

How does Unisem see the MEMS packaging opportunity? (/news/advanced-packaging/10439-how-does-unisem-see-the-mems-packaging-opportunity.html)

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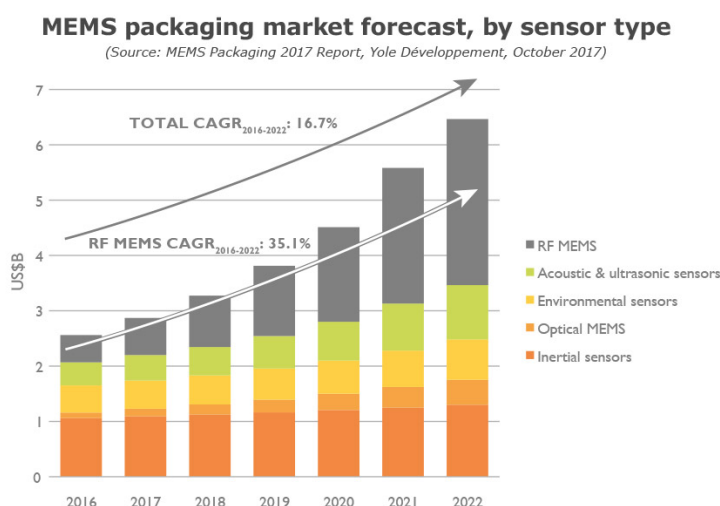


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MEMS devices are characterized by a wide range of different designs and manufacturing technologies, with no standardized processes. As a consequence, many technical challenges are in place and create a strong competition between packaging companies. Add to this, the fact that the MEMS packaging market will grow from US\$2.56 billion in 2016 to US\$6.46 billion in 2022, showing a 16.7% CAGR over this period, according to Yole Développement report MEMS Packaging 2017 (/report/product/mems-packaging-2017.html).

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(Source : MEMS Packaging 2017 Report (/category-listing/product/mems-packaging-2017.html), Yole Développement, October 2017)

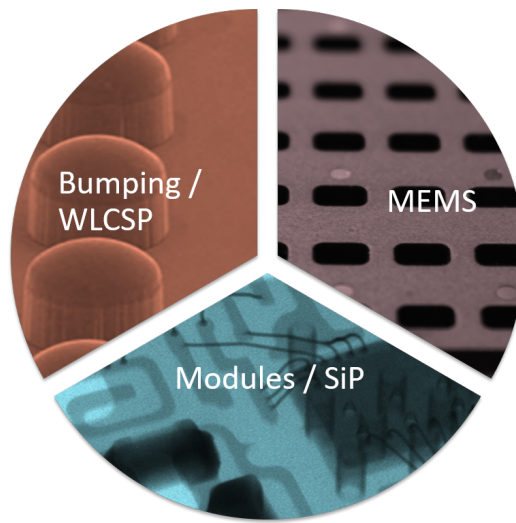
Yole Développement (Yole) sat down and discussed with Alan Evans, MEMS Business Development/Technical Program Manager at Unisem Group. He shared with us his vision of the market, competition and new trends to follow.

Yole Développement: Unisem provides MEMS packaging technologies, could you tell us more about your current activity in packaging and assembly but also in tests? How long has Unisem been in the MEMS packaging field? How would you describe these years?

Alan Evans: Our corporate packaging strategy has 3 main technology focus areas; Bumping and Wafer Level Packages, System in Package Modules, and MEMS Packaging. It ties together well as MEMS packaging solutions are often WLCSP, and otherwise nearly always SIP.

We have been packaging MEMS for over 10 years now starting in 2007 with the development of MEMS microphones. We do MEMS packages in our facilities in Chengdu, China; and Batam, Indonesia; and WLCSP in our facilities in Ipoh, Malaysia, and Chengdu.

We have had some ups and downs over the years and have learned to be patient. MEMS development is a slow process and it takes time, but we have some excellent ongoing projects and we are very positive about the future.



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(Courtesy of Unisem)

YD: Yole sees more packaging and assembly outsourcing to OSATs. What fosters the outsourcing to IDMs to OSATs?

AE: A few companies have always had the strategy to outsource but many more have always done their assembly and test "in-house". I think this is at least in part a reflection of the fact that there are fewer standards and more variables with MEMS versus other technologies, and so many companies have unique IP that they want to protect. We see this situation changing, especially with assembly where packages are in many cases becoming less unique to one customer, and more generic to several customers, so that the economies of scale offered by an OSAT outweigh any risk.

YD: Yole ranked Unisem as #6 OSAT as MEMS packaging player. Do you see more competition coming in the future or rather a specialization by OSAT? Even though, MEMS packaging represents only 5% on total packaging revenues, we see OSATs from Top 20 ranking (Cf. Status of Advanced Packaging 2017 (/advanced-packaging-report/product/status-of-the-advanced-packaging-industry-2017.html), Yole Développement). What motivates OSATs to be involved in this market?

AE: The MEMS market has been growing at a faster rate than the general market for a number of years and is predicted to do so for the foreseeable future. I think OSAT companies like anyone else will recognise the potential and want to be involved, so I think we are likely to see both more competition, and specialised areas of expertise with different OSAT's.

