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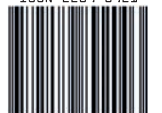
**THOUGHT LEADERS**

**The Energy Challenge and Other  
Extreme Conditions**

**SPECIAL REPORT**

**Alexander Dennis Limited**

ISSN 2269-8921



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# More than a Mode of Transportation



stefan@asianbuses.com

When I took the bus to school, back in the days, it was a bare-bones vehicle. It had seats covered in squeaky vinyl and buttons to let the driver know you wanted to alight at the next stop. It was functional. It got us to the next town, where our school was located. Besides that, it was a place where I would do my homework, swap books I had read for new ones and catch up with friends. I would know from a timetable posted at the bus stop what the schedules were.

Today, modern buses are very much rolling technological marvels. Here in South-East Asia, I welcome the air conditioning the most. However, I also appreciate that there are now better seats and APPs that can give us the exact whereabouts of a bus. The latest creation of SC Auto shows what is possible today. We went to have a look to find out just how much buses have changed from being a simple way of getting from A to B. Recently, Singapore's Land Transport Authority received Volvo buses that feature USB charging ports at every seat, sophisticated passenger information systems as well as anti-collision warning systems. With all that in place, surely a journey will be less stress and more of an experience. I just wish we had all these when I took our bus to school.

There are now various uses of buses. For instance, they can be used as mobile showrooms. Now, there is a whole culture around buses. There are bus spotters and collectors of models. As cities grow, more and more people take an interest in buses. Not just from a convenience point of view, but also with environmental protection in mind.

With mini buses, such as the ROSA, cities can ensure that commuters reach the places that they need to go to while at the same time being independent from their personal car.

In Dubai I also learned a lot about the changing nature of businesses that surround buses. Shell is now shifting gears and is aiming at being more than a provider of oils and petrol. Speaking with Dr Jason Brown, I got to know more about their view of what is needed to stay relevant. Also responding to specific requirements of the market is Sendok Group, which recently launched a mini bus that can be driven with a car licence instead of having to have a commercial vehicle licence. This could be a game changer as it would allow hotels and smaller tour groups to offer tours in the Co-Star.

Besides the production of commercial vehicles, manufacturers also recognise that they have a role to play in society. Scania has launched a new CSR initiative, which we are talking about in this issue. I am very happy to see that companies are taking responsibility, realising that they can make an impact.

Made possible by our advertisers, readers and business partners, I also won big last month. Following our win at the Magazine Publishers Association Awards last year, we bagged two more awards this time. The team won "Trade Media of the Year (Bronze)". Not a small achievement and it was only possible thanks to the dedication, hard work and drive of the people in our three offices. My writing must have impressed some seasoned publishing professionals as I went home with the trophy for the "Editor of the Year (Gold)" award. As you can imagine, I went home with my head held up very high that night. However, this is thanks to the people that let me have their time to conduct interviews and let me have a share of their knowledge. For that, I am grateful, and I will continue to strive to produce the best possible content for our readers.

Drive safe and I shall see you in the new year, 

Stefan Pertz  
Editor, Asian Buses

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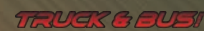
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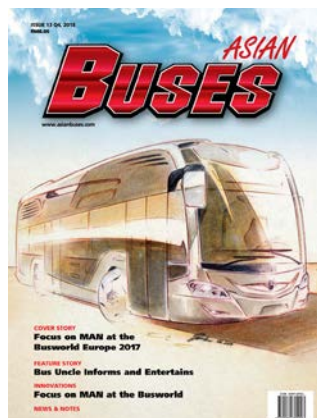
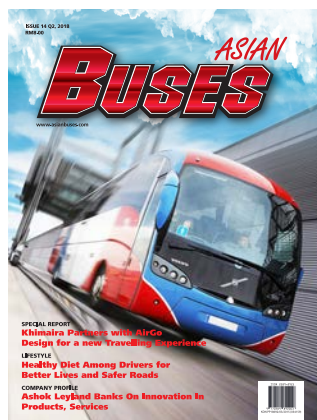


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## EDITORIAL

**EDITOR** Stefan Pertz  
**WRITERS** Carol Yeoh  
Farezza Hanum Rashid  
**GRAPHIC DESIGNER** Tony  
**PHOTOGRAPHERS** Floyd Cowan  
Rainer Pertz  
Carol Yeoh  
Farezza Hanum Rashid  
**CONTRIBUTORS** Floyd Cowan  
Murralli Thalor

## ADVERTISING

Nicole Fong  
[Nicole@asiantrucker.com](mailto:Nicole@asiantrucker.com)

## SINGAPORE

Floyd Cowan  
[Floyd@asiantrucker.com](mailto:Floyd@asiantrucker.com)

## THAILAND

Songyot Kamontavikun  
[Songyot@asiantrucker.com](mailto:Songyot@asiantrucker.com)

## ON THE COVER

A Bus in the Desert outside Dubai

## CIRCULATION, CONTRIBUTIONS and SUBSCRIPTION

[info@asiantrucker.com](mailto:info@asiantrucker.com)

## WEBSITE and E-NEWSLETTER

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# Danfoss EDITRON Powers First All-electric Bus Route in Taipei



The city of Taipei, Taiwan, has opened its first all-electric bus route, with fleet powered by electric drivetrains delivered by Danfoss EDITRON, the electrification arm of Danfoss group. 12 buses serve the 31.5 kilometres-long route across Taipei, linking 4 MRT stations, 11 schools and 5 major business districts.

The 12-ton buses are the lightest on the market in their class. Thanks to the extremely compact and lightweight design of the EDITRON system. The system's highly-efficient Danfoss Permanent Magnet Machines also reduce fuel and prolong the buses' operation range. With zero emissions, the fleet is able to run more than 260 kilometres when fully loaded, and over 300 kilometres when empty. Each bus's roof is equipped with a 302-square-metre roof single crystal solar panel that can generate 130kW of electricity per day. Each bus can be charged in just five hours.

EDITRON's control and monitoring software is capable of running self-diagnosis and is constantly monitoring and reporting to the control centre on motor temperature, power situation and remaining mileage. This greatly reduces the risk of sudden bus failure and improves the efficiency of the overall operation.

The buses were commissioned by RAC Electric Vehicles, and the company has already placed an order to Danfoss EDITRON for another 36 drivetrains to be delivered early next year. This will help to support Taipei City Public Transportation Office's new green energy policy, which aims to have 400 electric buses on its roads in the next four years. The long-term goal for the city is to have an all-electric bus network.

Kimmo Rauma, Danfoss EDITRON Vice-President, commented: "We have been very active in Taiwan since we launched Asia's first hybrid electric ferry in 2017 and we've seen how quickly electrification is happening in this region. As a company committed to fighting pollution, we are excited that Taipei has made the choice

to electrify its bus fleet and, of course, that they chose Danfoss EDITRON technology to achieve that vision. The confidence shown in the EDITRON system confirms us as the high-quality choice for bus manufacturers and we look forward to many new projects in the pipeline."

Danfoss EDITRON has a manufacturing partnership with Asia's largest electric motor producer TECO Electric & Machinery Company. The company manufactures Danfoss EDITRON's SPRM motors in Asia, making it easier for customers to equipped themselves with the market-leading electric drivetrains with a shorter lead time and advantageous prices.

Urban electric buses constitute the fastest part of the EV market, and the Asian market is driving momentum with China taking the lead. The country is the world's largest bus maker, producing 99 percent of the world's global fleet, and is putting on the roads the equivalent of the entire London bus fleet every five weeks.

## About Danfoss EDITRON

Danfoss EDITRON specializes in hybrid and electric powertrain systems for off-highway and marine markets. A business unit of Danfoss, it develops and manufactures high-performance power systems for heavy duty vehicles, machines and marine vessels, based on its unique synchronous reluctance assisted permanent magnet (SPRM) technology.

Based in Lappeenranta, Finland, Danfoss EDITRON has assembled an award-winning team to work on the technologies that will enable the world of tomorrow to do more with less. EDITRON is the new name for the complete electric drivetrain system developed by the company. It is controlled by powerful software that optimizes each individual component of the electric or hybrid drivetrain, leading to far more intelligent management of power distribution in order to deliver maximum efficiencies for the end user. 



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pleasant is one of the objectives of the Land Transport Master Plan 2040. I hope to see more of such initiatives as we strive to make Walk Cycle Ride the preferred way to travel."

These 50 Diesel Hybrid buses are supplied by Volvo Buses Singapore. The new Volvo hybrid buses are propelled electrically from standstill up to 15–20 km/h. As speed increases, a small efficient diesel engine complements the electric motor. The batteries are charged during braking thus requiring no external charging infrastructure. The highly efficient Euro 6 Volvo hybrid buses come with a 5 litre engine along with a 600V lithium-ion energy storage system.

As cities become congested and more urbanized, it is imperative to have a good, reliable, efficient and less polluting transportation system. - These hybrid buses will deliver savings in emissions and fuel consumption thus providing a greener environment -. The buses also cut harmful nitrogen oxides and particulate matter by as much as half compared to regular diesel buses.

"We are excited to deliver hybrid buses to the LTA in Singapore. It is great to see that sustainable transport solutions are and remain a key priority for the Singapore Government. With hybrid buses on the roads, we believe that the LTA will save on fuel costs, and Singapore will benefit from cleaner air, less noise pollution and new possibilities for city development." says Volvo Buses Singapore Director, Manish Sahi.

"Volvo Buses Singapore would like to congratulate the LTA on their new acquisitions and look forward to delivering Asia Pacific's largest fleet of Volvo hybrid buses." He added. ■

## Land Transport Authority of Singapore introduces 50 Diesel Hybrid Buses

*To build a more environmentally friendly public bus fleet, Land Transport Authority of Singapore introduces 50 Diesel Hybrid Buses fitted with new features and advanced technology.*

Commuters can expect smoother and more convenient rides with these hybrid buses. One of the new features on the bus is the enhanced Passenger Information Display System (PIDS), which can provide onboard audio announcements and visual representations of the upcoming bus stop. The PIDS on the exterior of the bus can also show the bus service number, bus destination, and the next 3 MRT or LRT stations along the bus route. These innovate solutions will help the commuters to better plan their journeys.

Additionally, the bus will feature more space for wheel chair bound passengers and also stanchion poles that are brighter in color will be beneficial for visually impaired passengers. All these features will be rolled out on the 50 diesel hybrid buses set to hit the roads progressively from December.

