

**ASAP**

**2022**

**A N N U A L R E P O R T**

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Michael Neisen, CEO at the ASAP Group

# INTERVIEW

## 2022 FOR THE ASAP GROUP

### How would you summarise 2022 for the ASAP Group?

“Due to a number of different factors, 2022 was by far the most challenging business year for the ASAP Group to date. The lasting impacts of the pandemic, the war in Ukraine, disruption in supply chains, chip shortages, production los-

ses, high energy costs, rising labour costs coupled with a shortage of skilled workers – all of these issues have combined to exert an unprecedented impact. On top of this, there is the most significant transformation in the automotive industry to date, which has pervaded every aspect of our work for several years and is progressing rapidly.

„In light of all these challenges, I think that the fact we can now look back on 2022 as the most successful business year in our company’s history – having surpassed the already excellent results we recorded in the previous year – is a very special achievement.“

Our economic performance in 2022 was significantly above the industry average. In addition, the numerous awards we have received in recent months prove that we have grown in both quantitative and qualitative terms. We have impressed in every category and been recognised numerous times for our economic strength and innovability as well as our performance as an employer. By doing this, we have continued the ASAP Group’s successful development of recent years.”

**Rankings published in 2022 showed that ASAP has achieved above-average growth compared with others in the industry. What are the reasons for this? What do you consider the most important characteristics that set ASAP apart from its competitors?**

“Our strong growth is clearly based on the efficiency and innovative ability of our entire workforce as well as the strategic positioning of our corporate group. We have focused on technological trends in the automotive industry from the very outset and made the right investments over the years. E-mobility and the development of our Electrics/

Electronics and Software segments are clear priorities for us. We have acquired in-depth expertise and experience in these fields and have positioned ourselves very effectively. In addition, ASAP stands out due to the high consistency and universality of our services, which means that the increasingly complex scope of development in customer project presents more of an opportunity for us than a challenge. In keeping with our pronounced customer focus, assigning the most suitable ASAP experts to each project is always a priority for us. Our work is not tied to fixed locations; for example, we work with cross-functional teams in which specialists from very different fields jointly guide projects to a successful conclusion, thereby offering our customers the best possible solution.

„In addition to rapid growth, we also benefit from fast decision-making channels and a high level of dynamism throughout the company. These are basic prerequisites for our ability to be proactive and support the transformation of the automotive industry.“

With this in mind, we have strengthened our internal structures and continuously adapted them as our company has grown. We are also committed to helping our employees to upskill and gain new qualifications, such as through our internal theme nights, a wide range of training opportunities and a focus on technology transfer. This has enabled us to establish strong, interdisciplinary collaboration across

all our locations. Ultimately, I consider the trustbased cooperation at management level, which already dates back several decades in some cases, to be a decisive factor in the ASAP Group's success."

### **In your view, what were the ASAP Group's highlights in 2022?**

"A particular highlight for me over the last year has been the growth we have achieved which, as I mentioned, was above the industry average – all ASAP locations improved on their results in the previous year and we were able to secure a number of long-term projects. We have also successfully positioned ourselves with a view to securing new customers and consequently further diversified our customer base. This has included securing another OEM for vehicle electronics services and establishing an automotive software development company as a top customer for ASAP. These successes also serve as evidence that our strategic project, "Speed up – ASAP 2025" – which has seen us revise our service segments and associated strategies through to 2025 – is already having an effect. Another milestone was further refining the direction of our corporate group through two M&A transactions. Firstly, we separated ourselves from production-related services with a management buy-out at the start of the year. Secondly, we integrated Sigl Bordnetz Design GmbH, which significantly expanded and strengthened

our wire harness development services.

*"Another highlight, in my view, was our ability to get a lot of new employees excited about ASAP and recruit 582 new members of staff, despite the ongoing shortage of skilled workers."*

We have continued to grow considerably, especially at our sites in Ingolstadt and by Lake Constance, and have responded to this by expanding our sites with around 4,000 square metres of additional space. On a personal level, I was delighted that we were able to reinvigorate our sense of togetherness and our corporate culture by hosting a number of in-person events and team events. In 2023, we will press ahead with the systematic implementation of measures developed in the course of our "Better together" initiative. It will focus on upgrading our organisation, through initiatives such as new roles, employee development, cultural projects and office design."

### **2022 began with the management buy-out of ASAP Technical Service GmbH and the acquisition of Sigl Bordnetz Design GmbH. How does that fit into the ASAP Group's strategy and do you plan to make further, similar changes?**

"The two M&A transactions of the last year fit in perfectly with our strategy: they have enabled us to further refine the ASAP Group's service portfolio. It is entirely possi-



ble that we will take further such measures as we plan to make further investments in our technological focus over the coming years. For example, we will build the infrastructure necessary for further growth and continuously upgrade our expertise and capacities. In relation to this, our cooperation with best-cost partners and our international search for talent will become increasingly important in future."

### **Do you have anything new to report on our cooperation with our strategic partner, ZF Friedrichshafen AG?**

"In 2022, we successfully expanded our cooperation with our strategic partner,

ZF Friedrichshafen AG, in particular in relation to central R&D and e-mobility. This is part of the reason for the exceptional growth of our ASAP location by Lake Constance. In total, we were able to increase our turnover with our strategic partner by over 60% compared to the previous year. Our cooperation focuses on the validation of electric drive systems, test automation solutions and functional validation as well as software-related topic areas such as DevOps and PMT. In the last year, we have also started collaborating with ZF Friedrichshafen AG on its new Commercial Vehicle Solutions division, with a focus on Software and Electrics/Electronics."



**Are you able to give us an idea of what is to come over the next few years?**

*„We will retain our potential-oriented strategic direction in the coming years. As a result, you should not expect any large-scale changes but rather the logical continuation of our approach to date, which involves market-oriented development.“*

Nevertheless, many tasks still lie ahead of us. For one, we need to drive forward internationalisation and networking within the ASAP Group and further promote the structures required for cross-location

collaboration. Expanding our resources both domestically and abroad and the continued digitalisation of our processes will play a decisive role. In addition, we must continue to devote our full attention to securing our economic stability and, in association with this, further diversifying our customer base. Continuing to make our corporate group more attractive as an employer is also a crucial issue, as the shortage of skilled workers will be further exacerbated in the years ahead. Like the industry as a whole, we face the significant challenge of keeping a grip on rising costs while simultaneously battling a growing shortage of resources. The long-term development of the Chinese market

and associated influences on development service providers demand exceptionally precise analysis of the risks and opportunities the future may hold. Familiar aspects, such as our focus on our customers' requirements and the impressive quality of our services, will remain constants for our work in future. In the ASAP Group, we are permanently focused on trends in automotive development, so we will of course keep an eye on future-oriented technologies in the automotive industry – so that we can respond dynamically to any changes in the market's needs. For example, we will continue to closely monitor issues such as software-defined vehicles and the integration of IT into vehicles, as well as potential new customer landscapes associated with these topics.

*„Based on the latest studies and forecasts, we expect to see particularly strong growth in our Electrics/ Electronics and Software segments in the years ahead. Our current direction means we are ideally positioned for this, which provides an excellent starting point for the ASAP Group to achieve further healthy growth in the coming years.“*

# 2022

## FACTS | FIGURES | DATA

people employed by the corporate group across 9 locations as of December 2022.

# 1,590



# 35 %



of the added value was generated by ASAP employees in mobile working.



# 6

time in succession, the ASAP Group has been named a leading innovator among medium-sized enterprises in Germany



# 38

nationalities are represented within the ASAP Group's workforce.



# 19

the ASAP Group's position on the Automobilwoche ranking of the 25 development service providers with the highest global turnover.

# 22.942



hours of professional development activities completed by ASAP employees in 2022.



# 150m Euro

turnover recorded by the ASAP Group in 2022, which was thus increased by 25 percent.

# 27.4 %



average annual growth in the ASAP Group since 2010.

# 4



Position achieved by ASAP in the TOP-Arbeitgeber 2022 ranking of automotive employers published by Focus and kununu.



# INTERVIEW

## THE ASAP GROUP MANAGEMENT REFLECTS AND LOOKS AHEAD

An interview with members of the ASAP Group's management team, covering the events and highlights of 2022 as well as

the developments and issues that await us in the years ahead.



Robert Morgner

**Robert Morgner, CFO of the ASAP Group:**

The year 2022 was dominated by challenges. On the one hand, the economic climate was extremely overcast and included massive cost increases, the threat of recession and unstable supply chains. On the other hand, the shortage of skilled workers has further intensified in all areas. The transformation of

the automotive industry affects the fields of software and electronics in particular – two segments in which ASAP is recording particularly strong growth. Despite these unfavourable conditions, it proved a very successful business year for the ASAP Group in which we recorded growth of 28%, considerably higher than the market overall. As the development partner to the automotive industry,

ASAP benefits from its strong position in relation to automotive megatrends, which are mapped out in our service segments: Electrics/Electronics, Software, Trials and Testing, Vehicle Development and Consulting & Service. From a strategic standpoint, we are in an outstanding position because we can offer our customers optimal support in the course of the automotive transformation. By integrating resources from best-cost partners into our projects, we have also expanded our capabilities while enhancing our competitiveness.

Against the backdrop of growth and the shortage of skilled workers, we started upgrading our recruitment activities at an early stage. Today, we have best-in-class recruitment and onboarding processes, which has enabled us to hire over 582 new employees – above all in our Electrics/Electronics and Software segments, where specialists are particularly in demand. The growth in our workforce is based on our high attractiveness as an employer. By providing genuine added value as a partner to our customers, we offer engaging projects. We also provide outstanding opportunities for our employees to develop, support them through numerous programmes and have filled around 80% of management positions by recruiting internally. In addition, we set ourselves apart by offering very attractive conditions. We offer flexible working time models, remote working, workations, additional leave, sabbaticals and an attractive work environment as standard. This is reflected in

the numerous employer awards we received once again in 2022. At this point, I would also like to emphasise the fact that, despite the exceptionally challenging conditions this year, we still achieved the highest revenue increase in our company's history in absolute terms, which I consider a particular highlight.

I expect the coming year to be similarly challenging to 2022 as the economic picture has broadly not improved. Inflationary trends will have an increasing impact on our costs and 2023 will likely be more difficult than 2022 for the economy as a whole. In 2023, our focus will be on continuing to grow in our core areas. At the same time, we must ensure that we remain competitive and economically successful despite rising costs. In my view, ASAP is well positioned to do just that. We have a wide customer base and service portfolio, with suitable solutions pertaining to all megatrends in the automotive industry. Looking to the years ahead, the shortage of skilled workers will remain an important issue for us. In light of this, integrating resources from best-cost partners in our projects will remain important in the next year – as we strive to become even more competitive. Overall, our plans for 2023 aim to achieve growth far above the industry average once again. Considering our innovation and growth-focused corporate culture, which has been reflected in the successes of recent years, we feel very confident of achieving our aims.



**Robert Werner, Managing Director of ASAP Engineering GmbH Ingolstadt and ASAP Electronics GmbH:**

The 2022 business year was extremely successful for ASAP Electronics GmbH at its Munich site. It clearly showed that we are well positioned in the right topics and therefore benefit from strong market tailwinds. We also had an excellent order situation and capacity utilisation across all areas in 2022 and recorded strong growth. The workforce at ASAP's Munich site has tripled since 2020. During this period, we have also taken considerable strides forward in terms of the substance of our work. In our Electrics/Electronics segment, for example, we have concentrated even more closely on future-focused topics and successfully established the topic of XiL modelling, for example. We are on the right track to position ourselves as one of our OEM customers' top partners in relation to test automation but also in test modelling. Our cooperation with our strategic partner, ZF Friedrichshafen AG has also been supplemented with new projects and customer environments. For example, we have been engaged to validate driver-assistance systems for an Asian OEM.

A particular highlight for me was integrating Sigl Bordnetz Design GmbH into the ASAP Group, having acquired 100% of the shares in the company with retroactive effect from 1 January 2022. As a result, we can now offer our customers a unique de-

gree of consistency and universality in wire harness-related services. I would also like to underline our successes in a large-scale project involving series production support and development in relation to central vehicle infrastructure. There has been a marked improvement in our cooperation with the customer and we have taken great strides forward in relation to project management. Consequently, we have made a significant contribution to securing vehicle production for this year – despite semiconductor shortages and supply chain disruption.

Looking to the year ahead, I see cause for both optimism and caution. On the one hand, current conditions including the energy crisis and rising inflation make for an increasingly challenging environment, not only for ASAP but also for our customers. This will likely have a negative impact on business development, which is why I can only offer a cautious outlook for 2023. On the other hand, we go into the new year with an excellent order situation for ASAP in Munich. We hope to expand our activities in the months ahead, especially in relation to data science. I am particularly looking forward to being able to open our new office in Munich. We plan to move into a modern office complex in mid-2023, doubling the space available to us in a significant expansion of the location. Our new office's design will incorporate the latest insights gained in our "Better together" initiative and in relation to New Work, thereby set-



Robert Werner

ting a new benchmark in relation to office well-being at ASAP.

**Christian Schweiger, Managing Director of ASAP Electronics GmbH Ingolstadt and ASAP Engineering GmbH Ingolstadt:**

After bringing the 2021 business year to a very successful conclusion – which was

far from a given in our industry – 2022 proved just as successful. However, this success was the result of considerable effort because, after years dominated by the pandemic, the consequences of the war in Ukraine presented a different challenge in recent months. First and foremost, of course, this is a humanitarian disaster than has touched us all. It has also entai-



Christian Schweiger

led shortages of raw materials and rising energy costs, which have direct impacts on the automotive industry. By contrast, the fact that we managed to further diversify our customer base across all segments was a very positive development. We recorded the strongest growth in our Electrics/Electronics segment, to which we have responded by providing 2,500 square metres of additional

office and hall space. Our Software segment has also made tremendous progress. In particular, our customers appreciate the fact they can find expertise in both software development and functional validation from a single source. We have also begun to expand our Trials and Testing service spectrum: although it is currently focused on electric motors, electric axles and power

electronics, we are now adding focus areas in DC/DC converters and on-board chargers. The topic of internal structures took up a lot of space in 2022. We have reinforced our structures by creating the new role of 'team leaders' and appointing two new division heads and a number of other managers. This takes account of our strong growth while also creating smaller teams to create closer manager-employee relationships – a core aspect of ASAP's culture.

When it comes to particular successes, I would point to two long-term, large-scale follow-up orders from an OEM customer that has been very pleased with our work to date: one in relation to test systems, and the other being the largest order our Consulting & Service segment has received to date. By acting swiftly, we were also able to compensate for orders for our testing and trialling centre in Sachsenheim being cancelled at relatively short notice by securing new orders from systems suppliers. Another highlight was successfully expanding our cooperation with a major automotive software development company as a top customer for our Software, Consulting & Service and, above all, Electrics/Electronics segments. One moment that was particularly emotional for me was handing over a donation for families of Ukrainian refugees. This fundraising campaign was made possible not just by the ASAP Group's contribution but through the active participation of our employees – and was received with deep gratitude.

One topic that will likely continue to occupy us in 2023 is the energy crisis. At our Ingolstadt site, we have an extensive range of machinery in operation, including in the testing and trialling centre and our E/E testing infrastructure – and so must take steps to counter the rising costs. So, in response to this, we are planning to install a further photovoltaic system on the premises' roofs with an output of 250 kWp. In keeping with the trend of e-mobility, we plan to almost double our current EV charging capacity in order to give our employees the opportunity to charge their EVs on our Gaimersheim campus. I expect to see further growth in our Software and in particular our Electrics/Electronics segment in 2023. In addition to established systems suppliers, OEM customers will become increasingly important. This expansion will be made possible by the structural changes I mentioned at the outset, the increased use of resources from partners in Eastern Europe and leasing a further 1,200 square metres of laboratory space in early 2023.

