PROFILE

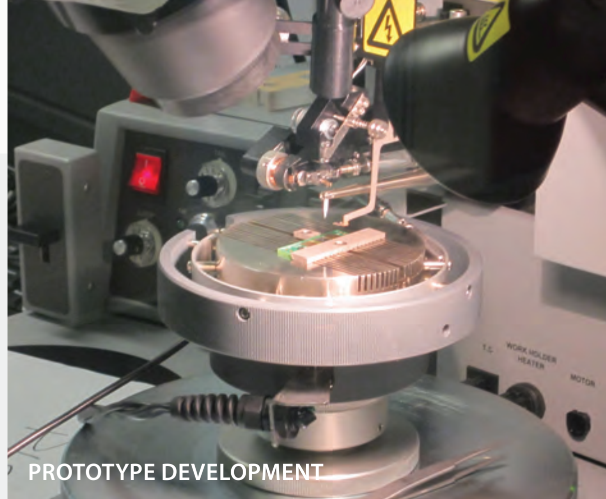
SMART MICROSYSTEMS

Your Microelectronic Package Assembly Solution for MEMS Sensors

SMART Microsystems Ltd. provides microelectronic package assembly services for MEMS sensors. Its customers are producers, manufacturers, and suppliers who need microelectronic sub-assemblies for sensor products in high-value, low-volume market applications. These customers are developing products – such as pressure, chemical, and optical sensors – for a wide variety of markets. SMART Microsystems has an experienced technical team, state-of-the-art equipment, and brand new facilities that provide contract services for prototype development, environmental life testing, and manufacturing.

Located in Northeast Ohio, SMART Microsystems has world-class cleanroom facilities providing microelectronic packaging, assembly, and test capabilities. SMART Microsystems is ISO 9001: 2008 certified, reflecting its commitment to high quality and continuous improvement. Its quality management system emphasizes service and support, and represents its commitment to continuously improving performance for customers.

The management team at SMART Microsystems is committed to helping their customers meet their goals by creating immediate and long term value. With over 65 years of collective experience in semiconductors, microelectronics, and sensors, this team's leadership has created a comprehensive set of microelectronic package assembly services for developing products that leverage the advantages of MEMS sensor technology. This team has a proven track record in new product development where they have been responsible for product launches in a variety of industry sectors, including aerospace, automotive, defense, biomedical, and industrial controls. Their leadership has successfully built an organization that is focused on supreme technical merit, commitment to the highest quality, and ultimate customer satisfaction and value.



PROTOTYPE DEVELOPMENT

ENVIRONMENTAL LIFE TESTING

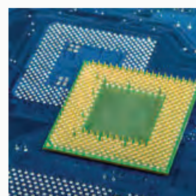
MANUFACTURING SERVICES

SMART MARKETS

AEROSPACE

AUTOMOTIVE

DEFENSE



DEVICE MANUFACTURERS & FOUNDRIES

ENERGY

ENVIRONMENTAL

SMART MICROSYSTEMS

ISO 9001 CERTIFIED

THE SMART ADVANTAGE

MEMS sensors are a platform technology that measure common types of modalities (eg., pressure, chemical, temperature, motion, etc.) and can be used in a variety of different application areas. MEMS sensors are attractive because they deliver higher performance at lower cost plus they are smaller, have less weight, and use less power than conventional sensors. Additionally, raw materials and components (eg., MEMS die, IC die, substrates, adhesives, etc.) have a lot of similarities, but the "new" advantages mentioned above can only be realized with custom microelectronic process development in order to ensure the performance requirements, the manufacturability, and the cost targets for the specific application.

SMART Microsystems has a significant competitive advantage by having key expertise related to MEMS sensor product development and manufacturing. First, the team specializes in microelectronic package assembly process development and test with customer-provided designs. Second, microelectronic package assembly solutions, also known as System in Package (SiP) have more flexibility and can be more highly leveraged by the customer than System on Chip (SoC). Third, SiP solutions tend to have shorter development cycles and therefore realize a faster path to the market for the customer. Fourth, there are very few outsourced low volume microelectronic package assembly suppliers in North America; furthermore, the ones that exist lack expertise in MEMS sensors.

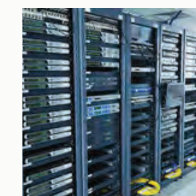
FOOD & AGRICULTURE

INDUSTRIAL MANUFACTURING

INSTRUMENTS & CONTROLS

MEDICAL

NETWORKING & COMMUNICATIONS



OPTICAL NETWORKING

SMART MICROELECTRONIC PACKAGING CAPABILITIES

SMART MICROSYSTEMS creates turn-key solutions for microelectronic package assembly challenges to move its clients MEMS sensor technology from development to production. With an engineering team experienced in manufacturing and state-of-the-art facilities, SMART Microsystems accelerates the transition of new MEMS sensor products to the market.

Microelectronic package assembly is a key part of the manufacturing process for MEMS sensor products. SMART's core capabilities and expertise support development, testing, and manufacturing of designs provided by their customers. Package assembly solutions offer more flexibility, faster lead times, and lower cost for niche applications.

TEST AND INSPECTION capabilities at SMART Microsystems play an important role in the development of processes and testing of microsystem package assemblies for our customers. By using Environmental Life Testing and Test and Inspection in conjunction with a Test Early-Test Often approach in the product development cycle, weaknesses in the design are found early, before too much value is added to the part.