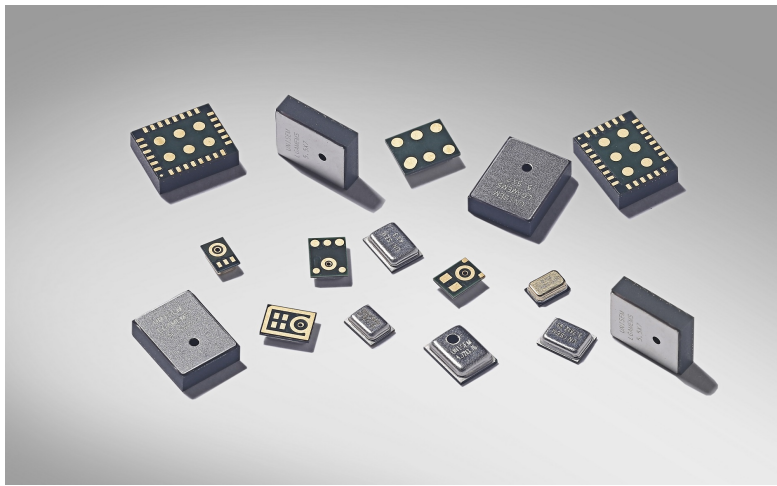
MEMS packaging has unique requirements, and there is a lot to learn if you are starting from the beginning. Being good at inertial sensors doesn't mean that you know how to make pressure sensors; there are nuances with all product types even if they use a similar package.

I imagine much like with product companies, if an OSAT today wants to target an established market they will need a disruptive package concept that improves performance and reduces cost. Otherwise they might be better off targeting new markets where perhaps the packaging technology is not so well established.

Development cycle time might deter some OSATs from entering the MEMS market. In our experience a consumer product in an established market will take up to 2 years of package development, and an automotive project will be at least 3 years and possibly nearer to 5 years in development. That requires a lot of patience and belief in the customer and their technology as any investment required to support a project might take some time to see any return.

YD: Consumer market driven by smartphones sales has been a long time business that contributed to consolidate OSATs business. In the last years, it seems that new challenges are coming from automotive that require more sensors, especially for autonomous cars. Do you believe that automotive a real opportunity for MEMS business?

AE: Yes we do. Automotive MEMS packages are approximately 50% of our current MEMS business and we hope to, and believe, that we can grow this. The automotive market is undergoing a period of incredible change driven by safety and environmental concerns and the legislation introduced to support the requirements, and of course autonomous and electric cars. We think this is going to create more opportunity, and that we are well positioned with the right packaging technology and capability to support many of the applications.



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(Courtesy of Unisem)

YD: Yole forecasts a market of more than 6 billion US\$ revenues by 2022, it is an important growth. Besides the tremendous growth of RF MEMS business driven by 5G, there is also a steady growth in inertial, environmental and acoustic sensors. Is there a field of applications, in which Unisem is specialized or would like to be in the future?

AE: Our main area of expertise and experience to date can be split into molded packages for consumer and automotive inertial sensors, and cavity packages for consumer and automotive pressure sensors, and microphones.

Our strategy is to take the packages we have developed and sell them into existing markets, and new and upcoming markets where they offer a good solution. Adding variations, improvements, and new concepts where we see it makes sense.

So for example our MEMS journey started with microphones over 10 years ago. We are still very strong in the microphone market with 10 years of production experience, and have recently invested in a class 100 cleanroom to support our front end operations. The cavity packages we developed for microphones are continuously evolving, but they also made good consumer pressure sensors, which led on to environmental sensors, so that today we are using our patented Direct Top Port microphone package for a DTP gas sensor.

Cavity packages that we originally developed for microphones are also currently in development for RF filters so we can probably say that cavity packages are a specialised area.

We are pursuing WLP for MEMS, in particular for RF packages.

YD: Yole sees more complexity in the package due to the needs to integrate several sensors in a package rather than disruptive change. Could you comment on next-gen packages? What trends do you see? What will be the next package implementation at Unisem?

AE: Yes we see the same trend to combine multiple functions in one package.

If you take the big consumer markets it was initially all about making a discrete device smaller and lower cost, I think at some point everyone realised that the size and cost had just about been squeezed as far as it could. At this point with no disruptive alternatives, the sensible view is to say, let's start adding functional value to the existing package size and cost.

This has led to 3, 6, 9 axis inertial sensors and discrete temperature, pressure, and humidity sensors becoming environmental sensors.

Automotive has the same trend, also driven by cost, but here it is about reducing the overall module cost by integrating all, or part, of the second level assembly into the package.

YD: Testing is a main contributor to PA&T costs, most of them are done by the MEMS vendors; OSATs are missing an addressable part of the business. What could trigger a bigger move to tests at OSATs?

AE: As an OSAT we want to sell turnkey solutions; from package development through to final functional test. This is our business model and what we do for most other products.

As discussed earlier whilst customers had unique package solutions there was a concern to outsource. As more generic package solutions have become accepted by the market, the door has opened to outsourced assembly. This is yet to happen for test as most MEMS product companies have a lot of IP in their approach to test, some "special sauce" that is unique to them.

This creates two issues; firstly product companies are concerned about letting their special sauce recipe leave home, and secondly it makes it difficult for OSATs to be able to offer an off the shelf solution.

So we typically don't do test of MEMS packages we assemble, although we do run test for some customers who have developed their own unique solution and consigned it to us. We are interested and willing to co-develop test solutions with customers if required.

INTERVIEWEE



(/images/Media/LED_/News_Nov_2017/PH_Matha_portrait.jpg) **Alan Evans, MEMS Business Development/Technical Program Manager, Unisem Group**

Alan graduated in Electronics from the University of the West of England, Bristol UK, and for the last 28 years has been working in semiconductor assembly and test.

As the Head of Engineering for Unisem Europe Alan was responsible for developing MEMS packaging solutions in the UK for customers in Europe and North America and transferring the volume production to the Unisem facilities in Asia.

Since 2014 Alan has moved into Business Development and is now responsible for growing MEMS business within the Unisem group.

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