

AEMtec delivers 'one-stop-shop' for optical component requirements

If you are looking for expert help with wafer treatment, preparation and packaging, offering advice on product and process development as well as volume production - all from a one-stop-shop, then AEMtec could be your solution. In this article, Jose Pozo (Director of Technology and Innovation at EPIC) talks to Matthias Lorenz, head of AEMtec's business development in North America about how AEMtec can help with application development and innovation in the photonics sector.

Background

AEMtec was set up in 1989 as a back-end group by Siemens Infineon mainly using wire bonding and fibre optics technologies for data communication systems. In 2000, they became an independent contract manufacturer and have since transformed themselves into an E2MS company - an engineering and electronic manufacturing service supplier. With this move, using their wealth of experience and

specialist know-how, they were able to complement their manufacturing capability with a range of services covering all stages from product development to volume production - all from a single source. Headquartered in Berlin, the company ensures effective service delivery through a workforce of 180 with 45 engineers dedicated to process development, process improvement and reliability improvement.

Current product lines

AEMtec's key product lines are currently high-precision placement for optical components for the semiconductor equipment industry, for example photolithography stems and mask writers. Another of their strengths is in the medical imaging sector, and involves the population of various types of ceramic substrates for applications in computer tomography as well as for ultra sound imaging for cardio and other health monitoring. They are also in the business of data telecommunications, especially customised devices such as cross-connect centres and special high-speed applications. Additionally, they are specialists in customizing imaging and other types of sensors that require a particular kind of packaging technology. For Matthias, AEMtec's main strength is their ability to help customers improve the reliability of their products through the use of a comprehensive range of dedicated processes and packaging technologies from a single source. This avoids the need to outsource, which is not only more expensive but can also jeopardise product reliability.

Services for the photonics sector

One of the key challenges for the integrated photonics sector is the long turnaround time for some



Fig 1. Matthias Lorenz, head of AEMtec's business development in North America and Dr. Jose Pozo, CTO of EPIC, the European Photonics Industry Consortium.

One of the difficulties for packaging houses in Europe in achieving placement accuracy, whether by active or passive alignment, is that some of the externally sourced components have imperfect substrate surfaces, which makes a consistent placement accuracy of 0.5 microns difficult to obtain

components from design to packaging, which can range from 6 months to a year or even longer. These long lead times, impacting directly the time to market, are detrimental both for the development of new applications and for innovation in general.

A case in point is the turnaround time, typically 12 to 18 weeks, for wafers between the moment when they leave the foundry until the chips of these wafers are ready for packaging. These long lead times are due to the various procedures required to prepare the wafer for population. These processes typically involve under bump metallization (UBM) done in layer of different metals like Ni/Au or Ni/Pd/Au followed by micro solder balls attachment, and then grinding, testing and dicing. In most cases, the supply chain is fragmented, the handling of various suppliers is tedious, time consuming and can also affect reliability.

In answer to this problem, in 2016, AEMtec opted for a backward vertical integration by expanding the range of services to include all wafer back-end processes, thus creating the most complete range of technologies in the industry, for small and medium volumes. Thus AEMtec takes full responsibility for all the processes required for getting the wafers out of the foundry, treating them and introducing them to the assembly lines. UBM, solder ball attachment and dicing are performed in-house and the grinding and testing are outsourced to reliable experienced companies. Amazingly, this service has reduced lead times from 12 to 18 weeks to less than 18 working days.

