

Sensors M&A update

July 2015

Sensors empower the new-age industrial revolution

Sensor-enabled technologies are pervading practically all areas of life as the development of sophisticated and smaller sensing solutions has seen adoption levels grow across a number of markets, including automotive and transportation, industrial, medical and consumer electronics. Rocketing demand, combined with technological innovations and concepts such as the Internet of Things (IoT)¹, will result in an impressive growth rate (far outpacing global gross domestic product [GDP]) for the global sensors market over the next five years.

As a result, the sensors market is experiencing robust mergers and acquisitions (M&A) activity as prospective acquirers are attracted by the sector's growth potential, attractive end-market segments and the opportunity for margin expansion by providing solutions for complex applications.

Key conclusions from this report include:

- **Sensor innovation is driving dynamic market growth**

Innovation in technology is creating huge demand for sensors. This, in turn, is driving robust market growth, with a compound annual growth rate (CAGR) of more than 7 percent expected between 2015 and 2019.

- **Sensing IoT opportunities**

The relatively new concept of the IoT (and Industrial IoT in particular) is a key future growth driver for the sensors sector. With some estimates suggesting up to 50 billion devices will be connected to the internet by 2020, sensors will play a pivotal role in facilitating these applications and companies will benefit from the strong demand that will follow.

- **M&A activity has been boosted by new market entrants**

Traditional sensor players continue to be active acquirers as they seek portfolio expansion and opportunities in new segments. Meanwhile, companies from adjacent markets have added a new dimension to the M&A market by targeting sensor companies that offer strong cross-selling opportunities and help overcome barriers to entry. Targets have typically included (large and small) specialist sensor companies and divisions divested by industrial conglomerates.

- **Valuation multiples at historically high levels**

Strategic acquirers are willing to pay high multiples (often well in excess of 12x earnings before interest, tax, depreciation and amortisation [EBITDA]) in order to leverage new technologies, break into new markets, grow product portfolios and expand addressable market size.

- **Private equity (PE) groups are also active sector participants**

PE firms continue to deploy capital into the sensors market, completing approximately a fifth of all M&A deals since January 2013. Underlying market characteristics (such as fragmentation and high barriers to entry), along with the considerable growth potential, are likely to see PE buyers continue to invest in sensor businesses, particularly those that offer valuable intellectual property, unique technical capabilities and strong customer bases.



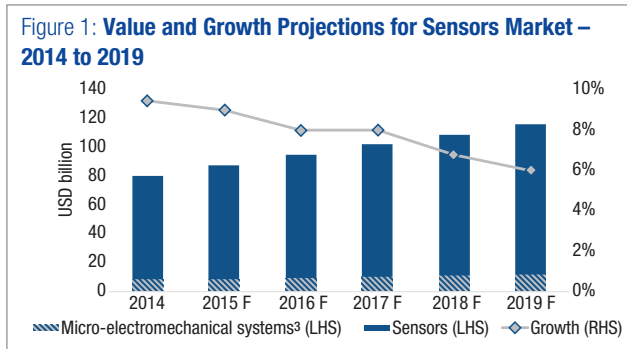
“Leading sensor companies are collaborating with customers to develop high performance sensing solutions (focused on speed and precision) with ever decreasing footprints. The integration of electronics, data acquisition and software analytics creates a differentiated solution and is a key driver of growth.”

Horacio Facca, Managing Director
Grant Garbers, Managing Director
Headwaters MB

¹ The IoT is a network of physical objects embedded with sensors, electronics, software and connectivity that enables the exchange data without human involvement.

Sensors market set for dynamic growth

The USD85 billion sensors sector has grown at a CAGR of more than 7.5 percent in the last three years. Forecasters anticipate robust growth over the next five years as sensors become integral to several industries and applications. As a result, the size of the market is expected to expand to more than USD115 billion by 2019, a CAGR of 7.3 percent (see Figure 1)².