**Thomas Martens, Managing Director of ASAP Engineering GmbH Wolfsburg:**

Although the 2022 business year got off to a tricky start for ASAP Engineering GmbH Wolfsburg, it ended on a positive note. At the beginning of the year, the impact of the pandemic, chip shortages and limited availability of parts resulted in a number of projects being postponed, which presented

huge challenges for us in the fields of testing and commissioning. However, we overcame these issues during the first quarter. The business year was, therefore, overwhelmingly positive as a whole and we continuously grew in stability in all segments over the course of the year.

We were once again able to celebrate a number of successes in 2022 – a particular highlight in my view was our successful positioning in relation to services in the high-voltage sector. In addition, we have taken on projects for an OEM customers, including one focused on HV charging for cars and HV integration for utility vehicles. We are assisting our customer with the integration and adaptation of HV systems and charging systems as well as in relation to internal processes and project management. We also provide support with definition and implementation in the course of functional realisation. In addition, in an interdisciplinary pre-development project for battery cells, our work is focused on measurement-based adaptation of the battery core for different cell chemistries as well as cell measurement and analysis. A further milestone we reached over the last year was reorienting our Environmental Simulation division, which is now squarely focused on safety tests for HV batteries. We have enormously upgraded our expertise, significantly expanded our team and received outstanding feedback on our services from numerous customers. I regard a large order in relation to mobile online services as a particular highlight, which allowed

us to open a new segment at our Wolfsburg location. Together with colleagues at our ASAP locations by Lake Constance and in Ingolstadt, we are responsible for functional realisation and requirements management for more than 30 mobile online services for this OEM customer – and, in another project, for testing. Our cooperation with our strategic partner ZF Friedrichshafen AG on a legacy project was also a major success of the last year. This order involved researching a new microchip, making the necessary adjustments, testing the software and ensuring that we worked in line with A-SPICE requirements.

ASAP Engineering GmbH Wolfsburg starts the new year with a very robust order situation. However, the current situation – including the effects of the war in Ukraine, rising electricity costs, the shortages of chips and raw materials, and market reactions to these challenges – are difficult to fully understand, so I can only offer a cautious assessment of 2023. At the same time, we plan to make further investments, such as expanding our battery safety testing activities with the ability to conduct gas analyses.

**Martin Ott, Managing Director of ASAP Engineering GmbH Weissach and ASAP Engineering GmbH Lake Constance:**

The 2022 business year was very successful for our sites in Baden-Württemberg. Our ASAP Engineering GmbH sites in Weissach and by Lake Constance surpassed their targets once



Thomas Martens

again. After doubling our revenue from 2020 to 2021, we recorded a further rise of over 30% over the last year. We have significantly expanded our relationships with customers, especially our strategic partner ZF Friedrichshafen AG and our local OEM customers. Our Electrics/Electronics and Software segments were key growth drivers. The noticeable shortage of skilled workers presented an increa-

singly significant challenge. We are countering this by intensifying our staff marketing activities, continuously improving our centralised and decentralised recruitment processes and, last but not least, by searching for talent internationally. This approach has enabled us to significantly expand our expertise and capacities once again. Furthermore, we have established a successful cooperation with a



Martin Ott

near-cost partner in the Czech Republic and a best-cost partner in Turkey. Both partner companies are effectively integrated in these projects and add value. We have also placed a stronger focus on cross-location collaboration within the ASAP Group. For example, we started working with our Wolfsburg and Ingolstadt sites in relation to online services and have already received further orders in this

area from our customer. In addition to testing and validating different control units, we were soon also tasked with developing them.

For me, particular highlights of the last year included moving into our new offices in Friedrichshafen and our developments in relation to New Work. These new, modern offices have significantly expanded our site by Lake Cons-

tance. Besides working on attractive projects, we believe it is important to provide a working atmosphere in which everyone feels comfortable. We supported the strong growth of our locations in Baden-Württemberg with numerous team-building activities – in accordance with the COVID regulations applicable at the time, of course. This helped our team grow close together in a short space of time. Beyond this, we have reinforced our internal structures: our employees have made intensive use of ASAP staff development programmes and we have already recruited internally for a number of positions this year. In accordance with the New Work concept, we have also created a new Group-wide framework for flexible working time models at ASAP, which have been very well received.

I find it hard to predict how the 2023 business year will turn out. Current challenges such as high raw material and energy prices, significant inflation rises and the persistent chip shortage will naturally impact the automotive industry in Germany as a whole. At present, however, our outlook is entirely positive and we start the year with a solid order position. In the coming months, our focus will remain on growth while also maintaining consistently high quality and customer satisfaction. We will continue to improve our internal structures and processes, and the sense of togetherness in our teams, to put us on a stable footing for future growth.

**Volker Schier, Managing Director of ASAP Engineering GmbH Rhine-Main:**

ASAP Engineering GmbH Rhine-Main can look back on a successful business year in 2022. We utilised our full capacity all year and across all our teams, which worked on large-scale, challenging projects. In total, we recorded a slight workforce increase of 15%. In recent months, our attention has been focused on our strategic project, “Speed up – ASAP 2025”, which is helping us to continue promoting collaboration throughout our corporate group and, in particular, expand our capacities in our Electrics/Electronics and Software segments. In keeping with this, we have established a new Software team at our Rhine-Main location and expanded our Electrics/Electronics team. This means that, in the future, we will be able to support the entire ASAP Group across all locations in relation to these topics. Together with our strategic partner, ZF Friedrichshafen AG, we have also further upgraded our ADAS testing services and have started working on function development at our Rhine-Main site for the first time. The development of our Test Drive and Vehicle Construction division, which is responsible for building and implementing prototypes and assembling and disassembling crash-test vehicles, was also very pleasing. We achieved strong growth in this area and will continue to expand these activities.

Our location also took its first steps in the Software segment, which was another special milestone in 2022. We are now exploiting the Rhine-Main metropolitan region for recruitment and have therefore already



Volker Schier

laid the foundation stone for a central team capable of providing cross-location support on Software projects throughout the entire ASAP Group. This will enable us to further intensify the use of synergies within our corporate group. Another highlight in my mind was our ability to further our expertise in relation to the validation of driver-assistance systems, so we can now assist our

customers in particular with analysing and testing new functions.

Continuing to make full use of our capacities will remain a challenge for our location in 2023, because the start of the year will be somewhat muted in this respect. Clear focus topics will include, on the one hand, the continued growth of our capacities for

driver-assistance system validation. On the other hand, we will make even greater use of the Rhine-Main region to recruit talent for the entire ASAP Group. This will enable us to continuously grow our Software and Electrics/Electronics teams. In keeping with the concept of New Work, we will support our employees in working remotely on projects throughout the Group. With this in mind, our ASAP “Better together” initiative will remain a priority for us. We have drawn up numerous measures and will implement them systematically over the coming months so that all new employees, many of whom work remotely, can still experience the ASAP Spirit.

# HIGHLIGHTS 2022

# SPEED UP – ASAP 2025

## ASAP GROUP LAUNCHES STRATEGIC PROJECT TO REFINE ITS KEY SERVICES

Continuous development is a central factor in a company's success. It is with this in mind that the ASAP Group launched a strategic project last year entitled 'Speed up – ASAP 2025'. A central element of the 'Speed up' project is refining ASAP's key services with the aim of making the Group's portfolio even more focused and technologically advanced. Following this realignment, the company's service portfolio now features

five service segments: **Electrics/Electronics, Software, Consulting & Service, Testing, and Vehicle Development.** ASAP is also striving to promote Group-wide networking and leverage synergies in the course of the strategic project. In addition, it will implement supporting measures in its Marketing and Human Resources divisions to help achieve the strategic project's objectives.

The ASAP Group focused on future-oriented technologies in the automotive industry at an early stage and has continuously refined its service profile in line with emerging megatrends. This strategic direction, which ASAP has pursued systematically for many years now, is entirely in keeping with the mobility transformation and the needs of customers. Development services in new technological areas are a clear focus of this business model. It also continuously consolidates synergy effects arising from its various services and across the entire ASAP Group. In the process, ASAP offers its customers a high level of service consistency as well as a highly developed understanding of its entire service portfolio. The increasing complexity of technologies in vehicles is therefore not so much a challenge, but rather an opportunity for the ASAP Group's future development. Nevertheless, continuous development is of central importance to the company's future success. In 2021, the ASAP Group launched a strategic project entitled 'Speed up – ASAP 2025' to position itself effectively for the future. This involves placing an even stronger focus on its key strategic service segments and further underlining the ASAP's Group strategic direction. Other key priorities include promoting networking within the Group and the increased use of synergies across all service segments. The ASAP Group will continue to systematically improve its competencies and expand its capacities in its strategic

service segments in the years ahead in order to ensure its continuous development. The qualitative and quantitative upgrading of our resources will happen both organically and inorganically.

### Focus on Electrics/Electronics and Software segments

In collaboration with an external consultancy firm, the ASAP Group has spent recent months putting its services under the microscope, analysing potential areas of development and working on the 'Speed up – ASAP 2025' strategy. As part of this process, it has defined five overarching service segments: **Electrics/Electronics, Software, Consulting & Service, Testing, and Vehicle Development.** The first changes are already evident – the spectrum of services listed on the company's homepage has been amended to reflect these five service segments, as have other communication materials. ASAP has explicitly placed the **Electrics/Electronics and Software** segments at the heart of this new strategy due to their pivotal role as drivers of growth in the automotive industry. The proportion of value added by these segments has increased significantly in recent years and will continue to rise in the years ahead. The Group's service spectrum is completed by three further segments, namely **Testing, Vehicle Development, and Consulting & Service.**

SYSTEMS ENGINEERING  
TEST & INTEGRATION  
TEST SYSTEMS  
WIRE HARNESS



## ELECTRICS | ELECTRONICS



## SOFTWARE

SERIES DEVELOPMENT  
PROCESSES | METHODS | TOOLS  
VIRTUAL VALIDATION  
MODELLING | SIMULATION



## VEHICLE DEVELOPMENT

PRODUCT LIFECYCLE MANAGEMENT  
MECHANICAL ENGINEERING  
AUTOMOTIVE TECHNICAL CENTRE  
DRIVE TESTING

## TRIALS & TESTING



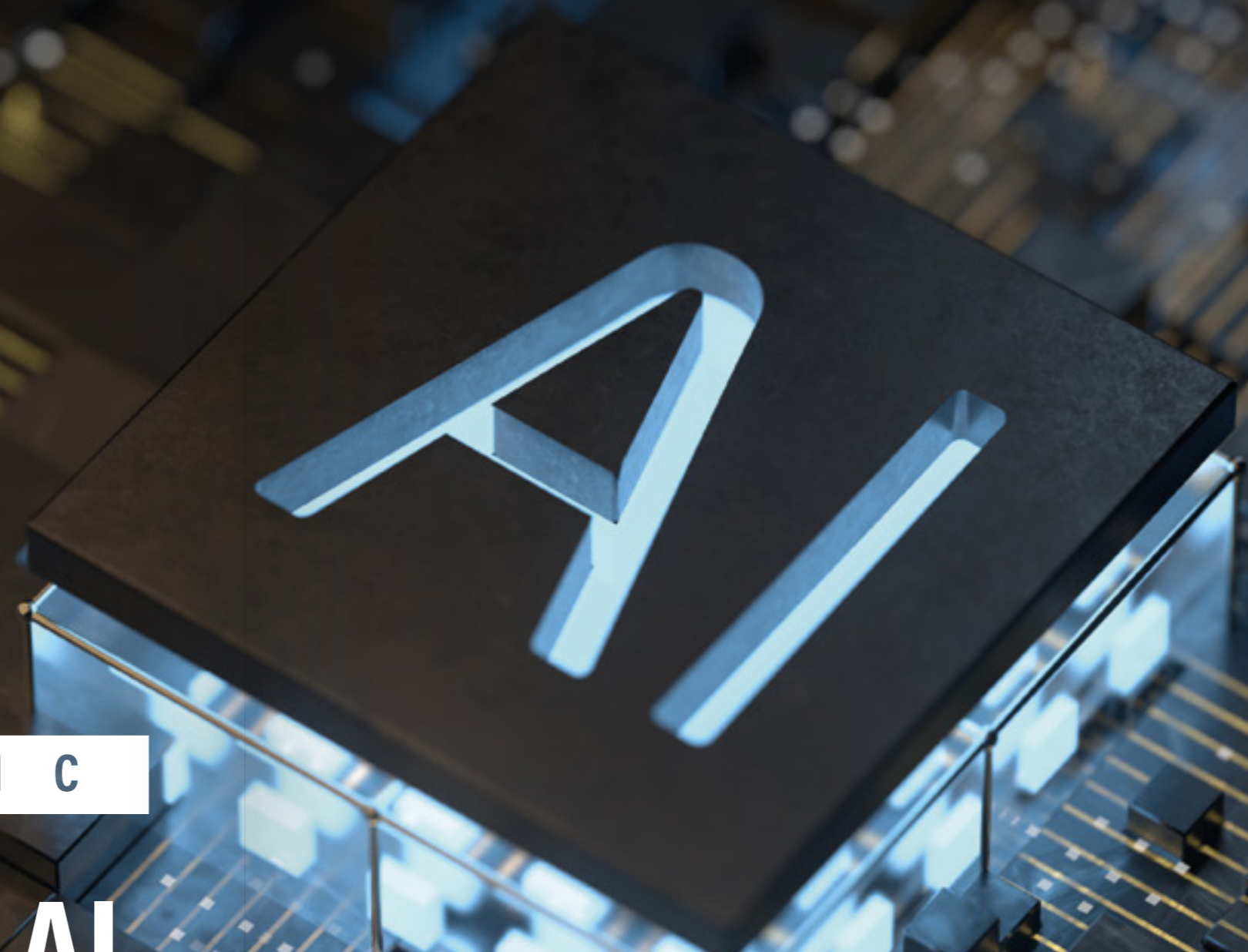
COMPONENT TESTING  
LIFE-CYCLE TESTING  
FUNCTIONAL VALIDATION  
MEASUREMENT/APPLICATION  
HOMOLOGATION



## CONSULTING & SERVICE

CONSULTING  
SERVICE  
QUALITY  
COMMUNICATIONS





S P E C I A L T O P I C

# DATA SCIENCE | AI



# ASSISTANCE SYSTEM FOR TEST ENGINEERS

## HOW ARTIFICIAL INTELLIGENCE FOR ANOMALY DETECTION FACILITATES THE USE OF BIG DATA FOR VEHICLE DATA

Highly automated driver-assistance systems must complete millions of kilometres of test drives before final approval can be issued. This includes both real-world test drives in test vehicles and automated testing using corresponding testing systems. Looking at this from a different perspective, the testing requirements also involve precisely recording and analysing vast quantities of data, with the results incorporated in the development process in order to continuously optimise functions.

Given the growing time and cost pressures in the automotive industry, what options are available to derive insights from these huge volumes of data and apply them as quickly as possible? The ASAP Group has launched a research project focused on precisely this issue, aiming to develop an assistance system for test engineers. By drawing on machine learning and statistical data analysis, ASAP hopes to automate the detection of anomalies in measurement data.

Autonomous driving is a prominent vision for the future and entails a whole host of benefits – from added convenience to safety enhancements and vehicles with the ability to react dynamically to complex situations. However, this also creates significantly higher demand for driver-assistance systems (DAS) and the corresponding software and sensor systems in vehicles. This in turn presents greater challenges for development and validation: as the degree of DAS automation increases, so too does the volume of data recorded by test vehicles. [1] Real-world test drives alone are not sufficient to validate the increasingly varied and complex driving functions in ever-shorter development cycles. Vehicle functions are therefore validated using automated test systems in parallel with real-world testing. This also produces enormous quantities of measurement data. With this in mind, the ASAP Group – development partner to the automotive industry – has launched a research project. In the process, ASAP has designed a solution that makes it possible to manage these vast quantities of data so that engineers can apply them more quickly for development purposes.