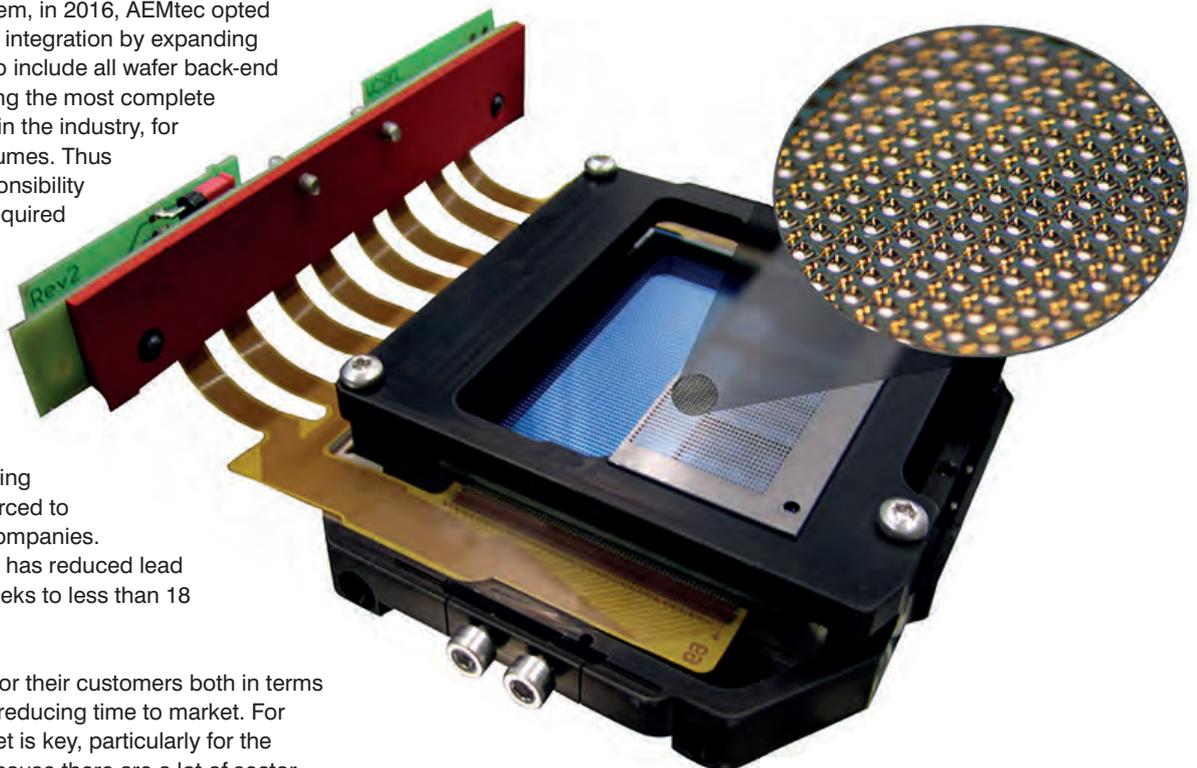
This is a huge benefit for their customers both in terms of reducing costs and reducing time to market. For Matthias, time to market is key, particularly for the photonics industry, because there are a lot of sector

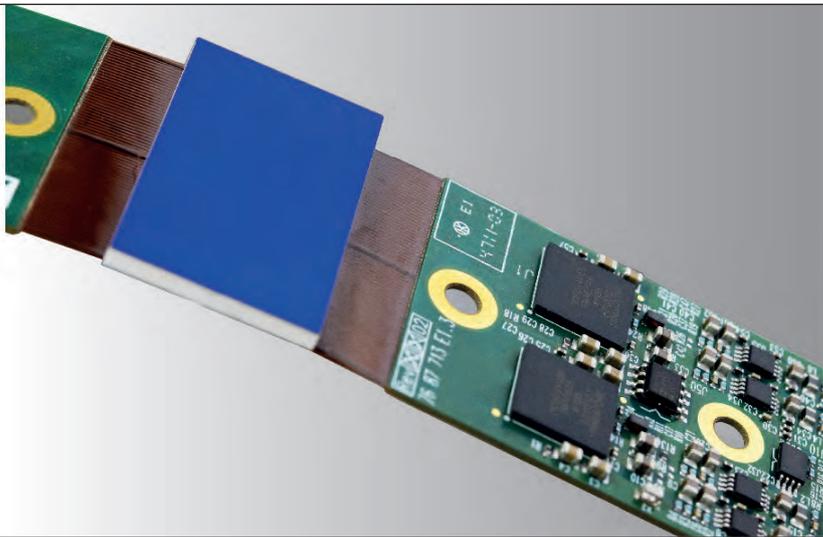
'hot spots' spread over North American, Europe and especially Asia. "Speeding up wafer treatment and preparation for packaging is a big advantage because it enables customers to obtain faster feedback on the functionality of the device and the opportunity to improve wafer design and even the device itself."

