

DRIVE ON

AMSTERDAM CALLING

**AI IN MODERN
TRAFFIC
MANAGEMENT**

EXAMPLES OF OUR
CORPORATE SOCIAL
RESPONSIBILITY

SWARCO – AN
**ATTRACTIVE
EMPLOYER**

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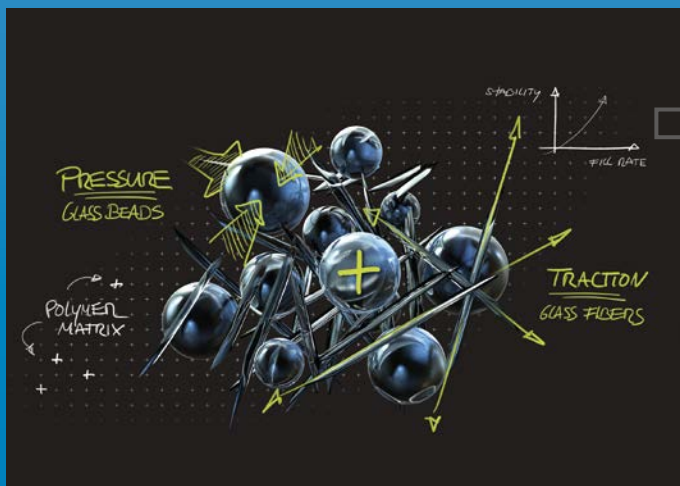
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EDITORIAL

DEAR READER!

Welcome to a new edition of our corporate magazine DRIVE ON, published right in time for the 2024 edition of the largest traffic technology exhibition worldwide, Intertraffic Amsterdam.

Looking back on 2023, we can say that we were able to continue the successful path of previous fiscal years. Our focus was on completing the integration of our recent acquisitions. This refers to extending and refining our portfolio, pushing corporate branding, creating synergies, and accelerating our innovation roadmap. The continued support by our esteemed business partners and their trust in our products, systems, and solutions resulted in the new all-time high of revenues of 1.2 billion euros. A big thank you goes to our committed employees all over the world who are in contact with our customers to prove that SWARCO offers the better way, every day.

In 2024, we will continue our GoGreen initiative addressing the cities committed to the European Green Deal. By means of a virtual reality experience, interested stakeholders can dive into our solution portfolio tackling the pain points of cities such as air pollution, congestion, or the safety of vulnerable road users. The mobility sector plays a significant role in mitigating climate change with intelligent transport systems, making traffic connected over all modes, more fluid, and environmentally sound.

Our research activities are ongoing to determine the optimal road marking systems so that roads can be consistently read by vehicles, which helps pave the way for cooperative, connected, automated mobility (CCAM). We will continue to invest in sustainable production, products, and facilities to underpin our corporate social responsibility. Electric vehicle fleets, photovoltaic systems providing green energy, and the use of waste heat from production are just three examples.

As many other industrial sectors, our industry struggles to find qualified personnel for the highly interesting jobs in corporate services, road safety, and intelligent transport systems. Our Employer Branding initiatives therefore have been intensified, among others with videos featuring our employees explaining why they are proud of working for SWARCO. A good opportunity to learn more about our versatility can also be a visit to our Traffic World showroom at the headquarters in Wattens, Austria (reservation required).

We now wish you an enjoyable read and a healthy and successful spring and summer season, with road safety and intelligent traffic management solutions made by SWARCO.

Yours sincerely,
The SWARCO AG Executive Board

IMPRESSUM

Overall editorial responsibility: Richard Neumann, Senior Manager
Communications & Events SWARCO Group, richard.neumann@swarco.com

Contributors to this issue: Jürg Biedermann, Greg Cutler, Wolfgang Danzer, Martina Dobner, Thomas Eller, Manuela Fürst, Julia Höger, Thorsten Kern, Markus Mitterecker, Harald Mosböck, Ferdie Mostert, Stephanie Müller, Richard Neumann, Anja Rautnig, Bent Seerup, Stefan Vogt, Gernot Weiszl, Bo Westhausen, Viktorija Zymantaite

Graphic design: Linda-Lucie Kleinheinz, SWARCO AG
Photo credits: SWARCO, shutterstock.com, unsplash.com, intertraffic.com, Schlothauer & Wauer
Circulation: 4,000 hardcopies
Print: Offset 5020, Salzburg; printed on 100% recycling paper
Copyright: © SWARCO AG, April 2024

Also available as PDF file on www.swarco.com



Günther Köfler
CAO

Michael Schuch
CEO

Manuela Fürst
CFO

AI-BASED TRAFFIC MANAGEMENT

Is AI-based traffic management on its way to becoming standard in Denmark? Effective traffic signal control using AI and object-based traffic data can help reduce congestion, improve traffic safety and decrease emissions while contributing to meeting the UN's climate goals by promoting sustainable urban mobility. The prospects are promising.



Contact:
Bo Westhausen
bown@cowi.com

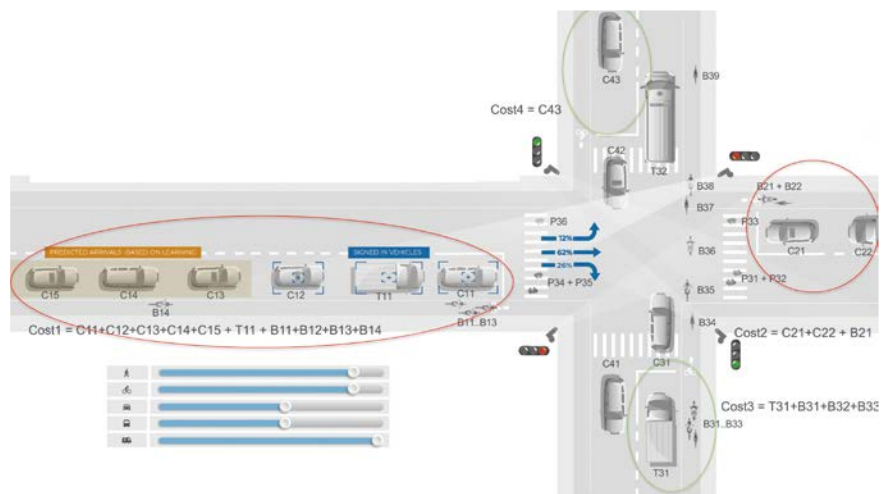


Illustration of the principle behind SWARCO Technology's SMART AI



Contact:
Bent Seerup
bent.seerup@swarco.com

DETECTOR DATA

Traditionally, communication between detectors and the control unit of a signal system has occurred by sending simple detector outputs (on/off) to the control unit's I/O inputs. After that, the control unit processes the various inputs based on the logic and criteria established in the traffic signal programme.

With modern sensors that have built-in data processing, the criteria for the inputs sent to the traffic controller can be made conditional on vehicles' stop line distances, speeds, expected arrival time (ETA) and classification (size). By allowing the traffic controller to process the sensors' 'raw' data instead of letting this happen in each individual sensor, control of the intersection can be based on the total amount of data available. Each sensor constitutes an independent data source, where the location, movement, etc. of each individual object is

determined based on the sensor's position (local coordinate system). Real-time data from each individual sensor must be collected, validated, formatted and assembled in a structured form.

Faulty data must be removed and replaced with valid ones, 'duplicates' reduced, etc. This process is, of course, very complicated and requires in-depth interface knowledge.

In addition to the detector data the traffic controller receives through its associated sensor system, data can also be collected from car GPS systems. Many car manufacturers send data from their vehicles to cloud-based systems. This is part of the development of modern car technology, which allows manufacturers to collect and analyse data to improve the car's performance, safety, and user experience. In the long term, access to these data could be included in the data foundation of signal control.

Management of traffic signal systems in Denmark has become increasingly advanced. Today, almost exclusively "smart" sensors are used, which are capable of generating large amounts of data that can be used directly to control the signal change in modern traffic signal systems. Artificial intelligence (AI) to process the large amount of traffic data has in recent years been applied in the development of signal control algorithms that can more or less "predict" the need for green time and optimise waiting times within the system's signal groups.



LIDAR (LIGHT DETECTION AND RANGING) AND RADAR (RADIO DETECTION AND RANGING)

are two different technologies used for detecting and tracking objects in traffic sensors. LIDAR uses laser light to measure distances by emitting short pulses of laser light and measuring the time it takes for the light to be reflected back to the sensor. This time is measured very precisely, providing accurate distance measurements. RADAR uses radio waves (electromagnetic waves) to measure distances and speeds by sending out radio waves and measuring the delay and Doppler effect of the returned waves. This makes RADAR more suitable for measuring speeds.



THE UNITED NATIONS' SUSTAINABILITY GOALS

include targeted areas of effort to reduce traffic-related environmental nuisances and promote sustainable mobility. These goals include reducing air pollution, noise pollution, and CO₂ emissions to improve the urban environment and public health. The UN's goals also include initiatives to reduce traffic accidents and create safer traffic conditions through traffic safety measures and education.

AI INTEGRATED IN THE TRAFFIC CONTROLLER:

The reinforcement learning (RL) model used for optimising the green time allocation in a traffic signal system can essentially be described as follows:

1. The model's optimisation goal is to allocate green time to the signal group (or groups) that has the greatest "impact" on reducing the total weighted delay in the system.
2. The model continuously calculates the current total weighted delay based on recorded and expected data. This is done by summing the delays of individual objects distributed across signal groups.
3. The model's sole action is essentially to decide which signal group (or groups) should currently be green to achieve the optimisation goal. A signal group can be suspended until a threshold for maximum waiting time for that signal group is reached, after which the signal group should be activated.
4. The model monitors the development of the system's average delay and "learns" to recognise certain patterns, which it uses in its decisions.



REINFORCEMENT MACHINE LEARNING

is a branch of artificial intelligence where an algorithm learns to make decisions by receiving feedback as a result of its decisions/actions. The algorithm receives rewards or punishments based on its actions and seeks to maximise its accumulated reward over time.

BETTER UTILISATION OF GREEN TIME:

The algorithm/model allocates green time to the various signal groups based on an optimisation goal to reduce the total system's average waiting time. By assigning different weights to certain directions and/or traffic groups, prioritisation can be made, as the optimisation will then be based on the system's average weighted waiting times. Thus, for example, prioritisation of 'soft' road users and/or public transport can easily be made. The model can register the actual computational passage time for each signal group as input for the optimisation algorithm.

The model 'learns itself' which data belong to each signal group, meaning the model itself determines lane distribution and stop lines. Therefore, the model adapts to roadwork where traffic lanes are reduced or moved. If a sensor's direction is changed or replaced, the model self-calibrates/corrects the sensor's input, etc. SWARCO Technology is currently testing their **SMART AI** algorithm in two existing facilities in Denmark, and preliminary results suggest that even in newer traffic-controlled facilities, improvements in average waiting times of more than 5-10% can be achieved by letting the AI optimisation algorithm decide the distribution of green time.