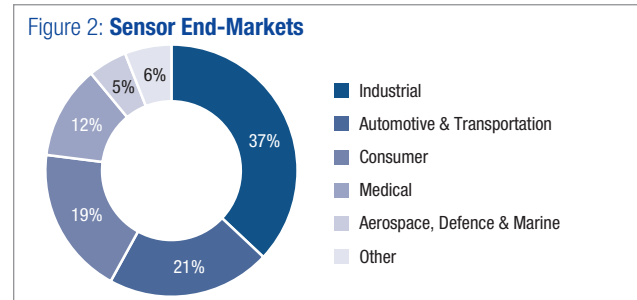


Source: BCC Research, Strategic Analytics, Frost & Sullivan, Morgan Stanley Research

The sensors sector is comprised of several defined sub-markets delineated by sensor technology (such as image and pressure), types of measurements (for example, flow and pressure) and several end-markets. Market growth in these sub-markets ranges from below GDP to double digit depending on the technology, measurement type and end-market.

Prominent end-markets in the sensors space include industrial, automotive and transportation, consumer, medical and aerospace, defence and marine (ADM). These segments currently make up around 94 percent of sales (see Figure 2). The more mature end-markets of industrial and ADM concentrate on high-end production and design rather than high volume manufacturing. Sensors in these specific sectors are typically utilised in harsh environments that require a high degree of reliability, precision and miniaturisation, which support higher margins.

These market segments have integrated solutions that incorporate pressure sensors, position sensors, temperature sensors and accelerometers (to name a few) to enhance performance, reliability and safety.



Source: BCC Research, Strategic Analytics, Frost & Sullivan, Morgan Stanley Research

Demand for sensors on the rise

Sensors are an integrated part of most ‘physical’ industries and the deployment of smaller, more reliable and sophisticated sensors across a wide range of applications has seen demand spike. Technological advances, improved manufacturing techniques and, ultimately, cost reductions have also helped drive robust market growth. New pressure sensors and associated taptic engines (haptics) have, for instance, enabled entire new device offerings for behemoths such as Apple.

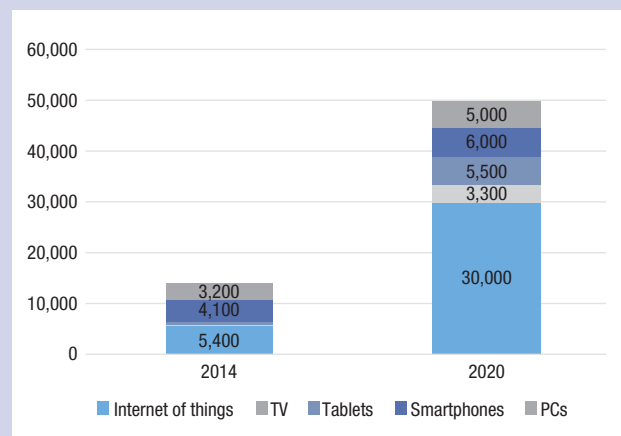
In addition, sensors are increasingly becoming a pivotal part of a highly automated and interconnected world. The rise of smart, “machine-to-machine” (M2M) communications through the Industrial IoT is likely to be a fundamental growth driver in coming years as sensor hubs represent one of the key enabling technologies driving this market. The Industrial IoT leverages data generated with the integration of physical objects on networks to enable predictive maintenance, asset monitoring and data analytics for production efficiency gains, improved safety and operations optimisation.

Internet of things

Strong demand for sensor technology generated by the IoT is likely to drive considerable growth and M&A activity. By 2020, experts predict that up to 50 billion devices will be connected to the internet (see Figure 3). Approximately 40 percent of these devices will be traditionally smart devices: computers, smartphones, tablets and televisions. The remaining 60 percent will be made up in large part by devices that traditionally have not been internet enabled.

Interoperability between IoT systems is critical to maximising the potential economic value. According to McKinsey, interoperability is required for at least 40 percent of potential value across IoT applications. This translates to more than USD4 trillion per year (out of USD11.1 trillion) in potential economic impact from IoT use by 2025. The advancement of the IoT would not be possible without sensors measuring a range of conditions for these applications.

