Press Release

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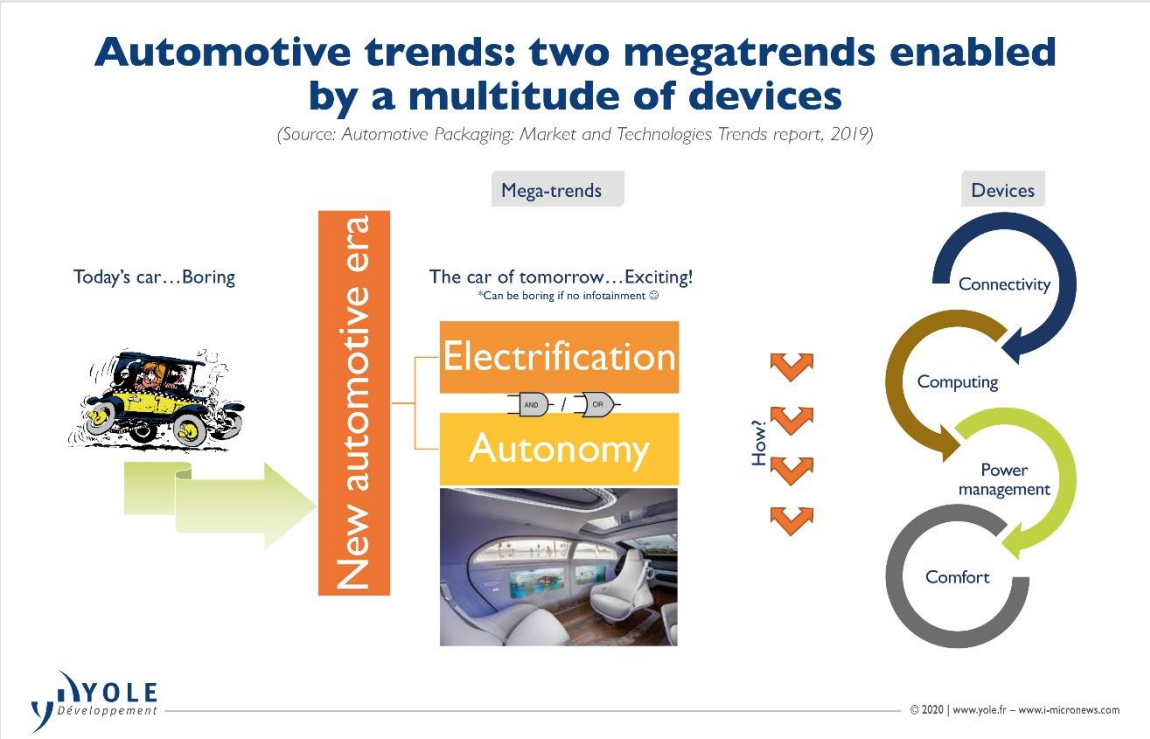
LYON, France

Electrification & autonomy: another (r)evolution for the automotive sector?

OUTLINES:

- Today's automotive industry is transforming in preparation for the vehicles of tomorrow.
- Automotive packaging is application dependent. In areas like MEMS, low-power, and most CIS, legacy packaging is sufficient...
- The automotive packaging landscape: an "IDM vs. OSAT" business.
- SYNAPS (March 31 – April 1st, Suzhou, China): More info.

"The automotive industry is facing a downturn in car sales - this is accepted reality," asserts **Santosh Kumar, Principal Analyst and Director Packaging, Assembly & Substrates, Yole Korea.** *"The industry's difficulties are partly linked to the political tension between China & USA, Brexit and the severe ecological regulations in Europe".*



These occurrences are global drivers that the automotive industry cannot predict or control but must live through. The trend is expected to recover in 2020. Though events occurring in 2020 may influence this trend in either direction. This situation worries the automotive industry and pushes them to take drastic steps. Audi, Daimler, Ford and others have announced job cuts. According to these companies, the main reason behind the cuts is to gather funds for their future projects (electrification and autonomy), but they are also a consequence of their difficulties. These measures will support their transition to autonomous electrical vehicles amid stringent CO_2 emission regulations requiring high investments.