### Intelligent filter for measurement

The aim of the ASAP project is to develop a tool for use in the field of test automation. Automated identification of anomalous measurement data should assist test engineers in their work. The rest of this article details the advantages of this tool, along

with practical examples and an explanation of how it works. Data from different sources is used for validation processes, including test systems – such as component and system HILs – and real-world test drives. A test drive of a single vehicle can generate around 80 terabytes of data in a single day. [1] As such, there is no limit to the volume of data produced by entire fleets of test vehicles conducting test drives over a period of months or even years. Added to this is the information from automated tests on hardware-in-the-loop (HIL) test benches, which operate around the clock. Left running for seven days, HIL testing can rack up several thousand measurements per test system, with each system recording data on bus communication and ECU behaviour (traces). When used to validate functions, all of this measurement data must be examined for anomalies. In light of the limited number of skilled professionals, and therefore the limited working hours available, combined with increasingly short development cycles in the automotive industry, examining all this data presents a major challenge. This, however, is where the ASAP Group's Data Science Tool comes in. It relies on statistical data analysis and machine learning to automatically examine these vast quantities of trace data and identify any anomalous data points that require inspection by the test engineers. This means that development teams no longer need to sift through trace data: instead, they can concentrate on the anomalies identified by the tool and, ultimately, devote more time to creative activities as development engi-

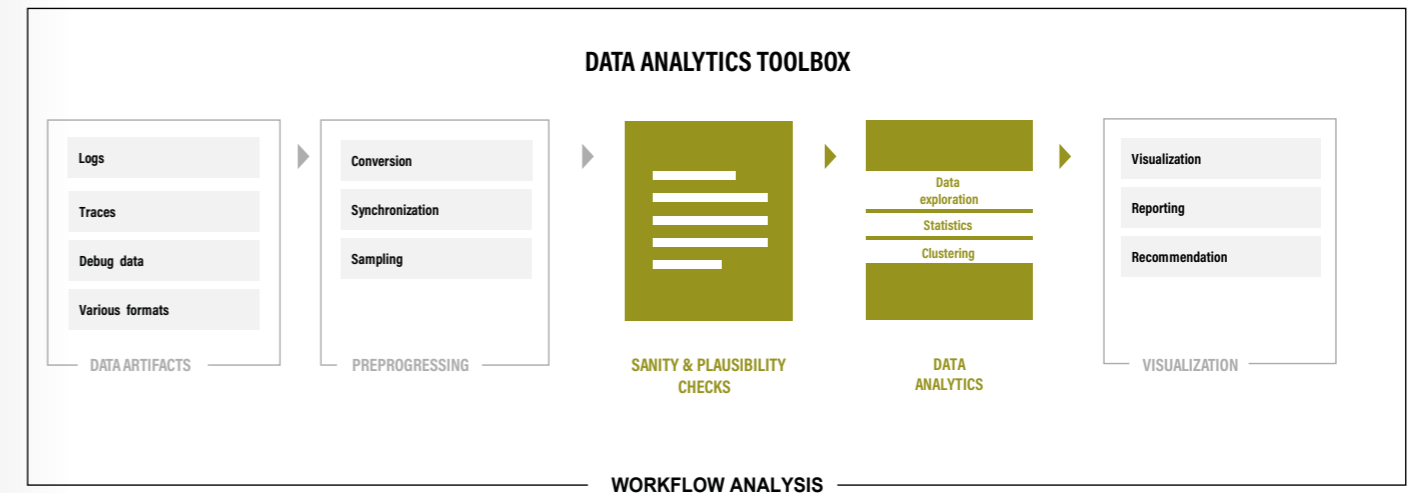
neers. The tool is not designed for any one specific case or a single vehicle function. In the future, the tool will make it possible to examine all ECU traces from HIL and real-world vehicle tests in the field of electronics development, conducting automated data analysis to identify anomalous data points.

### Greater complexity leads to new error patterns

In a modern car, around 80 to 100 ECUs must communicate effectively with each other. Future generations of vehicles will feature fewer, considerably more complex ECUs. Given the ever-growing complexity of modern vehicles, the new automated data-analysis tool from ASAP offers a further useful addition to requirements-based testing, namely the ability to identify new error patterns. A lane-departure warning system, for example, relies on ECUs and sensors in several domains. It is primarily mapped via the DAS domain in interaction with up to 30 ECUs and associated sensors. ADAS/AD systems involve a number of different, very complex challenges, such as longitudinal control, sensor-data fusions, object classifications and the use of artificial intelligence. Validating this type of software often requires scenario-based testing in complex co-simulation environments. The ECUs in these domains must also communicate extensively with each other because information from systems including steering, radar and cameras are used as the basis for decisions about the vehicle's responses in traffic. In such

critical structures, it is therefore important to examine whether the ECUs communicate faultlessly and the right decisions are made. For example, in a scenario where a car must navigate a narrow thoroughfare within a building site, the lane-departure warning system might not function correctly because it would not be possible to completely specify the parameters for such a situation to cover all possible incidents and occurrences. It is therefore important at this point to examine the measurement data thoroughly for any anomalies. Data anomalies – i.e.

ECU malfunctions – can occur in many different ways and for different reasons. They can be caused, for example, by faulty programming, an error in the communication between ECUs, or due to grey areas in specifications that leave room for interpretation in the development process. Typical causes include routing problems, gaps in ECU software specification and implementation, and collisions between messages on the bus system. For instance, contradictory sensor information sent to the function master for a lane-departure warning system could impair functional activation and, if faulty behaviour occurs, produce a toggle effect. This would cause the lane-departure warning system to switch between activation and deactivation at very short intervals, which could confuse the user. In its role as a supplement to requirements-based testing, the system developed by ASAP to assist test engineers is designed to identify such anomalous measurement points, which cannot be covered by test scenarios. Engineers

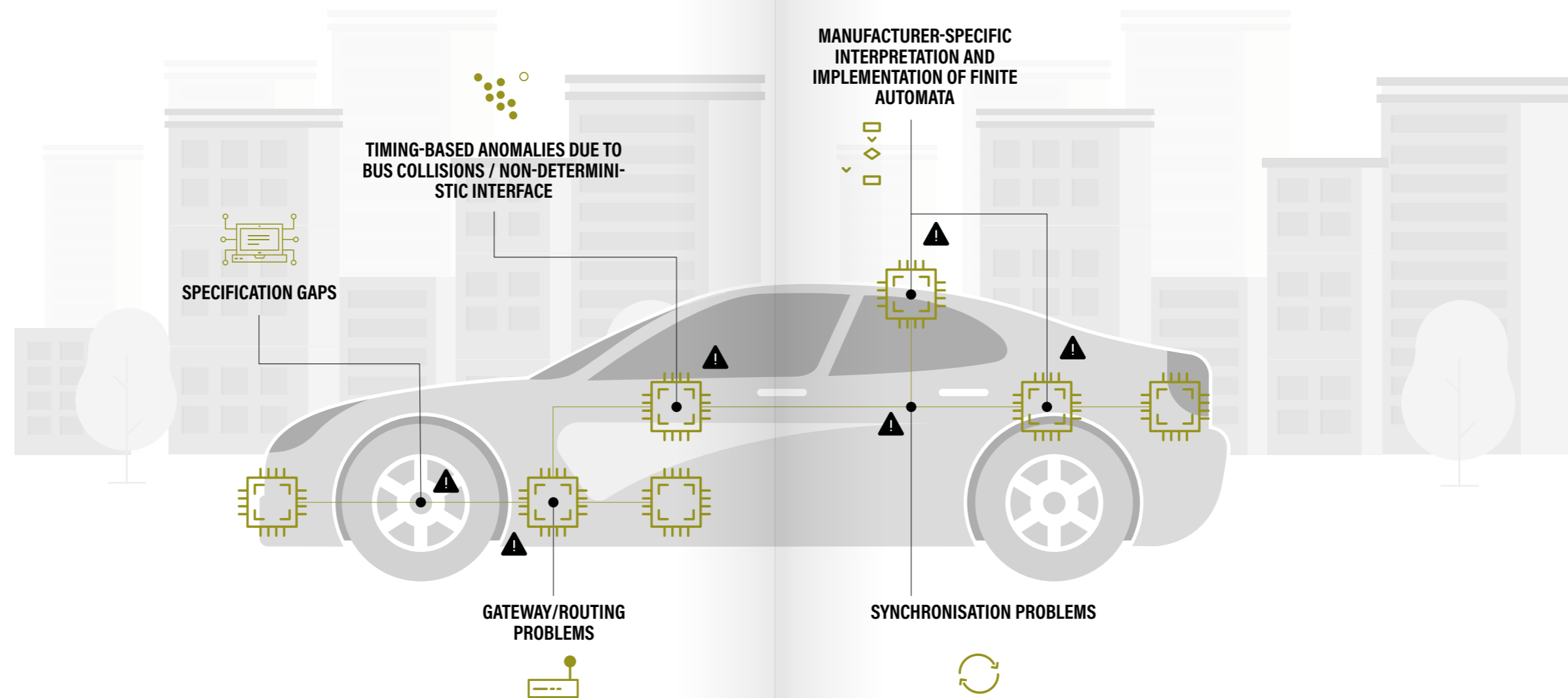


can thereby rectify such faults at an early stage. This makes it possible to manage the flood of data generated in development and validation, which would otherwise have to be evaluated manually.

### How the tool box works

In this publicly funded research project, the ASAP Group is assembling a toolbox for automated anomaly detection so that test engineers will be able to focus their attention on important data points that require their human expertise in the future. It relies on methods based on machine learning and statistical data analysis. Firstly, the data is loaded and examined for typical error sources such as formatting errors, incomplete log files and potential duplicates. The signal values undergo statistical analysis to identify problems such as issues

with signal specifications. In the next step, data points that logically belong together are compiled into sequences based on the prepared datasets. Non-relevant data is also removed from the computation dataset at this point, which reduces the scale of the evaluation. This makes the calculations more efficient. During this process, algorithms are used to identify anomalous data points in the measurement data. This involves examining the reduced data from all angles in a high-dimensional space. Mathematical metrics work in the background to ensure the success of the machine learning techniques by facilitating the automated calculation of intervals between all data points. This makes it possible to cluster the data and thereby examine it for statistical abnormalities. The notion behind this is that particularly large intervals between certain data points and the majority of data points



are indicative of an abnormality. The use of artificial intelligence therefore facilitates automated, rapid evaluation of all data and provides the test engineers with concrete recommendations for action. Anomalous data points are highlighted with a recommendation to review them for potential defects. The tool also generates a very simplified 3D display of the results to make them more easily comprehensible. Continuous feedback from users constantly improves the underlying artificial intelligence

– and thereby also supports the intelligent filtering of data points and, in turn, the recommendations for action. As a result, the tool developed by ASAP to automatically detect anomalies in measurement data not only makes it possible to apply data more quickly but also enables test engineers to give faster feedback to development teams in specialist departments. The result is time and cost savings in the development process for vehicles and their functions.

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# ARTIFICIAL INTELLIGENCE IN PRODUCTIVE USE IN THE AUTOMOTIVE INDUSTRY

## HOW MLOPS ACCELERATES DEVELOPMENT AND IMPROVES QUALITY

Artificial intelligence (AI) can be used in a vast range of applications, including autonomous driving but also many others – which means it offers enormous potential to achieve savings in the automotive industry. At the same time, studies show that the technology's advance into productive use remains sluggish. One of the reasons behind this is the lack of established, automated processes for

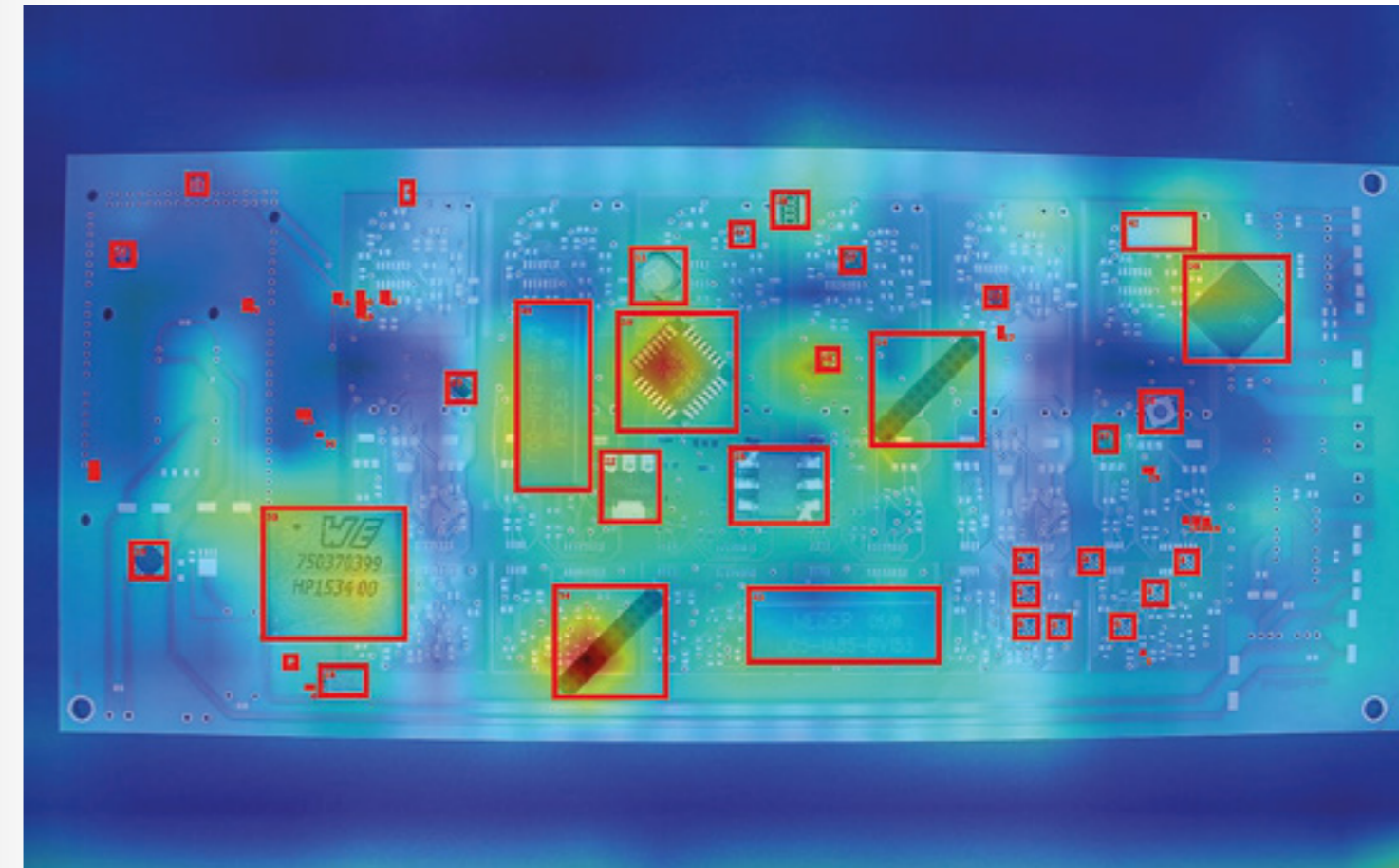
AI developments. With this in mind, the ASAP Group is applying Machine Learning Operations (MLOps) – translating DevOps, a widely known software development concept, to the field of machine learning. By developing a new tool for automatic component recognition, ASAP has demonstrated how MLOps can accelerate development in automotive engineering while also improving quality.

AI offers immense profit-generating potential, including the ability to increase overall revenues in the automotive industry by up to 16%. [1] From optimising internal processes and engineering to testing, supply chain management and production, there are numerous potential applications for AI, with the potential to improve efficiency, raise quality and in some cases achieve significant cost savings. At the same time, however, studies show that the number of automotive companies that use AI extensively has only increased a small amount in recent years. [2] Besides a shortage of experts in the field, the largest barriers to increased use of machine learning include the challenges inherent in its integration into existing processes and systems [3] and a lack of established processes for AI developments. The ASAP Group, development partner to the automotive industry, is therefore using MLOps to apply machine learning to automotive engineering.