Figure 3: Connected Devices by 2020 (in millions)



Source: IDC

² Based on BCC Research figures.

³ Micro-electromechanical systems combine electronics and mechanical components at a miniaturised scale by integrating sensors, actuators and integrated circuits.

Development of new applications for technologies such as micro-electromechanical systems (MEMS) will also help grow the sensors market. Rising demand for high-performance sensors and MEMS in consumer products as well as smart home appliances, vehicles, industrial machinery, commercial jet engines, oil-drilling rigs and healthcare devices presents opportunities for sensor companies to innovate, grow and reach new customers.

Miniaturisation is an important trend as original equipment manufacturers (OEMs) increasingly incorporate smaller sensors whilst simultaneously seeking to improve performance, reliability, safety and longevity (as well as reduce costs). Proprietary wafer bonding techniques permit greater sensor integration and smaller form factors than ever before.

Engines of growth

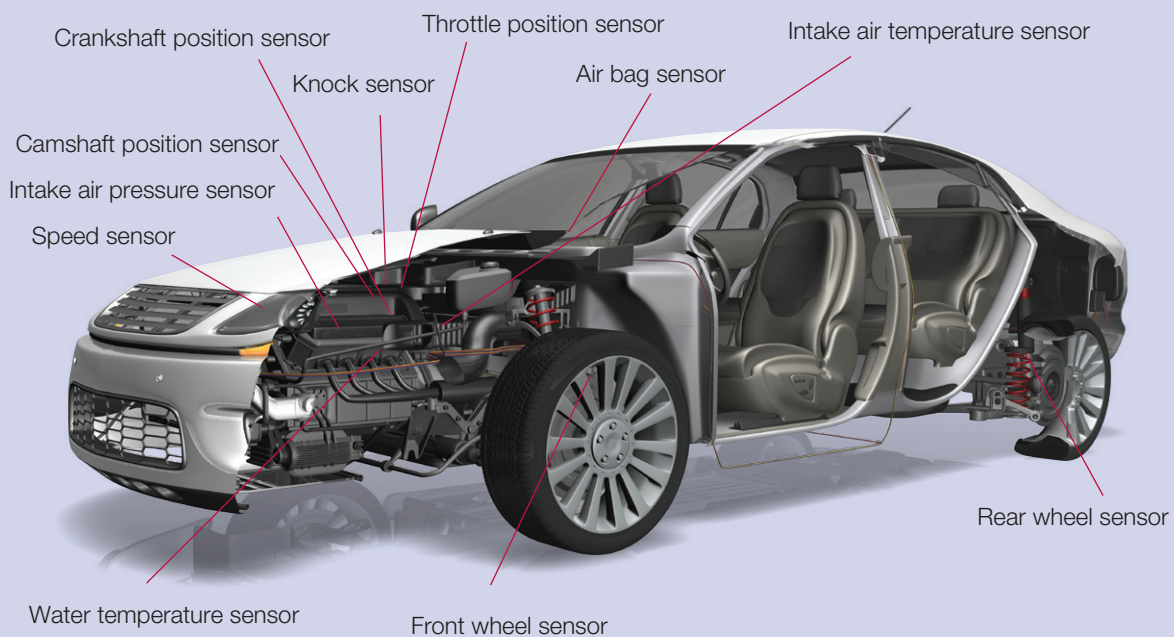
A significant proportion of this demand will come from emerging markets (China in particular) as industrial output and the middle classes in these economies continue to expand and drive consumption. Prompted by strong competition and declining average selling prices (ASPs), much of the manufacturing base for high volume sensor segments (such as smartphones and tablets where lowest unit cost is often the differentiator) has moved to emerging countries.

Other segments including automotive and transportation and healthcare are also seeing increased adoption of new sensor technology. In the automotive and transportation space, for instance, the connected car and autonomous driving have turned into mega-trends that call for greater use of advanced sensors in vehicles and infrastructure such as roads, bridges and tunnels.