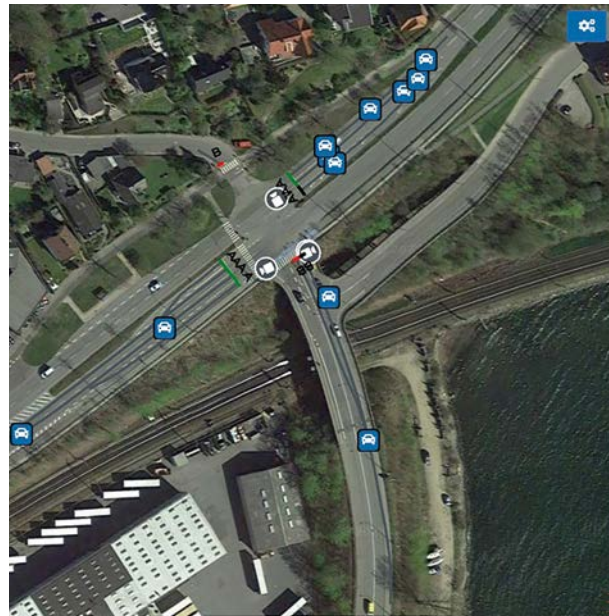
IMPROVING ROAD SAFETY

In addition to optimising the distribution of green time, traffic signal control must also be able to end green phases safely. Through the analysis of object data, traffic controllers should extend the green light as long as there are two or more vehicles in the same lane within the selection zone. This means within a distance from the stop line and at a speed where it is possible to both stop and continue through an amber light. This approach can reduce the risk of rear-end collisions. If the traffic signal system is located in a rural area, where the speed limit is 70 km/h or higher, the traffic control should also be able to extend the green light as long as there is a vehicle more than four seconds away from the stop line but closer to the stop line than its current stopping distance (the dilemma zone). This can reduce the risk of red-light running collisions (lateral collisions).

The signal control should also be able to delay the activation of conflicting signal groups if the intersection area is not cleared (inter-green extension). Examples of this type of 'event detection' could include left-turning traffic, pedestrians on the crosswalk or on the roadway, etc.

If LIDAR sensors or thermal cameras with object tracking technology are used for detection in the intersection area, the algorithm can detect near-miss incidents based on the relative positions, speeds, and directions of the objects.

If the control device is connected to the internet or integrated into a monitoring system, for example, prioritisation assignment to the individual signal groups and effectiveness monitoring can be performed via an online dashboard. The parameter-based user interface provides easy access to modification and adaptation of the control algorithm, thereby also ensuring a high degree of supplier independence.



NO SIGNAL PROGRAMMES OR PROGRAMMING

With the use of AI-based traffic management, there is no need to load a signal programme into the traffic controller. Once the algorithm is developed, it can in principle be used generally. SWARCO's SMART AI uses a parameter-based user interface, where the basic prerequisites and control parameters of the system are entered.

This includes information about:

- The system's signal groups
- The interdependencies/dependencies of the signal groups
- Conflict/inter-green time matrix
- Minimum green times for the individual signal groups
- Maximum waiting times for the individual signal groups
- Prioritisation (weighting) of the individual signal groups and/or traffic classes



SMART AI Dashboard with real-time and historical data: Current traffic flow and overview of cycle times

UPGRADING EXISTING TRAFFIC SIGNAL SYSTEMS IS A GOOD IDEA, ALSO ECONOMICALLY



Typically, an existing traffic signal system can be upgraded with sensors featuring object tracking technology and AI-based control for a cost between 20,000 and 40,000 €, depending on whether the existing control unit can be reused. An investment of this size can often be recouped within a few months, solely in terms of expected savings from accidents. Additionally, there are long-term effects on climate and public health. Since the control of the traffic signal system is self-optimising and self-monitoring, the need for 'human' intervention is limited to physical maintenance. Monitoring and optimising traffic signal systems using artificial intelligence (AI) has significant advantages that are not possible to achieve manually. Especially in times when human resources are often scarce, AI can play a crucial role in improving traffic signal systems in several ways. The use of AI enables automatic real-time monitoring and rapid response to

changing traffic conditions. While humans can monitor traffic, it is often difficult to respond instantly to sudden traffic jams, accidents, or roadworks. AI systems can analyse large amounts of data from sensors, cameras, and other sources in seconds and adjust the traffic controller in real time. This results in faster reactions, less waiting time, and reduced delays for road users. Using AI takes into account complex traffic patterns and variables that humans might overlook. AI algorithms can analyse historical data, weather conditions, real-time events, and even data from vehicles and their GPS systems. This allows for signal control adjustments specific to time periods and locations, maximising traffic flow. Additionally, AI can prioritise traffic safety in ways that humans may find challenging. AI systems are capable of detecting dangerous situations and potential conflicts between vehicles and pedestrians. This allows for extending green time at

critical locations, reducing the risk of accidents, and improving overall traffic safety. Finally, AI can operate around the clock without needing breaks or rest. This means that traffic signal systems are constantly monitored and optimised, resulting in more efficient signal control and reduced waiting times, regardless of the time of day or year. This level of constant optimisation is simply not realistic to achieve manually. In the end, the use of artificial intelligence leads to better performance of traffic signal systems, increased convenience for road users, reduced waiting times, and improved traffic safety. It is an investment in both efficiency and convenience that helps to tackle the challenges associated with increasing traffic loads in modern cities. In 2024 alone, SWARCO Technology expects to have commissioned 10-20 AI-based traffic controllers in Denmark and approximately 15 in Norway.



TRAFFIC ACCIDENTS

cost society a lot of money each year in terms of welfare losses, lost life years, hospital expenses, home care and rehabilitation, sick leaves, etc.

- A traffic fatality costs about 5 million €.
- A seriously injured person costs about 1 million €.
- A slightly injured person costs about 100,000 €.

Source: Transport Economic Unit Prices, DTU 2022



Contact:
Gernot Weiszl
gernot.weiszl@swarco.com

MORE THAN RED-AMBER- GREEN

Nowadays traffic lights can do much more than just indicate red, amber or green in traffic control. Austrian LED traffic light and variable message sign specialist SWARCO has introduced new functionalities in its COMBIA product line, for instance by adding a half-aspect to measure environmental parameters (AirDec), to warn distracted smartphone users from running a red light with a red light shining downward onto the pavement (SafeLight), and by elegantly integrating the acoustic unit for visually impaired people into the signal housing. A recent SWARCO-internal innovation ideas contest now led to a novel prototype of traffic signal premiered at forthcoming Intertraffic Amsterdam.

Sometimes it takes a little more time until a good idea becomes a prototype product, as Gernot Weiszl, Design Engineer responsible for Portfolio Management & Solutions at SWARCO FUTURIT in Austria, remembers. "I started working at SWARCO many years ago as a technical draughtsman for the design of variable message signs. At that time I had less knowledge

of printed circuit boards and LED components than I do have today. Since the implementation of RGB technology in variable message signs, I kept asking myself why this could not be used also for traffic lights. Of course, I know there are some arguments against it and many influences that should not be ignored. But the bottom line is that for me the additional use of an LED display integrated into the COMBIA housing is a valuable and useful add-on", explains Weiszl.



INITIAL SKEPTICISM

Not all colleagues were enthusiastic about this idea right from the start. Over time, however, more and more supporters of such a product were found, and we decided to proceed. Initial meetings with colleagues within SWARCO provided feedback, which made us feel stronger in our endeavours. By working together with colleagues from other countries, use cases were found that make the presence of the COMBIA SmartSign, as the novel product was baptised, desirable. The aim is not to replace the classic traffic light with all its safety-relevant features with freely programmable LED displays. The additional COMBIA SmartSign should be seen as a variable display that can be used to show a wide variety of information.

In addition to the classic LED traffic light modules, SWARCO also offers a number of special signals for special applications, for instance a countdown or a clearance time display. "With COMBIA SmartSign, we want to offer a universal option that can cover a wide range of use cases,

including some that we might not even be aware of at the moment.

As a manufacturer of traffic signalling systems, SWARCO constantly strives to optimise its product portfolio and adapt it to new customer requirements. From a business perspective, it is important to make the best possible use of the available resources and expertise in the various product areas. For some years now, the trend in dynamic LED traffic signalling has been towards full-matrix, freely programmable RGB displays.

SWARCO's portfolio offers a wide range of possible solutions with, for example, different pixel pitches for different areas of application.

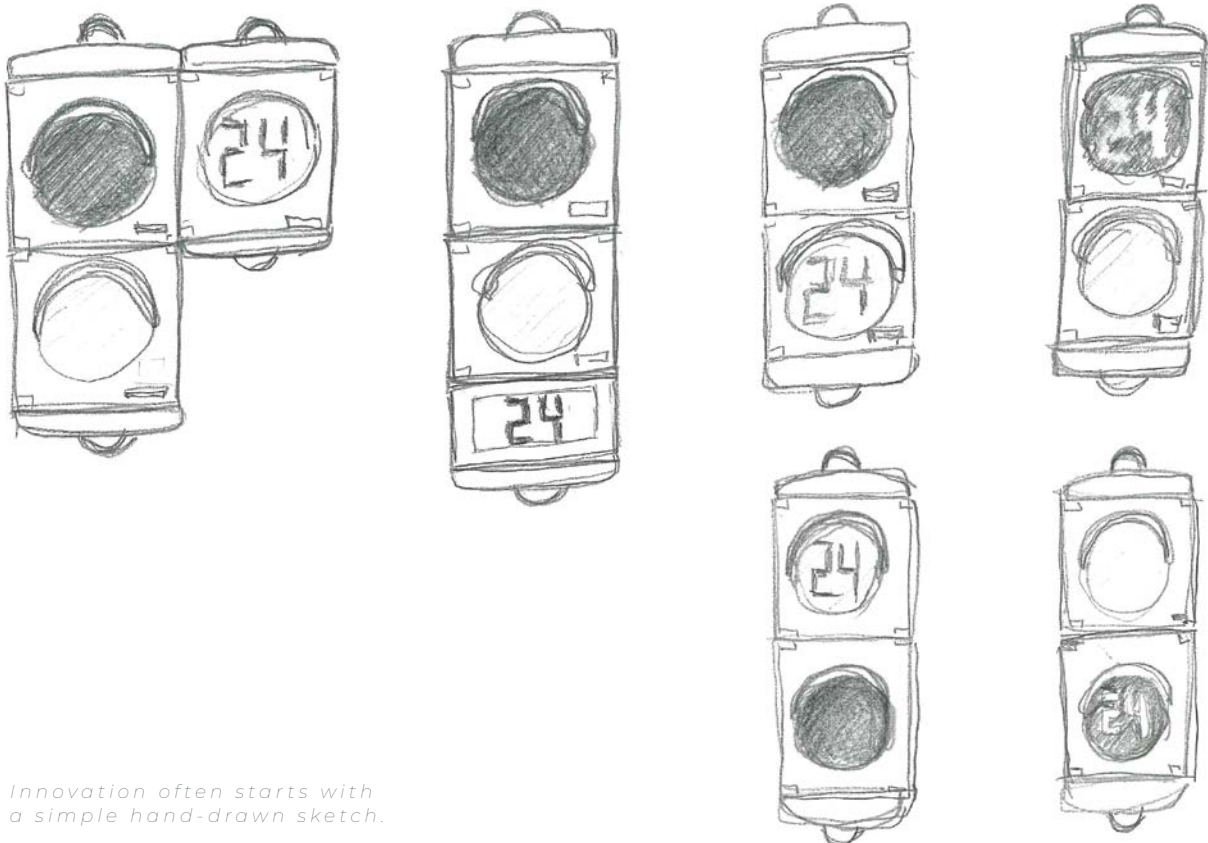
Although LED traffic lights and LED variable message signs have to comply with different European standards, there have always been areas of application that can actually be implemented with both kinds of product. The idea behind COMBIA SmartSign is to integrate the features and functionality of LED variable message signs into the design of

the COMBIA traffic light generation. An RGB matrix display in a COMBIA housing opens up a wide range of additional applications compared to conventional traffic light symbols.