### MLOps aims to accelerate the utilisation of machine learning

MLOps is a combination of three terms: machine learning, development and operations. The MLOps methodology is based on the DevOps concept, which has already become standard practice in software development. It is regarded as a method and toolset for implementing high levels of automation in development processes in order to accelerate the development and operation of software-based products or make them more

performant. The individual development steps (plan, code, build, test, release, deploy, operate and monitor) dovetail seamlessly and form the phases of the DevOps pipeline. Embedding them in an infrastructure made up of continuous integration, continuous testing, continuous delivery and monitoring also ensures speed and scalability. If developers make changes to a code, not only are these changes continuously brought together in the current software status, they can also be executed and tested automatically. The developers therefore receive prompt feedback and, if necessary, can make further changes to the code and restart the process throughout the DevOps pipeline. The MLOps methodology adapts the DevOps approach for machine learning so that companies can use it more quickly. Like DevOps, MLOps is a repeatable, automatable process. It involves continuously monitoring machine learning models, repeatedly training these models using development outcomes and thereby improving them for their next productive application. As a result, the MLOps process incorporates all development steps, including data selection and processing, model training, evaluation and provision for productive use, all the way through to repeated model training. MLOps therefore makes it possible to produce more models in less time – and their reusability means these models can be provided again even faster in the future, ultimately facilitating earlier value-adding application in productive operations. At the same time, these models are continuously



examined throughout their entire life cycle and adjusted accordingly, which results in a progressive improvement in model quality.

### A three-dimensional challenge

There are certain challenges to overcome before companies can apply MLOps to make vast quantities of data and machine learning productive and lucrative more quickly. Firstly, while DevOps is solely focused on the programming code, MLOps must devote equal attention to three dimensions: datasets, codes and AI models. So, what challenges does this present for tool development in each of these dimensions? Let's take an automated component development tool developed by the ASAP Group's experts as

an example. The developers applied machine learning algorithms for object and text recognition to automatically identify and assess the individual components of electronic circuit boards. Without the use of AI, employees would have to manually count and document up to 500 components on a circuit board, including resistors, transistors, integrated circuits and chips – a time-consuming task susceptible to errors. ASAP has automated component recognition using an AI model and supplemented the tool with the ability to recognise additional details. In addition to the number of components, it can also automatically identify and record components' serial numbers and manufacturers with project-specific settings. This achieves enormous time and cost savings



while also improving quality standards. There are numerous other use cases for AI in automotive engineering, such as object recognition for test automation in HIL systems and general process automations in production. The first step is to prepare the data for the AI models

#### **Basic dataset requires continuous improvement**

Having the right data is fundamental for training an AI and giving it the ability to make reliable decisions. The challenge lies in evaluating which data is suitable. On the one hand, an effective dataset for an AI model needs a good balance between clas-

ses. These classes relate to the different objects – which, in the example of electronic circuit boards, might include resistors, chips and transistors – that the tool should later be able to identify automatically. On the other hand, it is also important to select example images for the training data that depict the potential variations in reality as effectively as possible – which also means taking into account the influence of lighting, different positioning and the nearby objects obscuring each other. The basic dataset manually produced by ASAP for the component recognition tool has been supplemented accordingly with images that show different objects in various locations. In addition to the class and position of

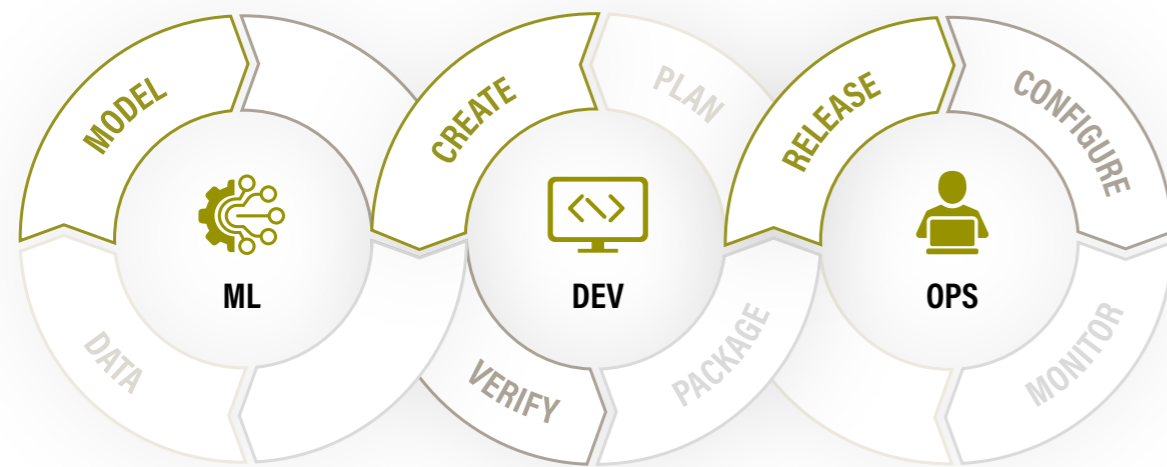
these objects, a subsequent step involves entering information about serial numbers and manufacturers. The AI will then be able to automatically identify these by means of text recognition. As soon as it is possible to conduct initial assessments of the AI's performance, additional examples must be added as data for classes of object the AI struggles to identify. Providing these examples might involve taking new photos, producing synthetic data (2D images of simulated objects) or data augmentation of existing images by the developers, such as changing the colour of objects. However well developers master the challenge of selecting the right data, the basic data set will still be too small and incomplete at the beginning of development, which makes it unsuitable for use in the real world. For this reason, further information is required from downstream development steps in order to continuously improve the dataset.

#### **Artificial intelligence in training**

In the next step, the basic dataset is divided into a training dataset, a validation dataset and a test dataset. All three datasets must be strictly separated from each other, contain details on all classes and be well balanced. This separation is necessary because the AI could otherwise memorise information which, in turn, would lead to overestimations in performance evaluations. The dataset contains a class label for each object as well as its position in a given image. Using the training dataset, the

AI learns data characteristics in order to distinguish between different classes. The validation dataset is used to evaluate and optimise the training process based on differences between the AI classification and the stored class labels. The test dataset exclusively comprises data that the AI has never seen before, which makes it possible to produce a neutral assessment of the AI functionality. ASAP selects the evaluation metrics (KPIs) and their weighting based on the respective project requirements. Evaluation criteria can include recognition accuracy, the incorrect recognition rate and the speed of the AI.

If, for example, the AI is to be used for authentication purposes in sensitive areas, ASAP adopts a restrictive approach in which precision is rated more than speed. Another important part of AI training is finding effective values for hyperparameters that are used to control the training algorithm. These hyperparameters include, for example, the learning rate to influence the speed at which the model learns, the optimisation algorithm used, the volume of data evaluated together in a single step and the degree of regulation of the weighting in the AI model. When training the AI, the aim is to find the best point  $x$  of the hyperparameters for maximum model performance  $\max(f(x))$ . Once the automated search for good hyperparameter pairs is successful, it is possible to train an AI model for productive use. The next development step involves applying the AI model in practice and conducting testing to evaluate its performance in the real world.



### Testing the AI model in productive use

Examining the AI model in productive use as quickly as possible requires clearly defined interfaces for the AI so that it can easily be integrated into the desired application. Even if the AI model has been trained in advance and continuously optimised, regular checks are still required in subsequent productive use. The reason for this is that the environment will change dynamically, such as through amendments to components or a change in image quality due to a new camera being used. In order to continuously measure the AI model's performance in productive use, the testing must not only identify potential problems in the AI but also make it possible to determine the causes. For this reason, ASAP programs the AI model so that a metric is evaluated for each AI decision-making pathway. These metrics are then used to assess the model's confidence. If this value exceeds or falls below a

pre-defined threshold or limit integrated in the program, a notification is automatically issued about a potential fault. However, as the AI is a black box model, this means that the decision-making process is difficult if not impossible for the developers to deduce from their external perspective. [4] ASAP therefore also incorporates methods from the field of explainable AI into its AI model. These methods indicate the criteria on which AI decisions are based so that developers are better able to deduce and identify the causes of errors. In the example of the automatic component recognition tool, AI is used to show which regions of the circuit board are examined by the image algorithm model to identify a given component, such as resistors. ASAP then uses mathematical methods to trace the AI decision-making pathway back to the original image, which are added into the AI as code. So, a result produced by the algorithm in the form of a resistor identified on the circuit board makes it pos-

sible to trace the decision-making pathway back via the network nodes to the original image. The developers receive this result automatically in the form of heat maps, which show the regions of the circuit board used to make the decision. The use of explainable AI thereby identifies weak decision-making bases – that cause the AI to make errors – at an early stage. The developers can then

make appropriate corrections in the next version of the AI model. The MLOps process is subsequently repeated with an improved AI model, which ensures continuous optimisation. As a result, using MLOps not only makes it possible to apply machine learning more quickly in automotive engineering, it also brings about continued improvements in terms of quality assurance.

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S P E C I A L T O P I C

# SOFTWARE

# CODEBEAMER: CROSS-FUNCTIONAL TEAMS FOR DEVELOPMENT, INTEGRATION AND MIGRATION

## MIGRATION OF AN APPLICATION LIFECYCLE MANAGEMENT TOOL DURING SERIES OPERATION

Megatrends in the automotive industry include autonomous driving, connectivity and e-mobility. These trends combine with other issues, such as increasing model variety and shorter development cycles, to produce an ever-rising level of complexity in the automotive industry. Nevertheless, the use of entirely homogeneous processes, methods and tools (PMT) in development remains an illusion because the requirements in different technological fields are simply too disparate. In an effort to overcome these challenges, and in response to the A-SPICE requirement for

consistent traceability throughout a vehicle's lifecycle, manufacturers use application lifecycle management (ALM) tools. These tools make it possible to create links between all stages in a development model. The ASAP Group can take care of all development and integration aspects for an ALM tool called codebeamer. This article outlines how ASAP uses cross-functional teams to combat the multi-dimensionality and complexity involved in this work – and how its PAK automation solution and rapid-prototyping approach ensure flexibility in implementation.





A recent study has predicted that the variety of vehicle variants produced by all automotive manufacturers will increase by up to 100% by 2025 due to the rise of battery-electric vehicles. [1] This is making one challenge increasingly topical, namely the ability to ensure traceability in all development projects throughout the entire product lifecycle. Not only is this traceability required by increasingly country-specific legal requirements and the rising level of indi-

vidualisation in cars as products, it is also essential for OEMs to ensure development in accordance with the A-SPIICE standard. This binding international standard for the automotive industry stipulates that manufacturers must ensure bilateral traceability in system and software development. This means traceability in both directions – and, as a result, transparency throughout all stages of development – which requires links between all relevant artefacts in the

development process. [2] The complexity of cars as products is challenging in and of itself; however, this is further complicated by the use of different tools in different domains in the development process, and the fact it has not been possible to establish a consistent process landscape to date. Although companies will continue to work with heterogeneous PMT landscapes in the future, there are a number of tools that can be used throughout the entire V model. One of these is codebeamer, an ALM tool used for central requirements management, software development, hardware development and test management. Codebeamer makes it possible to interlink all stages of development – from drawing up the system specification through to the SOP for a vehicle model.

#### **Consistent traceability despite heterogeneous PMT landscapes**

Codebeamer enables companies to interlink all development stages in the V model, thereby combining all disciplines in a central data model and, in effect, creating a golden thread that runs through the entire development process, from requirements management to system and software development through to validation and commissioning. This ensures traceability in individual areas and the ability to trace every individual step in the development process, while also ensuring compliance with all norms and standards. Codebeamer combines all sub-disciplines within the V model, including all

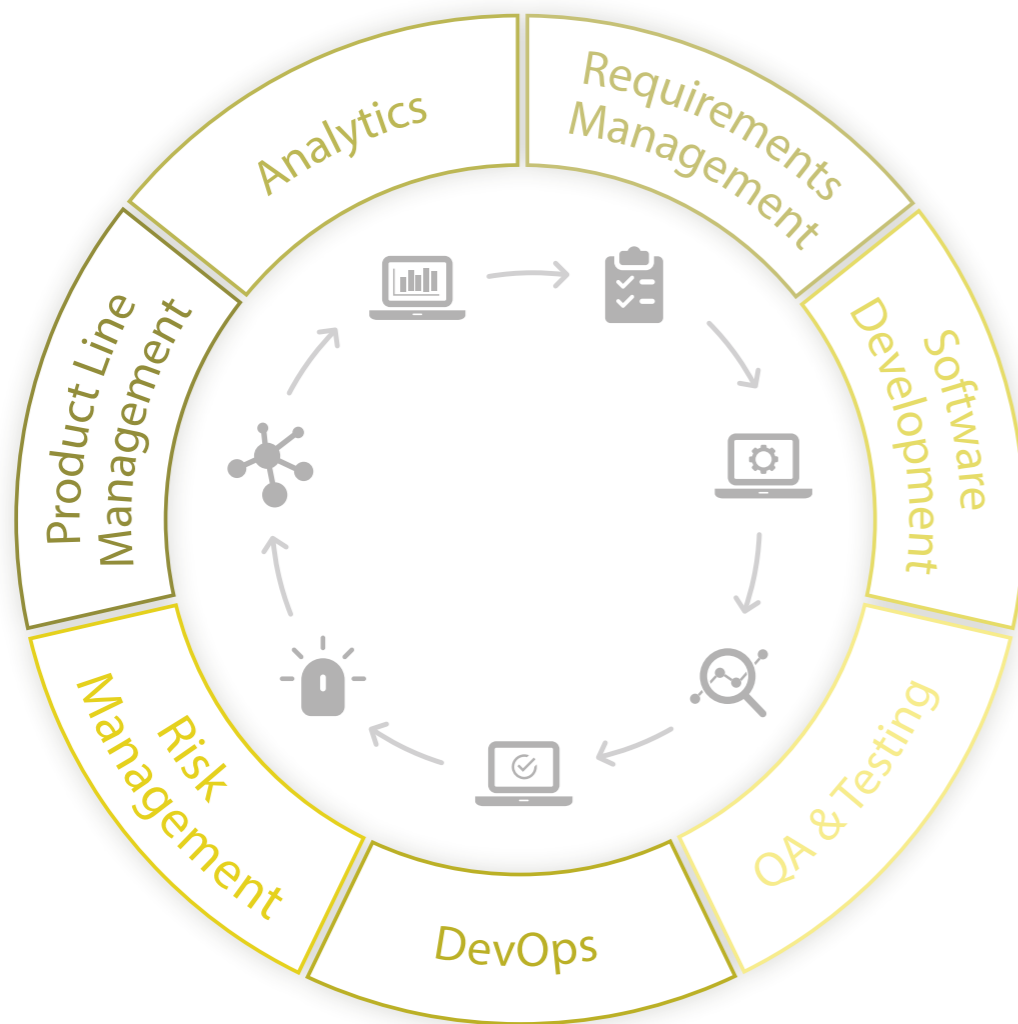
tools used for implementation tasks. As a result, all requirements for each software module are entered into codebeamer and linked with the software architecture developed on this basis in the next step. Adapters in codebeamer bring together different tools and ensure a consistent exchange of data to create a permanent connection between requirements and architecture in conformity with A-SPIICE. Similar to this procedure of linking requirements and architectures, codebeamer also stores all further information throughout the entire development process, including test specifications, the current status of implementation and review, and test results. In addition to establishing traceability, codebeamer also helps to improve processes, integrates quality management directly into the development process, improves coordination between everyone involved in the development process and, ultimately, delivers time savings and cost reductions in development. [3] A further advantage is that codebeamer facilitates standardised reporting and monitoring because the various methods, processes and infrastructures across all domains are collected and standardised in a single central data model. In addition, one special feature is the fact that, when a requirement is amended, codebeamer highlights all changes that developers will have to implement as a result. This is because the tool traces dependencies between individual development steps and always keeps their status up to date, which in turn creates greater consistency in development archi-

teatures and consequently promotes higher quality. [2]

