

THINK OUTSIDE THE CHIP: MEMS –BASED SYSTEM SOLUTIONS...REVIEW AND OVERVIEW WITH
SELECTED CASE STUDIES OF CURRENT AND FUTURE HIGH VOLUME APPLICATIONS

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Microelectromechanical Systems (MEMS) are typically not systems at all...they typically are devices that are manifested as structures, sensors and/or actuators. The word “MEMS” is truly a misnomer! In contrast, I propose that any true system requires a number of various functionalities to warrant this title...and so it is with MEMS. Recently, the commoditization of many MEMS devices e.g. accelerometers has forced suppliers to “think outside the chip” and to create higher levels of integration approaches a.k.a. “systems solutions” to provide product differentiation and higher profit margins to simultaneously best meet both the suppliers’ and the customers’ requirements.

This presentation which is based on a recent market study conducted by Roger Grace Associates will address the various functions of the MEMS-based system solution approach through a case study review process of a number of current and future high volume applications. Applications include MEMS in the electro-mechanical, electro-optical and microfluidic domains targeting applications in the sectors including automotive, consumer, analytical instrumentation and avionics. As a result of these numerous interviews which form the basis of this study, we will address the various functionalities of this systems concept including:

- Multiple front-end inputs both monolithic and heterogeneous,
- Signal conditioning/processing circuits e.g. ASICs, DSPs;
- Energy management
- Thermal management
- Networking
- Packaging from a heterogeneous and wafer-level approach
- Testing

The concept of co-design i.e. the concurrent and highly interactive design process of the MEMS and its interfaces e.g. ASIC, package as an integral design strategy to minimize cost and time to market will be addressed. Research activities and application examples currently in development by international organizations to support the systems solutions concept will be presented.

The expected outcome of this presentation is to provide the attendee through several application case studies a broader understanding of the issues and tradeoffs of integrating the various system functionalities that results in a system solution that best suits the users’ requirements.