, a global search service on line on I-micronews and a consulting approach), is defined in the order. Reports are established in PowerPoint and delivered on a PDF format and the database may include Excel files.

"Seller": Based in Lyon (France headquarters), Yole Développement is a market research and business development consultancy company, facilitating market access for advanced technology industrial projects. With more than 18 consultants, Yole works worldwide with the key industrial companies, R&D institutes and investors to help them understand the markets and technology trends.

1. Scope  
1.1 The Contracting Parties undertake to observe the following general conditions when agreed by the Buyer and the Seller. ANY ADDITIONAL, DIFFERENT, OR CONFLICTING TERMS AND CONDITIONS IN ANY OTHER DOCUMENTS ISSUED BY THE BUYER AT ANY TIME ARE HEREBY OBJECTED TO BY THE SELLER, SHALL BE WHOLLY INAPPLICABLE TO ANY SALE MADE HEREUNDER AND SHALL NOT BE BINDING IN ANY WAY ON THE SELLER.

1.2 This agreement becomes valid and enforceable between the Contracting Parties after clear and non-equivocal consent by any duly authorised person representing the Buyer. For these purposes,

the Buyer accepts these conditions of sales when ticking the box "I accept the conditions". This results in acceptance by the Buyer.

1.3 Orders are deemed to be accepted only upon written acceptance and confirmation by the Seller, within [7 days] from the date of order, to be sent either by email or to the Buyer's address. In the absence of any confirmation in writing, orders shall be deemed to have been accepted.

2. Mailing of the Products

2.1 Products are sent by email to the Buyer:

- within [1] month from the order for Products already released; or

- within a reasonable time for Products ordered prior to their effective release. In this case, the Seller shall use its best endeavours to inform the Buyer of an indicative release date and the evolution of the work in progress.

2.2 Some weeks prior to the release date the Seller can propose a pre-release discount to the Buyer

The Seller shall by no means be responsible for any delay in respect of article 2.2 above, and including incases where a new event or access to new contradictory information would require for the analyst extra time to compute or compare the data in order to enable the Seller to deliver a high quality Products.

2.3 The mailing of the Product will occur only upon payment by the Buyer, in accordance with the conditions contained in article 3.

2.4. The mailing is operated through electronic meanseither by email via the sales department or automatically online via an email/password. If the Product's electronic delivery format is defective, the Seller undertakes to replace it at no charge to the Buyer provided that it is informed of the defective formatting within 90 days from the date of the original download or receipt of the Product.

2.4 The person receiving the Products on behalf of the Buyer shall immediately verify the quality of the Products and their conformity to the order. Any claim for apparent defects or for nonconformity shall be sent in writing to the Seller within 8 days of receipt of the Products. For this purpose, the Buyer agrees to produce sufficient evidence of such defects. .

2.5 No return of Products shall be accepted without prior information to the Seller, even in case of delayed delivery. Any Product returned to the Seller without providing prior information to the Seller as required under article 2.5 shall remain at the Buyer's risk.

3. Price, invoicing and payment

3.1 Prices are given in the orders corresponding to each Product sold on a unit basis or corresponding to annual subscriptions. They are expressed to be inclusive of all taxes. The prices may be reevaluated from time to time. The effective price is deemed to be the one applicable at the time of the order.

3.2 Yole may offer a pre release discount for the companies willing to acquire in the future the specific report and agreeing on the fact that the report may be release later than the anticipated release date. In exchange to this uncertainty, the company will get a discount that can vary from 15% to 10%.

3.3 Payments due by the Buyer shall be sent by cheque payable to Yole Développement, credit card or by electronic transfer to the following account:

HSBC, 1 place de la Bourse 69002 Lyon France Bank code: 30056 Branch code: 200 1565 87BIC or SWIFT c00170 Account n°: 0170 ode: CCFRFRPP IBAN: FR76 3005 6001 7001 7020 0156 587

To ensure the payments, the Seller reserves the right to request down payments from the Buyer. In this case, the need of down payments will be mentioned on the order.

3.3 Payment is due by the Buyer to the Seller within 30 days from invoice date, except in the case of a particular written agreement. If the Buyer fails to pay within this time and fails to contact the Seller, the latter shall be entitled to invoice interest in arrears based on the annual rate Refi of the «BCE» + 7 points, in accordance with article L. 441-6 of the French Commercial Code.