### Interdisciplinary development through cross-functional teams

In order to make the numerous advantages of this tool available to customers quickly and throughout companies, ASAP offers a full spectrum of development and integration services for codebeamer. These range from data model and template development to process development in accordance with SAFe and A-SPICE, extension, adapter and methods development, rapid prototyping, automations, project migration and third-level support. In keeping with the concept of systems engineering – bringing together the totality of all development steps to facilitate interdisciplinary system, component and function development – the development partner to the automotive industry relies on cross-functional teams. They include experts in project management, process management, A-SPICE, E/E testing management, migration and software, who then work together to ensure that projects progress seamlessly. The major advantage of this approach becomes clear, for example, when developing the data model for codebeamer. This means defining the data model's basic structure, including all roles, sub-disciplines, domains and reporting requirements, which requires a highly developed understanding of development as a whole. In addition to data model development, ASAP also analyses the development





processes and provides advice – such as whether and how these processes can be mapped in codebeamer, or whether adjustments may be needed to ensure conformity with A-SPICE or SAFe (a framework for agile working). In addition, ASAP has in-depth expertise in relation to the implementation of codebeamer and can refine the tool to meet customer-specific requirements by creating extensions. This means that even highly individual functions can be integrated, with newly developed features forwarded by

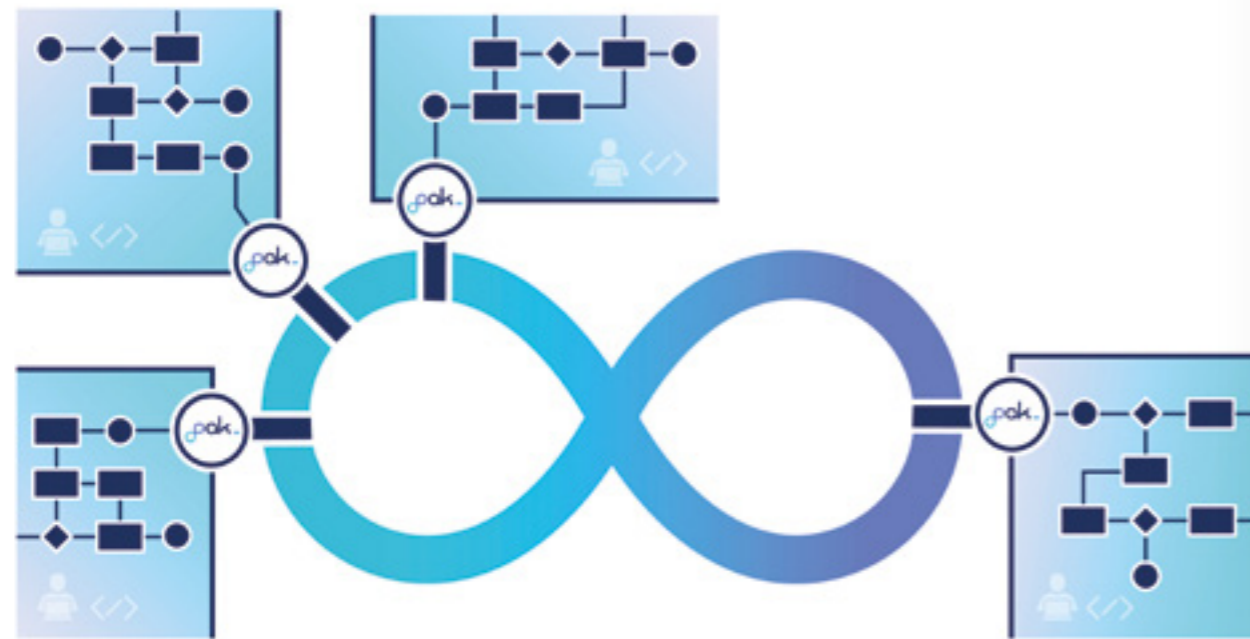
ASAP to the tool manufacturer for long-term integration and maintenance. As a result, codebeamer can be customised to fulfil the requirements of individual sub-disciplines, making it suitable for use as a central development platform in companies

#### **Integration of PAK for linking processes, data models and methods**

ASAP experts also develop all the necessary adapters to make the data exchange with

codebeamer as straightforward as possible for all specialist departments. This makes it possible to connect all development tools directly to codebeamer, including tools for software implementation, software architecture and testing. These adapters facilitate a direct exchange of data and thereby create hard links between data, i.e. the connections required by A-SPICE. A particular challenge is supplementing codebeamer with the interfaces required for this exchange of data, as it may be necessary to integrate business logic for data transformation between tools. However, ASAP relies on its Process Automation Kit (PAK) so that the overall solution can still be implemented as swiftly and flexibly as possible. The PAK is a framework for individual, reusable automations and a useful addition to conventional DevOps practices. This automation solution's modular system concept makes it possible to define and automate development steps for specific developer roles and reuse these later for other processes. Using the PAK, ASAP defines the methods in individual sub-disciplines and creates the interfaces between codebeamer and the required development tools. The PAK guides developers through the workflow defined for them, which leaves more time for creative, value-adding work and improves employee satisfaction. The PAK automatically starts the tools required for the activity, informs the users of the activities they need to carry out, stores all the information and, finally, automatically transfers the required infor-

mation to codebeamer and the repositories. Let's look at an example. If the task is to produce a new software architecture, all the necessary information will be in codebeamer – such as the system, system version and other requirements for which the architecture must be developed. The PAK then provides this information to the developers via the interface and opens the development tools they will need to perform their task. As soon as the activity has been completed, the PAK stores the results and information and transfers them to codebeamer. ASAP and its automation solution therefore ensure that there is always a link between the abstract process, the data model in codebeamer and the method that users must follow. Workflows can be quickly defined in the PAK, which facilitates use of the rapid prototyping approach. Let's consider a hypothetical use case. If a department's data model is already integrated in codebeamer but no decision has yet been taken regarding development tools and methods, it would not make sense to implement fixed interfaces at this point. In this case, the PAK offers a clear advantage, as different development tools can be connected with codebeamer quickly and relatively easily. This gives specialist departments the flexibility they need to try out the development tools at their disposal – and determine which are most suitable – before making a final decision. The fixed interface, which requires more extensive programming, is then created following test operation.



### Migration during series operation

The most significant challenge in the subsequent migration of all development artefacts into codebeamer is the fact it must be carried out during series operation. This involves migrating between 500 and 2,000 projects, and all the corresponding data, into codebeamer for each domain. Data migration in long-standing projects developed in silos is particularly challenging due to the high degree of heterogeneity between the different projects as a result of divergent requirements specification structures and attribute landscapes. For instance, different processes will have been used for requirements management and test management, while the tools set out in requirements specifications will vary considerably. Just a single project can map out requirements in hundreds of requirements

specifications – which may be interlinked to a greater or lesser extent. In addition to the differences within requirements specifications, there may also be different process structures in place within projects. This all combines to create a very difficult starting position from which to migrate all development tools into a standardised structure in the target system. Retaining an overview of this enormous volume of data requires extensive expertise, both in-depth and across a range of specific topics, again drawing on the benefits of cross-functional teams. When it comes to migration, ASAP prepares the source system to make it compatible with the target system. It may be necessary to make amendments in the source system, such as if the designations for specific attributes vary. If, for example, the attribute for the implementation status of a functional test has a project-specific designation, it must be renamed to match the

attribute's designation in the codebeamer structure in order to create a single, standardised structure. ASAP also checks at each step whether the processes in individual projects may require amendments in the target structure in codebeamer. Its experts also design, develop and implement automation solutions to avoid the need to migrate this mass of data manually and improve the efficiency of data transfer. The Migration Suite is one solution developed for this purpose. The tool transforms the data model from the source system into the target system and maps attributes as far as possible. The Migration Suite includes extensive aids to

assist engineers working on migration if they encounter outstanding mapping issues or potential conflicts. Ultimately, the artefacts generated in this way can be imported into the target system in automated cycles. As a result, the solution offers developers a way to make significant time savings on projects while ensuring data consistency. To round off its services, ASAP also offers training videos and documentation, hosts training courses and workshops, and oversees change management in an effort to support the transition to codebeamer – because giving users and departments the skills and abilities the use codebeamer is ASAP's focus.

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## ASAP GROUP AT DEVOPSCON 2022

### DEMO SESSION ON THE PAK AUTOMATION SOLUTION AND KEYNOTE SPEECH ON CONTINUOUS INTEGRATION

From 5–8 December 2022, the ASAP Group exhibited and gave talks on two topics at the DevOpsCon in Munich. The conference, which took the form of a hybrid event, centred around the motto 'Re-think IT' and focused on the topics of continuous delivery, microservices, containers, and clouds & lean business. Experts from ASAP's Software service segment engaged

with attendees both in person and virtually at the hybrid conference. The focal point of ASAP's appearance was a talk showcasing its Process Automation Kit (PAK), an individually scalable automation solution. The PAK is a suitable solution for any DevOps-based organisation – and organisations looking to implement DevOps – as a useful addition to their automation pipeline.

# LAST MILE BETWEEN DEVELOPER AND CI.



On 5 December 2022, the doors to DevOpsCon opened – both virtually and in person at the Hilton Park Hotel in Munich. Everything at the four-day event revolved around the use of cutting-edge processes, microservices, continuous delivery, container technology and clouds. Companies use DevOpsCon to find out which innovative infrastructural approaches can help them chart a course through the digital world. German-speaking and international DevOps experts and early adopters reported on their projects, sharing valuable experiences with those at the conference. The ASAP Group also had a (virtual) trade fair stand at the DevOpsCon. Following the motto ‘Last mile between developer and CI’, the individually scalable PAK automation solution was the centrepiece of ASAP’s appearance. During the demo session (hosted by Simon Grund), visitors had the opportunity to see the framework in practice. In addition, an ASAP software expert

(Martin Kreyling) gave a keynote speech on “An approach for automotive multi-staging continuous integration (CI)”.

#### **Keynote speech on multi-staging CI in the automotive industry**

The transition towards a ‘software-defined vehicle’ presents new challenges for the automotive industry. How can we accelerate processes? What options are there for introducing new software into vehicles and ensuring quality? And how can we guarantee adherence to automotive standards? In a keynote speech, ASAP addressed these issues and introduced its approach to implementing a multi-staging CI pipeline. The Group’s approach involves highly automated integration from the source code through to the finished software product. In addition to this integration, it also includes testing, validating and verifying the product. It is

therefore necessary to use the software-in-the-loop, system-in-the-loop and hardware-in-the-loop processes as efficiently as possible, leveraging the advantages of the various test methods and stages.

#### **Demo session on the Process Automation Kit (PAK)**

The PAK, an individually scalable automation solution, was at the heart of ASAP’s appearance at the conference. Attendees had the opportunity to see the PAK in operation during a demo session. The PAK framework for customised, reusable automation is a useful complement to established DevOps practices. The automation solution demonstrably reduces the complexity, time and costs of development while improving developer

acceptance and quality. PAK incorporates eleven years of PMT development experience in the series development of controller software for an OEM. Based on this expertise, PAK was born – and comes into play where comparable solutions reach their limits: it shifts the focus in the DevOps pipeline onto the developer. The modular system concept makes it possible to define and automate development steps for specific developer roles and reuse these later for other processes. The PAK makes it possible to offer all teams – up to the organisational level, that is to say in relation to cross-domain PMT – a marketplace for process automation, which can be used and expanded in different areas. This creates a methodology toolbox containing all previously developed process step automations, which require no further creative







work from the developers. The PAK thereby serves as a single source of truth. All departments can draw on this toolbox, which stores existing automations that have been tested and approved as 'com-ands', are always up to date and can be used at any time for new processes. Once developed, these commands can be used as often as the developers wish in any future workflow model. New processes can therefore be automated faster and faster over time, which makes it possible to scale the solution. The result? Using a single process language creates universal and consistent process definition and method

definition for all teams and projects. In addition, the PAK removes the need for developers to learn process steps off by heart and also offers greater scope for creative development work. The PAK releases developers from process steps that do not add value, guides them through the development process and informs them as soon as they need to provide active input. Ultimately, the PAK allows developers to devote more time to creative work and also improves employee satisfaction. For more information about the PAK, visit: [www.asap.de/en/pak](http://www.asap.de/en/pak)

### A brief overview of the advantages of the PAK automation solution

#### Developers

- > More time can be spent on actual development work
- > Prevents process overheads in development
- > Provides proprietary automation solutions for the team or the entire organisation

#### Process owners and pipeline developers

- > Reliable compliance with all process, method and tool specifications
- > Backup of defined minimum standards for development artefacts before committing
- > Better quality and traceability through automation

#### Management

- > Scalable automation solutions for all non-value-adding processes
- > Quicker onboarding of new employees
- > Increased employee satisfaction

## SEE MORE



Video about the Process Automation Kit (PAK):

# ZF AND ASAP SOFTWARE-FOCUSED COLLABORATION

## AN INTERVIEW WITH DR NICO HARTMANN, VICE PRESIDENT SOFTWARE SOLUTIONS & GLOBAL SOFTWARE CENTER AT ZF FRIEDRICHSHAFEN AG.

**Could you please summarise for our readers the overall situation in the automotive industry at present, specifically in relation to software?**

**Dr. Nico Hartmann:** We are on the verge of a major transformation in the software sector. On the one hand, this is driven by the fact that cars are increasingly focused on functions that customers can experience. On the other hand, this transformation is based on the need to update software throughout the entire product life cycle of a vehicle. The 'freshness' of functions is a response not only to consumer demand but also to statutory requirements. In particular, it is important to ensure information security in vehicles by providing updates throughout the entire life cycle. In light of this, the majority of vehicle functions are defined by software, which is why we're now talking about 'software-defined cars'. This is leading to changes in vehicle architectures, especially

in terms of electronics – as the strategy to date, which involves a high number of specialised ECUs, presents an obstacle given the need to update software and handle an ever-increasing number of functions. In the past, electronic components were heavily consolidated in central processing units. What we're seeing now is a fusion of domains in central control units – an evolution towards central processors within vehicles. This, in turn, presents new challenges when it comes to integrating and servicing multi-domain processors, and induces a change in the architectures of software development. It requires a complete modernisation of our development methods towards very heavily IT-driven methods. Continuous integration, continuous deployment, DevOps and cloud-based engineering are just a few of the methods we're dealing with in this context. The second major change this entails is the expansion of the platforms on which software runs onto the cloud.

Functions that were previously hosted only in the vehicle are now leaving the vehicle and are being supplemented by a cloud-based or backend component. As a result, a software development platform must consider not only the embedded platforms in the vehicle but also the backend platforms in the cloud. This is so fundamentally different to the systems used in the past that the way in which we structure and develop software as an organisation also urgently needs to change. In short, we face challenges in every aspect: in the technology, in the architectures, in tooling, in processes and in cooperation models.

**How important is software development in the strategic partnership between ZF Friedrichshafen AG and the ASAP Group?**

**Dr. Nico Hartmann:** When it comes to software, there are three dimensions we should examine more closely. The first dimension is software development itself and the second is the validation of software functions, including the associated testing technologies. The third dimension pertains to the infrastructure in our work: as I explained before, we need to adapt our development methods and tooling accordingly. This also gives new significance to the provision of development infrastructure, as it can no longer be mapped locally in projects. Our strategic partnership with the ASAP Group focuses, on the one hand, on the validation of software-driven functions and related testing technologies such as software-in-



Dr. Nico Hartmann

the-loop systems. On the other hand, it also focuses on the development and roll-out of new development methods. This involves getting DevOps-related topics up and running and providing functional assistance for new processes in projects. Beyond this, we also concentrate on developing cloud-based tooling solutions and supporting customers using them. All in all, I consider the field of software a very important element of our strategic partnership.

