VEHICLE electronics

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Arm and Intel partner on automotive SoCs

Intel and Arm are collaborating to produce systems-on-chip (SoCs) that allow potential design expansion into automotive applications.

Intel Foundry Services (IFS) and Arm have announced a multigeneration agreement to enable chip designers to build low-power compute SoCs on the Intel 18A process.

The collaboration will focus on mobile SoC designs first, but allow for automotive, IoT, data centre, aerospace and government applications.

Arm customers designing SoCs will benefit from Intel's 18A process technology, which delivers transistor technologies for improved power and performance, and from IFS's manufacturing footprint that includes US and EU capacity.

"Intel's collaboration with Arm will expand the market opportunity for IFS and open up new options and approaches for any fabless company that wants to access best-in-class CPU IP and the power of an open system foundry with leading-edge process technology," said Pat Gelsinger, CEO of Intel.

Rene Haas, CEO of Arm, added: "Arm's collaboration with Intel enables IFS as a critical foundry partner for our customers as we deliver the next generation of world-changing products built on Arm."

As part of its IDM 2.0 strategy, Intel is investing in manufacturing capacity around the world, including expansions in the USA and the EU, to serve sustained long-term demand for chips.

This collaboration should enable a more balanced global supply chain for foundry customers working in SoC design on Arm-based CPU cores.

By unlocking Arm's compute portfolio and IP on Intel process technology, Arm partners will be able to take advantage of Intel's open system foundry model, which goes beyond traditional wafer fabrication to include packaging, software and chiplets.

Intel and Arm to collaborate on SoC production

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ZF and STM sign multi-year SiC supply deal

ZF has signed a multi-year supply agreement with ST Microelectronics for silicon carbide devices to be used in production by a European car maker from 2025.

STM will supply a volume of double-digit millions of SiC devices to be integrated in ZF's modular inverter architecture going into series production in 2025. ZF will leverage STM's vertically integrated SiC manufacturing in Europe and Asia to secure customer orders in electromobility.

"We are strengthening our supply chain to securely supply our customers," said Stephan von Schuckmann, board member at ZF.

STM will make the SiC chips at its production fabs in Italy and Singapore with packaging into STPak and testing at its back-end facilities in Morocco and China.

ZF can connect a variable number of such devices together to match performance requirements without changing the design of the inverter. Among others, ZF will use the technology in inverters for vehicles of a European car manufacturer whose production start is planned for 2025.

The inverter is the brain of electric drivetrains. It manages the flow of energy from battery to e-motor and vice versa. Inverters have become more efficient and more complex with every development step. The combination of the inverter design and semiconductors, such as SiC, can be key to improving electric vehicle performance.

SiC devices reduce power losses in electric car inverters. Devices made with SiC have advantages such as higher efficiency, power density and reliability.

Just feels the force

Just Auto Lighting took inspiration from Star Wars light sabres when it designed its rear braking lights that were on show at April's Taipei Ampa and Autotronics shows, see pages 13 to 22.

The red strip LEDs have more than a passing resemblance to the Jedi weapons.

"Ours produce a soft and uniform light," said Steve Lin (pictured), Just vice president. "They are like light sabres in Star Wars."

The company's range of LED vehicle lighting products includes headlights, tail lights, fog lights, daytime running lights, projection lights and ambient lighting.

Just was founded in 1982 and carries out all design work in house. It has factories in China with its headquarters and R&D departments in Taiwan. Products are shipped to customers from China.

There is also a subsidiary in Thailand that provides direct sales and technical support to local OEMs.

The firm acts as a tier one or two supplier to car makers in Asia and Europe including Toyota, Lexus, Nissan, Subaru, Scania and Polaris.

"We work with car makers globally," said Lin.

SUSTAINABILITY

LEARNING LESSONS

Life cycle assessment and recycling management make automotive companies fit for the future, says Jens Ramsbrock

In March 2020, the European Commission adopted its new Action Plan for Circular Economy. It aims to promote sustainable product design while reducing waste in resource-intensive sectors – including electronics and ICT, battery and vehicle manufacturing, and the plastics industry – as part of the European Green Deal.

The revision of EU legislation on batteries is just one building block in this context.

It is intended to make life cycle assessments (LCAs) mandatory and regulate the use of resources. Thus, the new Batteries Directive illustrates the challenges facing the automotive sector and industry in general with regard to LCAs and effective circular economy.

To prepare companies for these legislative requirements and corresponding customer needs, it is useful always to embed an LCA in the context of sustainability management and circular economy.