3.4 In the event of termination of the contract, or of misconduct, during the contract, the Seller will have the right to invoice at the stage in progress, and to take legal action for damages.

4. Liabilities

4.1 The Buyer or any other individual or legal person acting on its behalf, being a business user buying the Products for its business activities, shall be solely responsible for choosing the Products and for the use and interpretations he makes of the documents it purchases, of the results he obtains, and of the advice and acts it deduces thereof.

4.2 The Seller shall only be liable for (i) direct and (ii) foreseeable pecuniary loss, caused by the Products or arising from a material breach of this agreement

4.3 In no event shall the Seller be liable for:

a) damages of any kind, including without limitation, incidental or consequential damages (including, but not limited to, damages for loss of profits, business interruption and loss of programs or information) arising out of the use of or inability to use the Seller's website or the Products, or any information provided on the website, or in the Products;

b) any claim attributable to errors, omissions or other inaccuracies in the Product or interpretations thereof.

4.4 All the information contained in the Products has been obtained from sources believed to be reliable. The Seller does not warrant the accuracy, completeness adequacy or reliability of such information, which cannot be guaranteed to be free from errors.

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4.6 In the case where, after inspection, it is acknowledged that the Products contain defects, the Seller undertakes to replace the defective products as far as the supplies allow and without indemnities

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4.7 The deadlines that the Seller is asked to state for the mailing of the Products are given for information only and are not guaranteed. If such deadlines are not met, it shall not lead to any damages

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4.8 The Seller does not make any warranties, express or implied, including, without limitation, those of saleability and fitness for a particular purpose, with respect to the Products. Although the Seller shall take reasonable steps to screen Products for infection of viruses, worms, Trojan horses or other codes containing contaminating or destructive properties before making the Products available, the Seller cannot guarantee that any Product will be free from infection.

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The Seller shall not be liable for any delay in performance directly or indirectly caused by or resulting from acts of nature, fire, flood, accident, riot, war, government intervention, embargoes, strikes, labor difficulties, equipment failure, late deliveries by suppliers or other difficulties which are beyond the control, and not the fault of the Seller.

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6.2 The Buyer agreed not to disclose, copy, reproduce, redistribute, resell or publish the Product, or any part of it to any other party other than employees of its company. The Buyer shall have the right to use the Products solely for its own internal information purposes. In particular, the Buyer shall therefore not use the Product for purposes such as:

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6.5 In the context of annual subscriptions, the person of contact shall decide who within the Buyer, shall be entitled to access on line the reports on I-micronews.com. In this respect, the Seller will give the Buyer a maximum of 10 password, unless the multiple sites organisation of the Buyer requires more passwords. The Seller reserves the right to check from time to time the correct use of this password.

6.6 In the case of a multisite, multilicence, only the employee of the buyer can access the report or the employee of the companies in which the buyer have 100% shares. As a matter of fact the investor of a company, the joint venture done with a third party etc... can not access the report and should pay a full licence price.

7. Termination

7.1 If the Buyer cancels the order in whole or in part or postpones the date of mailing, the Buyer shall indemnify the Seller for the entire costs that have been incurred as at the date of notification by the Buyer of such delay or cancellation. This may also apply for any other direct or indirect consequential loss that may be borne by the Seller, following this decision.

7.2 In the event of breach by one Party under these conditions or the order, the non-breaching Party may send a notification to the other by recorded delivery letter upon which, after a period of thirty (30) days without solving the problem, the non-breaching Party shall be entitled to terminate all the pending orders, without being liable for any compensation.

8. Miscellaneous

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The Seller may, from time to time, update these Terms and Conditions and the Buyer, is deemed to have accepted the latest version of these terms and conditions, provided they have been communicated

to him in due time.

9. Governing law and jurisdiction

9.1 Any dispute arising out or linked to these Terms and Conditions or to any contract (orders) entered into in application of these Terms and Conditions shall be settled by the French Commercial Courts of Lyon, which shall have exclusive jurisdiction upon such issues.

9.2 French law shall govern the relation between the Buyer and the Seller, in accordance with these Terms and conditions.