Baey Yam Keng, Senior Parliamentary Secretary said that "Come December, you will see some of these new diesel hybrid buses as part of your daily commute. The buses provide quieter and smoother rides for commuters and a more comfortable working environment for bus captains. Making journeys more



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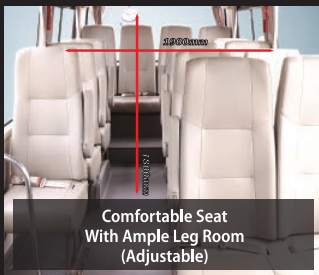
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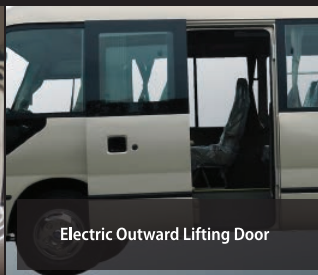
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# Busworld rolls into South East Asia

*Busworld South East Asia, a third new exhibition for Busworld in 2019 in Jakarta, Indonesia.*

The first Busworld South East Asia exhibition and congress will be taking place from March 20 – 22, 2019 at the Jakarta International Expo (JIEXPO) Kemayoran, Jakarta. These premises are the perfect place for an international exhibition like Busworld. With this new exhibition, Busworld is counting eight exhibitions throughout the world: Europe (Belgium), Turkey, India, Russia, Latin America (Colombia), Asia (China), Central Asia (Kazakhstan) and last but not least South East Asia (Indonesia).

Busworld decided to organise a new exhibition in Indonesia because of the promising bus and coach markets in Indonesia as well as in its neighbouring countries. The exhibition is organised together with Global Expo Management (GEM), who already have a thorough experience with exhibition organisation and the commercial vehicle industry.

Indonesia has a population of 260 million people (40 percent of ASEAN population) spread over 34 provinces with 415 districts. Due to traffic congestion by cars, the government of Indonesia is continuously improving the public transport system with for example a Bus Rapid Transit system in Jakarta, Yogyakarta, Solo and other provinces. The Indonesian Ministry of Transportation has planned for procurement of 3 000 new BRT system buses in the 34 provinces by 2019.

Next to this, the current bus fleet is old and needs renewal. The Ministry of Transportation is in the process of regulating the maximum ages: for buses the maximum

age will be 25 years and for tourism coaches 10 years. According to police records there are over 500 000 units of buses in operation on the road with 35 percent of them being over 20 years old. This would mean that Indonesia will need 175 000 units of new buses in the coming years.

Indonesia is also aiming to reach 20 million visitors by the end of 2019. Ten new destinations are ready now. In order to serve this larger number of visitors, forecasts are saying there is a need for 5 000 new coaches by 2019. Coach tourism is the next big thing in Indonesia. Since 2016 coach operators also started to introduce double decker coaches. Needless to say, that Indonesia is a perfect place to host a Busworld exhibition. Didier Ramoudt, President of Busworld International is very convinced about this location, "I am sure that the Indonesian bus and coach market is ready for a specialised professional bus and coach only exhibition and conference. Although the bus and truck industry might be linked through their similar technologies, the markets are completely different. The bus and coach industry deserves a separate targeted approach. Together with GEM Indonesia, we will make this happen!"

The exhibition is supported by IPOMI, the association of Indonesia's young bus operators and ASKARINDO, the association of bodybuilders. ■



## Tyrexpo Series Returns to Singapore

**T**yrexpo Asia is an event part of the Tyrexpo Series exhibitions held in various parts of the world - Singapore, India (Chennai and New Delhi) and South Africa, driving industry growth and synergising opportunities from its various sectors.

Generally regarded within the industry as Asia's most leading biennial tradeshow in the Asia Pacific region for the Tyres, Automotive Repair Equipment, Tools, Parts and Accessories industries, Tyrexpo Asia enters into its 12th edition and will be held from 19 to 21 March 2019 at Singapore EXPO, over a sprawling 15 000 square meters event floor across 2 halls. Held alongside 2 co-located shows - GarageXpo Asia and Automotive Aftermarket Asia, the event is expected to draw about 6 000 trade attendees globally – amongst which 80% are from the Asia Pacific region, with a record 300 exhibitors from almost 25 countries, including more than 400 brands.

Retailers and fleet operators can expect extensive exhibits of OTR tyres and retread tyres to meet the varied business objectives in terms of fuel efficiency and high mileage for the right fleet application. Latest tools, equipment and significant advances in tyre management, tyre repair and retreading on showcase also provides opportunities for OEMs, distributors, retailers, fleet operators, garages and retreaders alike to interchange ideas and solutions to further drive operational efficiencies.

With five months to go before the event, more than 150 exhibiting companies have already confirmed their participation in Tyrexpo Asia 2019. Returning exhibiting manufacturers such as Linglong Tyres, Aeolus Tyres, Saffiro Tires and Eversafe Rubber as well as new exhibiting companies such as Pirelli, Hengfeng Tires and Roadshine will be showcasing their latest product offerings.



International distributors in the likes of Van den Ban Autobanden, Globe Tyre, TMA International Tyres and Centropneus will be bringing into the show a diverse portfolio of global brands across the region.

Registration for Tyrexpo Asia is open on [www.tyrexposeries.com](http://www.tyrexposeries.com). For those with an interest in the future of the industry, don't miss this must-attend event – admission is free. ■



## Gathering of Industry: MCVE 2019

*Back for the fourth time, the largest commercial vehicle expo in South East Asia is shaping up to be a pivot point for industry players.*

Malaysia Commercial Vehicle Expo, MCVE in short, is making another comeback in 2019. It is the fourth time that the event is taking place. Held in The Mines Exhibition and Convention Centre (MIECC), just outside Kuala Lumpur, Malaysia, the expo will take up again all of the indoor space. This is the fourth instalment of the show and the organisers are delighted to confirm that it is still the largest commercial vehicle exhibition in South East Asia.

MIECC offers 8 000 square meters of exhibition space and MCVE has taken up all of it. Sharing the space among them are the top brands in the transportation sector. Besides vehicle manufacturers there will also be parts suppliers as well as service providers offering their trade to the visitors. The event is organised by Asian Trucker Exhibition Sdn Bhd, a subsidiary of Asian Trucker Malaysia and the people behind the show the same as those producing the Asian Trucker and Asian Buses magazines.

“We don’t understand our business as a publishing company. We provide communications platforms for the commercial vehicle industry in South East Asia. As such, the exhibition not only perfectly fits into this concept, but the various channels feed into each other,” said Stefan Pertz, Organiser of MCVE 2019. Exhibitors will be pleased to know that the organisers can tap into a massive database to invite visitors. “Exhibitors value that we not only provide the space to them but help them with other solutions to promote their presence during the show. It is therefore not surprising that many of the exhibitors have been exhibiting all four times,” he continued.

The fringe program will comprise of various activities, such as the Asian Trucker R & R, sponsored by Guardian South East Asia and NITTSU Transport, networking sessions and industry talks. According to the organiser, several other activities are currently being planned and will be announced shortly.



The following media partners have been confirmed: Marshall Cavendish, Tyreman, Truck and Bus News and Newpages.

Supporting the event as Official Freight Forwarder is Rogers Asia while the Maincontractor will be ES Exhibition Services once again. Pertz encourages those interested in the event to register for Asian Trucker’s regular E-Newsletter as there will be updates about the show, informing the market about the subevents at MCVE and other useful updates. This can be done on [www.asiantrucker.com](http://www.asiantrucker.com)

# Events & Exhibitions

## INTERNATIONAL CONFERENCE ON RENEWABLE MOBILITY "FUELS OF THE FUTURE 2019"

Date : 21 January 2019 – 22 January 2019

Venue : CityCube, Berlin, Germany

Contact Info: +49(0)228/81002-22 / hartmann@bioenergie.de

Details : On the opening day, the focus will be on mobility, set between the conflicting priorities of climate protection, economic efficiency and user acceptance. In the plenary session, representatives from the Federal Ministry of Transport and Digital Infrastructure, the European Parliament, European agriculture, the petroleum and automotive industries and the scientific community will discuss future prospects for the transport sector.

On the second day of the conference, 11 forums will examine a broad spectrum of topics from all areas of renewable energy in the mobility sector: German and international experts will present news on technical developments, research, certification, market analysis and trade flows, as well as entering into discussions with conference participants. These forums, like the exhibitor forum with exhibition stands, will also offer scope for professional exchanges and networking.



## 3RD ANNUAL AUTONOMOUS VEHICLES

Date : 24 July 2018 – 25 July 2018

Venue : Mandarin Orchard

Contact Info: <https://autonomousvehiclesasia.iqpc.sg>

Details : How far away are we from self-driving reality? What will it take to make it happen?

Technology and automobile giants are investing significant amounts of capital to secure a strong position in the driverless future, and at the same time, all players ranging from component vendors to municipalities are actively assessing their roles in the ecosystem. Clearly, autonomous vehicles will enable new business models around "Mobility as a Service" (MaaS). Showcasing the key developments in technology, regulation framework and infrastructure in Asia, the 3rd Autonomous Vehicles Asia 2019 will bring together the leading automakers, technology developers and regulators from Asia to examine the future ahead.

## TYRE EXPO ASIA 2019

Date : 19 March 2019 – 21 March 2019

Venue : Singapore Expo Hall 1 & 2, Singapore

Contact Info: [faizal.law@singex.com](mailto:faizal.law@singex.com)

Details : Asia is undeniably an important region for the global tyre market, with emerging economies such as China, India, Thailand and Vietnam expected to boost demand especially for the automotive tyre. At the same time, the tyre markets around the world rely on Asia's participation to keep the industry competitive, buoyant and successful. With its strategic location at the crossroads of the tyre market in the region, Tyrexpo Asia plays a crucial role in the future of the tyre trade in Asia. In its 12th edition, Tyrexpo Asia will bring about close to 5,000 industry players from around Asia Pacific to congregate in Asia's leading

platform for Tyres, Tyre Repair Equipment, Tools and Tyre Accessories, to showcase the latest technology and equipment, discuss best practices and solutions to drive operational efficiencies and profits for businesses. Tyrexpo Asia 2019 will once again partner IE Singapore to be co-located with the World Rubber Week, which also includes the World Rubber Summit and a series of networking events and seminar that is designed to address the needs of the different elements across the entire value chain in the global rubber industry. It is aimed at bringing together leaders, experts and stakeholders for focussed discussions to help shape the future of the industry.



## AUTOMECHANIKA KUALA LUMPUR 2019

Date : 21 March 2019 – 23 March 2019

Venue : Kuala Lumpur Convention Centre, Kuala Lumpur, Malaysia

Contact Info: <https://automechanika-kualalumpur.hk.messefrankfurt.com>

Details : The 2019 fair will continue applying 'Sourcing-Training-Entertainment' theme and serving as an ideal platform for local and overseas industry players to build business network and expand business in ASEAN region and other markets. A series of professional trainings on hot topics in the automotive fields will be organised.

## MALAYSIA COMMERCIAL VEHICLE EXPO 2019 (MCVE)

Date : 20 June – 22 June 2019

Venue : Mines Exhibition and Convention Centre

Contact Info: [info@asiantrucker.com](mailto:info@asiantrucker.com) / +60 12 201 5528

Details : Back for the fourth time, Asian Trucker invites you to be part of the largest dedicated exhibition for commercial vehicles in Southeast Asia. Following the success of the past events, we are returning with the show in June 2019 with a new, more exciting fringe program.

Buyers, purchasers and operators have the opportunity to review the latest offers in terms of trucks, busses, services and components. During the show, relevant government agencies, professional societies, and associations will join the organizer to hold seminars and updates on their products, services and the latest in trucking.