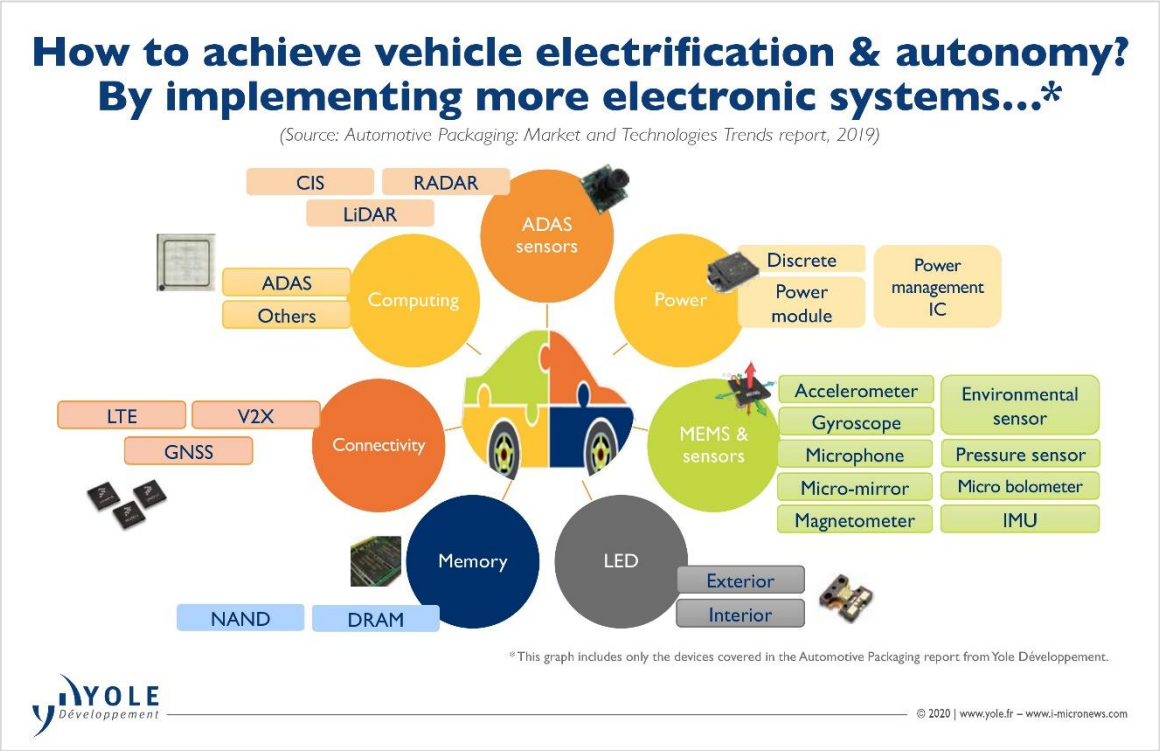
Yole Développement (Yole) and its advanced packaging team are pleased to deliver today a snapshot of the automotive industry with a special focus on advanced packaging. Based on its technology & market analyses, Automotive Packaging: Market and Technologies Trends and Status of the Advanced Packaging Industry, in addition to numerous debates with leading automotive and advanced packaging companies and presentations at key international trade shows and conferences, analysts reveal the status of the industry today and its evolution.

So will vehicle electrification and autonomy trends be the automotive industry's saviors? The answer is, it depends! It can be both, Yes and No…
And **Mario Ibrahim, Technology & Market Analyst at Yole** explains: *"No, because in terms of technology, many improvements are still required, and adoption is still low. Yes, because the automotive industry needs drastic changes and innovation…"*

But what is the reality today? How is the automotive industry organizing the transition, and what does that imply for its ecosystem?...
Yole's analysts are here talking about the automotive industry, known for its conservativeness. The competition is tough today, and players can no longer afford to delay their decision to adopt a new technology. Advanced ADAS[1] levels require cutting edge computing technologies and packages that are, and will be, approved far quicker (<1-year adoption curve vs current 5-8 years). The product's qualification process won't change, it will still be harsh and long.
According to Yole's automotive packaging report, Automotive Packaging: Market and Technologies Trends 2019, the automotive packaging market is dominated by mainstream packages accounting for 97% of the US$5.1 billion calculated automotive packaging market in 2018. Advanced packaging, such as FC BGA[2], FO[3], ED[4] and WL CSP[5], are already used in automotive for various applications, such as radars, power devices and modules, computing units… Their presence is still relatively small, expected to reach 6% of the total automotive packaging market in 2024, estimated at US$550 million of a US$9 billion TAM[6].

[1] ADAS : Advanced Driver-Assistance Systems
[2] FC BGA : Flip Chip Ball Grid Array
[3] FO : Fan out
[4] ED : Embedded Die
[5] WLCSP : Wafer Level Chip Scale Package
[6] TAM : Total Accessible Market

This is a significant increase of advanced packaging revenue as it will be multiplied by a factor of 4 between 2018 and 2024 but is less noticeable as the mainstream package business is huge and continuously growing.
A considerable number of automotive applications, such as MEMS[7], low-power devices and most of the CIS, are satisfied by the quality, cost and performance of their actual legacy packages whereas other automotive hardware require innovative solutions.



The automotive supply chain is adapting to better meet future needs.

"Car makers are willing to be more involved in the lower levels of the supply chain. Automotive component makers, recognized as analog experts, are today investing in digital solutions", details Santosh Kumar from Yole. *"Infineon Technologies acquiring Cypress Semiconductor is a relevant example."*

Increased electronic volumes and the entry of new technologies into automotive, such as advanced computing systems, are forcing IDMs[8] to focus on component development while subcontracting the packaging to OSATs[9]. Tier 1 players - known as system makers - are still today important components in the supply chain. It is expected, however, that their business will be affected by any ecosystem reshuffle and the eagerness of car makers to by-pass them and deal directly with component and module makers. At Audi and Toyota work is in progress to modify their supply chain to secure a reduced ecosystem for their advanced cars, enabling increased control and thus better quality. Tesla are doing it the Tesla's way, or Elon's way.

