



Focus on: Refrigeration for Mobile Applications

# compact

01 // 2014



Helmut Scheid:  
"Alternative drives are at the top of the agenda for the bus sector."

06


04

# 50%

Trade fair news:  
The new SPEEDLITE ELV21 compressor is 50 percent lighter than its predecessor



**08** BITZER ROADSTAR: The best for your bus's air conditioning



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# Efficient, Robust, Flexible

Refrigeration systems for the cooling and air conditioning of vehicles and transported goods are seen as the supreme challenge — and for a very good reason. The conditions under which they have to operate are much tougher than for stationary systems

One glance at the rough everyday operations quickly shows how high the requirements are. Bad roads, joints in rails and shafts frequently result in the refrigeration systems being subject to heavier vibrations. The stresses on compressors are increased by varying geographic locations, including regions where there are very high fluctuations in temperature. Usually there is no permanent power supply to pre-heat the lubricating oil. There is also limited space available to install the system and its weight should be as low as possible. This all results in very specific requirements for “mobile” refrigeration systems.

**The Technical Challenges** The reliable lubrication of all moving parts represents one of the greatest challenges. We have taken precautions so that BITZER transport compressors can cope with oil thinning during the start phase — owing to the high refrigerant concentration, periods without superheating the suction gas as well as occasional liquid slugging — without sustaining any damage: Specially treated pistons, connecting rods with running bearing bushes made of bearing metal or bearings coated with a Teflon-based material provide the answer to the challenges — and are the foundation for the highest operating reliability. On the other hand, the fundamental requirement of “efficiency” is met via low frictional losses, a minimum pressure drop over valves and good fatigue strength over the entire range of speeds and capacity.

Apart from efficiently creating refrigeration, adjusting the power to the requirements significantly affects the system’s energy consumption. Compressors which are externally driven by internal com-

bustion engines, via a belt or a shaft, follow the engine speed and thus frequently produce more refrigeration than is necessary. This is why, for the BITZER ROAD-STAR compressor, the CR11 capacity regulator offers the option of fast intermittent operation to avoid unnecessary excess capacity. Electrically driven compressors — piston, scroll, screw — can be operated at a variable frequency over a wide range of speeds and can thus adjust their capacity to the requirements. This doesn’t just reduce the energy consumption. By avoiding excess capacity, it is possible to install smaller heat exchangers. That saves cash.

**Refrigerant – a Never-Ending Story** R134a dominates for transport applications but, due to its high global warming potential (GWP) of 1,430, it is in question, even here. But what is the alternative? BITZER has comprehensively tested compressors with the available “low-GWP” refrigerants. There was a clear result from this: that so far there is no clear favorite. It remains to be seen whether other announced alternatives can meet the practical requirements. Even for the natural refrigerants, only CO<sub>2</sub> is a good choice — although, at least theoretically, ammonia and the hydrocarbons could be used in compact systems with secondary circuits. The BITZER application engineering department has thus decided that in the medium term, R134a remains the refrigerant of choice for compressors in transport applications. Of course, BITZER will continue to check all of the alternatives available on the market and will make compressors available for accompanied field tests. ■



Rolf Blumhardt, BITZER application engineering

# Good Times for Good Containers



Morten Nylykke, Star Cool Engineering

Reefer containers are moved over large distances while carrying valuable cargo. Therefore a good level of reliability is a must. Constant monitoring and evaluation of operating data is essential to catch potential problems which challenge reliability. Some of the container owners have therefore equipped the containers with remote modems, making it possible to receive real-time data from the containers. This data contains information about the actual temperature and atmosphere in the container, as well as the running condition of the refrigeration machine. This feature makes it possible to identify and react to potential problems before the cargo starts suffering.

According to independent customer tests, Star Cool is so far unchallenged on the market when it comes to energy efficiency. Star Cool is at least 20 percent more energy efficient than other cooling machines. However, there are still further possibilities to make it even more efficient. New motor technologies, intelligent temperature and ventilation control and precise alignment of all refrigeration parts are some of the possibilities which have potential and are being explored. Over the long haul, bunker prices will only go up and up. This means we depend on components in our Star Cool cooling machine that minimize the reefers’ energy consumption and maintain maximum reliability.

**More than cooling** Previously the container market has mainly concentrated on temperature control, which is still the

single most important factor. However, affordable controlled atmosphere systems recently made their entry onto the market. With those systems installed, it is possible to control both CO<sub>2</sub> and O<sub>2</sub> levels in the container. By controlling the atmosphere, it is possible to maintain a higher quality level for the perishables while extending the transport duration, and thereby reach new destinations. The latest trend is to build air cleaning systems into the container. These systems prevent mold, bacteria, etc. from spreading and infecting all the cargo in the container. By combining the above technologies, we have succeeded in widening the transportation window for bananas, avocados and mangoes from 20 to 45 days.