# SC Auto Launches Asia's first Integral Bus designed and Built in Singapore



*SC Auto's has doubled its factory size and added new technology to meet growing demand for a new generation of buses wholly designed, built and assembled in Singapore.*

Lasers cut metals into 2D and 3D shapes, robots weld parts together, machines twist wires, buses are assembled. It is all a part of SC Auto's, Singapore's first and only Original Equipment Manufacturer (OEM), newly expanded operations building integral coach buses with no underframe. This cutting-edge automotive technology capability and expertise, developed over 22 years, has now come together under one new roof over 200 000sqft of factory space. Here, on Senoko Road, Singapore's first coach bus OEM celebrated the opening of its new facility on December 7, 2018.

## Unwavering Commitment

"Innovation and passion are at the heart of SC Auto's ambition to become a global leader in the bus and coach industry," said Mr Tan Siow Chua, Chairman of SC Auto. "With SC Neustar's launch, we are set to reach our growth target of S\$100 million in annual revenue in four years. As Asia's first and only integral bus OEM, the launch of SC Neustar demonstrates our unwavering commitment to pioneering new automotive technologies, underpinned by years of experience architecting and manufacturing high quality transportation solutions, and investment in R&D."

About 250 people gathered at SC Auto's SC Neustar Launch and the Official Opening of the new facility with Guest of Honour Dr Koh Poh Koon, Senior Minister of State, Ministry of Trade and Industry; His Excellency, U Okkar, Deputy Chief of Mission, Embassy of the Republic of the Union of Myanmar, Singapore; His Excellency, U Tin Soe, Economic Counsellor, Embassy of the Republic of the Union of Myanmar and business partners, associates, customers and friends from Singapore, from Europe, Taiwan, Thailand, Myanmar, Hong Kong, and Malaysia.



### Further Expansion

Making an investment of S\$60 million in Singapore and Myanmar, and with assistance from Spring and Enterprise Singapore, SC Auto has transformed its business model from a quality bus body builder to an OEM. From being a body builder with a strong brand, SC Auto has achieved the company's ambition to build on its capability to design, manufacture, and assemble its own products from start to finish. While modernizing and expanding its facility in Singapore SC Auto's S\$30 million facility in Yangon, Myanmar will commence operation in early 2019.

"Today," said Managing Director Rachel Lee, "we have transformed into a full integral bus manufacturer, supplying complete bus solutions to the transport industry. I am proud to announce that SC Auto is the first and only company in Asia to have successfully designed and manufactured a full integral bus – the 'SC Neustar' – a new generation for SC Auto, that is set to change the game."

### The Transformation

Dr Koh Poh Koon added, "I would like to congratulate SC Auto for reaching this milestone in its transformation from a small private transport operator of chartered buses back in the 1970s and 80s to become a home-grown bus manufacturer and one-stop shop for bus owners today. SC Auto serves as an inspiration for our local SMEs to do the same. SC Auto's journey to become a market leader with a strong foothold in Singapore and the region is remarkable. When Mr Tan Siow Chua started his business in 1977, he only had a single bus to his name and no employees. Over the next 10 years, he grew his fleet to 40 buses and developed an interest to move upstream into bus design and bus-body building. In 1996, he incorporated SC Auto to pursue these higher value-add areas of business and has been building up the company's capabilities since.

"Today," the Senior Minister continued, "SC Auto employs 220 people and not only designs and produces buses, it is an integrated solutions provider with a suite of services spanning repair and servicing, to fleet financing and motor insurance. SC Auto's success can be attributed to its focus on building a trusted brand while seizing new opportunities through innovation and internationalisation, and investing in its people. Since it was founded, SC Auto's goal has been to



focus on quality instead of competing on the basis of price. As a result, SC Auto built up its brand of trust over the years. It established a reputation for high-end products boasting reliability and durability, which it achieved through constant innovation.”

**New Skilled Jobs**

The five-storey building, where the official launch took place and serves as SC Auto’s headquarters, is double the size of its original premise. Over the past five years alone, SC Auto has created 40 skilled jobs that are being filled by existing and new employees. Today, 50 percent of its production processes utilize automation technology. These include engineering and management positions. While new technology requires fewer workers, staff has been trained to take on new high skilled positions. For example, the introduction of robotic welding systems has replaced most of the manual welding work, allowing workers to have a better work environment and enabling them to do higher value-added tasks such as operating automated production machines and improving processes.

Mr Ho Chi Bao, Director for Precision Engineering, Marine and Offshore, and Engineering Services, Enterprise Singapore, said: “SC Auto has constantly challenged itself to adapt to the changing environment. Its transformation from a bus body builder into an OEM and adopting highly automated manufacturing solutions are commendable efforts by a home-grown Singapore company. This sets a good example for the industry and we hope to see more companies innovate and explore new areas to drive their business growth.”

**Rapid Transformation**

It has taken SC Auto just four years to go from a body builder to OEM. “We dedicated one year to building our first prototype bus, which was completed in 2015,” Ms Lee told the assembled. “The prototype bus went to Europe for homologation testing. It underwent an accelerated fatigue test on one of the world’s most challenging test tracks in Spain. It was durability tested to 1 million km on different road conditions – and it survived, as we expected it to! The prototype bus is back in Singapore, on display today, and you are all invited to check its

quality and condition.

In terms of branding, SC Auto created a new product called ‘SC Neustar’. “We invested in Intellectual Property and filed our IP trademarks and designs internationally,” the MD continued. “To date, we have over 200 IP trademarks and designs. We anticipated a strong demand for SC Neustar and invested in this new facility in 2017.” The construction took 10 months and the new facility, capable of producing 400 units per year, is expected to increase SC Auto’s overall production by five times but will produce the numbers required by demand.

**Overseas Move**

“During the same period,” noted Ms Lee, “we constructed our first overseas manufacturing plant in Myanmar. The plant is now ready and production line is set to start in the first quarter of next year. The size of Myanmar Plant is about the same size as the Singapore plant but will be able to produce 400 – 600 buses per year.”

The Myanmar plant is equipped with the same automation processes and equipment as the Singapore plant. “We have a strong and experienced workforce, and we want to tap into their expertise. Our team of 70 employees, most of whom have worked for more than eight years in our Singapore Plant, has been assigned to Myanmar to lead the production line.” The Myanmar plant will produce SC Neustar for the local market as





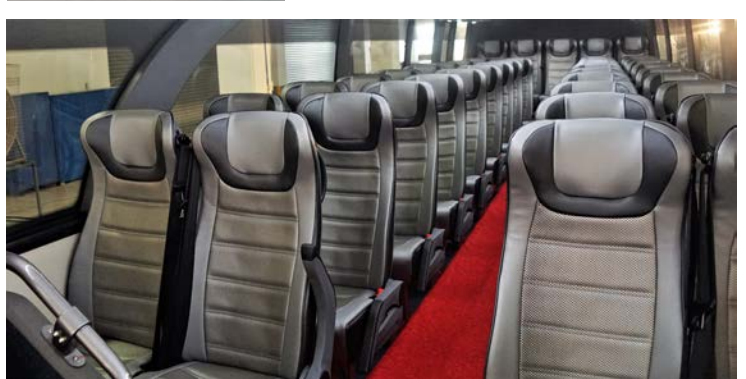
well as for export.

### **The Journey Continues**

MD Lee pointed out: "This is just the beginning. We continue to transform. Our R & D team will develop advanced technology for environmentally friendly green buses including hybrids and electric buses. We want to be a global company with our global product, a global brand, and reaching global markets, enabling us to deliver on our company promise of "global standards, local support". With SC Neustar, we will expand into international markets, targeting Asia Pacific and Europe."

The SC Neustar is certified in accordance with the strictest global standards allowing it to be sold in Europe. The buses meet exhaust and noise emissions standards to reduce the carbon footprint of vehicles globally. Designed for greater efficiency and the SC Neustar is built using a ferritic stainless steel structure that provides high tensile strength. It is light-weight and corrosion-free for up to 20 years. SC Neustar is available in left-hand and right-hand drive. It is equipped with automatic gears, full suspension system, and Advance Electronic Braking System (ECAS) that meets the highest standards of safety.

Wrapping up his speech Senior Minister Koh Poh Koon stated: "Today a Neustar is born!" 🚐





# The Energy Challenge and Other Extreme Conditions

*During a recent visit to Dubai, Asian Buses was able to join a seminar on Shell lubricants. Experts elaborated on the importance of lubricants that work in extreme conditions.*

**W**e may not think of buses as being tested by extreme conditions as they usually run on nice roads and with a lighter load compared to haulage trucks. However, climate plays a role as well as the way in which buses are operated. In his presentation, Frank Machatschek Product Application Specialist, Europe Shell, highlighted several conditions, which are “extreme” and have a severe impact on the performance of buses.

## The Heat is On!

Technological advances now see aluminium pistons being replaced by steel pistons as a result of the higher pressures in the combustion chambers. The higher pressure is a result of the quest for lower emissions. While more environmentally friendly, this new design results in pistons that are lower heat dissipation characteristics. At the top of a piston, temperatures reach up to 270 degrees Celsius. This means that modern lubricants not only need to withstand the heat with lubrication films that don’t break, but they also have to take over the job of dissipating heat. “Add to that the high ambient temperature of places like Dubai and you have a real challenge on hand to develop lubricants that perform in such conditions,” Machatschek said.

## Stop and Go = Soot

Buses also face the extremes of urban driving. For a bus engine, constant starting and stopping in traffic causes sludge to build in your engine, which means more wear on engine parts which are vital to the operation. Soot build-up in particular is an issue for commercial vehicles. Soot loading in diesel engine oil can present wear problems. Diesel engines consume a carbon-rich fossil fuel that releases soot as a byproduct of combustion. Soot consists of micrometer-scale particles of elemental carbon. The existence of soot signifies incomplete combustion, which suggests an incorrect air/fuel ratio, improper combustion temperature, insufficient residence time in the combustion zone, and/or non-availability of sufficient oxidants (another way to say that the air/fuel ratio is too fuel-rich).

## Work Harder for Longer

Operators are also putting pressure on lubricant providers to come up with solutions that help to minimise downtime. Therefore, oil drain intervals are to be longer. In other words, lubricants have to work harder for a longer period

of time. With that comes a push for lower viscosity. And while lower viscosity has advantages on one hand, on the other it means that there are drawbacks in other aspects of lubricants. However, field trials have shown that Shell lubricants can go the distance with one vehicle having received only three oil changes in eight years. In such trials, the oil drain interval can go up to 270 000 kilometres. “However, it has to be pointed out that this is only possible if all other components are equally good. For instance, in this trial we used a Hengst filter to ensure that particles are being swept out from the oil,” he added.

## The Energy Challenge

It was not all just fun and games during the stay in Dubai. Shell utilised the event to also talk about the upcoming challenges that the world is facing. While labelled “Energy Challenge”, it is also a technology challenge as providers, such as Shell, constantly try to find new and innovative ways to address the needs of customers.