**Looking ahead to the future of the partnership between ZF Friedrichshafen AG and ASAP, where do you see particular opportunities and challenges? What advantages do you think it will provide in relation to software specifically?**

**Dr. Nico Hartmann:** In terms of software, I believe that a major opportunity lies in our ability to continue driving forward technological development in relation to software-



in-the-loop systems and thereby further automate test-ing in the context of cloud integration and development. However, the greatest advantage in my view is the expertise of ASAP, which our strategic partnership enables us to access at ZF Friedrichshafen AG. I've only ever heard good things from others in our industry about ASAP's expertise. It is this expertise that enables ASAP to achieve excellent results in its own projects. That has always been ASAP's aspiration and should remain its aspiration in future: to approach projects with its own ideas and philosophy to drive topics forward. Turning to challenges, there is obviously one aspect that affects everyone in our industry, namely the shortage of skilled professionals. The ASAP Group and ZF Friedrichshafen AG are looking for people with the same skills – which is only natural when two companies agree a strategic partnership on a given topic. And, of course, we mustn't stand in each other's way because, at the end of the day, ASAP and ZF both want to become stronger

and grow together. Another current challenge is the positioning of ASAP in terms of our global partnership. At ZF Friedrichshafen AG, we distinguish between our customer centres and development centres. The latter are predominantly located in Asia and Eastern Europe. Important customer centres for us include China and the USA, where we are rolling out technologies and processes on the ground in customer projects. ASAP is very well represented in Germany but does not yet have a presence close to our customer and development centres overseas. However, by working together, we will certainly be able to make steady progress on this point.

**What are the strategic approaches in the partnership between ZF Friedrichshafen AG and the ASAP Group in the months ahead?**

**Dr. Nico Hartmann:** In the coming months, we will continue to expand our work in areas

in which we're already collaborating effectively. In particular, DevOps, infrastructure and tooling – topics we've already mentioned – will play an important role. This will involve assembling all manner of tools throughout the software development process to automate development to the greatest possible extent to form a cohesive whole. The second major topic we'll be devoting our time to is the operation of these tool landscapes. Another topic for development, which is directly related to this, is software-in-the-loop systems, in which ASAP will provide greater support in relation to test infrastructure, tooling and automation.

**Finally, a personal question: At the ASAP Group, people are connected by their shared passion for the automobile. Do you have a personal passion for automobiles?**

**Dr. Nico Hartmann:** I have to admit, I don't have petrol running through my veins, as the German saying goes. Instead, my passion for automotive matters is based on the combination of technology, people and cultures. Looking at things through an engineer's eyes, there's hardly any other technology that combines the different facets of engineering knowledge quite as extensively as automobiles. To me, a car is less about an amazing engine or fast driving; instead, it's the ultimate carrier of technology and innovations. We've got maximum mechanical precision, maximum complexity in terms of materials and an incredibly wide range of topics and disciplines – all working together

to build a car. Whether you're working in research and development or in a production-focused role, in the automotive industry we don't say "we've always done it that way" because it's such a dynamic environment. In addition, it's an environment that covers an array of different topics. Due to the enormous complexity of modern cars, they are no longer simply an engineering project, so you automatically come into contact and work with people with very different job profiles. There are also very few products that are as international as a car, so you come into contact with cultures all around the world. My fascination with automobiles is a product of all these different facets.



# ASAP GROUP TEST SYSTEMS FOR INTEGRATION TESTS

## MODULAR STRUCTURE ALLOWS FOR INDIVIDUAL AND RAPID CONFIGURATION

The ASAP Group designs and manufactures turnkey impact-chain and composite test benches for its customers to use in integration testing. All systems are based on a fundamental modular concept. This not only makes it possible to configure the testing systems to suit individual customer requirements, it also provides the flexibility needed to integrate new components at

a later date and switch between different types of control unit. However, the ASAP Smart Test Execution Platform (STEP) – a middleware for test automation – is always integrated. STEP unites hardware and software to create a complete system and allows for straightforward commissioning up to 50% faster than conventional systems.

For many years, the ASAP Group has been developing impact-chain and composite test benches for OEMs and systems suppliers, with either partial or full integration of control units and original components, for validation purposes. Customers not only benefit from the expertise of the specialists working in the corporate group's Test Systems department but also from the test system concepts that have already been trialled internally. The systems' modular structure offers numerous advantages. For one, they can be configured individually and further modules for additional functions can be added at any time without significant expense or effort. As a result, the test system's structure remains flexible and can be adapted to specific customer requirements even after completion. In the planning phase, ASAP coordinates closely

with each customer to develop concepts for impact-chain and composite test benches and, if desired, to integrate the system in existing testing infrastructure, including risk assessment. In the subsequent design phase, experts from ASAP Test Systems define all other details before manufacturing the systems in accordance with all applicable standards. The ASAP Group's development specialists also oversee commissioning of the testing systems. They start by checking that the electrical systems are functioning correctly. After that, they activate all the control units, monitor their communication with other control units, ensure they can be contacted for diagnostic purposes, and finally analyse the diagnostic values to examine the system as a whole.



### Impact-chain test benches for manual operation of original components

The impact-chain test benches produced by ASAP are partially automated, openly accessible systems for examining impact chains. These systems are used in system testing, diagnostic testing and flash testing, and allow manual operation and manipulation by users. Original components are integrated into the test bench and then either manually

operated or, in some cases, controlled by the system in order to examine their mode of operation. In addition to the ASAP middleware STEP, vehicle bus systems, monitors and computers, a specialist workstation can integrate a steering wheel, accelerator pedal and brake pedal. This means that the user can steer, accelerate and brake from the workstation and thereby examine the effects of these actions on the networked control units. ASAP can also install control units in

all available variants in the testing system if requested by the customer. The STEP middleware includes a switching function that enables the user to swiftly change between control units.

### Fully automated composite test benches

Composite test benches from ASAP make it possible to examine combined functions – and, unlike impact-chain test benches, are self-contained systems featuring up to 100% automation. These testing systems are closed-loop test benches. This means that a real integrated control device network and the simulated environment interact with each other, with their behaviour influencing each other. If, for example, the control units accelerate virtually to a certain speed, the simulated environment changes accordingly and provides the corresponding control units and sensors with feedback on factors such as the gradient angle of the road, the speed of the wheels and so on. The developers disconnect the real sensors from the control unit and connect the simulation to the control units directly in order to feed these environmental responses into the control units without the need for feedback to pass through the sensors. In addition, the testing systems provide all information time-synchronously (deterministically) so that all sensor technology can be fused simultaneously. These characteristics make ASAP composite test benches suitable for the automated validation of driver assistance systems up to SAE Level 5 and offer

a range of advantages in this regard. The ability to use test benches for validation reduces the need for real-world driving experiments using expensive prototypes to a minimum, cutting both the time required and costs involved in validation.

### Communication between test automation and test bench

The use of the Smart Test Execution Platform (STEP) in all ASAP impact-chain and composite test benches makes it easy to scale up test systems. This means that any form of sensor technology can be integrated in the system at any time and commissioned quickly and easily with ASAP's STEP software. STEP serves as middleware between test automation and measurement technology and was specifically developed by ASAP for testing systems with different measurement and control hardware. The software allows test automation and the testing system to communicate and serves to relay sensor and actuator systems as an abstracted channel to a single control system. The experts at ASAP Test Systems can support customers by developing the necessary test automation or adjusting existing test processes if required.



# ASAP GROUP SETS NEW GREEN DIRECTION FOR DONAU CLASSIC RALLY

## CO2 COMPENSATION SPONSORING AT CLASSIC CAR RALLY

The ASAP Group, the Ingolstadt-based development partner to the automotive industry, has set a new, green direction for the Donau Classic rally. The rally really is an Ingolstadt institution: held annually since 2006, the exhibition of rare classic cars and modern classics thrills the many participants and spectators alike. In an

effort to improve the Donau Classic rally's green credentials, ASAP sponsored full CO2 compensation for this year's event. A team at ASAP Engineering specialising in green mobility services took care of the carbon footprint calculations and CO2 compensation by obtaining climate protection certificates.



This year marked the 17th edition of the Donau Classic rally, which has thrilled automotive enthusiasts and rally fans in equal measure every year since 2006. The ASAP Group has now sought to set a new, green direction for the rally by organising and sponsoring CO2 compensation for the entire event. As a result, the cars taking part in the rally and all service vehicles used at the event ran carbon-neutral throughout the entire rally. ASAP firstly worked out the carbon footprint for the rally route. It then offset the calculated CO2 emissions by procuring combined certificates in cooperation with Nature Consulting. These combined certifi-

cates compensated for the CO2 emissions of all vehicles involved in the rally by supporting forestation projects and international climate protection projects in line with the event's overall carbon emissions.

Experts at ASAP Engineering in technology-neutral and sustainable mobility services initiated and implemented this new green direction. "With a team in the field of green mobility, ASAP has been supporting its customers for many years on development and consultancy projects related to climate-neutral fuels and sustainable mobility solutions. In addition to advising

companies on the sustainability of their mobility systems and certification management for renewable energy sources, ASAP also offers services such as life cycle assessments, supervising and conducting studies, and technical and economic consultancy on alternative fuels. The green new direction for the Donau Classic rally is a great opportunity to bring the potential and possible applications of carbon-neutral mobility home to automotive enthusiasts. Michael Neisen, CEO of the ASAP Group, says: "As a development partner to the automotive industry, we collaborate intensively with our customers to develop sustainable mobility for future generations. E-mobility represents a key topic for us and we have committed to tackling the challenging development tasks it presents from the outset. At the same time, it is important to approach the mobility of the future with a technology-neutral mindset for the energy transition to be successful. A mix of emission-free and carbon-neutral mobility will be the key to success. That's why we're so pleased to sponsor the CO2 compensation for the Donau Classic rally, which has given us the opportunity to present our services related to technology-neutral and sustainable mobility."

#### **Combined certificates improve green credentials**

The use of combination certificates promotes international climate protection projects with an amount commensurate with

the calculated CO2 emissions for the event. This method of compensating for the calculated CO2 emissions also supports energy efficiency projects in developing countries. This includes helping partner organisations to expand the use of renewable energies. Another example is a recently completed project in South Asia to install low-smoke, efficient cooking areas that consume 25% less fuel – not only to help people cook more healthily but also to save energy and CO2. The other side of the dual certification is equal support for forestation projects. This includes working in collaboration with partner organisations to assist farmers and local associations in South America by donating trees. The selected enterprises are agroforestry enterprises that cultivate forests in accordance with the permaculture principles. The partner organisations also help to ensure that the planted trees are cared for until they bear fruit and thus provide an additional source of income for the supported micro-enterprises.

# NEWS 2022





Reinhold Sigl, Robert Werner and Robert Morgner

# ASAP GROUP ACQUIRES SIGL BORDNETZ DESIGN GMBH

## UNIQUELY UNIVERSAL SERVICES FOR WIRE HARNESS DEVELOPMENT

The ASAP Group has acquired Sigl Bordnetz Design GmbH, a specialist in physical wire harness development, and purchased 100% of the company's shares. Sigl Bordnetz GmbH and its Munich location have been integrated into the

corporate group, with retroactive effect from 1 January 2022. They will continue to act as two legally independent companies that work closely together. By acquiring Sigl Bordnetz Design GmbH, the ASAP Group has significantly expanded

**its capacities and deepened its expertise in wire harness development. ASAP has therefore optimised the universality of its services in this field by combining the complementary specialisms of both companies.**

The ASAP Group, a development partner to the automotive industry, signed a contract concluding the M&A transaction of Sigl Bordnetz Design GmbH on 13 May 2022. Bordnetz Design GmbH specialises in physical wire harness development, has 20 years' experience in the field and has become part of the ASAP Group with immediate effect. The integration of the company, its Munich location and its entire workforce has been applied with retroactive effect from 1 January 2022. Both parties have agreed to keep the financial details of the transaction confidential. Sigl Bordnetz Design GmbH will remain an independent enterprise. The company's incumbent managing director, Reinhold Sigl, will work closely with Michael Neisen, CEO of the ASAP Group, and Robert Werner, COO of the ASAP Group for its Ingolstadt and Munich locations, on the management of Sigl Bordnetz Design GmbH.

The merger of the two companies presents considerable potential for synergies and optimisation on both sides. For its part, ASAP has once again significantly enhanced the universality of its services in wire harness development. Although ASAP is already renowned across Germany as one of the

country's leading wire harness development partners, with a focus on 3D geometry, Sigl Bordnetz Design GmbH stands out through its particular expertise in 2D electrologic using PREEvision software. Efficient wire harness development requires close coordination between 2D and 3D aspects, so the two companies complement each other perfectly with their respective expertise. Thanks to the resulting increase in its capacities and enhanced competencies, ASAP will be able to fulfil increasingly complex and extensive customer requests in this field in the future. At the same time, the merger turns both companies into a unique development partner capable of offering universal expertise in 2D and 3D disciplines. In addition, the two companies have significantly expanded their respective customer networks through the merger agreement.

"We are delighted that Sigl Bordnetz Design GmbH has become part of our corporate group with immediate effect and warmly welcome all of its employees to ASAP," said Michael Neisen, CEO of the ASAP Group. "The two companies complement each other wonderfully and, by combining our strengths, we are creating another unique selling point for the ASAP Group in the field of wire harness development. By linking our complementary portfolios in this field, we will be able to fulfil increasingly complex customer requests with even greater flexibility in the future," said Neisen, as he explained the strategic decision. Reinhold Sigl,

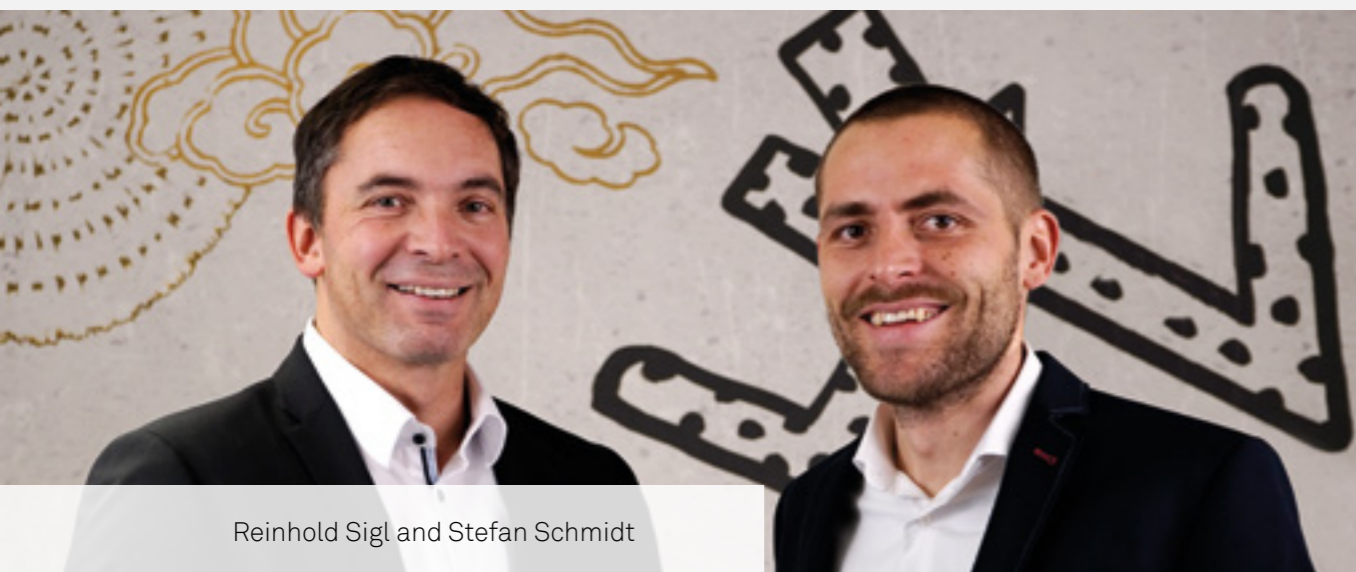


Managing Director of Sigl Bordnetz Design GmbH, agrees. “We have already collaborated successfully with the ASAP Group in a spirit of trust on various projects over the years,” he said. “We are pleased that, following the integration of Sigl Bordnetz Design GmbH into the ASAP corporate group, we will be able to continue and further intensify our excellent business relationship, collaborating even more closely in the future. By working together, we will be able to comply with customer requests even more swiftly and flexibly in the future, offering universal services and thus unlocking significant potential in wire harness development.”