Automated packaging

Packaging of opto-electronic components, including single dies, and photonic devices is one of AEMtec core businesses and Matthias believes that AEMtec is unique in the technologies they offer. After evaluating the strengths and weaknesses of passive vs. active alignment, they opted for passive alignment and have a variety of equipment in-house which is capable of handling placement accuracies down to 0.5 microns. But, he adds, "the real key is not the placement accuracy itself, it's the expertise in

VCSELs gained renewed notoriety in 2018 thanks to their use in high-end smartphone facial recognition applications. Alignment and packaging plays a critical role in each finished module that can involve 300 or more individual VCSEL die.





AEMtec supports a wide range of medical devices and can assist customers with the administrative paperwork associated with reliability testing and clinical studies.

handling the components, the equipment and the consumables.” The crucial feature of good packaging is that the process is stable and reproducible for future volume production and thereby avoids any return merchandise authorizations (RMAs) from the customer.

One of the difficulties for packaging houses in Europe in achieving placement accuracy, whether by active or passive alignment, is that some of the externally sourced components have imperfect substrate surfaces, which makes a consistent placement accuracy of 0.5 microns difficult to obtain. Being a one-stop-shop, this is not a problem for AEMtec. But as Matthias points out, accuracy is not just a matter of equipment and components: of equal importance is the process, the environment and the type of substrate the customer selects. These all vary according to individual requirements and in turn, determine the type of packaging technology. Matthias sees AEMtec’s role as similar to the conductor of an orchestra. “If the violins are the components, the brass instruments the consumables and the wind instruments the substrates, then like a conductor, we try to get the best sound

from each combination of the individual instruments.”

FDA approval

While many of the products that AEMtec produces are used in medical devices that have to go through the FDA approval process, as an independent contract manufacturer, AEMtec cannot assume responsibility for product release and the company is therefore never directly involved in the FDA approval process. However, in accordance with current medical device regulations (MDRs) and the new revised FDA regulations, they can help customers with all the administrative paperwork in relation to reliability testing and clinical studies.

Future projects

As an end note, and with an eye to the future, AEMtec is currently investigating the silver sintering technology applied to optical products, as a viable alternative to the soldering process, especially for high temperature/high pressure applications. AEMtec shares the opinion that this ‘fully clean/no residues’ process may be the better alternative, also due to the lower remnant mechanical stress for 3/5 and 2/6 materials (compared to TS/TC processes), and it is therefore investing resources in the technology in order to be ready for the next step.

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ABOUT AEMtec

AEMtec develops, qualifies and manufactures next level optoelectronic assemblies in compliance with highest quality, security and sustainability standards. In a cleanroom environment (ISO class 5 to 8), AEMtec offers a unique spectrum of high-end chip-level technologies: Wafer Back-End Services (UBM, SBA, Au Stud Bumping, Dicing), high speed / high accuracy Die and Flip Chip Bonding, Au and Al Wire Bonding, SMT, assembly of Optical Components, Box-Build, 3D integration. AEMtec is certified for medical industries.

www.aemtec.com



Jose Pozo is Director of Technology and Innovation at EPIC (European Photonics Industry Consortium). He has a 20 year background in photonics technology and market knowledge, and a large network within the industrial and academic photonics landscape. Jose is a member of the board of the IEEE Photonics Society Benelux. He holds a PhD in Electrical Engineering from the University of Bristol in the United Kingdom and an MSc and BEng in Telecom Engineering from Spain/Belgium.