WHY IT MAKES SENSE

"We consider a supplementary display as an addition to the classic traffic light an innovative and sensible approach", says Weiszl. This display is, for example, able to provide information about the duration or reason for the red phase, making the waiting time less stressful. Other applications might include information on the time, date or temperature. At toll stations, the toll fee can be shown under the classic red-green traffic lights. Like this, the traditional appearance and function of traffic lights can be enhanced and extended.

SWARCO's equation of Innovation = Passion + Ideation + Market Success. Intertraffic Amsterdam will be the international feedback ground for the new COMBIA SmartSign prototype.



Innovation often starts with a simple hand-drawn sketch.

GLASS FILLER BEADS FOR MORE EFFICIENT 3D PRINTING

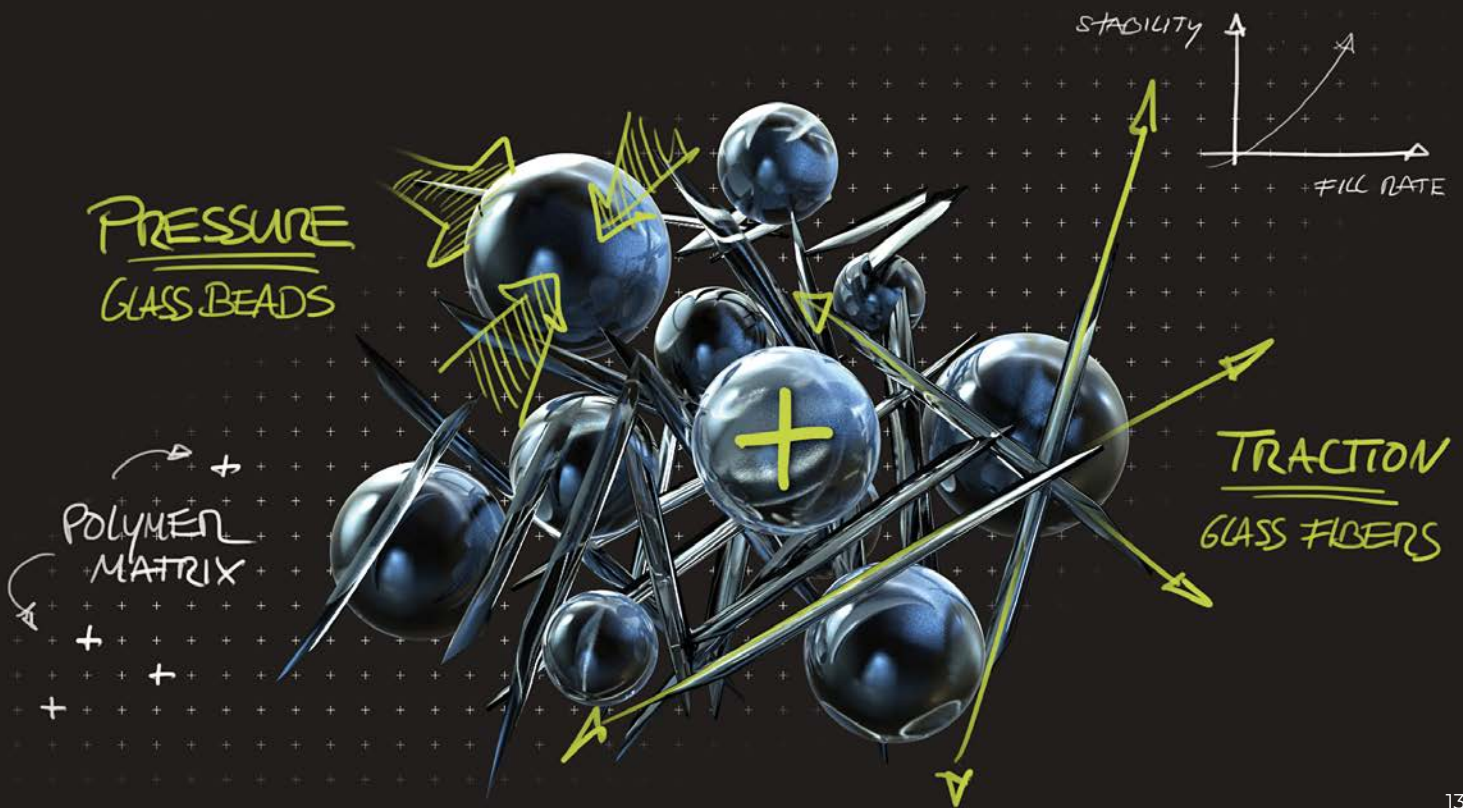
3D printing and additive manufacturing are conquering the world. SWARCO Indusferica – formerly SWARCO Advanced Industry Systems – helps shape this world with glass filler beads.

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Contact:
Stephanie Müller
stephanie.mueller@swarco.com

Additive manufacturing – i.e. the use of 3D printing in the industrial context – has come of age. Whereas in the past it was primarily used in research or prototype production, it is now employed extensively. The nature of materials that can be printed is subject to continuous further development. This is where the tailor-made range of glass filler beads from SWARCO Indusferica comes into play. Their addition allows the properties of 3D printing base materials to be individually modified and optimised. Every additive manufacturing process, such as stereolithography, laser sintering, or Fused Deposition Modelling (FDM), offers different benefits for specific applications. However, the type of material used is restricted by the respective printing technology. Tests to broaden the spectrum of material types that can be used extensively have therefore been the biggest challenge for a long time. They are also the driving force for innovation.



IT'S ALL IN THE MIX

Composite materials are a proven way to achieve individual physical properties. Ultimately, the new material acts as the sum of all its components. Composite materials have always been a popular way to achieve certain performance characteristics or to solve problems such as loss of dimensional accuracy due to shrinkage. Consequently, composite materials have also proven themselves in the field of additive manufacturing – especially since the introduction of methods such as fused deposition modelling (FDM) or selective laser sintering and the accompanying emergence of light-curing resins with ceramic particles as a printer material in high-temperature applications.

A WELL-ROUNDED MATTER

SWARCO Indusferica, well known for their micro glass beads as a blasting abrasive for surface treatments and as a filter medium for water treatment, develops tailor-made solutions for additive manufacturing. “The range of glass filler beads can be employed in many different printing technologies and improves the properties of the materials used according to individual parameters”, says Stephanie Müller from SWARCO Indusferica Marketing. “Adding them simultaneously improves the hardness and the shrinking behaviour of the basic material. Glass filler beads give moulded parts a higher density and contribute to reducing material costs, thanks to the highly efficient production process with a small carbon footprint”, explains Müller.

GLASS FILLER BEADS IN A SUSTAINABLE CIRCULAR ECONOMY

The glass filler beads are melted from high-quality recycled soda-lime glass fragments from the flat glass industry. The company has many years of experience and the necessary know-how to produce high-quality microglass beads from recycled products. Purchases of the raw material are made within the regional area of the production plants. In this way, SWARCO Indusferica avoids long transport routes and makes a significant contribution to sustainable production and environmental protection.



In summer temperatures, in particular, natural shade and a water biotope provide an inviting green space for a break or meeting, like here at one of SWARCO Road Marking Systems' sites.

SWARCO MARKIERUNG GmbH in Wienersdorf



SWARCO VICAS SRL in Targoviste (Romania)



Some sites of the SWARCO Road Marking Systems Division already include nature-friendly company gardens. Given the significant benefits they bring to employees and the environment, the plan is to create even more!





NATURE OASES IN INDUSTRIAL ZONES

MEETING POINTS CLOSE TO NATURE

Thanks to these green spaces, employees can enjoy breaks close to nature at their doorstep. They can have a little rest on inviting lounge chairs set up here and there, take a short walk, or spend time with their colleagues outdoors, relishing flowers, hedges and trees in full bloom. Along with the staff, bees and other insects also love these areas. Beehives were therefore set up as well at one of the SWARCO Markierung GmbH sites in Austria. "This is a win-win situation," says Managing Director Georg Eder, expressing his excitement. "Such nature-friendly green spaces do not require as much care as a meticulously manicured English lawn. What's more, they provide food for bees, and we humans then get to enjoy the great honey they produce."



Contact:
Martina Dobner
martina.dobner@swarco.com

Employees make use of the company gardens to enjoy a little time-out close to nature in their everyday work life. In addition, these nature-friendly areas also create spaces for diverse and species-rich fauna and flora in industrial zones. SWARCO Road Marking Systems has already been recognised for its active commitment in this field.

Be it striping companies, glass bead factories or lane marking producers – the SWARCO Road Marking Systems Division has been creating spaces for small nature oases at different sites throughout Europe. Projects range from water biotopes to large parks all the way to shared vegetable gardens.

VEGETABLES FROM THE WORKPLACE

The company garden at the SWARCO site in Targoviste, Romania, is also something special. There, staff carefully cultivate and harvest vegetables, such as tomatoes and bell peppers, in raised beds that they made out of old pallet wood. Corina Berekmeri, Managing Director of the site, is delighted about the keen interest: "Colleagues are making ample use of this possibility. It is great to see that so many employees are participating with

such enthusiasm and can look forward to a rich harvest."

ACTIVE COMMITMENT RECEIVES RECOGNITION

Fostering biodiversity is, in general, an important concern to the SWARCO Road Marking Systems Division. Its active commitment, specifically the dedicated activities at the site in Neufurth, Austria, has already won recognition: As part of last year's "Taten statt Worte" (Actions Not Words) climate campaign, the project dedicated to the nature-friendly outdoor design of the corporate premises was ranked among the top 100 climate projects of the province of Lower Austria.

This recognition has motivated the entire Division to create additional green spaces with a natural diversity of indigenous, site-appropriate plants at other sites, too. A green roof was already installed at one site, with the greening of numerous flat roofs more to follow at other sites in the future, where feasible. "Our goal is to seal as few surfaces as possible," says Martina Dobner, Corporate Social Responsibility Specialist at SWARCO Road Marking Systems. "Setting up such nature oases around our sites requires time and money. We are convinced that these investments are highly valuable for the future and hope that many other companies will be following our example."



DO YOU ALREADY KNOW SWARCO PERFORMED?



Lines, arrows, stop signs, words, symbols, company logos - everything can be quickly and easily applied to roads, paths and squares using prefabricated thermoplastics. This popular form of road marking is now available under a new name: SWARCO PERFORMED.



Contact:
Laurens Meurer
laurens.meurer@swarco.com



The preformed thermoplastics from SWARCO Road Marking Systems may be changing their name and packaging, but not their usual high quality. You can see this for yourself at Intertraffic in Amsterdam. There will be a separate area for SWARCO PREFORMED on the SWARCO stand 02.236. Product Manager Laurens Meurer is already looking forward to many interested trade fair visitors: "You will be able to try out for yourself how easy the application is. We will also be presenting solutions from our five different product areas."

All these road markings are cost-effective and robust. Due to their durability, they are also suitable for roads with heavy traffic. Compared to many other marking materials, SWARCO PREFORMED can be applied all year round. In many cases, temperatures of 5 degrees or higher are required for other marking materials before application can begin. Preformed thermoplastics do not have a minimum temperature. "This makes SWARCO PREFORMED the ideal choice - especially in cold climates," emphasises Laurens Meurer.

QUICK AND EASY

Usually specialised equipment is required for the application of road marking materials. With the preformed thermoplastics, it is quick and easy: All you need is a gas burner. The material is placed on the cleaned surface, heated with the flame of the gas burner and then drop-on materials such as reflective glass beads or anti-skid aggregates are applied. "Everything is done in just a few minutes," confirms the Product Manager. "The quick and easy application means that roads or car parks do not have to be cordoned off for long periods so that traffic obstructions can be avoided."