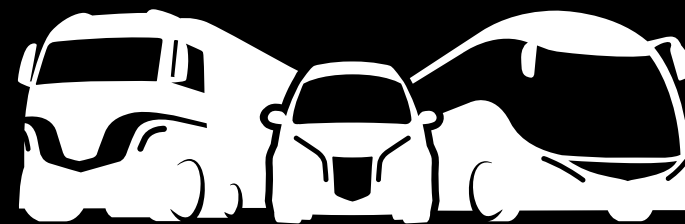
Reliability, efficiency, environmental friendliness and cargo care — that is what customers expect from reefer containers. Morten Nylykke from Star Cool Engineering shows how his company meets those needs

**Quality for the future** In the future our biggest opportunity will be the further increase of world food demand. This will also increase the need for transportation that is affordable and dependable: independent economists predict 5 to 8 percent growth in the reefer trade. The main challenge right now is beyond our control. The shipping lines, which are our customers along with leasing companies, are generally hard pressed financially, which means they have less money to invest in new containers. The good thing about this is that only the best containers will win out. Since we have gained several new customers in recent years I am very optimistic that we will continue to do so in the future. ■

# Trade Fair Firsts

The new horizontally oriented, semi-hermetic SPEEDLITE ELV scroll compressors with a frequency inverter cooled by the suction gas for air conditioning in bus, train and metro applications will be presented at the IAA and InnoTrans trade fairs. The three compressors in both housing sizes deliver a cooling capacity of 0.9kW to 5.5kW, 0.9kW to 7.5kW and, in the SPEEDLITE ELV51, up to 27kW with R134a at SST = +5 °C and SDT = 50 °C. During the development of this compressor family, the main focus was on the scroll spirals, the electric motor and the frequency inverter, which have

been developed together to form a new system. At both trade fairs, the BITZER subsidiary Lumikko also presented a new user interface for mobile refrigeration units



»» IAA 2014



## An All-Rounder for Mobile Air Conditioning

The newly developed SPEEDLITE ELV51 supplements the horizontally oriented ELH scroll series with a built-in frequency inverter for the same capacity and significantly reduced weight and dimensions. A low noise and vibration level as well as a robust design make the SPEEDLITE ELV51 series an all-rounder for mobile applications—in hybrid buses and trains. Particularly the adjustment of the cooling capacity independently from the bus's engine reduces the system cost while maintaining the same, or even improving, the comfort in the cab. ◀



“An electrically operated scroll compressor with a frequency inverter enables a completely new system design with compact dimensions, a low amount of refrigerant and increased efficiency of the system. In view of the electrification and hybridization of the drive equipment, that is a promising market. The scroll technology marks the future for us for mobile, electrical air conditioning applications.”

Rainer Große-Kracht, BITZER Chief Technology Officer

## Specialist for Cabin Cooling

As the successor to the ECH209, the new SPEEDLITE ELV21 is not only shorter, weighing less than half as much (approx. 9 kg), it also has varying power supplies from 24VDC to 400VAC, making it a universal compressor for bus applications or to cool the cabins of farm or construction machinery. The significant weight savings of the semi-hermetic scroll compressor made in aluminium lead to lower fuel consumption and reduce the CO<sub>2</sub> emissions. It is now possible to smoothly control the cooling capacity independently of the drive motor in a wide range of speeds between 2,000 and 9,000 rpm—so that the optimum cooling is possible for all climatic conditions. BITZER Chief Technology Officer Rainer Große-Kracht emphasizes a particularly strong point: “The significantly extended limits now offer variable application options at a high condensing temperature and using other refrigerants than R134a.” ◀



## New User Interface for Mobile Refrigeration Units

When it came to developing the new generation of user interfaces to operate Lumikko cooling systems, BITZER subsidiaries Lumikko and Lodam wanted to simplify the daily work for truck drivers and service staff. The new user interface offers the following benefits:

- User-friendliness** // The 4" color display offers high contrast for optimal legibility even in sunshine and at extreme angles of vision—regardless of whether it's mounted inside or out.
- Simpler service** // Errors are displayed clearly with recommended actions, making it easier for service staff to correct faults. All stored data can be exported via a USB connection.
- High adaptability** // The main menu can be customized, for example to simultaneously monitor different temperature zones. The color of the lighting can be adjusted to match that of the dashboard.
- Multiple installation options** // Thanks to its robust design, the display can withstand direct sunlight, moisture and salt, so it can also be installed outside on the trailer. In the driver's cab it can be directly installed in the radio slot. ◀





The Citysphere modular air conditioning system provides comfortable temperatures as here in Utrecht, in Holland

# It's the Variety That Does It

Spheros GmbH, from Gilching in Bavaria, Germany, positions itself as a system partner for HVAC systems and their complete control in buses around the world. **Helmut Scheid**, who has been Chief Technology Officer at Spheros since 2010, knows what makes the international markets tick

*Mr. Scheid, how much does the discussion about the refrigerant of the future concern you?*

**Helmut Scheid:** Of course we constantly keep up to date and test alternatives. We take a very clear position, but we don't support just the "one" correct solution. We offer variety — and can thus accommodate every customer's wishes. Personally, I see that for example on the subject of "CO<sub>2</sub> as an alternative refrigerant in buses" that this is a discussion which is essentially led in Germany — also, of course, driven by the car market. Buses have quite different requirements to cars. You have to take a close look to ultimately see which is the best solution for the environment and for the operator. Notwithstanding that over the years we have significantly reduced the amount of refrigerant required and we offer completely hermetically sealed solutions. On the international front there is scarcely any interest in alternative solutions on the subject of refrigerant in buses. There are quite different subjects which drive the market.