Two developments in the 1970s gave rise to the first life cycle analyses as they are known today: on the one hand, the worldwide increasing volume of waste, which is pushing more disposal systems to their limits and, on the other, emerging energy bottlenecks and the associated realisation that a large proportion of the raw materials used are not available in unlimited quantities.

Accordingly, LCA at that time focused on the effective use of resources and the reduction of emissions from products.

Over the years, the concept of LCA has been continuously expanded and refined. Today, it encompasses a holistic analysis of the product system from cradle to grave, ideally even from cradle to cradle as an approach to a continuous circular economy.

Regulatory instruments such as the EU's Circular Economy Action Plan and the accompanying legislative tightening, for example the revision of battery legislation underway, are making LCA mandatory in an increasing number of sectors and industries.

Pressure

Among other things, the EU Battery Regulation stipulates that rechargeable industrial and commercial batteries with internal storage must have a CO_2 footprint declaration as of 1 July 2024. As early as 1 January 2026, a label indicating the performance class for CO_2 intensity will be mandatory and, finally, as of 1 July 2027, corresponding maximum values for the CO_2 footprint must be complied with.

According to Din EN ISO 14040 and 14044, the LCA required to determine these and similar values consists of four phases: definition of target and scope, life cycle inventory, impact assessment, and evaluation.

Depending on the defined scope, the analysis covers all relevant input and output flows. These include raw materials and material procurement, energy, transport, (partial) processing, waste, emissions and discharges into water and soil, both during production and the use phase, right up to end-of-life scenarios.

Legislators are increasingly demanding LCAs in various sectors, but the analyses can also be useful or even necessary for a second reason: more processing companies are demanding corresponding evidence to make their own production more resource-efficient and to equip themselves for future requirements.

Even now, this is clearly noticeable in the automotive industry.

At the beginning, the object of consideration must be sensibly and clearly defined and the methodology to be applied must be determined. Then, all the relevant information, including any interdependencies and interactions, must be collected before dedicated software – with access to eco-impact data – can start the calculations.

The third step is interpreting the results and deriving feasible optimisation proposals as well as any further LCA determination loops.

The Batteries Directive exemplifies challenges facing the automotive sector

Know-how

A typical challenge that requires a lot of know-how and finesse from the implementing experts can clearly be found in the nature of new products. As a rule, hardly any data are available for the use and end-of-life phases before the launch, since they result from the final recycling rate of individual components and materials as well as from actual usage behaviour.

Therefore, it is common to use estimates or model calculations.

Many parameters affect individual phases and process steps in different ways. If conditions change, for example due to the development of new recycling processes, these in turn would have to be retroactively incorporated into the LCA.

In addition to ecological factors, social aspects are also becoming increasingly important in public awareness and thus also for many companies. To meet these new demands also, an extension of the methodology offers the potential to take these additional parameters into account, in the sense of a so-called social LCA (S-LCA) in accordance with the UN Environment Programme.

LCAs should always be embedded in the contexts of sustainability management and circular economy

Eco-balance

The use of lightweight materials in the automotive industry serves as an illustrative example of how technological progress shifts energy consumption and environmental impact from one phase of the product life cycle to another.

For example, a vehicle consumes less energy in the form of fuel during the use phase due to its reduced weight. However, the energy input in the manufacturing phase can increase due to raising parameters such as pressure and temperature, which are necessary in the individual production steps of, for example, CFRP components.

Yet, research results from Chalmers University of Technology indicate that energy consumption and the CO_2 footprint in the production of CFRP components may be significantly reduced in the future, with circular economy playing a decisive role.

By producing carbon fibres using lower-energy methods such as microwaves as an alternative to classic melting furnaces, the overall eco-balance of lightweight vehicles can be improved. This gives them an advantage over vehicles made from conventional materials. Likewise, there are various aspects of the entire life cycle of a vehicle that should be taken into account; it is worthwhile not only to look at the recycling process, but also to focus on the service life or production.

LCA refers to holistic analysis of the product

Competencies

To master the challenges of LCA, a precise definition of goal and scope as well as an alignment of expectations and the underlying methodology are essential.

Using lightweight materials in automotive illustrates how energy expenditure and environmental impact shift from one phase of product lifecycle to another

Implementing firms do not depend on any particular software.

The analysis can be carried out flexibly with the client's preferred tool. In doing so, the LCA specialists not only draw on their own engineering know-how, especially from automotive development, but also on in-depth expertise in the areas of sustainable materials and the associated compliance requirements as well as environmental sustainability.

These aspects, which are closely intertwined with the circular economy, are always taken into account within the scope of LCA and thus form the optimal basis for comprehensive approaches to optimising the respective product systems and developing strategies.

Jens Ramsbrock is senior expert on sustainability at Arrk Engineering