Dr. Jason Brown

change public perception. However, if we want to stay relevant, we have to change.”

When discussing lubricants, Brown also sees a major shift in the requirements that are put before providers. Historically, as he explains, lubricants had to fulfil certain criteria and if they helped improve fuel economy, it was a bonus. Today though, lubricants are to be designed in a fashion that they help improve fuel economy first and foremost and any other benefit that comes with that is becoming more and more secondary.

### **Bound to Infrastructure**

Given the global push for electromobility, one could also ask if there is still a need to develop lubricants for combustion engines. Brown is of the opinion that electrification will be the way forward, however is cautious to see that the end of the diesel engine is very near. Having vehicles that run on batteries is one thing, but there is still the need to build the infrastructure. “Certain applications can simply not be run on electricity as of today and still require a different form of energy, which is Diesel fuel.” His estimate is that Diesel engines will still be the main drivers of the transport industry for another 20 to 25 years. Therefore, there will still be an increased need for highly efficient lubricants and engines that burn fuels in the most efficient way possible.

Given the trend towards smaller and faster deliveries, engine sizes have to be adjusted. To provide last mile solutions, engines will need to be smaller and it is here where the notion of fuel efficiency is highly important. With lesser items moved per vehicle, the relative energy usage increases. ■

Stemming from the projection that by 2050 the Earth will be populated with some nine Billion people, energy needs to be both, more efficient and cleaner. The same prediction gives way to the estimate that by 2040, some 70 percent more energy would be needed for the transport industry.

While access to energy ensures that trucks are moving, it is noteworthy that over half the transporters surveyed in a study by Shell admit that their errors in lubrication have led to vehicle breakdowns. The same study showed that 1 in 3 of those estimate this unplanned downtime cost their business more than \$100 000.

### **Industry in Transition**

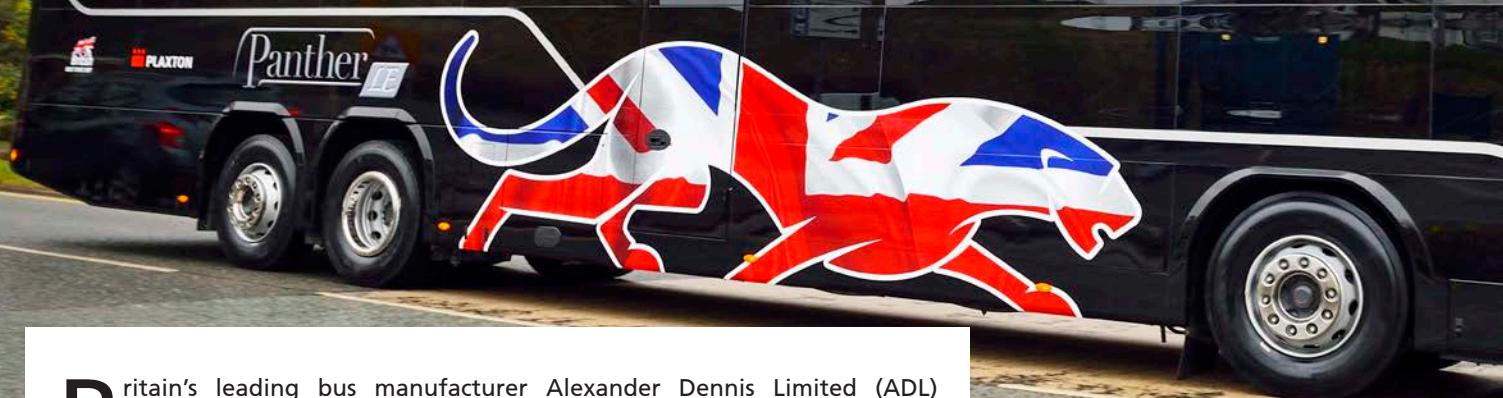
With electromobility being in the lime light, a shift in the provision of energy is unavoidable. Dr. Jason Brown, Global Technology Manager (Shell), shared insights on how Shell is planning to move from pump to plug. He told us that “We, Shell, are obviously aware that electromobility is coming and what we can see is that it might come a little faster for passenger cars than it is for commercial vehicles. But we can clearly see that it is the next big trend.” However, he acknowledged that energy is only one aspect of making goods move.

### **Changing Perceptions**

While Shell is now offering charging stations in certain markets, the company is still very much involved in other segments, including combustion engines. “While we want to have a voice and want to shape electromobility, we also continue to work in other areas as electromobility is not the total solution.” As of now, Shell is generally seen as a provider of fuels and operator of petrol stations. The new Shell image should be a portrayal of a company that provides energy, in whatever shape or form that may be. Using the example of the oil-tanker, the perception may not be changing as quickly as one wishes for, which is also rooted in the fact that Shell as a company is based on infrastructure that has been in use for about 100 years by now. “It won’t be easy to move that and

# Alexander Dennis Limited

*Addressing today's needs of the industry, Alexander Dennis Limited presents a number of solutions fit for the demands of smart cities. Asian Buses took a deep dive to learn more.*



Britain's leading bus manufacturer Alexander Dennis Limited (ADL) presents a selection of the market's widest range of low and zero emission buses, as well as members of its Plaxton coach range, at Euro Bus Expo 2018. Bristling with innovations, ADL's show vehicles underline the company's position as a systems integrator and technology pioneer that puts customer collaboration at the centre of everything it does. In addition to its unrelenting focus on vehicle reliability, ADL's Aftermarket division now delivers a personalised user experience with the new AD24 digital offering.

Chief Executive Colin Robertson set out ADL's stall during a press briefing on the first day of Euro Bus Expo: "I am convinced this will be our best show yet. We position ourselves not only as the UK's leading bus and coach manufacturer, but as a systems integrator and technology pioneer. We have a range of class-leading products bristling with technology with many brand-new features being seen for the first time.

"Customer collaboration is at the centre of what we do. The new products and services we are bringing to market have been developed together with our customers to increase their operational efficiency and fleet reliability, to delight their passengers and to help respond to increasing environmental pressures. We're continuing to invest in new product development as well as in our Aftermarket offering to make sure we deliver what our customers need. Their time and energy is a precious resource. It is in our gift to make sure this is spent productively by being easier to do business with."

The continued drive for innovation does not detract from ADL's core values, as Robertson explains: "Reliability is our cornerstone and will always be so – along with safety, it is non-negotiable and is the lifeblood of our business."

## **AD24 personalises online Aftermarket user experience**

The new AD24 digital offering makes doing Aftermarket business with Alexander Dennis easier by providing a one-stop solution encompassing parts sales, online training, online manuals, online service bulletins, a customer forum and the AD Connected vehicle solutions technology.

The new service redefines aftermarket support with industry-leading usability and a personalised user experience for customers, designed to offer an ideal solution for all of Alexander Dennis's customers from the smallest private operators to large multinational groups. A 24/7 online parts shop is at the heart of AD24, with all makes' parts easily searched combined with powerful options to display frequently purchased or saved items making it easier than ever to source high quality, original spare parts for Alexander Dennis buses, Plaxton coaches and other OEMs' vehicles. AD24 is live and available to UK operators at [www.ad24.direct](http://www.ad24.direct) and its international rollout will commence as soon as 2019.



## **Passenger-centric low and zero emission buses**

Recognising that one size does not fit all and solutions to the air quality and climate challenges can be delivered in many guises, ADL offers the widest range of low and zero emission buses on the market and shows a selection of these at Euro Bus Expo 2018.

The successful BYD ADL partnership continues to lead the British market for electric buses with over 215 now delivered or firmly ordered and the Enviro400EV double decker on track to be launched in the first half of



the provision of wireless phone charging on its two social seating tables – provided for the first time on a single deck bus – and a media shelf at the first raised row of seats.

Passengers will sit comfortably on the high-back ADL SmartSeat, which is now available with integrated passenger amenity consoles complete with wireless bell push, USB charger, phone holder, reading light and bag hooks.



Also featured is the SmartVision system that replaces traditional mirrors with high-definition digital cameras and displays mounted inside the cab for direct and clear visibility. With a wider angle covered and automatic adjustment of screen brightness as well as digital image correction to compensator for lighting, shadows and glare, SmartVision not only provides a safety benefit but also reduces the risk of mirror damage or injury to passengers or pedestrians.

The Enviro400 continues to be the UK's favourite double deck bus thanks to its industry-leading reliability and the wide range of specification options available, as shown by two customer vehicles and a demonstrator on the ADL stand. Go South Coast has chosen the eye-catching City body style and SmartPack efficient diesel bus technology for its Bluestar operation in Southampton, while National Express Group picked a high-specification interior and SmartHybrid for its Xplore Dundee fleet.

The award-winning SmartPack and SmartHybrid technologies for efficient diesel buses have been developed in-house by ADL. They feature smart management of alternator and air compressor, engine stop-start technology and electrically-driven cooling fans. SmartHybrid adds a 48V mild hybrid system with long-lasting supercapacitor energy storage. Vehicles with both systems are accredited as Low Emission Buses by the Low Carbon Vehicle Partnership, entitling operators to increased BSOG rates.

Another Low Emission Bus option is the biogas-fuelled Enviro400CBG City, which ADL produces together with chassis and technology partner Scania. Shown on the Scania stand, the 100th of these buses demonstrates the green credentials of biogas.

ADL's successful growth in the independent and retail market sectors has seen the Enviro400 developed into a high-capacity, executive-style vehicle suitable for private hire and corporate work that has found favour with coach as well as bus operators. A new 11.5m demonstrator, shown for the first time at Euro Bus Expo 2018, promotes this versatile option, packed with premium passenger-centric specification.

2019. A new single deck Enviro200EV demonstrator will begin a tour of UK towns and cities after its appearance at Euro Bus Expo. It provides full zero emissions capability even on demonstrations thanks to a compact mobile EV charger that can be transported inside the vehicle and plugs into operators' existing mains electricity.

The demonstrator has been built to a high specification that creates an atmosphere befitting its state-of-the-art environmental credentials with an electroluminescent ceiling as well as

The single deck Enviro200 remains the UK's leading vehicle in its class with a market share in excess of 65%. Its appeal ranges from stock-built vehicles ready for immediate delivery to built-to-order buses finished to a high specification such as that exemplified by a demonstrator shown in the outdoor display. In addition to SmartPack efficient diesel technology, it has bonded glazing, three large roof skylights, a glazed cab rear partition and double saloon passenger information displays. Its high-back ADL SmartSeats are trimmed in elegant black leather and fitted with integrated passenger amenity consoles and ambient under-seat lighting. Media shelves at the first raised row of seats complete the passenger-centric specification that combines just some of the wide range of options available across ADL's complete range of low and zero emission buses.

### British-built Plaxton coaches

ADL's Plaxton coach brand is on track for a positive year with more than 200 coaches sold, showing the fruits of significant investment in two new coach models that complete the range.