THE FIVE PRODUCT RANGES:

- **SWARCO PREFORMED Symbols**
Lines, arrows, letters, numbers, traffic signs
- **SWARCO PREFORMED Bespoke**
From special characters to company logos
- **SWARCO PREFORMED Playground**
Pavement markings for schoolyards and playgrounds
- **SWARCO PREFORMED ECO Rolls**
Roll material in various widths and colours
- **SWARCO PREFORMED ECO Sheets**
Preformed thermoplastics for larger surfaces

IDEAL FOR COMPANIES

Markings with SWARCO PREFORMED are also an ideal choice for companies looking for cost-effective solutions for markings of all kinds. SWARCO PREFORMED markings are available in a colourful range of standard colours, and special colour requirements can also be met on request. This means that even a colourful company logo on the pavement is easy to implement.



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The well-known British company HITEX is now incorporated in the worldwide established SWARCO brand. That also applies to the production facility in Ellesmere Port.



High friction surfacing also known as anti-skid is one of the most effective road safety surfacing measures. The newly rebranded SWARCO HITEX LTD contributes a wealth of experience in this new solution field of the SWARCO portfolio.



Road repair and reinstatement products play a pivotal role in helping extend the operational life of road surfaces. This new solution area in SWARCO Road Marking Systems' comprehensive portfolio helps road operators to increase road safety and save money.



NEW SOLUTIONS FOR MORE ROAD SAFETY

SWARCO HITEX will add both High Friction Surfacing and Road Repair & Reinstatement to the existing catalogue of road marking systems. In both areas, the SWARCO HITEX addition offers a wealth of experience and well-proven products.

Following the 2021 acquisition by SWARCO, the well-known British company Hitex Traffic Safety is now formally rebranded as SWARCO HITEX LTD. The rebrand adds much more than just another RMS division company to the SWARCO portfolio. New solutions have come on board.

HIGH FRICTION SURFACING

High Friction Surfacing (HFS) also known as anti-skid is one of the most effective road safety surfacing measures to decrease accidents. Designed specifically to reduce braking distances and skidding, high friction surfacing is proven to save lives. The SWARCO Road Marking Systems portfolio offers both hot and cold applied solutions. While the hot applied method is known to be more efficient, cold applied high friction surfacing can be applied without heavy duty machinery. The solutions are used in many application areas: On highways, High Friction Surfacing can reduce the risk of accidents, especially at high speeds and in adverse weather conditions. Applied in front of pedestrian crossings or at intersections, it helps drivers to brake in time and increase the safety of pedestrians and other vulnerable road users. In traffic-calming zones, such as residential areas,

play streets or school zones, HFS is used to increase the safety of residents, especially children. The increased skid resistance ensures vehicles can come to a stop within shorter braking distance, helping to minimise accidents.

ROAD REPAIR & REINSTATEMENT

Road repair & reinstatement products play a pivotal role in helping extend the operational life of road surfaces. The portfolio of SWARCO Road Marking Systems offers a pro-active approach to preventing further road deterioration. The products are primarily aimed at preventing road surface defects, small cracks, open joints, potholes, and areas requiring reinstatement. SWARCO HITEX offer cold-applied, hot applied, and preformed solutions to solve these problems. Alastair Powell, Managing Director of SWARCO HITEX LTD, explains: "There is no 'one size fits all' approach to solving road repair and reinstatement problems on our roads and urban networks. Offering a large range of solutions allows us to help meet our stakeholders' needs with the greatest efficiency possible. We offer a complete portfolio designed to maximise the longevity of highway assets for the benefit of all."



Contact:
Alastair Powell
alastair.powell@swarco.com

AN EVENT NOT TO MISS



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Contact:
Richard Neumann
richard.neumann@swarco.com

From 16 to 19 April 2024, the SWARCO Group will present its competences and solutions portfolio in road marking systems and intelligent transport systems at Intertraffic Amsterdam. We look forward to welcoming you on our combined stand in hall 2 with stand numbers 02.222 (ITS) and 02.236 (RMS). Richard Neumann, preparing for his 14th attendance in Amsterdam, tells us why this event should not be missed.

Intertraffic Amsterdam with its bi-annual rhythm is the global showcase for modern traffic technology and mobility solutions. Visitors can look forward to a massive SWARCO presence again on more than 500 square metres of stand space. Our Road Marking Systems world will display the latest retroreflective systems, integrating the high-performance reflective glass beads SWARCO SOLIDPLUS. Furthermore high-friction surfacing, road repair and reinstatement kits, preformed tapes, and the innovative SWARCO ECO-line products will be featured. Learn how important high quality road markings are for the upcoming age of automated driving. Of course, preformed thermoplastic markings, cycle path markings, airport markings, and structured road markings with high visibility in rainy nights will also be on display. And we welcome again our Dutch representative for road markings, COATEQ, on our stand.



Moreover, SWARCO will take you on a journey addressing the urban, interurban, parking, and public transport mobility aspects with latest ITS technologies. A central element on our ITS stand will be the GoGreen Virtual Reality Experience. Try our VR goggles and experience how we empower cities in reaching their ambitious climate goals and reducing greenhouse gas emissions. Take a deep dive into the SWARCO Meta-City with our holistic solution competence, condensed in the latest release of our urban mobility management suite MyCity. We will highlight how to better manage parking space and increase the safety of vulnerable road users. Traffic engineering and consulting expertise will be contributed by the German colleagues from Schlothauer & Wauer who will present the latest release of their market leading traffic engineering software LISA. Smart LED traffic lights, top class variable message sign technology and our latest developments of the Intelligent Traffic Controller can be experienced as well. We will explain to you our progress made in solutions for Cooperative, Connected, Automated Mobility (CCAM), and we will

showcase the SWARCO MyHighway / My-Tunnel solution helping road operators to better manage interurban traffic scenarios.

As the exclusive sponsor of the ITSUP area in hall 6, SWARCO will help you furthermore to get in touch with new ideas and concepts by start-up companies. A special challenge for the start-ups will be launched, and the best solution awarded with a SWARCO prize.

And finally: What would Intertraffic be without the welcoming atmosphere and legendary hospitality on the SWARCO stands? Please mark Wednesday, April 17th, 5 pm in your calendar to enjoy with us some relaxing moments with typical Austrian refreshments at our After Show Reception.

See you in Amsterdam!



PREMIERE: THE SWARCO JOB CAFÉ

Visit the SWARCO Job Café at Intertraffic Amsterdam, where coffee enjoyment meets career perspectives. Allow yourself to be inspired by the fascination of our products and projects and discover more about how you can become part of our dedicated team. Because at SWARCO, doors open to exciting career paths – savour your coffee and explore your future!

AN INTERVIEW WITH FERDIE MOSTERT



Contact:
Ferdie Mostert
ferdie.mostert@swarco.com

Since 2021, SWARCO has been working in the road marking systems business in Australia with its subsidiary SUPALUX based near Perth. Many years longer is our track record down under with the supply of LED modules for traffic lights and very large variable message signs like the ones at Sydney Airport.

Now also our ITS business has its own foothold in Australia, with Ferdie Mostert (FM) as Managing Director of our new offices near Sydney. DRIVE ON (DO) wanted to know more about it.

DO: Ferdie, what is your professional background?

FM: My introduction to the industry was through two major UTC SCOOT systems we delivered in South Africa in the capacity as the Software Manager. I transitioned through the various operational and business development disciplines, holding senior management roles. I was seconded to Australia in 1988 and led a global traffic organisation. During this time, I held several executive director roles, including in joint ventures, where we provided the ITS products and systems, technical and project delivery support.

DO: Where is SWARCO Australia located, what is its role, and why was it established?

FM: The trading name is SWARCO Australia PTY LTD, and the company is based in Rydalmere, Western Sydney, NSW. The initial role of the organisation is to provide technical support for the range of SWARCO ITS products and to grow the SWARCO footprint in Australia and New Zealand. Once established, the organisation will broaden its customer base and target market to include South-East Asia and selected APAC countries. The goal is to be the regional window into the SWARCO ITS organisation.

DO: Who are the main customers you are targeting?

FM: The focus is governmental organisations, major service providers, and ITS integrators, a client structure similar to that of our System Integration & Services companies in Europe.

DO: How do you judge the Australian and New Zealand markets in terms of their readiness to adopt ITS technologies?

FM: The Australian and NZ markets are keen to innovate and do wish to embrace

(not just adopt) new ITS technologies. The Australian market is set up to provide some protections to local suppliers. This is done through setting up specifications that tend to align with European/ISO standards but have a few changes that generally make them more stringent. This generally provides the benefit of ensuring that hardware is frequently better quality or more aligned to Australian conditions (high humidity, temperatures, etc.).

The approvals process for adoption by State agencies differs from state to state. The costs and delays to get type approval in each jurisdiction are not insignificant. There are efforts to harmonise and to set up mechanisms to adopt other state agency approvals, but these are not mature. Depending on the device type, other avenues to include these in major projects is through engaging with project delivery and maintenance contractors.

The design consultants tend to be risk adverse (as is the industry in general) and tend to specify the end client's (road agency) approved equipment list. Opportunities do exist where specific device types are not specified. The customers are also keen to investigate and invest in technology which presents an add-on or enhancement but remains compatible with an existing approved device.

Overall, I believe the Australian/New Zealand market is well suited for the SWARCO product portfolio, and the feedback we have received from customers has been extremely positive.

DO: What do you do in your spare-time?

FM: We are very fortunate to live in an area in Sydney which borders several national parks, and I enjoy spending time walking the various trails. In addition, I enjoy spending time with the family. We all gather every Sunday evening for dinner, for which I prepare the meal.

SECOND LIFE FOR DISUSED TRAFFIC SIGNS

Gaggenau-based sign manufacturer SWARCO Dambach shows the way for the sustainable handling of aluminium traffic signs. 88% of CO₂ savings are possible.

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Every year, over one million small road traffic signs are produced. The reason for replacing a traffic sign is usually to update the lettering or because the retroreflectivity of the sign decreases over time. Only in rare cases is the base plate defective.

Aluminium blanks made from a high-quality alloy, which are produced using a very energy-intensive forming process with high CO₂ emissions, are used as base plates for all new traffic signs. The carrier plates of the disused traffic signs are recycled, i.e. melted down in aluminium plants. Due to the high quality requirements, traffic signs cannot be made from 100% recycled aluminium, but only from aluminium alloys that may only contain up to a certain percentage of recycled aluminium. Therefore, there are no recycled signs. And this is precisely where the sign

experts at SWARCO Dambach from Gaggenau in south-western Germany come in. Keyword: recycling. They use a process in which the aluminium carrier plates can be stripped off their films and reused without reshaping. This significantly extends the "first" life of a sign, as the coating can be renewed several times. A "second" life after recycling by melting can follow, but with a much longer delay than it was previously the case.

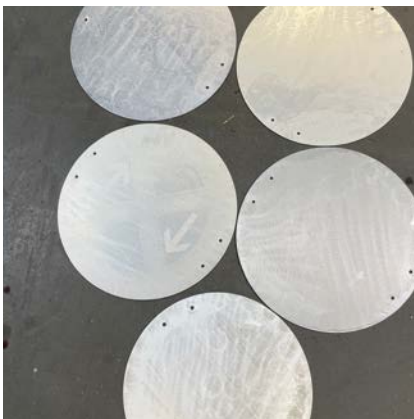
SWARCO Dambach collects used signs from its customers in pallet cages and issues credit notes for the current scrap price. The signs are then sorted into "recyclable" and "for disposal". The signs to be disposed of are handed over to a recycler for environmentally friendly recycling. "We sift through the recyclable signs, sort them according to shape, size and perforation, remove

the coating and store them," explains SWARCO Dambach Managing Director Thorsten Kern. The decoating process is environmentally friendly and completely chemical-free. Only normal household waste is produced, which does not have to be disposed of separately. The new coating is applied by painting and laminating with reflective film. Signs reconditioned in this way retain their RAL quality mark and their approval from the Federal Road Research Institute (BAST). Every remanufactured sign receives the green "SWARCO Refurbished Sign" label.