Sensor utilisation in automotive

Connected and self-driving cars are creating huge demand for sensors. Using onboard sensors and internet connectivity, the connected car is changing the driving experience by optimising its own maintenance and operation (through sensors for lane assist, vision and collision control). The rise of telematics for car insurance purposes has also seen premiums fall significantly for drivers that have agreed to have black boxes installed in their vehicles.

In addition, as part of the autonomous driving trend, the powertrain, body shell, lighting and seats play a complementary role to intelligent functions enabled by sensors, radars and associated interfaces. MEMS sensors for active/passive safety systems and powertrain sensors that add functions and reduce wiring in applications such as battery monitoring are other areas of strong growth.



Healthcare is also a rapidly growing market for sensor applications. Sensors are set to become an integral part of future healthcare by helping people stay healthier for longer and reducing the cost burden on health services. Wearable and unobtrusive health devices are being deployed for health

monitoring purposes such as managing chronic conditions and identifying unhealthy habits before they cause problems. Sensor applications in medical diagnostics are also being deployed to facilitate early detection of disease, including cancer.

Sensing industrial IOT revolution

Industrial sub-sectors such as energy, factory automation and test equipment are also generating increased electronic content. Process automation remains a key industrial focus. In this context, automation systems for process control, process safety, operations management and asset optimisation call for the increased use of sensors for measurement and analytical instrumentation (including diagnostics) as well as the control of industrial settings that range from valves to actuators and regulators.

The recurring theme of integrating multiple sensor technologies with software analytics will enhance the speed and precision of the information flow driving production performance, reliability and safety. The result is an improved cost structure and work environment leading to superior products or processes.

Opportunities around the IoT in the industrial space are also expected to stimulate huge demand for sensors, with industrial data expected to double within the next 10 years. In addition, Bank of America estimates that the current global near-term unaddressed monetisation opportunity for industrial IoT applications alone ranges from USD50 billion to USD160 billion. In our view, IoT technology is a higher margin growth opportunity for industrial players, particularly given their domain expertise.

As the IoT becomes an increasingly disruptive theme, three key trends in the industrial space are expected to emerge. The attributes of Smart Factory, Industrial Internet and Industrial Automation are outlined in Table 1.

Table 1: Overview of IoT Trends in Industrial Space

Smart Factory	Industrial Internet	Industrial Automation
<ul style="list-style-type: none"> Smart Factory represents the application of the IoT to industrial production and manufacturing processes for connectivity and real-time information flow across the manufacturing value chain. Industrial players with a large manufacturing base and software focus are best positioned to benefit from Smart Factory efficiency gains. Smart Factory applications can amount to 20% more productivity at the machine level, with 10%+ increases in throughput and 10% reductions in inventory. 	<ul style="list-style-type: none"> The Industrial Internet is the network of data created with sensors, industrial products, Big Data analytics and Cloud infrastructure. The data collected and managed in the Smart Factory is an application of Industrial Internet technology. Double digit annual growth is expected in Industrial Internet markets, as technology is installed in existing sites and across existing field equipment through retrofits and upgrades. Smart Factory is expected to grow in-line with the Industrial Internet. 	<ul style="list-style-type: none"> Connectivity across the manufacturing value chain is enabled by M2M sensors. M2M enables communication amongst different machines, creating production efficiencies and cost savings. This process helps optimise production procedures and factory efficiency by monitoring machine performance and up time, thereby pre-empting machinery malfunction. Automation and closed-loop control enable the production and design feedback loops in a Smart Factory.

Source: Bank of America, Mergers Alliance

In order to exploit opportunities in the IoT market, industrial companies are increasingly looking to expand their software and technology capabilities by making research and development (R&D) investments, partnering with technology companies and acquiring businesses with an expertise in real-time data management, asset monitoring capabilities and sensor instrumentation/analytics.

“Another end-market seeing similar demand for sensors is aviation through new and traditional air traffic products and the rapid rise of unmanned aerial vehicles (UAVs). Not only are sensors needed for various UAV applications, but more advanced surveillance sensors are needed to ensure safe and efficient use of the airspace.”