The Plaxton Panorama double deck coach has been designed to give a high degree of specification options, allowing it to be geared towards a variety of uses. Acklams Coaches have become the first operator to buy the Panorama for touring work with the vehicle shown at Euro Bus Expo 2018. Fully seated for 87 passengers, it has been built to DDA-compliant standards, giving operational flexibility and ensuring high residual value.

Built on the Volvo B11RLE chassis, the Panorama is wheelchair accessible through either the front or centre door, depending on specification. A fully flat lower saloon floor with quick-release tracking throughout allows for multiple wheelchairs to be carried according to requirements. The flat-floor luggage hold has a full height walk-in door as well as lift-up loading flaps, while there are full-depth usable luggage racks in both saloons. Additional stowage can be provided with a removable internal luggage rack, and the Panorama is provisioned for a rear-mounted ski box.

The second addition to the Plaxton range is the innovative Panther LE low entry vehicle on Volvo B8RLE, combining bus accessibility with coach comfort. With a permanent forward-facing wheelchair bay in the accessible front section of the saloon that also offers 16 seats, the Panther LE is fully DDA-compliant without the need for a wheelchair lift. Further seating in the raised rear of the saloon brings the total number of seats to 53.

The Plaxton Panther continues to be Britain's best-selling touring coach and has been further improved with a new entrance step configuration. Featured on the Euro Bus Expo show vehicle, this introduces an extra step for easier access. Also new is the option of luxury seating with high headrests, which are given additional legroom by the 53-seat layout combined with a centre demountable toilet, servery and a second, dash-mounted fridge. Powered parallel lift locker doors to the nearside further add to the value of this coach, built on the fuel-efficient Volvo B8R chassis.



Completing the Plaxton line-up at Euro Bus Expo is a Cheetah XL. A repeat order from York Pullman, this midicoach has the improved 230hp power rating as well as the revised entrance step arrangement for better accessibility.

### Business update: 2018 on track for record sales

2018 has been a very strong year for Alexander Dennis and the company is on track to deliver record sales of £630m with 2 600 vehicles produced globally. In the United Kingdom, the bus market shrank by 15 percent between 2015 and 2018 and the decline has accelerated in 2018 with a 20 percent fall forecast by year end. ADL's investment in its portfolio strategy has paid off by allowing the company to maintain volume and grow market share. In London, this has steadily increased from 40 percent in 2016 to 70 percent this year and ADL has grown its activities in the independent and retail sectors by 46 percent in the last four years to around 300 vehicles in 2018 across Britain's towns and cities.

However, Colin Robertson warns the business not to be complacent: "We have planned to ensure we remain resilient as we continue to improve our manufacturing agility in the UK, with restructuring around our cost base and offsetting the reduction in demand by bringing work in house."

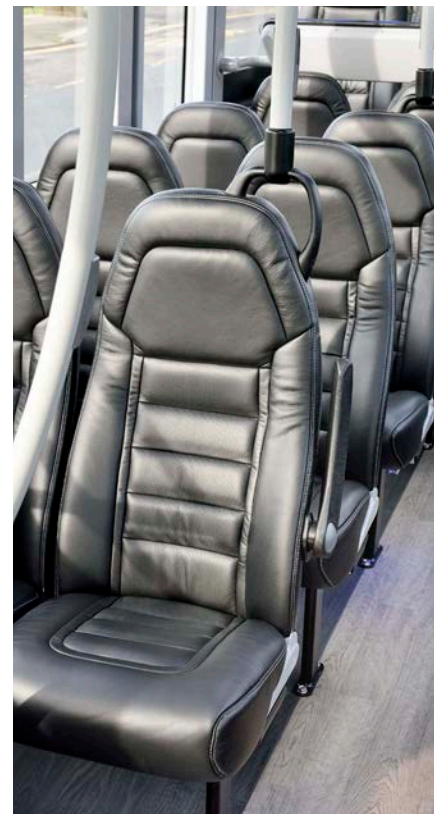
Elsewhere, North America is a key strategic market ripe for expansion. Alexander Dennis has sold over 1 000 Enviro500 double deck buses to the United States



to normalise in 2019 following the completion of new fleet investment as part of the Auckland and Wellington Public Transport Operating Model. The peak replacement period of the cyclical Hong Kong market has also been completed along with some forward activity before the introduction of Euro 6, but Alexander Dennis is pleased to announce orders just received from KMB and Citybus for over 100 Enviro500 built to the new emissions standard.

In Europe, Enviro500 deliveries to Switzerland will continue in 2019 and Alexander Dennis has recently been selected to supply Berlin's new fleet of double deck buses. This is a significant step for the company's plans in the region, as Colin Robertson explains: "The framework contract is worth up to EUR220m, but in terms of strategic importance, the value is infinitely greater."

Across all its markets, Alexander Dennis is committed to continue to invest to deliver its customers' operational and environmental needs and investment in new product development will see record levels in 2018, putting the company on a resilient footing for the next years. 🚐



and Canada, allowing the concept to transition from a quirky niche into a mainstream solution for commuter and transit applications. The company is expanding across existing customers and new transit authorities, and is now building the Enviro200 in its Nappanee, Indiana facility to accelerate this growth.

In Mexico, the fleet of 90 Enviro500 in Mexico City has been in full service since the start of 2018 and the buses are carrying in excess of 130 000 passengers per day, surpassing their target by as much as a third.

Activities in the Asia Pacific region have continued to grow in 2018 with 730 units sold and well over 4 000 vehicles into service across the region since the new Enviro500 was launched in 2012. The regional assembly operations in Malaysia and China are running at full pace to deliver the 2018 volumes, producing more than 20 vehicles a week. Demand in New Zealand is expected

# Ulu Pandan Bus Depot Hosts Bus Carnival

*With Singapore's transit officials endeavouring to get more Singaporeans out of their cars and into public transportation they held a carnival that allowed the public to get an up-close look and hands-on experience with everything bus.*



Opening Ceremony

The excitement was palpable as Singaporeans flocked to Ulu Pandan Bus Depot for a Carnival hosted by SBS Transit to celebrate the opening of the new facilities. On the morning of October 27, 2018, free SBS shuttle bus services were offered between Bukit Merah, HarbourFront and Jurong East and the new bus depot located at 1 Business Park Drive, that is within walking distance from Boon Lay Way.

## Accessibility

The carnival, that showcased the newly completed Bus Depot, was held from 8:30am to 4:00pm. Free WiFi was available at the Carnival and on the Shuttle Buses! In addition to the shuttle buses there were numerous regularly scheduled bus services that allowed passengers to alight close to the new Depot.

A variety of activities was prepared for the public by both SBS Transit and exhibitors. Guided Depot Tours and Bus Wash Tours were conducted throughout the event. Several game stations were available for the young and young at heart. Food and drinks were also provided at no cost. Pokka drinks, Popcorn, and Ice-Cream were available on the event ground, while NTWU Canteen provided packed meals with the presentation of the food coupon.

## Opening Ceremonies

Mr Khaw Boon Wan, Coordinating Minister for Infrastructure & Minister for Transport officially opened Ulu Pandan. The Minister graced the event at the official opening ceremony at 10:00am along with Mr Melvin Yong, Assistant Secretary-General in the National Trades Union Congress and many dignitaries and management from SBS Transit and industry players such as Bridgestone, Esso, Volvo Bus, MAN and others.

Volvo, Singapore Technologies, TNT Surveillance showcased their products at booths. The Carnival featured static display buses, activities, free food and exhibition booths. Informational displays informed the public about different aspects of bus transportation. Four buses were on display and visitors were allowed to go on board them to see them inside and out.



Khaw Boon Wan, Coordinating Minister for Infrastructure & Minister for Transport



## ST Autonomous Mini-Bus

The Singapore Technologies (ST) Autonomous Mini-bus is an autonomous, low-floor, battery-electric single-deck city bus built by ST Engineering Land Systems. Currently under testing and development, two units of the ST Autobus are slated for passenger trials over three months in 2019, operating on a 5km route on Sentosa Island.

The Mini-Bus is fitted with an array of sensors which enables it to navigate on its own in urbanised areas, with or without the aid of GPS. It is also able to sense and recognise its surroundings and obstacles such as vehicles and pedestrians in a safe and reliable way, without compromising passengers' safety.

## Volvo B8L

The Volvo B8L, that currently operates on SBS Transit Bus Service 71, was showcased at the Carnival. The bus, a low-floor double-decker city bus chassis, has been built by Volvo Buses since 2016.





a rest area for drivers, and a canteen. The depot is split into two halves by Business Park Drive, with the main building, fuel pumps, bus washing machines and some parking lots on the eastern half, while the other half consists of bus parking lots. The bus depot was handed over to the first incumbent, SBS Transit, in mid-2018 for outfitting and preparatory works before the TC part of the Bukit Merah Bus Package commenced operations.

### Singapore Bus Academy

Ulu Pandan Bus Depot is the first depot to house the Singapore Bus Academy's Bus Technical Specialist Certification Centre (BTSCC). The BTSCC supports the training needs of technicians by providing a conducive environment for technical training and certification. Specialised training facilities use innovative technologies such as augmented reality and tablet devices to provide an interactive learning experience

BTSCC features three training rooms and individual rooms for Chassis, Digital Technology (Augmented Reality), Door System, Engine System, Transmission System, as well as a general space for Brake, Steering & Suspension, and Air-Conditioning System.

### Goodie Bags

Visitors were given an SBS Transit Tote Bag that contained SBS Transit Paper Bus Model – Volvo B9TL, Wright with Ulu Pandan Bus Depot Ad-Wrap; SBS Transit Post-It Pad; SBS Transit Magnet; SBS Transit Dual Micro-USB/iPhone Mini Fan; Water Bottle sponsored by Denso; Pocky biscuits sponsored by TNT Surveillance; Bottled Water sponsored by SMC; Stamford Tyres Tote Bag; Pens from Bridgestone, Cool-Air, Eberspacher, Sumimoto Tyres and Volvo. 🇸🇬

### MAN A95 3-Door Bus

Crowd favourite MAN A95 3-Door Bus was displayed. The bus is one-of-its-kind, being the first double-decker bus in Singapore to feature three doors and two staircases. Prior to the carnival, the bus was operating on SBS Transit Bus Service 7.

### MAN A95

The MAN A95 buses are built for the Singapore market. The contract was awarded to Singapore Technologies Kinetics Ltd., and it consists of both Euro 6 MAN A22 and MAN A95 buses. The fifth batch of MAN A95 buses, with 111 units under the Euro 6 Double Decker Bus tender will enter service from 2019.

These buses are Euro-VI compliant and are bodied by Gemilang Coachworks with the MAN Lion's City DD bodywork. In compliance with LTA specifications, buses are equipped with a suite of new features, such as Passenger Information Display Systems (PIDS) and two wheelchair bays.

### Chassis Displayed

Three bus chassis were displayed offering a rare glimpse of the internal components of a bus. As these chassis were for training or display purposes, the placement of components on these buses were not similar to that on fully-assembled buses. The three chassis on display were the MAN A95 Euro 6, the Volvo B9TL training Chassis, is a shortened version of the original chassis, with the middle axle removed, and the Volvo B5L Hybrid chassis.