An independent verification body now certified that the CO₂ footprint of refurbished signs is 88% lower compared to the production of new signs. SWARCO Dambach's green attitude thus makes a valuable contribution to environmental protection and sustainability.



Contact:
Thorsten Kern
thorsten.kern@swarco.com



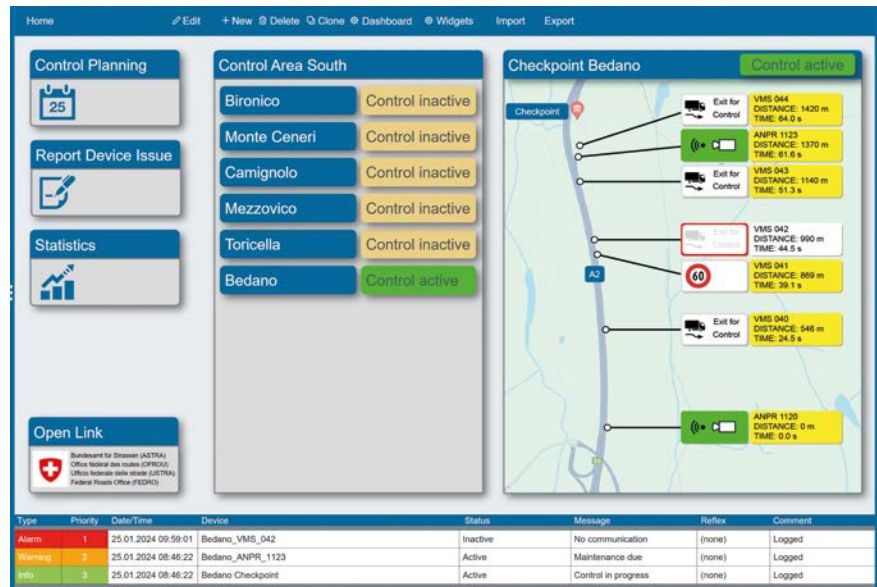
CHECKPOINT TRAFFIC



Contact:
Juerg Biedermann
juerg.biedermann@bergauer.ch

Based on the proven MyHighway platform, SWARCO's Swiss subsidiary Bergauer AG has created an innovative solution for the use case of central traffic control and enforcement on highways.





The comprehensive system consists of a central control center (CCC) and local traffic checkpoints (TCP). It is intended to support authorities in efficiently monitoring and controlling vehicle traffic based on specific criteria. Such criteria can be flexibly defined and applied for on-site inspections. In addition, the system also makes it possible to summon vehicles that are on a blacklist, e.g. due to expired vehicle inspection, unpaid taxes, criminal offenses, etc. A local TCP and its upstream road section are equipped with sensors such as cameras for Automatic Number Plate Recognition (ANPR), Weigh-in-Motion (WIM), radar, and detection loops for speed measurement and vehicle classification. Sensors can be part of an external system and continuously provide data to the local TCPs. Additionally, local sensors can be added to complement external sensors. Information and instructions for motorists are provided by fixed signals and variable message signs (VMS). These signals and VMS are dynamically controlled based on the information collected from ANPR, WIM

and other sensors.

“Multiple traffic checkpoints can be connected to a nationwide central control center”, says Jürg Biedermann, Head of Sales with Bergauer AG. “This solution offers central setup, configuration, operation, and management of both the CCC and all connected TCPs. The architecture allows simultaneous controls to be executed on different TCPs. Operators can schedule inspection events, monitor the control process, and intervene in the event of unexpected problems such as defective sensors or signs. Specific criteria can be defined for vehicle identification based on factors such as weight, license plate information or other predefined attributes”, explains Biedermann.

Overall, a centrally managed traffic control system with modern sensor technology and variable message signs represents a comprehensive solution for managing and controlling vehicle traffic, thereby contributing to improved road safety, efficient traffic flow, and legal compliance.



SWARCO McCain recognized by New York for Outstanding ITS, Green Traffic Controller Cabinet Innovation.

While many companies in the global intelligent transportation systems (ITS) industry have consolidated and now operate under a venture capital model, SWARCO McCain continues to innovate, while focusing on what's important: YOU, the customer! This customer-centric approach includes the continued development of industry-leading hardware and software solutions and offering end-to-end traffic solutions as part of the 1.5 billion-dollar family-owned SWARCO Group. All of this while maintaining the McCain legacy of innovation and leadership.

Dedicated to enhancing the public's quality of life through advancements in travel safety, convenience, and environmental sustainability, the investment into SWARCO McCain combines renowned McCain products with the innovation and resources of the worldwide SWARCO organization. This collaborative initiative directly translates into the expansion of SWARCO McCain's research and development resources, growing software and hardware engineering teams, participating in standards development, and offering a wider portfolio of products and services. At the core of SWARCO McCain's research and development is the

unwavering desire to protect the public, reduce traffic congestion, and promote urban mobility. These core desires are the crucial concerns that drive SWARCO McCain's dedication and commitment to developing software solutions like Red Light Protect, protecting drivers and pedestrians from red-light runners, as well as designing low-voltage cabinet options that protect field technicians from electrical shock and reducing power consumption, thus improving safety and helping the environment. Standing behind every product and solution, SWARCO McCain is unrelenting in providing high-quality, reliable products offered as the industry's low-

PASSION FOR CUSTOMERS AND THE ENVIRONMENT

In 2016, McCain, Inc., the long-time industry leader in the U.S. market for advanced traffic control technologies, became part of the SWARCO Group. A powerhouse active on all continents, the SWARCO Group's mission is to support society's growing mobility needs through a range of traffic management products and solutions. To further solidify the shared vision between companies, McCain was rebranded as SWARCO McCain.

est total cost of ownership. SWARCO McCain continues leading the industry in award-winning ATC cabinets, traffic controllers, dynamic messaging signs, software, and signals. And, the passion does not stop there. A team of dedicated customer support and a first-class distribution network ensure rapid response and support by highly skilled representatives.

Recognizing that relationships are the key to trust and sustaining mutual long-term success, SWARCO McCain remains steadfast in its commitment to channel partners, clients, and the industry. By prioritizing these connections, SWARCO McCain empowers clients

and distribution partners to secure grant funding through safety and environmental opportunities. Additionally, SWARCO McCain actively engages in global initiatives like Vision Zero; collaborating closely with channel partners to correctly implement these endeavors. This contributes to societal well-being and creates avenues for obtaining additional grant funding to elevate intersection safety and optimize traffic control. SWARCO McCain continues to be a transportation solutions provider fueled by a team of talented people. Together, we are driven to transform the traffic industry and change lives, one intersection at a time.



Contact:
Jimi Meshulam
jimi.mechulam@swarco.com

AN INTERVIEW WITH MANUELA FÜRST

She joined the SWARCO Executive Board at the beginning of October 2023 after having held managerial positions at Austrian companies like Agrana and Greiner. DRIVE ON (DO) met Chief Financial Officer Manuela Fürst (MF) for an interview.

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DO: What are your impressions of the first half year on board of SWARCO?

MF: At the headquarters in Wattens and at the different locations I visited, I had a very warm welcome. I see a high degree of dedication to SWARCO throughout the teams I met so far. There is a strong SWARCO family spirit that can be felt every day. I notice a strong hands-on and managerial mentality and met an open climate for new suggestions that I can bring in from my professional experience in other family businesses or a consultancy environment. I like the constellation we have at the Executive Board level where I experience a respectful and content-focused cooperation. To me, this is the major pre-condition for taking optimal decisions for SWARCO as such.

DO: If you compare SWARCO to your former employments, what is different?

MF: Our discussions are very open and productive until we have found a common solution. There is a very low level of "politics", if I may say so. This is very good for the cooperation in general. As far as the headquarters are concerned, I can say that I have seen other companies with a higher degree of centralisation, which is not necessarily better. Thanks to the very high level of motivation among the staff, there is little tracking of agreed tasks necessary.

At SWARCO, Sunday is Sunday, and vacations are taken seriously. This helps to recharge the batteries and supports a stronger performance during the week. I do not take this for granted, and I know this is essentially contributing to the work/life balance. Somewhere I read that the culture of a company can be interpreted by the feeling in one's stomach on Sunday evenings. For me it feels much better now, and I am grateful for this.

DO: What is the portfolio you represent on the Executive Board?

MF: As the CFO, I am responsible for all areas related to Finance and Financing, such as Controlling, Accounting, Tax, and Treasury. In addition, my responsibility includes Mergers & Acquisitions, Risk Management, and Procurement. This is a wide mixture of responsibilities, but with a lot of inherent synergies.

DO: What are the main topics in your focus for the next twelve months?

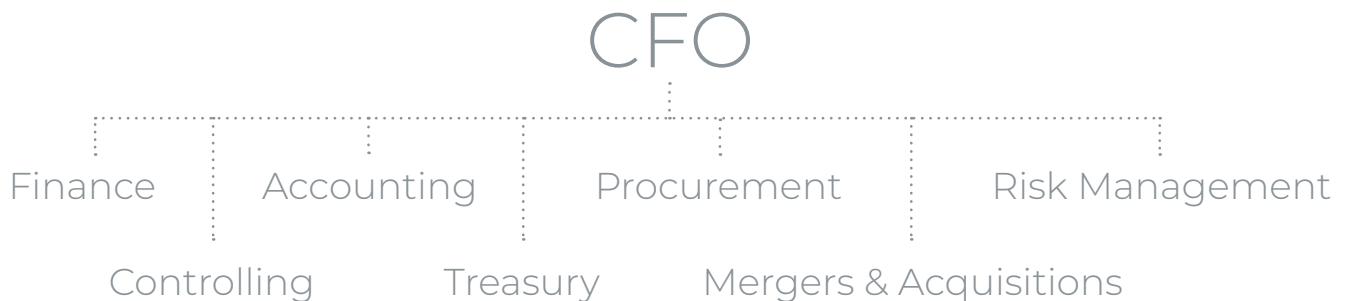
MF: I would like to get closer to the teams, learn more about the people and their competences. Getting a deeper understanding of our products and services and visiting as many subsidiaries as possible remain, of course, on my agenda.

Technically, I will focus on the Net Working Capital situation in order to strengthen even more our financial performance and capability to grow further. There is still improvement potential as far as the transparency of our balance sheet and the EBIT performance are concerned. In this context I also try to push forward our digital performance. Moreover it is my wish to support our female SWARCO network and improve the learning curve within the teams.

DO: What do you do in your spare-time?

MF: I commute between Wattens and Vienna, where my family lives – my husband Markus, my daughter Marie Zoe and my son Maximilian. Interesting, our first names all start with “Ma” 😊. And my agenda makes me travel to other international places as well. So spare-time is very limited, but we try to make the maximum out of it. We love to go skitouring, hiking, we like to cook together or watch a movie. I also help my kids study French and English and other courses. In the evenings, I love to read good books. Wherever I travel I bring my running shoes. This helps me in the mornings, even if it is still dark outside, to digest loads of information and find answers and ideas for open questions or projects.

DO: Thank you very much, Mrs. Fürst, for these insights.