Mike Gerry, Head of Saab Air Traffic Management

Mergers & acquisitions

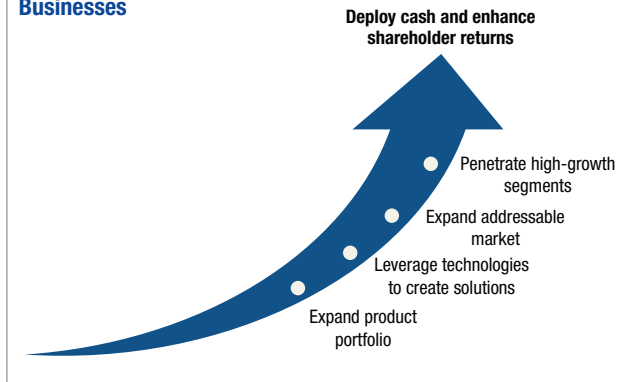
Growth opportunities around the development of innovative sensor technologies are increasingly drawing in new potential buyers/investors. In this increasingly competitive environment, industry players seek to improve profitability by enhancing performance, increasing system responsiveness and reducing operating costs. M&A has commonly been used as a vehicle to achieve these goals and overcome specific barriers to entry.

The sensors market remains highly fragmented, made up of large, independent companies, divisions/subsidiaries of

industrial conglomerates and hundreds of small companies operating in niche markets. Key acquirers in recent years have included specialist sensor companies and organisations from adjacent markets (see Table 2).

Targets that offer technology differentiation, addressable market expansion and opportunities to move into high-growth segments typically generate considerable bidding activity and higher valuation levels.

Figure 4: Key M&A Drivers for Strategic Acquirers of Sensors Businesses



Source: Mergers Alliance

In approximately 100 M&A deals analysed by Mergers Alliance in the sensors sector since 2013, more than two-thirds had transaction values of less than USD200 million, demonstrating the importance of the middle market to the sensors market. Typical targets included specialised subsidiaries of large industrial companies and small private players. Deals were completed at a range of valuation levels during this period (often well in excess of 12x EBITDA).

Sensor companies located in the United States, United Kingdom and Europe continue to be attractive acquisition targets given they are at the forefront of innovation. Indeed, more than 85 percent of all the M&A deals analysed by Mergers Alliance involved targets domiciled in these geographies as acquirers sought to secure advanced technology and win new customer relationships.

Table 2: Selection of Strategic Sensor M&A Transactions – 2013 to Q2 2015

Date	Acquirer(s)	HQ Country	Target	HQ Country	Transaction Value (USDm, historical rate)	Enterprise Value / Revenue	Enterprise Value / EBITDA
May-15	Dialog Semiconductor	United Kingdom	DYNA IMAGE Corporation	Taiwan	nd	-	-
Apr-15	Uni-pixel Displays	United States	XSense Touch Sensor Assets, Atmel Corporation	United States	0.45	-	-
Feb-15	Innovative Sensor Technology	Switzerland	Jobst Technologies	Germany	nd	-	-
Nov-14	CoorsTek Sensors	United States	Pegasor Oy	Finland	nd	-	-
Oct-14	Hottinger Baldwin Messtechnik	Germany	HBM FiberSensing	Portugal	nd	-	-
Sep-14	TE Connectivity	Switzerland	American Sensor Technologies	United States	nd	-	-
Aug-14	Amphenol Corporation	United States	Casco Automotive Group	United States	449	2.0x	-
Aug-14	Sensata Technologies	Netherlands	Schrader International	United States	1,005	2.2x	19.5x
Aug-14	e2v Technologies	United Kingdom	Innovaciones Microelectrónicas	Spain	46	6.1x	-
Jul-14	TT Electronics	United Kingdom	Roxspur Measurement and Control	United Kingdom	17	1.2	-
Jul-14	Sensata Technologies	Netherlands	DeltaTech Controls	Germany	190	-	-
Jun-14	TE Connectivity	Switzerland	Measurement Specialties	United States	1,654	3.9x	22.3x
Jun-14	Audience	United States	Sensor Platforms	United States	41	-	-
Apr-14	Semiconductor Components Industries	United States	Sensor Holding	United States	96	1.2x	-
Dec-13	Sensata Technologies	Netherlands	Wabash Technologies	United States	60	-	-
Nov-13	Amphenol Corporation	United States	Advanced Sensors Business of General Electric	United States	318	-	-
Oct-13	Petroleum Analyzer	United States	Advanced Sensors	United Kingdom	55	-	-
Oct-13	SOR	United States	Smart Sensors	United States	nd	-	-
Aug-13	Meggitt Sensing Systems	Switzerland	Piezotech	United States	41	-	-
Jun-13	Gefran	Switzerland	Sensormate	Italy	4.5	2.3x	-
Apr-13	Honeywell Analytics	United Kingdom	RAE Systems	United States	340	3.1x	-
Feb-13	Kober	Germany	LTi Holdings	Germany	50	0.3x	-
Jan-13	Teledyne Technologies	United States	Teledyne RESON	Denmark	70	1.0x	-