### The New Depot

Ulu Pandan Bus Depot accommodates 470 buses and is equipped with facilities for daily bus operations, bus repair and maintenance, bus parking areas, offices,



School headmistress, Norzila Ishak was delighted that Scania liked the green idea and will be funding the start-up of what they hoped to be a self-sustainable project after a few months, which will be sustained by the income generated from sales of their urban farming produce.

“We hope that this initiative will give our students a better understanding of urban farming – from how food is grown, treated (before and after) and harvested – and learn how to adopt environmental-friendly planting methods using household waste, organic refuse and water-based solution. We are certain that it will be an educational process for them to care for what they have planted, watch them grow and sell them,” said Norzila.

## Scania Empowers Primary School Towards Sustainability

*Being in the transportation industry, Scania aims to sustain the environment for future generations.*

Scania Malaysia recently launched its “Master Sustainability by Scania” fund at Sekolah Kebangsaan Perdana Jaya SS19. The fund is to motivate and assist local primary schools to start curricular and extra-curricular activities or projects that focus on sustainability.

The first project at Sekolah Kebangsaan Perdana Jaya SS19 was in the form of an urban farming and environmental awareness project, which features a self-sustaining herb and fruit plantation that uses compost and hydroponics.

The endowment from the fund will be utilised for purchasing seeds, eco-friendly fertilisers and materials like a compost maker and a hydroponics system. The school will also purchase items to facilitate its environmental project that includes putting up recycling bins and signboards around the school, as well as activities such as a mural.

Present at the launch was Scania Southeast Asia’s Managing Director Marie Sjödin Enström who said the school’s urban farming proposal exemplified Scania’s goal of mastering sustainability. “We are very excited to fund such a like-minded initiative. For Scania, it is about doing the right things and doing things right. We are aware of how climate change can greatly impact our future generations, which is why we made the decision to nurture the young to become sustainability leaders and help save Mother Earth,” she said.

The “Master Sustainability by Scania” Fund is itself sustained by a portion of the company’s vehicle sales revenue. Scania Southeast Asia Business Development Director, Ian Tan, told Asian Trucker that the initiative is also aimed at making future leaders in sustainability, by grooming children to think and act in a sustainable way by always thinking about the environment.

“Being in the transportation industry, we are part of the problem but also part of the solution. We need to lower carbon dioxide (CO2) as much as possible by 2025 and we have alternative fuels like biodiesel. Scania vehicles can be tweaked to be alternative fuel competent,” he said.





# Safety is Closer than You Think

We worry about our health, safety and standing in life. Naturally. And sometimes, others take care of the decision for us. When we are born, our parents may sign up for insurance that covers us as we grow up. One big concern for parents is the education of children. Savings accounts are set up to ensure that junior or filia will have sufficient funds to pay for university. Even the stream of education may be decided for us. We are worried and worry for others.

All that worrying about the future seems to go out of the window the moment people sit down in a bus. In that environment, somehow, safety precautions seem to go out of fashion and passengers are cocooned in a feeling of being safe and that nothing ever will happen. I notice that I am almost always the only one who uses the seat belt. I get upset if the seat belt doesn't work and I cannot buckle up.

Does that matter? I would say yes. It is the same as with an insurance. We are happy to pay monthly or yearly premiums for a case that we hope will never happen. Our biggest fear may be that we will have to make use of the health insurance. If that happens, we are actually happy that we haven't had to use the insurance that we have paid for for so many years. But why do people not use the seatbelt when they are travelling in a bus? It is, still, the most effective safety mechanism in motor vehicles. It was given to us by Volvo, which at the time of the creation of the three-point seat belt did not patent it so that we could all benefit from it. It is there, it is simple to use and if that doesn't convince passengers to use it, here is the killer argument: using it does not cost anything extra.

I even insist that people around me buckle up. Some may reply that it is their lives and that it is none of my business. There is a simple response to that. It actually IS my business. When catapulted forward in a collision that will reduce the speed of a bus from 80 to zero in less than a second, any person

becomes a projectile, an avalanche of muscle, flesh and backpack. The kinetic energy is massive and while I am safely strapped in, my seat belt holding me in place, my fellow traveller may crush me and even kill me. I have heard many arguments about why not to use them. Some women are said to claim that the strap is not pleasant to have across the chest. I see, but pump shoes that cause extreme pain when worn are acceptable? One gets used to wearing a seat belt. It eventually becomes a reflex. And if one didn't need it, better still.

If one is arguing that accidents don't happen that often and that one takes his or her chance, then why, I ask, does one worry about health insurance or third-party insurance for a car. Why do parents worry about their children's education some 10 years away when they don't worry about their safety now? Isn't it a bit irrational to be planning a person's future and at the same time putting that very life at risk? When grown, that child may be grateful for the education, but I am sure that the person will be even more grateful to be alive after spending decades in dangerous situations.

To me, safety is very close to me and in ensuring that I have a long (and happy) life, sometimes it is the simple things that get the job done. And hopefully, I will never need all the costly insurances as the simple, trusted seat belt is around me wherever I travel. ■



## Mercedes-Benz Vans to Enhance eDrive@VANs Strategy With Fuel Cell

*Alternative fuels are a hot topic. One such new alternative is the fuel cell. T Murralli took a closer look at the Concept Sprinter F-CELL from Mercedes-Benz.*

**M**ercedes-Benz Vans is set to enhance the eDrive@VANs strategy with fuel cell. Using the example of a semi-integrated motorhome, the Concept Sprinter F-CELL, exhibited at Daimler Product Showcase at Hannover airport, a day before the recently concluded IAA 2018 show, illustrated the full breadth of the characteristic benefits of a fuel cell from long range to zero-local-emissions mobility.

Apart from motorhomes, these are characteristics also suitable for commercial purposes such as longer courier routes or minibuses in inter-urban traffic.

When it comes to selecting the right powertrain concept, Mercedes-Benz Vans is focusing more on the individual application, making it more customer-dependent than ever. In addition to the vehicle technology, a comprehensive evaluation must take into account system weight, charging or refuelling time, range and economy. To the question whether the classic internal combustion engine, battery-electric drive or forward-looking fuel cell is better, the Daimler strategy does not provide a dogmatic, ideological answer, instead makes the choice dependent on the best possible customer benefit.

### Market Potential

"We will offer every commercial range with an electric drive – starting this year with the eVito and in 2019 with the eSprinter. With these, we will cover many, but not all, use cases with a zero-local-emissions powertrain. For this reason, we are enhancing our eDrive@VANs strategy with fuel-cell drive, which offers substantial medium-term opportunities, especially in long-distance operation

– regardless of whether a fuel-cell vehicle is used as a motorhome or in other commercial applications," Volker Mornhinweg, Head of Mercedes-Benz Vans, said.

"The potential of this technology is undisputed. That applies above all to comparatively large vans with a need for long range and short refuelling times. Our analyses demonstrate that the fuel cell can represent a sensible expansion of the powertrain line-up in a number of different applications in both the commercial and the private arenas. The Concept Sprinter F-CELL provides an insight today into the possibilities of the future," Mornhinweg said.

Daimler is among the pioneers in fuel-cell technology. The most recent development level was presented to the public at the 2017 Frankfurt International Motor Show – the mid-size Mercedes-Benz GLC F-CELL SUV with an innovative combination of fuel cell and battery-electric drive configured as a plug-in hybrid.

Sources from the display area said one of the objectives for the company is to develop a fuel cell powertrain

that can be retrofitted in a conventional vehicle. Therefore, the key challenge for the company was to develop the fuel cell engine that will match all certain parameters of the conventional Diesel engine such as weight of the engine, external dimensions and mounting points as well. This enabled the company to go ahead without certain tests that are specific to new vehicles including crash test. Since the weight of the engine is almost the same as its diesel variant of the Sprinter, all the safety parameters such as braking, vehicle protection related data were the same; therefore, there was no need for the fuel cell Sprinter to go through related tests, sources said. These advantages helped the company reduce the development time substantially, they added.

Franziska Schwerer, Manager for Product Concepts & Planning as well as Innovation Management at Mercedes-Benz Vans, told AutoParts Asia that "The intelligent interaction of battery and fuel cell drives in the Concept Sprinter F-CELL delivers an electric output of around 147 kW and torque of 350Nm. The three tanks in the substructure can store a total of 4.2 kg hydrogen, enough for a range of around 300 km. If a longer range is required for a specific use, the hydrogen tanks integrated into the vehicle underbody can be supplemented by another in the rear. This configuration lifts the range to as much as 500 km. Like the GLC F-CELL, the Concept Sprinter F-CELL also combines innovative fuel cell and battery technology to create a plug-in hybrid. Alongside hydrogen, it can also be 'refuelled' with electricity, raising the range by up to additional 30km."

The integration of the hydrogen tank in the substructure, the positioning of the fuel cell at the front of the vehicle and the rear-wheel drive create the basis for maximum interior design freedom. With a standalone energy supply for the living quarters or longer range, the technology showcase makes full use of its merits as a travel companion or, in other applications, as a spacious load carrier.

### Rear-wheel Drive

The structure of the Concept Sprinter F-CELL with rear-wheel drive and a comparably low system weight creates the greatest possible flexibility for additional bodies and conversions or for commercial use with higher payload. With the modular system the fuel cell can establish itself as an alternative to conventional and battery-electric drives for use on shorter routes in as many use cases as possible, Schwerer said.

On the fuel cell as an area of focus for the company, she said, "The fuel cell is an essential part of our drive train strategy. We are convinced of the technology as an overall energy system. With a steadily growing share of renewable energies, Hydrogen will surely play an increasingly important role for the overall energy system – and especially for the mobility sector. Currently the battery has an advantage when it comes to the comprehensive market introduction – e.g. because of the cost situation and the development of the infrastructure. Electric vehicles for example can currently be charged at home."

Nonetheless there are physical limits to current battery technology. Especially due to the high energy density of Hydrogen there are many possibilities for payload and possible range. "This is the reason why we are active in the field of fuel cell technology. We are convinced that we will need different drive train options to satisfy all customer needs," she said.



The future will show what further applications the company will have for the fuel cell technology. In order to implement the technology in greater volumes, "We face the challenge of further developing the base module in a way that we can even more easily integrate it into our company-wide construction kit for electric vehicles. This would give us maximum flexibility. The systems could variably be combined with different battery sizes and could be used for manifold use cases," Schwerer added. ■



A tensile test is probably the simplest and most widely used mechanical test one can perform on materials. The test is commonly used to determine the maximum load a material can withstand. By pulling onto the material, it can be very quickly determined how the material will react to forces being applied in tension. With the information gathered, the properties of the material can be determined, allowing engineers and designers to predict how materials and products will behave in real life applications.