#SWARCOcareer



#Proud
of SWARCO

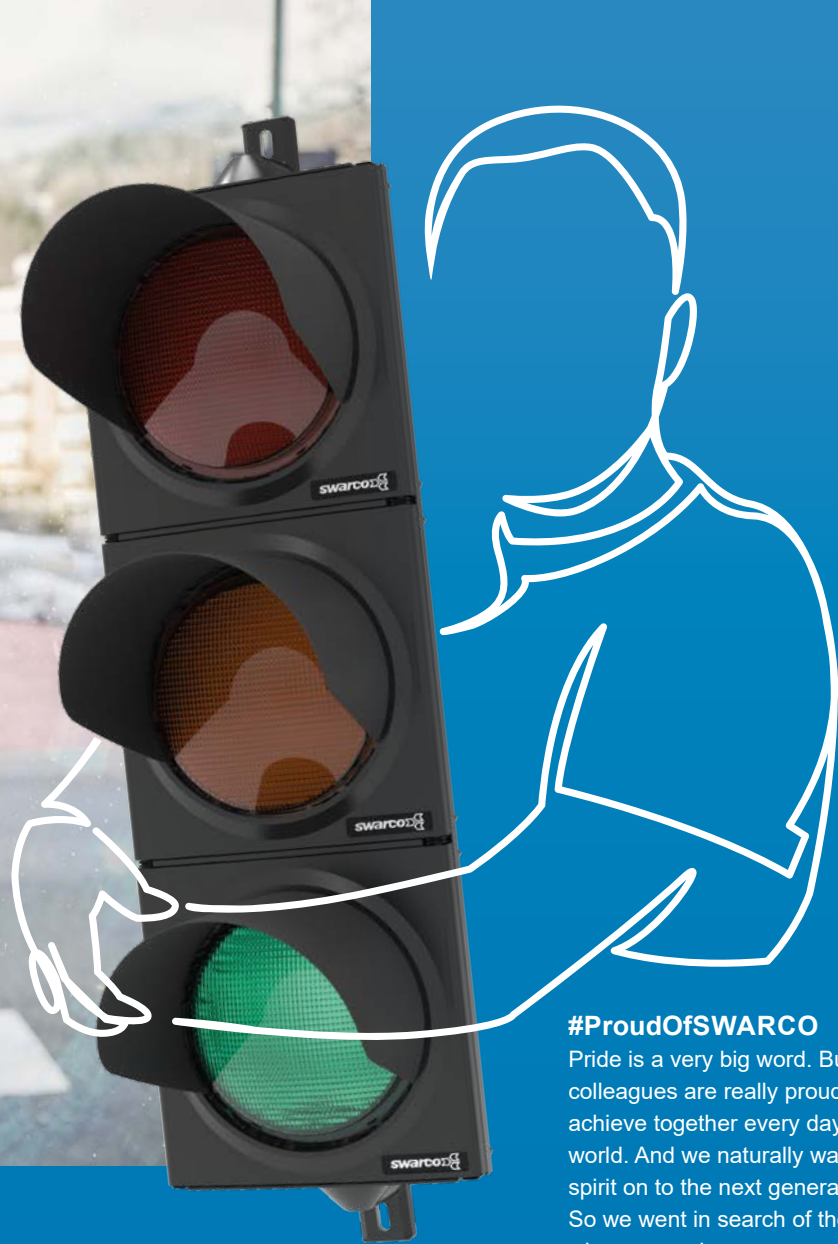


Contact:
Markus Mitterecker
markus.mitterecker@swarco.com



#WeAreSWARCO

We often like to talk about the SWARCO family, by which we mean our entire company with its more than 5,500 employees. We use the term family because family values are important to us at SWARCO: We look after each other. We look out for each other. We want each and every individual to feel at home with us. To ensure that these are not just empty words, we are happy to let actions speak for themselves and implement projects, strategies and programmes that anchor these values in the individual teams at SWARCO. We all have a common goal: everyone here at SWARCO should have a really good time at their workplace and in their environment. We want employees who are proud of working at SWARCO. We want to grow together and, above all, we would like many doors to be open to people at SWARCO so that they can also grow personally.



#ProudOfSWARCO

Pride is a very big word. But many of our colleagues are really proud of what we achieve together every day for a better world. And we naturally want to pass this spirit on to the next generation.

So we went in search of the reasons why our employees are proud of SWARCO as an employer, their job, and their mission. The result is some great interviews. Our colleagues talk about many things that are already going very well at SWARCO and, of course, many new ideas for the future, which in turn will enable us to become even better. What you can definitely feel is the passion, the connection, the spirit, and the pride we have for what we do at SWARCO every day.

#GrowWithSWARCO

Our customers are growing. SWARCO is growing. But we do not want to grow at any price. What is therefore particularly important to us is the personal development of all employees at SWARCO. We support each individual in their personal development and in discovering new perspectives.

In our employee surveys and also in the Time4Feedback employee appraisals, we find out what goals we need to pursue in order to enable progress and development. This enables people at



SWARCO to grow and develop on a daily basis.

#SWARCOworldwide

Our global operations are something we are really proud of as a company. The fact that we help people all over our planet to get to their destination faster, safer and in a more environmentally friendly way is a good feeling and for many of us one of the #ProudOfSWARCO moments. After all, we are saving lives every day, to put it bluntly. That is an incredibly valuable awareness. But SWARCO is also about something else: working worldwide.

Thinking outside the box. Discovering other cultures. With the SWARCO Job Rotation Programme, for example, it is possible to work in another country for a few weeks or months. This helps you to look at things from a different perspective and discover many new things. SWARCO also employs people from a wide variety of countries with all kinds of imaginable backgrounds. In other words, the world of SWARCO is as colourful as the world we live in. We are proud of that, too.

#SWARCOcareer

The world is colourful. So is the world at SWARCO. If you would like to work in a dynamic environment with great colleagues, then discover and apply for a job at SWARCO.



Jobs at
SWARCO



Comparison is the only way to be sure: The Centre of Competence, the globally connected research and development department of SWARCO Road Marking Systems, examines the ecological footprint of different road marking systems. Result: Pavement markings with SWARCO SOLIDPLUS glass beads perform better due to their durability.

Reflective glass beads in road markings fulfill two main tasks: Firstly, they ensure the visibility of the markings in adverse lighting conditions, and secondly, they protect the paint layer from abrasion. To fulfill these two tasks perfectly, SWARCO SOLIDPLUS micro glass beads feature a special glass composition. This enables excellent retroreflection values and makes the micro glass beads particularly durable.



FOR A SMALLER ECOLOGICAL FOOTPRINT



Contact:
Friedrich Wiesinger
friedrich.wiesinger@swarco.com

THE ECOLOGICAL FOOT- PRINT - HOW BIG IS IT?

"We carry out life cycle assessments of standard and high-performance systems - from cradle to grave. This means from resource extraction to recycling or final disposal. We specifically want to determine the ecological footprint of the individual systems over the service life of the road surface, for example asphalt or concrete," explains Friedrich Wiesinger, Team Leader Product Development at SWARCO Road Marking Systems. "A key aspect here is the functional service life of the marking systems. This is ensured until the retroreflectivity falls below the required minimum value."

The robustness of SWARCO SOLIDPLUS offers great advantages: The premium reflective glass beads can perform their protective function for the marking in the high-performance marking systems for a longer period of time. As a result, the paint layer remains protected from abrasion by traffic, and the excellent retroreflection values are maintained over an extended period of time.

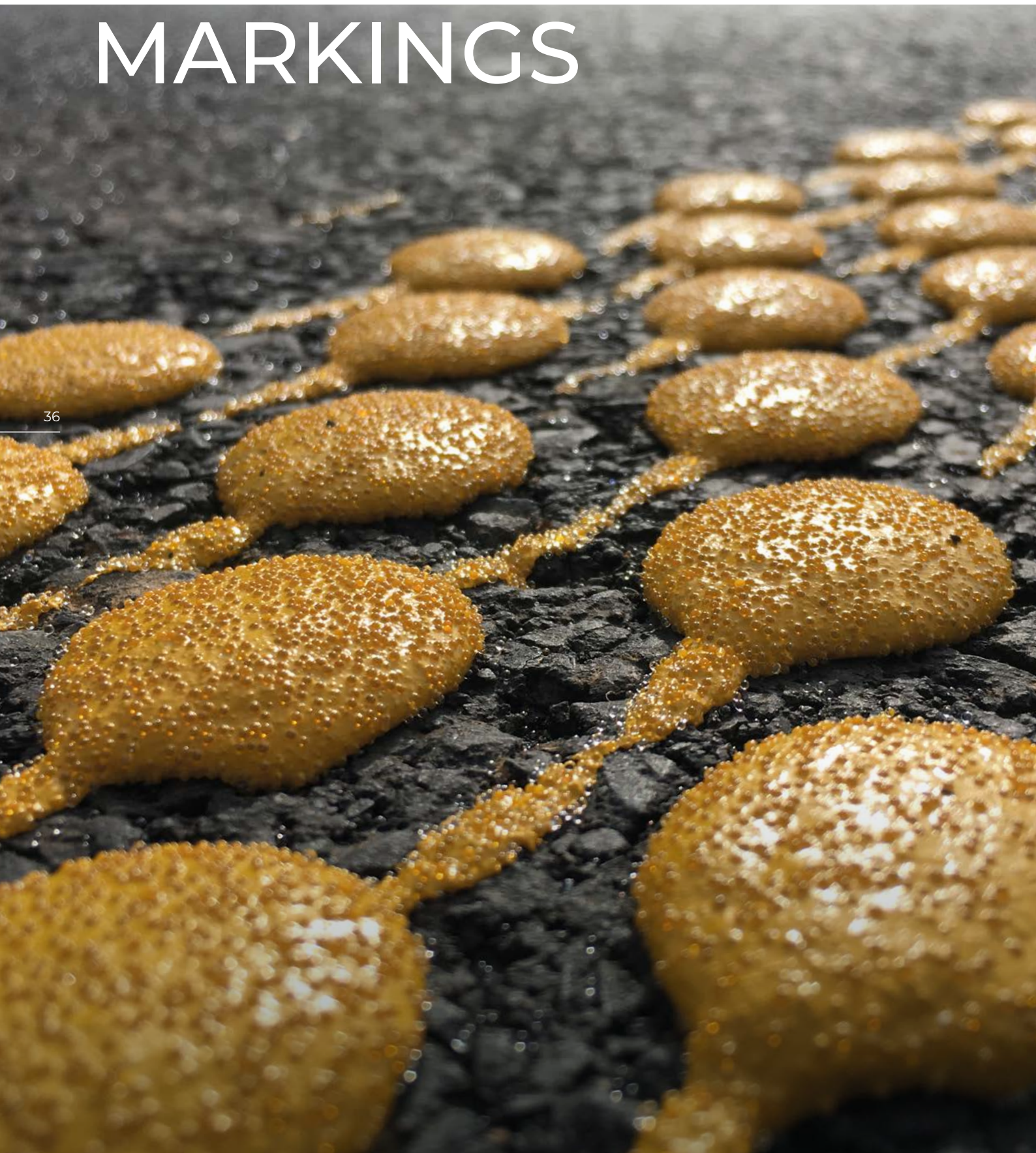
Friedrich Wiesinger adds: "This makes a big difference, especially in cold regions where snow and ice are cleared from the roads by the winter road service."