#### **About Sigl Bordnetz Design GmbH**

As a specialist in physical wire harness development with over 20 years' experience, Sigl Bordnetz Design GmbH has particular expertise in wire harnesses for the automo-

tive industry, especially the fields of project management, networking and virtual 3D design. On the one hand, the services offered by Sigl Bordnetz Design GmbH in physical wire harness development are centred on project management, with the company acting as a link and coordinator between OEMs and suppliers. On the other hand, the company also focuses on the topic of networking. Sigl Bordnetz Design GmbH offers services in relation to the processing structures of topology, electrologic, wire harness module design and subsequent processes. A further area of specialisation is the 3D design of wire harnesses and their components in virtual vehicles. The company's development engineers process and oversee projects in these fields throughout the entire development process – from the concept through to series maturity and throughout their model cycles.



Reinhold Sigl and Stefan Schmidt

# ASAP & SIGL BORDNETZ DESIGN GMBH

## INTERVIEW WITH STEFAN SCHMIDT, DIRECTOR OF THE WIRE HARNESS DEVELOPMENT SEGMENT AT ASAP GROUP, AND REINHOLD SIGL, TECHNICAL DIRECTOR OF SIGL BORDNETZ DESIGN GMBH

**It has been a few months since Sigl Bordnetz Design GmbH was integrated into the ASAP Group in May 2022. How would you assess the cooperation since then? Has it already yielded some initial joint successes?**

**Stefan Schmidt:** Strictly speaking, the cooperation goes back further than the integration of Sigl Bordnetz GmbH in May 2022, as we had already been working together as partners on various projects for several years before-hand. On both human and specialist levels, Sigl Bordnetz Design GmbH and the ASAP Group have always been a good match. Our complementary concen-

trations – 2D electrologic on the one hand, and the 3D geometry on the other – make us perfect partners. Today, as partners, we have a very special USP: we cover the full service spectrum in relation to wire harness development. This has already enabled us to secure major new projects.

**Reinhold Sigl:** Following our merger, we are the largest trade partner for wire harness development for Tier 1 suppliers and OEMs in the Munich region and, in this context, have already secured major new orders in recent months. The cooperation between Sigl Bordnetz Design and ASAP employees also got off to a good start and has been

intensifying ever since. The message about integration was received very well on both sides and a close sense of community has already developed.

### **What was the reaction in the industry and from customers to the ASAP Group's acquisition of Sigl Bordnetz Design GmbH?**

**Stefan Schmidt:** We informed all our customers promptly via email. We set out the reasons for the merger and the benefits it would bring for customers. The reactions were thoroughly positive: after receiving the message, a few people even contacted us directly to convey their congratulations.

**Reinhold Sigl:** I've also heard only positive feedback from our customers. This was due, on the one hand, to the fact that we have made the consistency and universality of our wire harness development services more visible to the outside world. ASAP is now capable of handling entire projects that are usually split up across several service providers. On the other hand, our combined expertise is now even more extensive and our capacities are significantly greater. This is a very positive signal for our customers, especially given the current short-age of skilled workers in our industry.

### **Mr Schmidt, how did the idea of integrating Sigl Bordnetz Design GmbH into the ASAP Group come about**

**Stefan Schmidt:** The idea of integrating

Sigl Bordnetz Design GmbH into the ASAP Group never came from a single individual – instead, we came up with it together. We are intimately familiar with the market and the situation surrounding customer tenders. The complexity and extent of tender procedures have been increasing noticeably for some time now. Thanks to the two companies' complementary strengths in wire harness development, we had worked on projects long before the integration [of Sigl Bordnetz] in order to implement them in full. As a result, we reached a point when we asked ourselves why we were using such circuitous communication channels and whether we would be better off combining our strengths in order to implement projects even faster and more effectively. In typical ASAP fashion, this idea was soon followed by action – and we're delighted that Sigl Bordnetz Design GmbH is now part of the ASAP Group.

### **Mr Sigl, what do you see as the advantages of the merger?**

**Reinhold Sigl:** There are numerous advantages for Sigl Bordnetz Design GmbH because, owing solely to its size and with over 1,500 employees across Germany, ASAP has entirely different abilities and resources at its disposal. For example, we benefit from cooperation with the Controlling, Marketing and HR/Recruiting departments at ASAP. This is a tremendous benefit, especially in relation to recruitment, because that has become an increasingly significant challenge

in recent years due to the continuously worsening shortage of skilled workers. Not only does ASAP have a number of recruitment specialists, it also enjoys a high level of market awareness. In addition, the employees of Sigl Bordnetz Design can now access the extensive benefits package offered by ASAP. Beyond that, we obviously also benefit from ASAP's customer base, which is larger and more diverse than our own. From a technological perspective, of course, the greatest benefit for both companies is that we can now offer our customers a truly universal, consistent portfolio of wire harness-related services. It means we can process highly complex, extensive projects involving different trades as a single unit and achieve even greater market penetration in the future.

**Where do you see the opportunities and challenges in the future cooperation between the two companies?**

**Reinhold Sigl:** The greatest opportunity to my mind is the fact we can offer all services related to wire harness development from a single source, which creates considerable added value for our customers. The merger has improved the consistency and universality of our wire harness development and created close links between services in the fields of 3D geometry and 2D electrologic. Aligning different processes and working methods in order to exploit further potential for optimisation certainly presents a chal-

lenge – though we're already well on the way to achieving that

**Stefan Schmidt:** I have to agree with that assessment. The unique consistency and universality of our services provides new perspectives and is creating entirely new possibilities. I'm sure that our merger will not only deliver qualitative growth by furthering our expertise but also will also generate quantitative improvements in the future in the form of continued growth.

**Finally, a more personal question: At the ASAP Group, people are connected by their shared passion for the automobile. What is your personal passion for automobiles?**

**Stefan Schmidt:** I grew up in the countryside, so farm vehicles sparked my passion for all things automotive at a very young age. Later on, I started fine-tuning my scooter and cars. I trained as a precision machinist through a course in toolmaking and mechanical engineering, followed by a course in mechatronics and a qualification as a state-certified mechanical engineer – turning my passion for cars into my career, first working in a job building show cars. That's also how I became involved with wire harnesses: I was fascinated by how the wire harness specialists brought the show cars to life just before they were showcased at exhibitions. Cables are cables – but, to me, the wire harness is the nervous system of the car and, without the wire harness, nothing in the car



will work. My passion for this subject area endures to this day.

**Reinhold Sigl:** I also showed a passion for cars from a very early age. It's why I deliberately chose to train as an electrical engineer, so that I could go on to work in this field. My motivation was to get involved in

automotive development and actively drive this development forward – and I still have this motivation and passion for cars today. Anyone who has met me knows that I have a very special interest in a pretty famous automotive brand from Munich. So, not only is being able to work in this field a lot of fun for me, I also really enjoy driving in general.



# MANAGEMENT-BUY-OUT

## CLEAR FOCUS ON DEVELOPMENT SERVICES RELATED TO E-MOBILITY, ADAS/AD AND CONNECTIVITY

The ASAP Group, development partner to the automotive industry, has disposed of all its shares in the production-related ASAP Technical Service GmbH as part of a management buy-out, with retroactive effect from 1 January 2022. The GS Group owned by Gürsel Sen, the Managing Director and founder of ASAP Technical Service GmbH, has acquired a majority holding in ASAP Technical Service GmbH and made it an independent company. However,

the two companies will remain closely connected in the future and cooperate where necessary. Following a very successful business year in 2021, which included sales growth of 20%, the ASAP Group is continuing to pursue its strategic orientation. It is once again refining its profile and its portfolio of development services, which is centred on future-focused technologies for the automotive industry.

ASAP Technical Service GmbH is no longer part of the ASAP Group with immediate effect. Applied retroactively as of 1 January 2022, a majority interest in the company has been sold to the GS Group as part of a management buy-out. As the majority shareholder, the GS Group has acquired the assets of ASAP Technical Service GmbH, which specialises in production-related services. Both parties have agreed to keep the financial details of the transaction confidential.

Both Neisen and Sen emphasised that the two companies will continue to work together closely in the future. "The ASAP Group and ASAP Technical Service GmbH will continue their trusting collaboration in the future and we can still count on the expertise of Gürsel Sen as a shareholder in the ASAP Group," said Neisen. "The management buy-out of ASAP Technical Service GmbH represented a win-win situation for both companies. In line with our strategic focus on future-focused technologies in the automotive industry, we have thereby taken the next step in the ASAP Group towards focusing even more closely on our key services. These include in particular our development services related to the megatrends of e-mobility, autonomous driving and connectivity." Sen concurred: "I am delighted that the two companies will remain closely connected through their many years of partnership and their shared drive to shape the mobility of the future. I see a very positive future both for the ASAP Group and for ASAP Techni-

cal Service GmbH. Since the foundation of ASAP Technical Service GmbH, I have become intimately familiar with the company's strengths as its Managing Director. Together with all our employees, we will continue to make ASAP Technical Service GmbH a leading provider of production-related automotive services in the coming years."

### ASAP Technical Service GmbH

ASAP Technical Service GmbH supports its customers with technical services in relation to production and assembly. The company is renowned for its years of experience in production-related quality management as well as its exceptional flexibility and reaction speed. Its employees serve customers around the world to ensure they enjoy a smooth start to series production. In addition, ASAP Technical Service GmbH provides support with technical vehicle preparation and ensures compliance with the most exacting quality standards.

# NEW BUILDING AT INGOLSTADT SITE

## CONTINUOUS INCREASE IN ELECTRONICS DEVELOPMENT CAPACITIES

**The ASAP Group continues to pursue its growth course, with the development partner to the automotive industry once again expanding its capacities at its Ingolstadt site. After moving into another building, ASAP now has access to approx. 2,500m<sup>2</sup> of additional office and hall space. The majority of the new premises will be used for electronics development. The thoroughly positive growth in this segment in recent years, combined with the positive outlook for further development in future, necessitated the expansion at the Ingolstadt site.**

More space for automotive progress: the ASAP Group has recently moved into a further building at its Ingolstadt site. Offering around 2,500m<sup>2</sup> of additional space, the premises will provide space in particular for continuous expansion of the company's electronics development services. The 750m<sup>2</sup> hall area offers room to set up additional HIL and SIL testing environments for functional validation as well as an area to test software functionalities in a direct ve-

hicle environment. The new building also offers a large area for working on prototypes, meeting all applicable safety requirements. ASAP's focus on electronics development is a response to customer demand. "Electronics and software development are the major drivers of growth in our sector. They have accounted for a significantly larger proportion of value added in recent years and will continue to grow in importance in the coming years," said Christian Schweiger, COO at ASAP's Ingolstadt site. "By moving into the new building, we are creating the infrastructure required to drive continued growth in these areas, which is in turn a direct investment in the future and strategic goals of the ASAP Group. We have continuously and rapidly developed our electronics and software development activities in terms of both substance and capacity, and will continue to work at pace to expand our capacities further in future. We consider ourselves a development partner and can offer our customers considerable added value thanks to the consistency of our services." At the same time, the new premises



will offer employees the ideal conditions for office working while also serving as a venue for networking, an exchange of ideas and collaboration as a community.

# ASAP GROUP EXPANDS LOCATION BY LAKE CONSTANCE

## CONTINUED GROWTH IN SOFTWARE AND ELECTRONICS DEVELOPMENT

**The ASAP Group has recently moved into new offices spread over 1,300m<sup>2</sup> in Friedrichshafen. After opening its first premises by Lake Constance in late 2019 and founding ASAP Engineering GmbH Bodensee in early 2021, the development partner to the automotive industry has now secured the infrastructure required to support further growth. The expansion was made necessary by positive developments in recent months, with the site growing significantly in recent times. With the new offices, ASAP has also established a presence closer to its strategic partner ZF Friedrichshafen AG. Their collaboration focuses on continuing to drive forward future-focused technologies.**

Around two years after it opened its first premises by Lake Constance, the ASAP Group has now significantly expanded the space at its disposal in the area by moving into new offices in Friedrichshafen. On the

one hand, this has allowed the development partner to the automotive industry to meet the demand for space arising from numerous new orders. On the other hand, it provides not only new workspaces, meeting rooms and project areas but also the space needed to continue its positive development. “We had planned to double our operations at our ASAP Lake Constance location in 2021 with very healthy growth – and we have exceeded even that,” said Martin Ott, COO at ASAP for the Lake Constance region. “By acquiring new projects, we have grown significantly. In particular, we have been able to substantially expand our trusting collaboration with our strategic partner ZF Friedrichshafen AG. With the expansion of our site and our many years’ expertise in future-focused technologies in the automotive industry, we are ideally strategically positioned for the region’s future development. At the same time, our attractive premises mean we offer our

employees optimal working conditions in the office as well as a place to network, exchange ideas and collaborate as a community.”

ASAP has continued to drive forward its customer diversification efforts in the Lake

Constance region, especially in the fields of software and electronics development as well as for its Engineering Service. Its services are focused on processes, methods and tools (PMT), vehicle dynamics control, mechatronic and sensor development, and project and process management.



# BETTER TOGETHER

## UPDATE ON THE ASAP CULTURE INITIATIVE

The corporate culture at ASAP is alive – and it is experiencing permanent change, especially due to increased hybrid working. Because in addition to many advantages, the changed working world is also accompanied by new challenges for everyday work and togetherness. In 2021, the ASAP culture initiative ‚Better together‘ was therefore launched, which the company has been supporting intensively ever since. Within the framework of the cultural initiative, numerous colleagues in

cross-location working groups deal with issues relating to the WE and the tangibility of the ASAP culture in hybrid working and develop solutions together. Because the WE, the community and the trusting collaboration – the core of the ASAP identity – will remain an essential part of the guidelines at ASAP in the future. In the course of the last months, ‚Better together‘ has continuously gained momentum – numerous measures have been jointly conceptualised and implemented.

„‚Better together‘ is for me the foundation for the successful future of the ASAP Group.“

- Michael Neisen, CEO of the ASAP Group

In a hybrid working environment, how can we inspire employees with heart and mind for ASAP and let them experience the corporate culture in a refreshingly different way – no matter where in the world they work ‚Better together‘? This question is one of the permanent components of the working groups of the ASAP culture initiative ‚Better together‘. Because togetherness and a strong sense of community make up the spirit of the ASAP team and are thus one of the keys to the successful development of the company. The fact that people are at the centre of ASAP has been firmly anchored in the ASAP identity and management guidelines since the company was founded in 2010 and is the central pivot for daily activities. However, with the onset of the Corona pandemic, the working world has changed massively and become more digital: Corona-related con-

tact restrictions and mobile working mean that everyday working life is experienced less together as a team and more often on one’s own. As a result, interpersonal exchange and the bond with the company, as well as the integration of new employees in particular, have become much more difficult. The cultural initiative ‚Better together‘ therefore aims to further develop the culture: the ASAP corporate culture is transferred to hybrid working and thus remains tangible in the future. The aim is to create new opportunities for joint exchange, networking and collaboration. Four key topics, which are presented in more detail below, form the starting point of the ASAP culture initiative. Numerous measures have been developed by the respective working groups in the course of 2022 and many milestones have already been reached.





## THE ASAP OFFICE AS A HOME BASE

Is the office a place to collaborate, inspire, socialise, evolve or even revolutionise? What requirements, tasks and needs must the office workplace fulfil in the future as the home of the ASAP Identity?

The thematic area gets to the bottom of these questions and the working group creates concepts for new working worlds according to current standards: based on the requirements of a hybrid working world consisting of mobile working and presence in the office, the Workforce deals with modern office concepts: co-working spaces, quiet rooms or also meeting places for informal exchange. Step by step, concepts are being developed that can be implemented at all ASAP locations.