Source: Capital IQ, Mergers Alliance

Sensor deals

Although only a small number of large incumbents are dedicated solely to the sensors space (such as Sensata), there are a number of large companies that have significant sensor capabilities (such as Ametek, Amphenol, Danaher, Spectris and TE Connectivity to name a few). M&A has been an integral part of sensor companies' capital allocation strategies in recent years as they have scaled operations to capitalise on opportunities in new markets.

Sensata has been particularly active in capitalising on the fast growing automotive sensors market, which represents approximately 60 percent of its sales. The company executed two notable deals in 2014:

- Sensata acquired Schrader International from Madison Dearborn Partners in August 2014 for USD1 billion. This deal saw Sensata penetrate the growing low pressure sensors market whilst also expanding its capabilities in MEMS, ASIC design and wireless. The purchase price represents a multiple of 19.5x trailing EBITDA.
- Sensata bought DeltaTech for an aggregate purchase price of USD190 million in July 2014. The acquisition enabled Sensata to expand content with new and existing customers in the heavy vehicle and off-road market.

Connector deals

Companies from adjacent market segments are also actively looking for strategic acquisitions in the sensors market. Connector manufacturers in particular have moved into the sensor's space in order to exploit the substantial solutions selling opportunities that exist across a wide variety of end-markets.

These companies are looking to integrate connectors, sensors and controllers to offer high value-add solutions to their customers and create a defensible market position due to content control. As a result, companies that have traditionally operated in the connector market have become increasingly acquisitive in the sensors space:

- Recent examples include TE's purchase of Measurement Specialties and American Sensor Technologies in June 2014 and September 2014, respectively, and Amphenol's acquisition of GE's Advanced Sensors business in November 2013.

- TE's acquisition of Measurement Specialties was valued at USD1.45 billion (22.3x EBITDA). The deal established TE as one of the largest sensor companies in the world (with strong cross-selling opportunities) and puts the company in the unique position of offering customers an integrated connector/sensor platform. The transaction also added nearly USD40 billion to TE's addressable market and also provided the company with significant tax and cost synergies.
- Amphenol's purchase of GE's Advanced Sensors business for USD318 million added complementary products in automotive, medical, industrial and transportation to its offerings. The acquisition delivered significant long-term expansion opportunities, driven by the increased use of combined technologies in supporting electronics functionality across a broad set of applications and markets.

A high number of connector companies targeting the sensors space have strong balance sheets and growing cashflows, meaning significant M&A activity is likely to continue for years to come. The integration of connectors, sensors and controllers into a single solution is expected to provide a strategic advantage in the long-term, leading to higher performance and cost reductions for OEMs.

Private equity

PE firms have also been active acquirers of sensor companies in recent years (see Table 3), completing nearly a fifth of transactions analysed by Mergers Alliance since 2013. Recent, high profile examples include the sale of Custom Sensors & Technologies (CST), Schneider Electric's sensor business, in a management buyout transaction backed by Carlyle Group and PAI partners in April 2014. The deal, in which Schneider retained a 30 percent stake in the business, enabled CST's management team to accelerate growth (including through acquisitions) and increase its customer base by launching innovative products.