“Putting it to real life application on bus seats, when a bus collides during an accident, there is bound to be an extreme amount of force exerted on the seats and other parts found in a bus. The tensile test is done to ensure that when an accident unfortunately occurs, the seats and parts in a bus are capable of withstanding the force

## Vogel Industries Acquires New Tensile Testing System

*Asian Buses visited Vogel Industries in Johor Bharu to understand more about their newly procured tensile testing system, the first in Malaysia.*

exerted and ensure the safety of those on board. For example, the seats must stay secured to the floor of the bus and the bolts must stay fastened after the impact caused by a collision,” said Mr Tai Boon Huck, Managing Director of Vogel Industries Malaysia Sdn Bhd.

The tensile testing system at Vogel Industries Malaysia is the first of its kind in South East Asia and was built according to the United Nations Economic Commission for Europe (UNECE). The UNECE Regulations list down the maximum amount of force a human body can withstand before fatalities occur and Vogel abides by the Regulations strictly as “this is a matter of life and death”.

“The engineering of the tensile testing system and the software were made in Germany and it took nine months to complete the project. We invested RM 1.5 million in the tensile testing device and are looking to invest another RM 1 million in other testing devices,” Tai continued.

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messe frankfurt



L-R: Tai Boon Huck, Managing Director and Lee Tiam Fei, Technical Support Engineer



we figured that the time saved outweighed the cost to purchase the equipment," shared Tai.

"In order for a seat to be certified safe to use, it has to pass various tests. Tensile testing is one of the many required tests. Other tests include dynamic tests and shaking tests. A tensile test is primarily used to determine the strength and durability of the part. The UNECE Regulations tells us the minimum force that the part should withstand for it to be deemed safe to use," explained Lee Tiam Fei, Technical Support Engineer at Vogel Industries Malaysia Sdn Bhd.

Lee further added "All parts that we manufacture at Vogel comply with the Regulations from seat belts to headrest. We test each and every item that goes through our facility to ensure safety is not compromised for the bus passengers. Of course we do not wish that the products will be tested to its limits in real life but in the event that an accident unfortunately occurs, our products will be able to live up to its pre-tested strength".

"We might look into purchasing other testing devices such as dynamic testing and shaking test in the future but for now I am glad that we decided to purchase our own tensile testing device. This has greatly facilitated the research and development process and tensile tests can now be done whenever we want to," Lee concluded.

The testing facility located in Johor Bahru is open to the public because "At Vogel, we believe that safety comes first and for those who share the same values are welcomed to make an appointment with our engineers for further discussions."

Prior to purchasing their own testing device, the company spent approximately 300 000 to 500 000 Euro per year to send products to be tested in Germany. "The Vogel tensile testing system is designed to evaluate the strength of structures when subjected to test loads within the specific standards. We had to send products to Germany to be tested as there was no such facility in Malaysia before this. By bringing the technology home, we are able to ensure passenger safety more efficiently with less manpower and cost."

"Another reason that encouraged us to purchase our own tensile testing device was the time taken to send the products to Germany. Just to schedule an appointment to test an item in Germany would previously require at least three months advance booking. Now, the test can be done whenever the engineers want to. This was the main deciding factor for us to purchase our own testing system. As we test all our products before they are released to the public, this caused a major delay in production and after much discussion;



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**Mahesh  
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## Commercialising Electric Vehicles through Policy, Projects and Partnerships



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**Jenny Lim**  
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**Goh Chee  
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## KEY THEMES



The 2025 Vision  
- **What Will Cars  
Look Like in 2025?**



**Industry  
outlook, recent  
developments and  
regulatory changes**  
for South East Asia's  
E-Mobility market



**Project updates  
from the regions  
leading OEMs; Car-  
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**Public-private  
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C.A.M is a light commercial vehicle brand founded in 2009. The brand is distributed by R&A Marketing Sdn Bhd, a member of Sendok Group. The Co-Star was developed in response to customer requests for a luxury mini bus with easy manoeuvrability for use on city roads.

Truly one of its kind in Malaysia, the six-metre Co-Star was produced as an extension of C.A.M's existing light commercial vehicle range which consists of 10-18 seater vans, trucks and caravans to cater to an entirely different segment of the market. Although the mini bus was launched at KLIMS 2018, the Co-Star was initially introduced to the market at the beginning of 2018 and the response has been overwhelming, according to Sendok Group representatives.

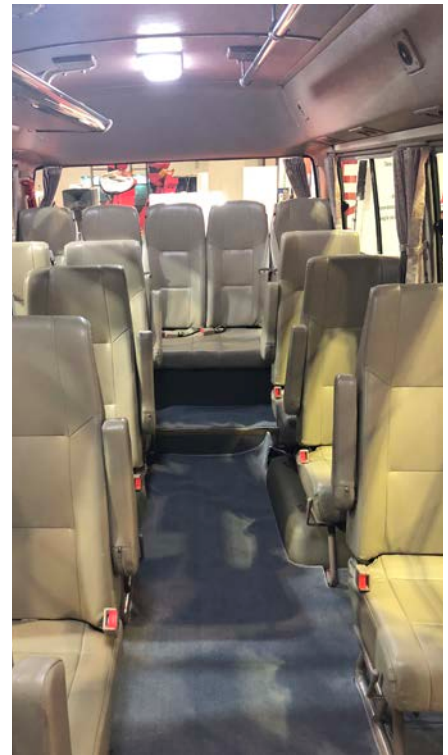
It is worth noting that the Co-Star can be registered as a private vehicle and anyone with a driving licence will be able to operate the vehicle with its versatile applications. The Co-Star has a maximum capacity of up to 20 individuals, either with a 16+1 or 19+1 seat layout. With interior dimensions of 1.8m in height and 1.9m in width, it provides the driver and passengers with an unobstructed view of the surrounding as well as ample natural light, making it a perfect choice for those in the tourism industry.

## Sendok Group Reveals Co-Star and Placer-X

*The company launched both vehicles at the Kuala Lumpur International Motor Show 2018.*

Sendok Group launched the C.A.M Co-Star and Placer-X at KLIMS 2018 held in MITEC, Kuala Lumpur. The event saw both vehicles introduced to members of the media at the exclusive media preview held on the 22nd of November 2018. Malaysia's Transport Minister, Anthony Loke, also graced the event and was introduced to the various vehicles on display. Bok Wee – Sendok Group Chief Executive Officer and Managing Director and Madam Lau Kiat Hoon – Executive Director at Sendok Group.

Speaking at the launch of show, the Loke emphasized that "the aspect of vehicle safety is one of the priority areas that the ministry is looking into. Various new active and passive safety technologies introduced by the manufacturers and industries are capable of assisting drivers in making the right decisions and have better control of their vehicles. It is imperative that we encourage the implementation of vehicle safety technology."



The Co-Star is equipped with a 2.8 litre engine which complies with Euro 4 emission standards, German Getrag transmission technology and fuel supply system from Bosch. Customers are entitled to a 3-year or 100 000 km (whichever comes first) warranty at C.A.M's existing service network of service centres available nationwide as well as free towing service within the warranty period. For a limited time only, the company is offering customers a free bird's eye view 360 degrees camera system as well as installation charges which retails for RM3 500.

During the show, C.A.M also displayed its bestselling vehicle, the Placer-X, an 18 seater van. The Placer-X is no stranger to those in the industry as it is the bestselling 18 seater van in Malaysia, besides being a C.A.M bestseller. The longest van in Malaysia was recently awarded as "The Preferred Vehicle" at the Malaysian Tourism Council Gold Award.

The Placer-X is available in two configurations. These are the 2.5L CDTi and 3.0L CDTi. The newer version Placer-X 3.0L is equipped with a 3 000cc engine with six speed gearbox, twin pot brake callipers and heavy duty axles to ensure maximum performance, efficiency and enhanced safety.

More than 70 percent of the Placer-X vehicles sold in Malaysia can be found in the hotel and tourism industry according to C.H. Gwee, General Manager at Sendok Group. With over 100 sales and service dealers as well as branches nationwide, customers can be rest assured that servicing of vehicles and be done conveniently and timely.

C.A.M's range of light commercial vehicles are assembled locally by R&A Commercial Vehicles Sdn Bhd (RACV), a manufacturing and assembly plant under Sendok Group.

RACV obtained the manufacturing licence under the Industrial Coordination Act 1975 and Sales Tax Act 1972 to assemble trucks, prime movers, buses and pick-up trucks. The company was ISO certified in 2006.

Also present at the event was Dato Hj. Wazir bin Haji Muaz - Chairman of Sendok Group and Mr Gwee. ■





**B**ridgestone has launched a pilot of its Tirematics solution for yard management in the Asia Pacific region. Using the latest IoT and Cloud technologies, Tirematics facilitates fleet management and enhances operational efficiency. This solution is initially being deployed in Singapore and Thailand.

**Delivering Value**

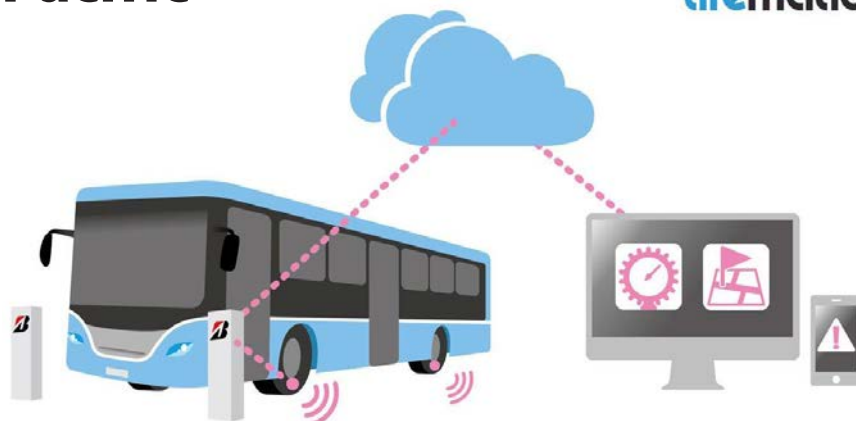
“Digital Innovation is at the core of Bridgestone’s business and through solutions such as Tirematics solution for yard management, we aim to deliver value to our customers by proactively anticipating and addressing their needs and expectations,” commented Tao Yang, General Manager of Commercial Marketing Department, Bridgestone Asia Pacific Pte. Ltd. “We see great potential for Tirematics solution for yard management in Asia Pacific and expect to expand this solution gradually across the region in the coming months.”

The Tirematics solution for yard management is a comprehensive package that includes a full range of premium fleet solution services to address customers’ needs. The combination of sensors and a new cloud-based engine enables real-time monitoring of tyre pressure and temperature, with a high degree of accuracy and instant alerts when vehicles enter the depot. The system automatically alerts service managers and drivers via email or SMS when abnormal tyre air pressure and/or temperature is detected. This enables Bridgestone to positively impact its customers’ daily business operations through reduction of tyre maintenance costs and occurrences of tyre-related breakdowns.

# Bridgestone Tirematics Solution for Yard Management Piloted in Asia Pacific



tirematics



**New & Improved**

Since 2013, Tirematics Solution has been successfully deployed in Europe as part of Bridgestone’s fleet service programme. The launch in Asia Pacific region comes with multiple new enhancements and a scalable proprietary cloud-based engine. These new enhancements aim to reduce investment and simplify requirements. The next-generation Tirematics solution for yard management in Asia Pacific is a practical, cost effective fleet-oriented solution that positively impacts fleet operation.