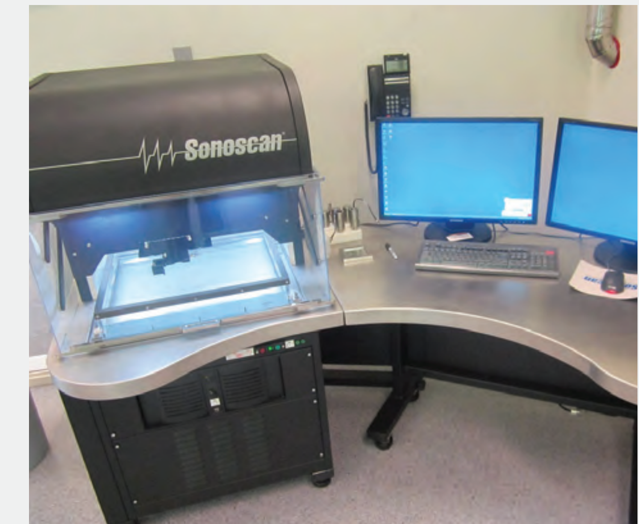
DICING is the process in which semiconductor wafers such as MEMS and IC's are singulated into individual die before package assembly. This is an automated process to ensure precision and accuracy. SMART Microsystems has experience cutting a wide range of materials for customers. These include silicon, glass, alumina, sapphire, and ceramic. Additionally, we offer wafer inspection and die sorting services if required.

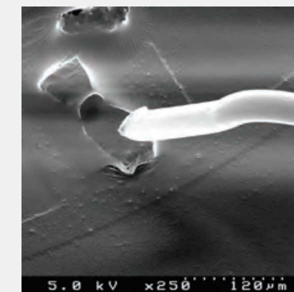
DIE ATTACH is a critical step in the packaging of microsystems and MEMS sensors that can impact other packaging and assembly processes. The capabilities consist of epoxy die attach, flip chip, sintering, eutectic attach, multi-chip module, and solder reflow. The die attach processes and expertise at SMART Microsystems support the development, testing, and manufacturing of sub-assemblies designed by our customers.

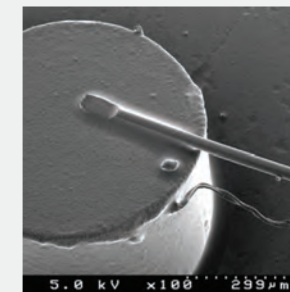
WIRE BONDING is a key manufacturing process for microelectronics and MEMS sensor products. SMART Microsystems provides extensive wire bonding capabilities: fine gauge wire gold ball bonding, fine gauge wire/ribbon gold wedge bonding, fine gauge wire/ribbon aluminum wedge bonding, and heavy gauge wire/ribbon aluminum wedge bonding. Wire bonding processes are flexible and robust, allowing our customers to quickly realize a microelectronic package assembly solution.

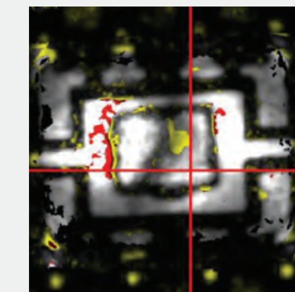
ENCAPSULATION of microsystems is a sophisticated process requiring understanding of the encapsulant materials and their interactions with die surfaces, package substrates and their related processes, as well as the physical environment in which the packaged device will be exposed. The SMART Microsystems encapsulation capabilities are adhesive dispense-dam and fill, glob top, potting, and underfill-hermetic and non-hermetic lid sealing, and parylene coating.

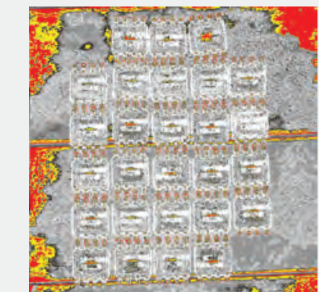
ENVIRONMENTAL LIFE TESTING at SMART Microsystems identifies reliability issues early in your product development. Our contract testing laboratory works directly with you to provide testing solutions that help ensure product quality and reliability. As part of your turn-key product solution, reliability study, or on an as-needed basis for overflow/bandwidth, SMART Microsystems can solve your issues before they become a problem in the field.











SMART ENGINEERING WITH THE END IN MIND

SMART Microsystems uses two strategies – **Test Early Test Often** and **Concurrent Engineering** – in order to successfully develop new products that meet market demands. These product development strategies create quicker learning and shorter design cycles. By implementing these two strategies, product development teams can lower overall development time and cost for the MEMS sensor market.

The **Test Early Test Often** approach to product development addresses the flaws of the traditional product development cycle (PDC). This strategy shortens the overall PDC by employing targeted testing early in the development process. The Test Early Test Often approach uncovers weaknesses in designs by testing fundamental design and process assumptions before too much value is added to the part. In this strategy, requirements for new science are highlighted, potential issues are addressed before they become integrated into the process, and the overall cycle of iterative changes is shortened.

Another strategy to address the pitfalls of the traditional PDC is the **Concurrent Engineering** approach to product development. Concurrent Engineering promotes manufacturable design and reduces overall product development cost by creating synergies between design and process engineering groups. By beginning with the end in mind, this strategy encourages the design engineer to consider the process and the process engineer to consider the design.

When the design and process development is conducted concurrently, and early testing is performed, learning is quicker and the design cycles become much shorter. Implementation of Concurrent Engineering hand-in-hand with the Test Early Test Often strategy adds real, measurable value. These combined engineering strategies significantly lower overall development time and cost.

SMART MICROSYSTEMS

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