[7] MEMS : Micro Electro Mechanical Systems
[8] IDM : Integrated Devices Manufacturers
[9] OSAT : Outsourced Semiconductor Assembly and Test

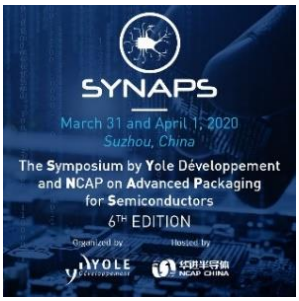
Tesla is eager to achieve vertical integration for their automotive business. That is risky… but Tesla are devoted and passionate about challenge and uncertainty…

Any supply chain modification will impact, positively and/or negatively and in different proportions, all the business models involved. However, two of the existing businesses will be less affected, the manufacturing services (foundries) and OSATs. Car makers have the possibility of integrating foundry services and packaging in-house but at a high cost (production line and human investment). Certain IDMs are both producing and packaging chips in-house. This business model is evolving in two different directions, manufacturing at IDMs or foundries and packaging at OSATs.

In 2018, 65% of the automotive packaging TAM was still in the hands of IDMs such as NXP, Infineon Technologies, Denso, Robert Bosch … Yole foresees business transfer will intensify in the future, driven by greater volumes and higher package complexity, toward OSATs such as Amkor Technology, ASE, UTAC… Yole expects that in 2024 the two business models will have a similar sized share of the automotive packaging market.

These modifications to the supply chain are still in their early stages but will accelerate in the coming 10 years encouraged by the journey to autonomous electrified vehicles.

But Yes, the automotive industry is going to be extremely hot in 2020 and an exciting topic in the years to come. This evolution is mainly due to a shift in the concept: cars are "drifting" from pure mechanical beauties used for transportation into a comfortable service powered by "moving computers" stuffed with electronics. Let us keep in touch to follow this (r)evolution. Stay tuned on i-Micronews.com



2020 SYNAPS powered by Yole Développement and NCAP China will be a powerful mix of key technology sessions related to the evolution and innovation in the industry. The Symposium will offer effective networking time with advanced packaging executives, organized within the impressive Suzhou's advanced packaging ecosystem. Yole Développement, NCAP China and the Technical Committee will combine their technical and market expertise to build an exciting program. More on i-Micronews.com.

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About the report

Automotive Packaging: Market and Technologies Trends

Vehicle autonomy and electrification are encouraging advanced packaging's growth in this industry. - Performed by Yole Développement

Companies cited

ASE, Amkor, ams, Analog Devices, Apple, AT&S, Audi, Autoliv, BAIC, Baidu, Benewake, Build Your Dreams, BMW, Bosch, Brightek, Brillance Auto Group, Broad-Ocean, CammSys, Cepton, Cheng-Tech, Chery Automotive, CHJ Automotive, Citroën, Continental, Daihatsu, Daimler, Dajun Technologies, Delphi, DeNA, Denso, DEPO, Didi Chuxing, Discovery Semiconductor, Dongfeng Motor Corporation, Dynex Semiconductors, Edison Automotive and many more...

Authors

Santosh Kumar is currently working as Principal Analyst and Director Packaging, Assembly & Substrates, Yole Korea. Based in Seoul, Santosh is involved in the market, technology and strategic analysis of the microelectronic assembly and packaging technologies. His main interest areas are advanced IC packaging technology including equipment & materials. He is the author of several reports on fan-out / fan-in WLP, flip chip, and 3D/2.5D packaging.

Santosh Kumar received the bachelor and master degree in engineering from the Indian Institute of Technology (IIT), Roorkee and University of Seoul respectively. He has published more than 40 papers in peer reviewed journals and has obtained 2 patents. He has presented and given talks at numerous conferences and technical symposiums related to advanced microelectronics packaging.

As a Technology & Market Analyst, Advanced Packaging, **Mario Ibrahim** is a member of the Semiconductor & Software division at Yole Développement (Yole),), part of Yole Group of Companies. Mario is engaged in the development of technology & market reports as well as the production of custom consulting studies. He is also deeply involved in test activities business development within the division.

Prior to Yole, Mario was engaged in test activities development on LEDs at Aledia. He was also in charge of several R&D advanced packaging programs. During his 5 years stay, he developed strong technical & managerial expertise in different semiconductor fields.

Mario holds an Electronics Engineering Degree from Polytech' Grenoble (France). He spent 3 apprenticeship years within Imaging Division of STMicroelectronics Grenoble, where he contributed to the test benches park automation within the test & validation team.

Other related report: Status of the Advanced Packaging Industry

About Yole Développement

Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis.

With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide covering MEMS & Sensors - Imaging - Medical Technologies - Compound Semiconductors - RF Electronics – Solid State Lighting - Displays - Photonics - Power Electronics - Batteries & Energy Management - Advanced Packaging - Semiconductor Manufacturing - Software & Computing - Memory and more...

The market research, technology and strategy consulting company Yole Développement, along with its partners System Plus Consulting, PISEO and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business… More

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