Status of the MEMS Industry 2015

12th Edition
INTRODUCTION

• This 2015 edition of “Status of the MEMS Industry” presents the MEMS device market and key industry changes and trends.

• Yole is actively following the market evolution of more than 200 MEMS applications and is tracking 350+ MEMS companies. This report combines all these applications into 15+ major MEMS devices: IJ heads, pressure sensors, microphones, accelerometers, gyroscopes, magnetometers, IMUs, micromirrors, MOEMS, microbolometers, IR sensors, microdisplays, RF MEMS, Oscillators, micro tips, and emerging MEMS devices.

• Based on the thousands of direct interviews Yole Développement analysts are conducting annually in the MEMS field with MEMS manufacturers, system manufacturers integrating MEMS, MEMS designers, MEMS equipment and material manufacturers, MEMS technology developers, this 12th version of the “Status of the MEMS Industry” provides up-to-date analyses and data on MEMS markets.
MEMS & SENSORS ROADMAP

From More than Moore towards Beyond Law

MEMS & Sensors enable key functionalities ...

Current battleground of the industry
MEMS MARKETS

Key facts & figures

• In 2000, the total MEMS market had a large growth reaching a $5B revenues for a bit more than 1B units.

• In 2014, the MEMS sector achieved a $11.1B business and we expect a $20B business in 2020 with 30B units.

• The boost started in 2003 with Knowles microphones & 2005 with ST accelerometers.

• Since 2009, the consumer applications enjoyed significant volume growth (around 17% expected between 2015 - 2020).

• It will continue to do so, although strong price pressure (-5% a year at best) will result in 3% revenue growth over the same time period.

• An interesting phenomena is that, besides expected growth coming from wearable and IoT, the car industry will still be a driver for the MEMS industry with more and more sensors (the autonomous car is the target).
2000-2020 MEMS MARKET (MUNITS)

20% CAGR over 2004-2020 (including glass/polymer-based microfluidics chips)

In 2030, a MEMS ASP at $0.3 (already a reality for accelerometers)

Simple MEMS market rule: 2016, $16B, 16B units, $1 ASP
2015-2020 MEMS MARKETS (BY APPLICATION)

Consumer is still the main driver

MEMS $M forecast per application
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Consumer (incl. wearable) is more than 60%
$400M difference between first & second.

This ranking shows a clear emerging of what could be a future “MEMS Titan”: Robert Bosch.
HISTORICAL SALES FOR 6 MAJOR MEMS PLAYERS

Very different dynamics

Figures summarize the historical sales 2009-2014 for 6 major MEMS companies. Without doubt, both Bosch and InvenSense still grow while others, like STM or Knowles, are suffering a slow down or a MEMS sales decrease.

With dual market and right R&D/production infrastructure, Robert Bosch is definitely winning the MEMS race today.
TOP 30 MEMS PLAYERS POSITIONING: DEVICES VS. SYSTEMS MAKERS & NUMBER OF MEMS DEVICES

The 3 « Great Walls of MEMS » rule!

Entering the MEMS business and being successful is a long & complex process!

MEMS revenues

1 MEMS product line

2 to 3 MEMS products line

> 4 MEMS products line

The « MEMS business entry » barrier

The « from 1 to more MEMS product lines » barrier

The « Devices to Systems » barrier
TOP 30 MEMS PLAYERS POSITIONING: DEVICES VS. SYSTEMS MAKERS & NUMBER OF MEMS DEVICES

The 3 « Brick Walls » rule!

• We have analyzed the 3 “Brick Walls” players have to pass for developing a significant MEMS business.
  • The first barrier is the “MEMS business entry” to have a first go in this market with a first MEMS product.
  • The second is the “from 1 to more MEMS product lines” to diversify its portfolio.
  • The last is the “Devices to Systems” barrier to move from a devices makers to a system maker with a successful MEMS business.

• So far, only Robert Bosch achieved a very successful transition (figure hereafter is illustrating this for TOP30).
FUTURE MEMS INDUSTRY GAME CHANGERS

What will / could change the future of MEMS?

- **NEW DEVICES & APPLICATIONS:**
  - New large volume markets (wearables, IoT …)
  - Pressure sensors for consumer
  - New MEMS device such as gas sensors
  - A shift of the value from the Si (material) to the full solution (sensor fusion – brain!)

- **NEW DISRUPTIVE TECHNOLOGIES / DESIGN:**
  - Packaging solutions e.g. TSV
  - New materials (e.g. thin film PZT for microphones, industrial IJH, auto focus …)
  - 300 mm MEMS line(s) for large volume to lower cost
    - But only a few companies can afford such investment (at least 3 industrial projects worldwide)
    - Which rationale?
  - From MEMS to NEMS
  - Further integration (e.g. optical MEMS)

- **NEW PLAYERS:**
  - Emerging MEMS foundries in China
    - Many MEMS foundry projects erecting
    - At least $150M+ invested in MEMS
  - The entry of a major player coming from the semiconductor to compete with the big 3
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• North America: Steve Laferriere - laferriere@yole.fr  
• Japan & Asia: Takashi Onozawa - onozawa@yole.fr  
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## CONTACTS
For more information about:
• Consulting Services: Jean-Christophe Eloy (eloy@yole.fr)  
• Financial Services: Jean-Christophe Eloy (eloy@yole.fr)  
• Report Business: David Jourdan (jourdan@yole.fr)  
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