In addition, numerous measures have been developed in recent months around the topic of back-to-office and have already been implemented by numerous teams: In order to pass on the corporate culture to all employees, even in hybrid working, a catalogue of event ideas has been developed that contribute to strengthening the sense of togetherness in the team. The office design and the necessary equipment for hybrid working were also the focus of the main topic, 'The ASAP Office as Homebase'. As part of the concept for digitalisation and modernisation of the workplaces, a digital booking system was introduced last year: It combines all booking processes for temporary workplaces, meeting rooms and pool vehicles on one platform.

## THE LEGENDARY ASAP SPIRIT

The legendary ASAP Spirit – what is that actually? What distinguishes ASAP? Where do you feel the pulse beat the strongest? The aim here is to think freshly together about the ASAP spirit, to drive it forward in a hybrid way and to make it more tangible.

In 2022, this topic area dealt, among other things, with how the strong sense of community and team spirit that make up the ASAP Spirit can be brought closer to new colleagues in the hybrid working world. In this context, the onboarding process was revised in order to convey the ASAP values

and culture before the first day of work at ASAP and beyond. Part of the concept is also the 'ASAP Spirit Day', where new colleagues come together for a joint event after their first three months at ASAP. After the successful test phase in Ingolstadt, the 'ASAP Spirit Day' will be rolled out Group-wide at all locations in 2023. In addition, a concept for an ASAP think tank, which focuses on the working world of tomorrow, was recently developed in this focal topic: The idea is to create new space for the creative and innovative exchange of colleagues.





## EMPLOYEE RELATIONS

We want to talk – for more togetherness and to meet as people at eye level. How can working relationships be socially charged for a strong ‚better together‘? In this thematic area, new formats – offline and online – are being tested and relationship work is being made a fixed agenda item.

The first measure that the team has conceived around the main topic of employee relations and is already putting into practice is the use of the Microsoft tool Viva Engage: it is suitable as a platform for cross-team network communication. Employees from all teams and locations can use it to network with each other, exchange ideas and organise joint after-work events according to their interests. The Group-wide roll-out of the new tool is planned for the first quarter of

2023. Also already in implementation is the new ‚90 days ASAP‘ format, which is part of the onboarding process: After 90 days with ASAP, the respective manager takes time for a personal interview with the new employee – the focus is not on the role or function, but on the new team member as a person. The aim is to build trust and mutual understanding on a personal level in the long term. In addition, Workforce wants to establish the ‚Open Door‘ concept in the course of 2023: Each manager will offer his or her employees the opportunity for personal exchange on professional as well as private topics during a fixed period of time. Furthermore, under the title ‚Time for us‘, more space is to be created – both digitally and in the office – for brainstorming and exchanging creative ideas together.

## LEADERSHIP RESPONSIBILITY

Leadership responsibility is so easy to say – but what does it mean in a hybrid working world? How do you manage the balancing act in the leadership task between the individual, the team and the company? This area is about exchanging ideas and learning from each other – leadership responsibility in the spirit of ‚better together‘.

The team around this focal theme has already achieved numerous milestones in the course of the last few months. For example, new development programmes have been developed in cooperation with the HR department in order to make the training opportunities at ASAP even more individual. ASAP has already successfully introduced the new programmes in 2022. The further training of managers is also an essential part of the culture initiative. At the end of

last year, ASAP therefore implemented the ‚New Leadership‘ format. It offers managers the opportunity to receive specific further training and, through a selection of current topics, to take away direct approaches to solutions and implementation for their everyday work. In addition, the workforce is working on the question of which team structures and organisational forms are best suited for which situations and requirements. The restructuring has already been completed and implementation is planned for 2023. Together with the HR department, the working group has also focused on the topic of mental health. Currently, the results of a practice group of the THI (Ingolstadt University of Applied Sciences), which intensively dealt with ideas and approaches for mental health at the workplace for ASAP, are being analysed with regard to further steps.



# THEME EVENT TO MARK INTERNATIONAL WOMEN'S DAY

## LECTURE AND DISCUSSION ON THE TOPIC OF FEMALE EMPOWERMENT

**International Women's Day is celebrated on 8 March each year – and, this year, the ASAP Group seized IWD as an opportunity to host a theme event for all employees throughout the Group on the topic of female empowerment. With over 100 people taking part, the lecture and subsequent discussion was a complete success.**

A shared commitment to female empowerment and the fight for gender equality – this was the motto the ASAP Group adopted on 8 March 2021, International Women's Day, as it hosted a special event for all its employees. ASAP has a rich tradition of hosting events on specific issues and has invited external speakers to give lectures on a wide range of topics since 2012. These events enable ASAP to promote an exchange of views and ideas between employees in different departments and at different sites within the corporate group. Past events have focused on topics including the chal-

lenges of measuring electric drive systems, managing complexity in vehicle development and data-driven automotive development.

### External speaker on female empowerment

To mark International Women's Day, the ASAP Group invited Anna Trunk, Head of Employer Branding at CARIAD, to give a talk on the topic of female empowerment as part of a digital event. She offered concrete advice for empowering and achieving equal rights for women: "Get out of your comfort zone – because otherwise, women miss out on too many exciting opportunities." In the online event, Anna Trunk described how she forged a path for herself to a leadership position at a traditional automotive company. She emphasised that female empowerment is not solely a women's issue, as men also have a role to play. This is because we all have unconscious prejudices and be-



haviours that it is important to identify and change. Ultimately, we all have a responsibility to make our (working) world more diverse in order to master the challenges of (the mobility

of) the future. The lecture and subsequent discussion were a roaring success. Over 100 employees took part and feedback on the event has been very positive.

# AWARD-WINNING

## ASAP LEADS THE WAY

### ONE OF BAVARIA'S TOP 50 COMPANIES

On 26 July 2022, the Bavarian State Ministry of Economic Affairs, Regional Development and Energy (StMWI) recognised the 50 fastest-growing medium-sized enterprises in Bavaria. The ASAP Group has now been named in this group, taking home the 'Bayerns Best 50' award for the third year in succession. Hubert Aiwanger, Deputy Minister Present of Bavaria and State Minister for Economic Affairs, personally presented the title to the 50 winning companies at an event at Schleissheim Palace. Michael Neisen, CEO of the ASAP Group, accepted the accolade on behalf on the corporate group.

The Bavarian State Ministry of Economic Affairs presents the 'Bayerns Best 50' title to honour medium-sized companies that have achieved above-average growth in their turnover and workforce in recent years. In addition to economic growth, future viability is a central selection criterion in the competition. The title recognises outstanding entrepreneurial performance and the resulting economic success. The contest intentionally highlights entrepreneurial role models and emphasises the importance of medium-sized enterprises to the Bavarian economy. The winners of the awards were determined by accountancy and tax consultancy firm Mazars GmbH & Co. KG as an independent juror.



### A FIRST-RATE EMPLOYER

The ASAP Group has been recognised for the outstanding working conditions it provides. The development partner to the automotive industry has been named among Germany's best national employers in 2022, collecting the title for the seventh year in succession. ASAP achieved an excellent 4th place ranking out of 47 companies in the 'Automobile and Suppliers' category and 97th out of 1,000 in the overall ranking. Current affairs magazine Focus presents the title of 'TOP Arbeitgeber' in cooperation with FactField, a research institute specialising in extensive data collection and analysis, on the basis of online surveys and ratings of employers across Germany.



### LEADING INNOVATOR AMONG GERMAN SMES

The ASAP Group has once again been named among the most innovative SMEs in Germany. This is the seventh year in succession that the development partner to the automotive industry has received the TOP 100 award. Yet again, ASAP demonstrated its innovative power, particularly impressing the jury in two categories: 'Innovative success' and 'Innovation-fostering top management'. TOP 100 uses a transparent, accountable and scientific approach to identify the most innovative companies among SMEs.

You can find out more by watching the virtual awards ceremony with TOP 100 mentor Ranga Yogeshwar, jury member and Deputy Chief Editor of Manager magazine Simone Salden, and journalist Linda Zervakis, who hosted the event.



## SEE MORE



Video of the virtual awards ceremony



## AMONG GERMANY'S MOST FAMILY-FRIENDLY EMPLOYERS

The ASAP Group provides an award-winning balance of work and family life. The development partner to the automotive industry has this year been named one of Germany's most family-friendly employers for the third time. Media brand freundin and employer rating platform kununu awarded the title of 'Deutschlands familienfreundlichste Arbeitgeber' after examining around 200,000 companies.

## A COMPANY COMMITTED TO STEM TALENT

The ASAP Group has been named a 'MINT Minded Company' for the eighth year in succession in recognition of its commitment to promoting young STEM talent. The initiative honours companies that show particular dedication to promoting young STEM talent and specialists

## LEADING SME EMPLOYER IN 2022

Business Punk, Germany's leading business magazine for young professionals, and market analysis specialist Globis Consulting have used a comprehensive methodology to examine over 13,500 SMEs in Germany and identify the best employers among them. The ASAP Group is officially one of these 'TOP KMU-Arbeitgebern'. By achieving impressive results in all three areas under examination – transparency, organisation and employee rating – ASAP won through against strong competition.

## LEADING DIGITAL COMPANY

The ASAP Group has been named among the leading digital companies in Germany in a study by Statista GmbH, which awarded the title of 'Top Digitales Unternehmen' to companies that have taken a leading role in the digital evolution in Germany and should be considered as pioneers of digitalisation. The analysis examined over 3,000 companies in 26 sectors with sites in Germany. Companies were assessed on factors such as their internal digital processes and general digital presence as well as an independent online survey of 40,000 employees..

## A LEADING EMPLOYER

ASAP has received the 'Leading Employer' award once again this year, putting it in the top 1% of German employers for the third year in a row. More than 100,000 companies were considered for this award. The selection process analysed some eight million datasets, making 'Leading Employers' the most comprehensive employer evaluation system of its kind in the world.

## A VALUABLE EMPLOYER FOR THE COMMON GOOD

The ASAP Group has once again been named a valuable employer for the common good, receiving the highest possible grading of 'very high contribution to the common good'. German magazine Wirtschaftswoche, in cooperation with ServiceValue, conducted the 'Wertvoller Arbeitgeber für das Gemeinwohl' study to determine how companies are perceived by people in the regions around their sites. A decisive factor was the respondents' assessment of the companies' relevance to the surrounding area based on their contribution to the common good.

## ONE OF GERMANY'S BEST EMPLOYERS IN 2022

Does the image match reality? Where ASAP is concerned, it certainly does – which is why the Group received the 'Germany's Best Employer' seal of quality once again this year. In cooperation with WELT, the Cologne-based analysis institute ServiceValue GmbH conducted large nationwide surveys to determine just how attractive German companies are in the eyes of the German public. The ASAP Group was rated 'extremely attractive'.

## EMPLOYER OF THE FUTURE

The ASAP Group has been named an 'Employer of the Future'. The participating companies were evaluated by the German Innovation Institute for Sustainability and Digitalisation (DIND) in a two-stage selection process. Digitalisation and sustainability are key factors in the future viability of companies and were therefore key criteria in selecting the winners of the 'Arbeitgeber der Zukunft' title.

# CERTIFIED

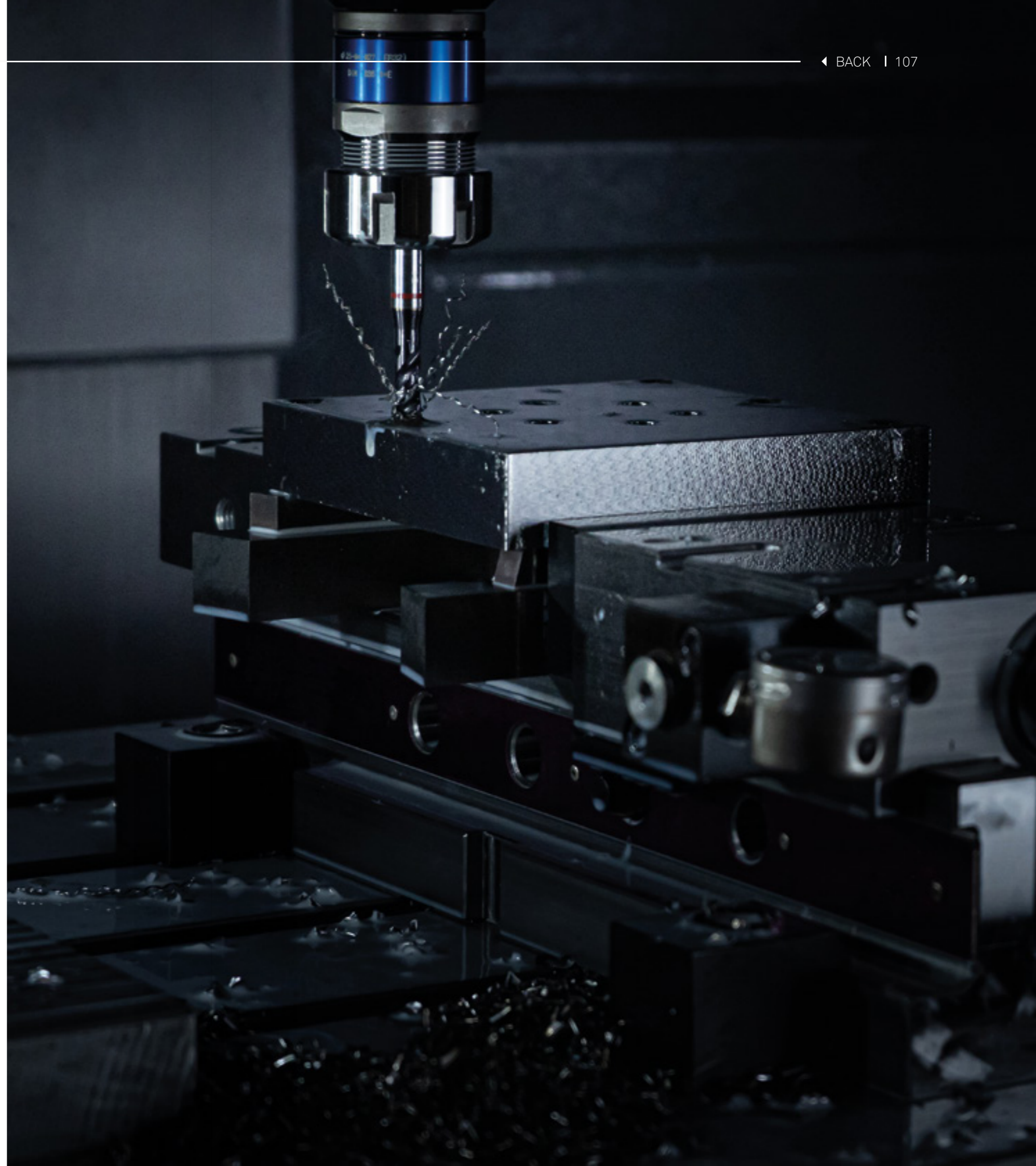
## A FOCUS ON QUALITY AND OUR CUSTOMERS

### CERTIFIED QUALITY

Quality and customer focus are integral elements of the ASAP philosophy and decisive factors in ASAP's success. Bureau Veritas has certified the corporate group's quality management system in accordance with DIN EN ISO 9001:2015. In addition, as the operator of the central IT and information security systems within the ASAP Group, ASAP Holding GmbH has been certified by DEKRA in accordance with ISO/IEC 27001:2013. ASAP Holding GmbH also adheres to the German Association of the Automotive Industry (VDA ISA) information security catalogue. The certification was issued by DEKRA in accordance with TISAX (Trusted Information Security Assessment Exchange). The TISAX assessment results are published on the ENX portal and can be viewed there.

### ACCREDITED TESTING AND TRIALLING CENTRES

The ASAP testing and trialling centres in Ingolstadt and Wolfsburg have been certified by DAkkS, Germany's national accreditation body, as complying with DIN EN ISO/IEC 17025:2005. In addition, the testing and trialling centres have passed audits according to current automotive and industrial standards, including: LV 124; VW 80000 and 80101; DC 10611, 10612 and 10615; GS 95003-x and 95024-x; DIN EN 60 068 2-x and DIN ISO 16750.



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