The acquisition of OmniVision Technologies by a Chinese investment group composed of Hua Capital Management, CITIC Capital Holdings Limited and GoldStone for USD1.9 billion in April 2015 was another big ticket sensor transaction. This particular deal was in line with the consortium's strategy to grow its digital imaging and other related technological innovations portfolio and OmniVision's ambition of developing more cutting edge solutions (including the IoT) to drive future growth opportunities.

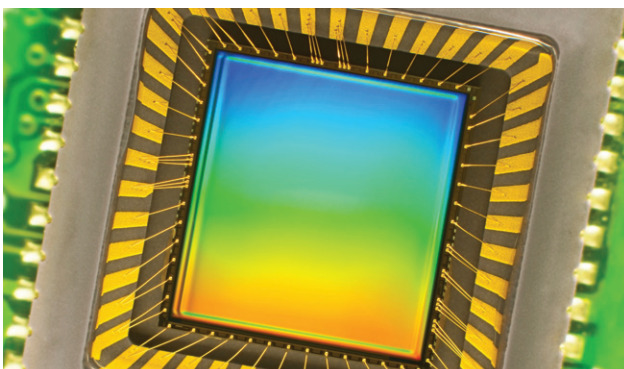
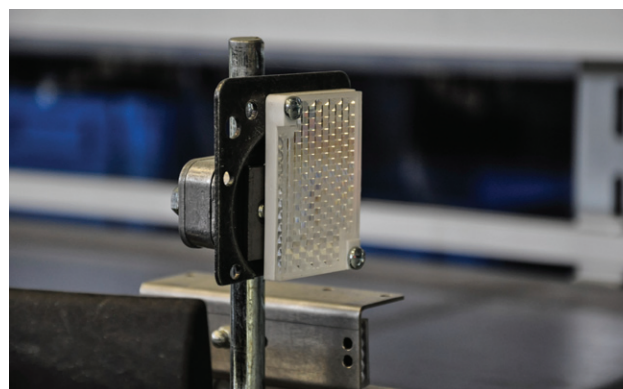


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Apr-15	Hua Capital Management; CITIC Capital Holdings; GoldStone Investment	China	OmniVision Technologies	United States	1,898	1.0x	11.9x
Jan-15	FTC Technologies	Canada	Micalyne	Canada	nd	-	-
Sep-14	IK Investment Partners	United Kingdom	Exxelia Group	France	nd	-	-
Apr-14	Carlyle Group; PAI Partners	United States/ France	Custom Sensors & Technologies	United States	900	1.5x	-
Dec-13	Xenon Private Equity	United Kingdom	Gimatic	Italy	nd	-	-
Dec-13	TA Associates Management	United States	CMOSIS	Belgium	nd	-	-

Source: Capital IQ, Mergers Alliance

The uptick of PE involvement looks set to continue as technological advancements drive growth across all segments of the sensors market. This, combined with opportunities to execute buy and build strategies in such a fragmented market with high barriers to entry, will likely see PE buyers become increasingly attracted to high margin sensor businesses, particularly those that offer valuable intellectual property, unique technical capabilities and strong customer bases.



Sensor M&A outlook

Innovations in sensor technology and strong demand generated by the IoT and Industrial IoT has created a compelling investment case. The proliferation of applications and connected devices using sophisticated sensors offers exciting opportunities for customers, companies and investors alike. Sensor's integral role in achieving a highly automated and interconnected world will be a key market growth driver for years to come and lead to continued strength in the M&A market.

As the level of automation becomes more entrenched across key industries, increased sensor utilisation will follow. This uptick in demand, along with significant solution-selling opportunities, is likely to continue to attract a number of new entrants into the market. As a result, further consolidation looks set to occur, particularly in the middle market, as new and traditional acquirers target companies that deliver innovative solutions for complex applications that demand precision, speed and reliability.

Selected Mergers Alliance Deals



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For information on sensors sector trends and M&A



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