CUTTING THE USE OF RE- SOURCES

With their longer functional service life, high-performance markings require less frequent renewal. This reduces the use of resources in production, transport, and application. These are all key aspects also taken into account in the life cycle assessment - and therefore have an impact on the respective ecological footprint. "Compared to road marking systems with standard beads, the systems with SWARCO SOLIDPLUS consistently have a lower ecological footprint," reports Friedrich Wiesinger. "We achieved the best values in our test series with a premium cold spray plastic in combination with SWARCO SOLIDPLUS. Savings in CO₂ emissions of up to 50% are possible. We will continue our research to further improve the environmental footprint of our marking systems in the future."

This durability results in measurable advantages for road marking systems with SWARCO SOLIDPLUS beads. This is the conclusion of a recent analysis by the SWARCO Road Marking Systems Centre of Competence. Various marking systems, including solvent- and water-borne paints, cold- and thermoplastics, and cold spray plastics, with standard and premium reflective glass beads were subject to the tests.

BRIGHTER YELLOW MARKINGS





Contact:
Harald Mosböck
harald.mosboeck@swarco.com

It is not so difficult to create great retroreflectivity with white road marking systems. But it is a different story when it comes to yellow ones. SWARCO's Vice President of the Road Marking Systems Division, Harald Mosböck, has a solution for this challenge.



Yellow markings are used all over the world - often at dangerous road sections, in incoming traffic areas or in zones with difficult weather conditions such as snowy mountain areas. In Switzerland, zebra-crossings are made of yellow stripings. Field tests in the Canton of Bern showed that the introduction of SWARCO's SOLIDPLUS high-performance beads led to a drop to almost zero of fatal accidents or injuries involving pedestrians at the crossings. Also at a test deck of the Texas DOT with structured thermoplastic markings, the high-performance beads branded SWARCO DURALUX delivered outstanding retroreflectivity readings after 30 days of traffic exposure. Initial readings of 829 mcd/m²*lx dropped to just 674, while the Texan standards require a minimum of 250 mcd for yellow markings under dry conditions after 30 to 40 days of traffic exposure.

“SWARCO SOLIDPLUS micro glass beads combine the advantages of an environmentally sound production process with high performance for greater road safety”, Harald Mosböck explains. “One key feature is that the premium glass beads achieve excellent retroreflection values in both white and coloured markings. Particular attention is paid to yellow road markings, where typical RL values often exceed 600 mcd/m²*lx”, says Mosböck. SWARCO SOLIDPLUS glass beads make the yellow markings clearly visible in the dark and under challenging lighting conditions. Another crystal-clear advantage: Thanks to their unique glass formulation, SWARCO SOLIDPLUS micro glass beads are much more robust, providing the yellow markings with a much longer functional life. Road marking service providers count on the quality of these beads, also in blends of high-performance with standard beads, because they can be sure their applied systems reach the required night-time visibility values at any time.

THE DIGITAL MOTORWAY

SWARCO and AFUSOFT support the digitalisation of German motorways. Roadside infrastructure will deliver warnings directly to vehicle dashboards in the future.



Contact:
Kevin Seipel
kevin.seipel@swarco.de

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Germany's operator of the highest-ranking road network, Autobahn GmbH des Bundes, is driving forward the digitalisation of roads with the nationwide roll-out of cooperative intelligent transport systems (C-ITS). The aim is to use infrastructure-to-vehicle communication to provide early warning of hazards, improve traffic flow, and increase overall road safety. The bidding consortium consisting of system integrator SWARCO Traffic Systems GmbH and AFUSOFT Kommunikationstechnik GmbH was recently awarded the contract for Lot 3 of the C-ITS project of Autobahn GmbH. The project involves the comprehensive equipping of Region 3 (north-east, east and north Bavaria branches of Autobahn GmbH) with a total of 551 roadside communication systems (ITS Roadside Stations, IRS), including the associated service and maintenance. The contract term covers four years from the start of the contract with eight further optional extensions of twelve months each. "The overall system consists of the IRS and the co-operative ICS (ITS Central Station) as well as the connection to upstream and downstream systems," SWARCO Product Manager Kevin

Seipel explains. "For this purpose, the mobile warning trailers are equipped with the IRS, which communicate with the vehicles in the form of radio telegrams, provided they are already equipped with the necessary technology. In an initial measure, warnings are transmitted to work sites of short duration in particular."

"We have been equipping mobile warning signs and LED signs in various federal states with our secure communication systems for over twenty years and have been developing and supplying ITS technology for traffic telematics for ten years now," explains Professor Erich H. Franke, Managing Director at AFUSOFT. In addition to the actual devices, this also includes the distributed communication network that processes the data in a tamper-proof manner. Safeguarding the privacy of road users and, last but not least, protection against sabotage and spying are top priorities. In order to avoid hazards and improve traffic flow, road users receive information on their vehicle display long before they reach the actual roadworks, so that they can adapt their driving style in advance and thus significantly reduce the risk of accidents.



IRS

Radio antenna

LISA: THE FUTURE-READY ASSISTANT FOR TRAFFIC ENGINEERS

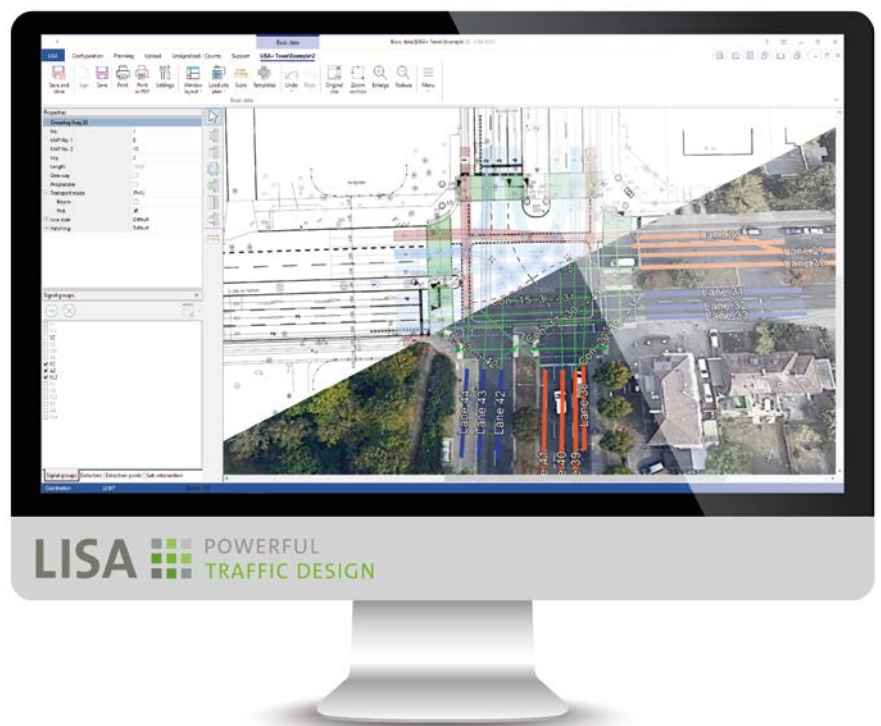
Today's traffic engineers navigate a rapidly changing landscape. Challenges like climate change, resource scarcity, and urbanisation are reshaping mobility and traffic management paradigms. Modern urban living demands next to sustainability and reduced environmental impact also a redistribution of available space, necessitating a shift in focus, away from mere car-centric traffic flow optimisation towards whole new mobility concepts. New communication standards offer increased stability and data volume, facilitating the rise of CCAM (Cooperative, Connected, and Automated Mobility) and other new technologies.

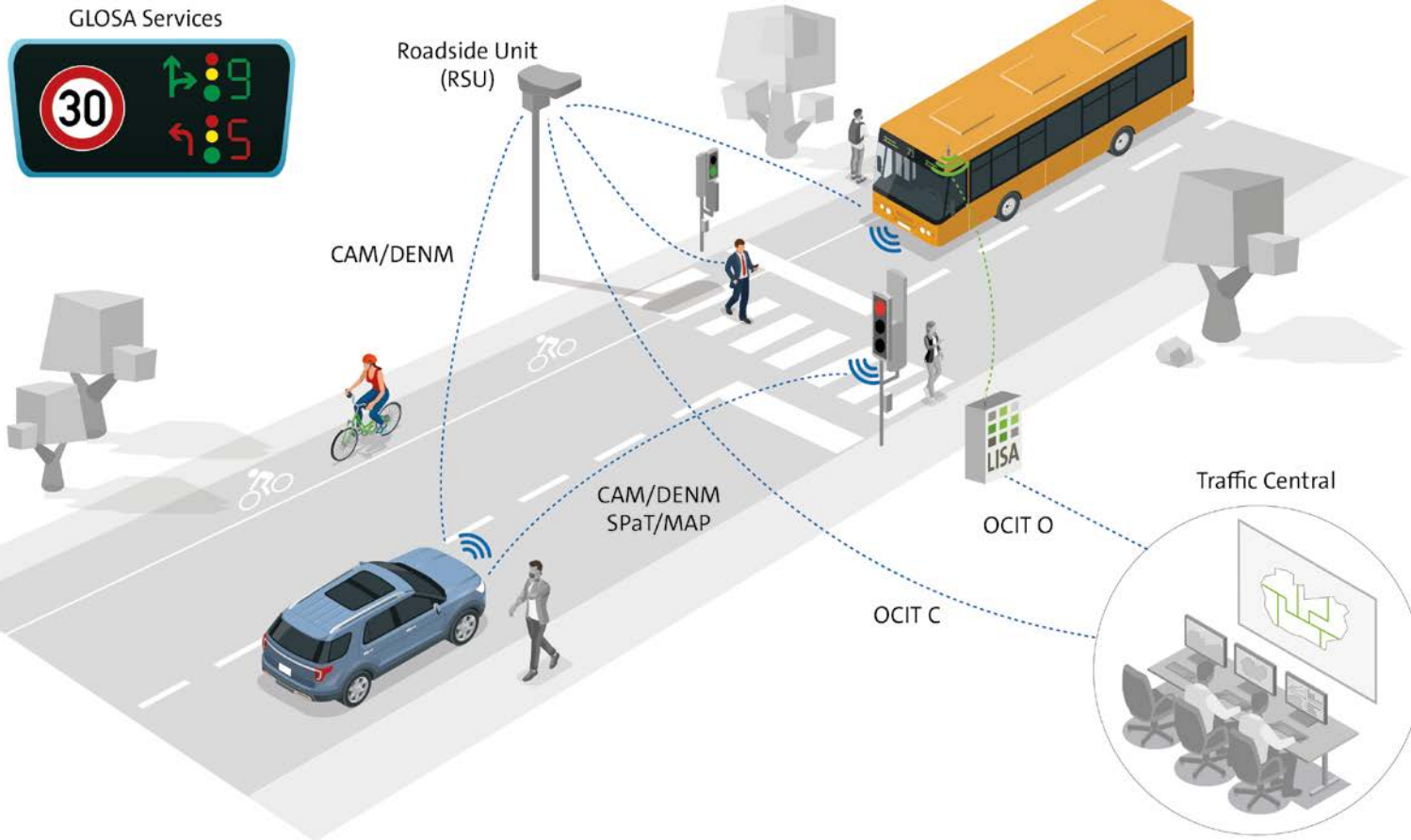
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Contact:
Paul Schneider
paul.schneider@schlothauer.de

lisa@schlothauer.de





“Communication among various road users and infrastructure becomes more and more a reality”, says LISA product manager Paul Schneider from Schlothauer & Wauer traffic engineering company in Berlin. “Cars, buses, trams, cyclists, pedestrians, emergency vehicles, etc. can exchange data in real-time with traffic signals, controllers, signs – directly or via a central cloud service, sent/received by a mobile or an inbuilt device” explains Schneider.