Linked with Bridgestone’s new cloud-based engine, Tirematics provides integration with Toolbox, (Bridgestone’s proprietary application for tyre audit and performance tracking with CRM) to deliver end-to-end asset management capabilities to its customers. Toolbox allows Bridgestone to instantly access tyre information to analyse and make informed decisions on optimal tyre maintenance and selection.

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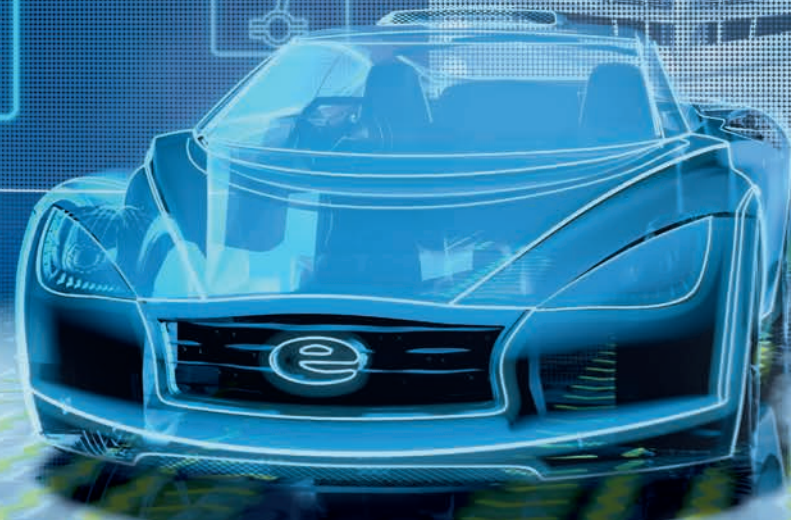
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# The New Rosa

**M**itsubishi Fuso Truck and Bus Corporation, under the umbrella of Daimler Trucks Asia (DTA), recently launched the 2018 model year Rosa light bus, available for sale at all Mitsubishi Fuso sales outlets across Japan.

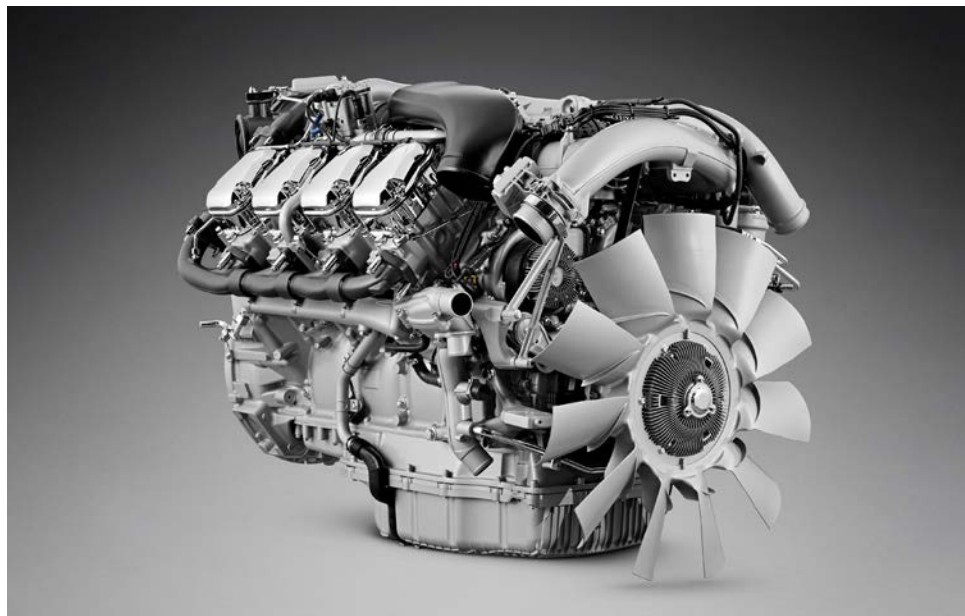
The 2018 model introduces the first new face for the Rosa since 1997. The design language integrates the “Fuso black belt” a design element that enhances the “FUSO” logo and signifies the new brand identity of upcoming Mitsubishi Fuso vehicles. Further, the 2018 Rosa features optimized headlamps and new style LED fog lamps available on certain Rosa models.



### Vehicle Specifications

Vehicle Designation:	BE640G
Engine:	4P10 (T6) 129KW (175PS)
Transmission:	6 Speed Duonic 2.0
Capacity Drivetrain and trim:	29 passengers, 2WD Long body, Basic grade

# All Scania Vehicles Sold by Scania (Malaysia Sdn Bhd can Immediately Run on B10 Diesel



There are no changes to the operational procedures or frequency of vehicle servicing. Also, there would be no additional costs incurred as no additional equipment is required for vehicles sold by Scania (Malaysia) Sdn. Bhd. to run on B10.

“Scania continues to be in the forefront of sustainable transport solutions. Our wide range of alternative fuels have been in operation around the world for some time already and including in Southeast Asia. Our customers continue to enjoy profitability while being environmentally-friendly in their operations through reduced CO2 emissions.” says Managing Director of Scania Southeast Asia, Marie Sjödin Enström

All Scania vehicles sold by Scania (Malaysia) Sdn. Bhd. can run on B10 diesel without further adaptation. Normal warranty will apply when running on B10 diesel – which comprises 10% biodiesel and 90% regular diesel – which means there will be no impact to existing customers with regards to warranty.

## Nic Zerbst New MANN + HUMMEL COO



(Ludwigsburg, Germany) Nic Zerbst will become the new President & Chief Operations Officer (COO) and member of the MANN + HUMMEL Group management effective February 1, 2019. He succeeds Hansjörg Herrmann, who left the company on November 30, 2018 at his own request to devote himself to a new professional task. Mr Zerbst, from South Africa, was most recently Vice President Global Operations, responsible for production at Eberspächer Exhaust Technology GmbH & Co. KG Esslingen. Previously, he worked at Faurecia and Ford.

Thomas Fischer, Chairman of the Supervisory Board of MANN + HUMMEL stated, “We are delighted that we have found a CEO in Nic Zerbst who, thanks

to his expertise, will continue to develop the production strategy in our plants worldwide with regard to their respective core competencies.”

Fischer expressed regret for Herrmann’s departure who was responsible for worldwide production in the approximately 40 plants of MANN + HUMMEL. “On behalf of the shareholders, the management and our employees, I would like to thank Hansjörg Herrmann for their trusting cooperation. We regret his departure and wish him all the best and every success for his professional and personal future. “Herrmann was with MANN + HUMMEL since 2011 and became a member of the Executive Board in December 2015.”



# Strong Performance from MAN at IAA 2018

With numerous highlights in electromobility, automation and digital innovation as well as extraordinarily high demand for trucks, buses and vans, MAN Truck & Bus scored one of its best IAA Commercial Vehicles trade fair appearances of all time. As per the MAN motto, "Simplifying business", making its customers' jobs easier was the central maxim at the heart of it all.



In the bus segment, MAN provided an outlook on fully electric passenger transport in cities with the Lion's City, and presented its first E18 natural gas engine as a world first, a further step forward in MAN's decades of expertise in natural-gas-powered city buses.

The standard products with the Büssing lion and the NEOPLAN logo too gave a strong trade fair performance thanks to their proven strength, robustness and uncompromising customer orientation.

Jerome Wong, General Manager Sales & Marketing of MAN Truck and Bus (M) Sdn Bhd said, "We are excited to be able to showcase new developments and innovations to our customers at the IAA. Our aim will always be on making our customers' job easier, true to the motto "Simplifying business, while offering them low total cost of ownership".

## Telematics Solution

### Fleet Management

GPS navigation and routing records, geo-fencing control, vehicle location tracking, real time vehicle information, fleet operation efficiency report, web-based management via PC, Notebook, tablet or mobile devices on Android or IOS.

### Driver Management

On duty time management (Engine start and end time and idling), two-way communication via radio communication channels.

### Driver State Monitor (DSM) - Driver & Cargo Safety

Real-Time event recording, driver driving behaviour monitoring, monitor cargo loading, offloading through cloud and theft prevention.

### Advance Driver Assistance System (ADAS) Integration

ADAS data log and analysis report, forward collision warning, lane departure warning, headway monitoring and pedestrian collision warning

### The solution will run on:

1. Cloud
2. 4G / LTE Network for driver's console





The donated bus will be regenerated as a learning bus called "STEAM BUS". Every Thursday afternoon, there will be an "OLE" (Other Learning Experience) learning section. Students can make use of the regenerated bus for STEAM (Science, Technology, Engineering, Art and Mathematics) education. There will also be a "JOYFUL FRIDAY" session every Friday, when students can board the bus to enjoy STEAM activities.

KMB aims to use the retired buses, which are used for teaching purposes, as a different way of serving Hong Kong, while achieving the purpose of recycling resources. These donations also allow the schools to use their creativity to give a new meaning to the old bus and assist students in chasing their dream in an enhanced learning atmosphere.

## Bus Regeneration Programme: KMB Retired Bus Converted to Promote STEAM Education

Students and teachers of CNEC Lui Ming Choi Primary School will now be able to enjoy learning on a retired bus provided by The Kowloon Motor Bus Co (1933) Ltd ("KMB") under its Used and Retired Bus Programme, a programme for the donation of used and retired buses.

Under the Used and Retired Bus Programme, which was rolled out at the end of 2016, retired single-deck and double-deck buses will be donated to schools and non-profit organisations. Applicants are required to submit a proposal detailing how the bus will be deployed, including a description of how it will meet the requirements of sustainable development and the educational purposes to which it will be put. ■

## New Research and Development Center for Electronics: a Milestone for Vehicle Electrification at MAHLE

MAHLE inaugurated a new research and development center on November 23rd at its location in Valencia/Spain. In the future, around 250 employees will work on developing new products and solutions for sustainable mobility at this competence center for vehicle electronics.

Electronic systems are becoming increasingly important in modern vehicles. The powertrain of the future is a system consisting of interconnected hardware and software that communicates and interacts intelligently within the vehicle. As a pioneer of future mobility solutions, MAHLE is therefore continuously expanding its activities in the area of electronics, with the company's new research and development center in Valencia representing a significant element of this approach.

To effectively advance the electrification of vehicles, MAHLE has combined its activities relating to electric drives, actuators and auxiliaries, as well as control and power electronics in the Mechatronics division. These products are used in passenger cars, commercial vehicles, and off-highway vehicles.

MAHLE's goal is to make individual mobility more climate-friendly and sustainable. To achieve this, the company is pursuing a dual strategy. On the one hand, MAHLE is working intensively on the further optimization of the combustion engine. On the other, the company is developing solutions for the widespread adoption of electromobility. As a key player in the automotive industry, MAHLE is therefore instrumental in shaping the future of mobility. ■



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