As innovation accelerates, driven by emerging start-ups and public research projects, norming committees – such as ODG (OCIT), C-Roads and others – are defining protocols for standardised use across providers and components. Schlothauer & Wauer experts are part

of these initiatives and projects and bring this knowledge into LISA, their market-leading comprehensive software suite. LISA is future-ready and already supports traffic engineers in leveraging CCAM technologies today. Speakers of several cities and institutions presented their projects at Schlothauer & Wauer’s CCAM user forum and highlighted public transport’s leading role in adopting CCAM, driven partly by the impending end of R09 radio messages. Projects like Leezenflow, facilitating GLOSA (Green Light Optimal Speed Adaption) services for cyclists, showcase CCAM’s potential.

LISA facilitates these various use cases, including:

- Creating MAPs,

- Leveraging real or virtual MAPEM, CAM, SSEM, and SREM data,
- Utilising CCAM functions in the logic editor (LISA C-ITS library 2.0 has been released in October 2023),
- Visualising impacts in the inbuilt test site or by exporting them seamlessly into third party simulation software.

Testing different levels of CCAM-equipped road users to evaluate their impact on criteria like stops, waiting times, greentime distribution, emissions, and other environmental KPIs, traffic experts can now proactively integrate CCAM into their work for future mobility and traffic management with LISA. It’s time to embrace the future today!

Embark on a journey into the future of urban mobility with ImFlow, SWARCO's revolutionary Urban Traffic Control (UTC) solution that seamlessly integrates Cooperative, Connected, and Automated Mobility (CCAM) technologies.



Contact:
Koos van Vliet
koos.vanvliet@swarco.com

imflow@schlothauer.de

IMFLOW - A SYMPHONY OF C-ITS AND AI ELEGANCE

FOR CUTTING-EDGE URBAN TRAFFIC CONTROL

To understand how ImFlow goes beyond the ordinary and creates a paradigm shift through the fusion of Model Predictive Control (MPC), CCAM and Artificial Intelligence (AI), let us take a look at the history:

"Urban Traffic Control (UTC) systems were introduced in as far back as the 1970s, with the first generation providing coordinated control based on pre-determined fixed schedules, and the next generation providing System Activated Plan Selection (SAPS) based on detector data", remembers Koos van Vliet, ImFlow product manager at SWARCO in Dutch Amersfoort. "Adaptive" traffic control now means a system that takes into account a variety of factors and road users (i.e. cars, pedestrians, and cyclists, public transport, emergency vehicles, etc.) and optimises signals and traffic flow to minimise stops, travel time and therefore emissions.

In addition to traffic engineers using logic to program traffic controllers, a wide range of adaptive traffic systems are now available on the market, each with specific functions, features and levels of adaptivity to suit individual local requirements and complexity, ranging from vehicle actuation to strategy managers (SAPS) to model-based control - for individual intersections, corridors, and networks.

"ImFlow's Model Predictive Control (MPC) navigates the complex terrain

of traffic dynamics by minimising a cost function over a finite horizon", van Vliet reports. "Having won the prestigious Intertraffic Innovation Award in 2012 as the first policy-based adaptive traffic control system, it now combines CCAM and Artificial Intelligence (AI), enabling city authorities to reap the full benefits of CCAM: increased safety, reduced environmental impact, and a newfound sense of inclusiveness."

The integration of the Dutch Talking Traffic and Belgian Mobilidata programmes was the catalyst for the powerful combination of MPC and C-ITS, making ImFlow an open eco-system that allows any traffic light controller to be upgraded to an intelligent traffic controller.

Imagine a traffic control system that learns, predicts, and optimises in real time, responding intuitively to the ups and downs of urban life: prioritising trucks, groups of cyclists and other active road users, providing GLOSA services that redefine the traffic experience. All based on the city's policies.

With nearly a thousand ImFlow installations in eight countries, the latest successful additions in Darmstadt in Germany and Crewe (East Cheshire) in the UK, the system is an attestation of its reliability as the foundation for modern traffic control, ensuring harmonious coexistence of road users with its mantra of Optimise, Prioritise, and Inform.

TRANSFORMING URBAN TRAFFIC MANAGEMENT IN ZWICKAU WITH MYCITY ADAPTIVE

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“With SWARCO MyCity, we always have an overview of the traffic and our corresponding infrastructure in Zwickau and can control it centrally. The system grows with our requirements thanks to the various modules: MyCity Adaptive, for example, not only takes into account the current traffic volume, but also creates a short-term forecast and thus optimally adapts the control of our traffic lights”, says Stefan Weiß, traffic planner and engineer at the Department of Traffic Planning / Road and Bridge Construction of the City of Zwickau. The installation in the 90,000-inhabitant city of Zwickau in Saxony in eastern Germany is the latest in a series of successful MyCity implementations.



Contact:
Torben Titze
torben.titze@schlothauer.de

SWARCO's intelligent program selection approach for advanced adaptive traffic control is represented within MyCity by **MyCity Adaptive**, a module that is also available as an open stand-alone solution.

The core functionality of **MyCity Adaptive** is characterised by

- deterministic scenario selection based on comprehensive analysis of traffic volumes, loss times, and waiting times
- dynamic adaptation to local conditions while integrating with actuated and adaptive systems,
- enabling and thus optimising traffic control at corridor and network level
- a clear focus on transparency and traceability

- its foundation in scientific knowledge and precise algorithms, backed by decades of experience and expertise from research and traffic consultancy projects around the world.

“MyCity Adaptive enhances the performance of local adaptive controls by identifying and reallocating unused green time, ensuring that just as much green time is provided as is needed for the expected number of vehicles”, explains product manager Torben Titze. **“It optimises the offset of coordinated controls to improve the quality of green waves. By changing project-specific parameters at runtime it allows for a wide variety of customised traffic optimisation solutions.”**

Efficient use of existing infrastructure is a major benefit of the system, as **MyCity Adaptive** relies on low detection requirements, meaning that the existing detection infrastructure can generally be used without adaptation. The robust design against detector failures ensures continuous functionality of the software under all circumstances. Always one step ahead and ready for future challenges, **MyCity Adaptive** implements innovative scientific approaches, including adaptive learning behaviour and predictive analysis algorithms to anticipate future traffic patterns. The software not only minimises stops and loss times, but also contributes to increasing traffic safety and reducing emissions.





SWARCO CEO Michael Schuch (2nd from left) with Ertico CEO Joost Vantomme (l.), Ertico Chairman Angelos Amditis (2nd from right) and Herald Ruijters from the European Commission at the GoGreen ribbon cutting in Lisbon in May 2023



A POSITIVE STOCK-TAKE



Contact:
Itir Coskun
itir.coskun@swarco.com

In May 2023, SWARCO's GoGreen team started a unique journey at the ITS European Congress in Lisbon, traversing various exhibitions and trade fairs across Europe to present their innovative approach in achieving the climate targets set by the European Green Deal.

Since then, we have met with a diverse audience, including city representatives, private industry partners, academicians, traffic experts and engineers in a mission to support them in meeting the EU Green Deal objectives and, at the same time, learn about the current market challenges to ensure our future development directly respond to what our customers need.

Fast-changing mobility trends require new ways of managing traffic, and the traditional way is no longer sufficient in times of increased travel demand. GoGreen makes sure cities can experience how ITS solutions can be integrated and support cities with the current needs of mobility management for all types of travellers – as travelling green means also travelling different.

Sustainable progress in this matter is only possible by striving for true collaboration. “It is not possible to just meet a customer and present a general solution that fits everyone. But if we talk about available technologies in the right way, with the right people at the table, we can identify all the challenges and reveal potentials that sustainably benefit the society”, Rory Abraham, Innovation Manager at SWARCO, points out that this is something we need to put our focus on.

WHAT IS GOGREEN AND HOW DOES IT STAND OUT?

GoGreen is an initiative that welcomed much support from the European Commission, visualising how the EU Green Deal cities can utilise a scalable and modular eco-system of ITS to reduce pollution coming from day-to-day traffic. The initiative is supported by an immersive VR experience: people get to see a connected city, play with different ITS components, and get a visualisation of how these components change the city’s infrastructure, look and feel, and traffic flow – in a nutshell, it shows how SWARCO can help to build green cities, wrapped in a very tangible, understandable, and interactive way.

“GoGreen plays a vital role in helping cities understand how ITS can contribute to meeting the Green Deal goals. Along with insights into various mobility challenges and the significant value of ITS to address them, cities are offered a strong partner in sustainability with an End-to-End portfolio and access to an internal expert pool”, Itir Coskun, Innovation Manager, underlines the benefits of the initiative.

WHAT ARE THE KEY LEARNINGS?

Cities are confronted with individual situations, whether due to varying geographic, economic, or climatic conditions. But there are some fundamental challenges which are relatively similar, based on our GoGreen survey answered by over 80 leading transport stakeholders from 20 countries:

- Demand for behavioural shift and public awareness: Demand to change travel behaviour and raise awareness about sustainable transportation alternatives like micro mobility and public transport.
- Political and governance hurdles: Political structures and governance hurdles hinder effective transportation strategies for climate concerns. Decision-making involves complex prioritisation across government levels and sectors.
- Enhanced citizen engagement and awareness: Public participation in decision-making and the spread of information about the benefits of sustainable transport options are crucial for change.
- Infrastructure and funding challenges: Challenges due to outdated systems, limited funding, and the need for substantial investments, particularly in public transport and sustainable mobility.
- Lack of clear ownership and collaboration: Prioritising challenges remains difficult due to various reasons. Collaboration among organisations is crucial, requiring

breaking down silos and fostering cross-departmental cooperation to address sustainability effectively.

- This aligns with discussions at the events and clearly points out where levers should be applied. “It proves that we are heading into the right direction”, Coskun emphasises the experiences she encountered during the meetings: “We are not just any contractor; we are a willing partner with a lot of knowledge in domain technology. Our objective is to find the best tailor-made solutions for our customers and the environment in the long term.”

HOW DOES GOGREEN RESPOND TO THE MARKET SURVEY OUTCOMES?

The benefit of GoGreen is evident in its tangible outcomes and will lead to significant positive impacts on the environment and urban mobility. The initiative focuses on reducing congestion, fostering park & ride solutions, cycling, and pedestrian infrastructure, increasing road safety for vulnerable road users, promoting public transport and supporting with mobility strategies based on detailed data.

GoGreen enables cities to understand how to upgrade their mobility eco-system to the next level. It will exploit the full potential of ITS and push the boundaries of innovation in the quest for a more sustainable mobility landscape.

HOW WILL WE MOVE ON WITH GOGREEN?

Since the start of the GoGreen initiative in May 2023, our aim has been to share expertise and learn from cities until Intertraffic 2024. But the journey is far from over, as it brings SWARCO closer to customers. The need to expand globally and engage with cities worldwide, including those not part of the European Green Deal, is vital, as climate change does not stop at European borders. Collaborative action is needed to create a greener future for all of us. And this is what we are aiming for!

Let's make Europe green. Deal?



The cities committed to the European Green Deal lead by example. Mitigating climate change, reducing emissions and pollution, and transforming energy and mobility systems are challenging tasks for the cities on their way to become climate neutral by 2050.

SWARCO is ready to lend support when it comes to reshaping urban mobility with ITS technologies. Together, we can make big steps towards reaching the Green Deal goals and improving quality of life for us and future generations.

Let's make Europe green. Deal?

Come and see us and our GoGreen VR experience at INTERTRAFFIC AMSTERDAM

16 - 19 April 2024 | Stands 02.222 and 02.236

SWARCO | The Better Way. Every Day

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