*What is the most important subject in the bus sector, from your point of view?*

It is quite clearly alternative drives, in other words vehicles with a hybrid or purely electrical drive. Reducing emissions in conurba-

tions and metropolitan areas is a huge subject in Asia — and increasingly in other corners of the world. Here too, you must be aware of the differences. While we in Europe discuss which is the best solution, in Asia products are being delivered. For many years now, hybrid solutions have been in daily use. Just recently for example, Shanghai ordered 1,200 hybrid buses in one go.

*How do you deal with this situation?*

We have pushed our range of products for hybrid and electrical buses extremely hard and can now offer differing variants of completely electrically driven, highly efficient HVAC systems. Moreover, we are active in research projects. After all, the optimization of auxiliary units is of increasing significance when it concerns the efficiency of hybrid buses in public transport. Together with the Fraunhofer Institute for Transportation and Infrastructure Systems, in the "load-synchronous thermal management" project, we have designed a special air conditioning system for hybrid city buses and have introduced a set of strategic rules, which adjust themselves to the driving profile. The aim is to develop a holistic concept which controls all of the components integrated in a system (including the trac-

tion batteries) via a higher-level control system — depending on the driving profile and on the amount of energy which is available.

*Is this why Spheros is building up its core skills for control and vehicle electronics?*

Precisely. When the aim is to manage all of the components in a bus to produce an optimal climate in the bus, behind the efficient and fault-free control, there is the intelligence of the software — for example a CAN bus based networking of the system components, not just those from the HVAC area. In future air conditioning systems, more and more components will be included; the vehicle's operating state will be read out, evaluated and taken into consideration. The demands made of the systems are growing — and we are preparing for that. With internal solutions, we minimize the interfaces, thus creating functional and cost benefits for our customers. However, we also develop and supply bus electronics and multiplexing systems, which extend beyond the simple control of the air conditioning, encompassing far more components in the bus. In South America we are already a recognized partner for the development and supply of bus electronics — starting with infotainment right through to vehicle destination displays.

*What future challenges do you see on the horizon?*

New tasks come from the differing markets around the world. In all of the strongly growing markets for modern buses outside of Europe, we need individually customized functional concepts. Together with our partners, we have to examine cost structures, meet special requirements on operating philosophies, on quality and reliability and we have to take account of many other external influences. Working together, from all of these factors, we have to derive the correct strategies and products. ■



Helmut Scheid, Chief Technology Officer at Spheros GmbH since 2010

## Lutz Boeck

Head of Center of Competence HVAC, Faiveley Transport Leipzig GmbH & Co KG, Germany

“The trends are the increase of energy efficiency and the use of safe refrigerants which are available in the long term. Increasing the efficiency of the cooling and heating processes is a short-term task; in the medium to long term we will have to change to alternative refrigerants. It is an open question as to how far synthetic refrigerants will continue to play a role. Apart from the reworked F-gas regulation, there are also guiding themes within the sector which aim for environmentally neutral air conditioning in railway carriages.”

# What is Driving Your Sector?

## Hannes Wolf

General Manager, Aurora Konrad G. Schulz GmbH & Co. KG, Germany

“The consideration of the life cycle costs plays an important role for all of us involved in the air conditioning of buses. It is certainly an important question as to how far the COP values for air conditioning systems can be significantly improved with electric buses. Opportunities arise here above all as the compressor drive — in contrast to diesel-powered vehicles — is independent of the engine speed. Another important area is the recovery of energy from the electric vehicle. The cost pressure is no new trend, but a fact with which we are always ultimately occupied.”

### Comfort and Safety

Bus drivers should always keep a cool head when behind the wheel. Of course passengers also appreciate a vehicle which is pleasantly air conditioned. In regions with high temperatures, air conditioning in buses is of great importance. As the world leader in the market for compressors in bus air conditioning applications, BITZER has consistently continued to optimize its reciprocating compressor for this application—and now presents the ROADSTAR series. The outstanding characteristic of this series is its high operating reliability, which impresses especially under extreme conditions in all climatic variations. Since early 2013, the ROADSTAR has been produced all around the globe in Brazil, China, Germany and the USA. Whether in big cities, the forests of Brazil or the deserts of the United Arab Emirates, or at the 2014 Olympic Games in Sochi—the ROADSTAR reliably ensures pleasant temperatures at all times.

### Optimization in Detail

The strengthened drive gear and its innovative surface treatment increase its reliability and extend the compressor's service life, even under demanding conditions.

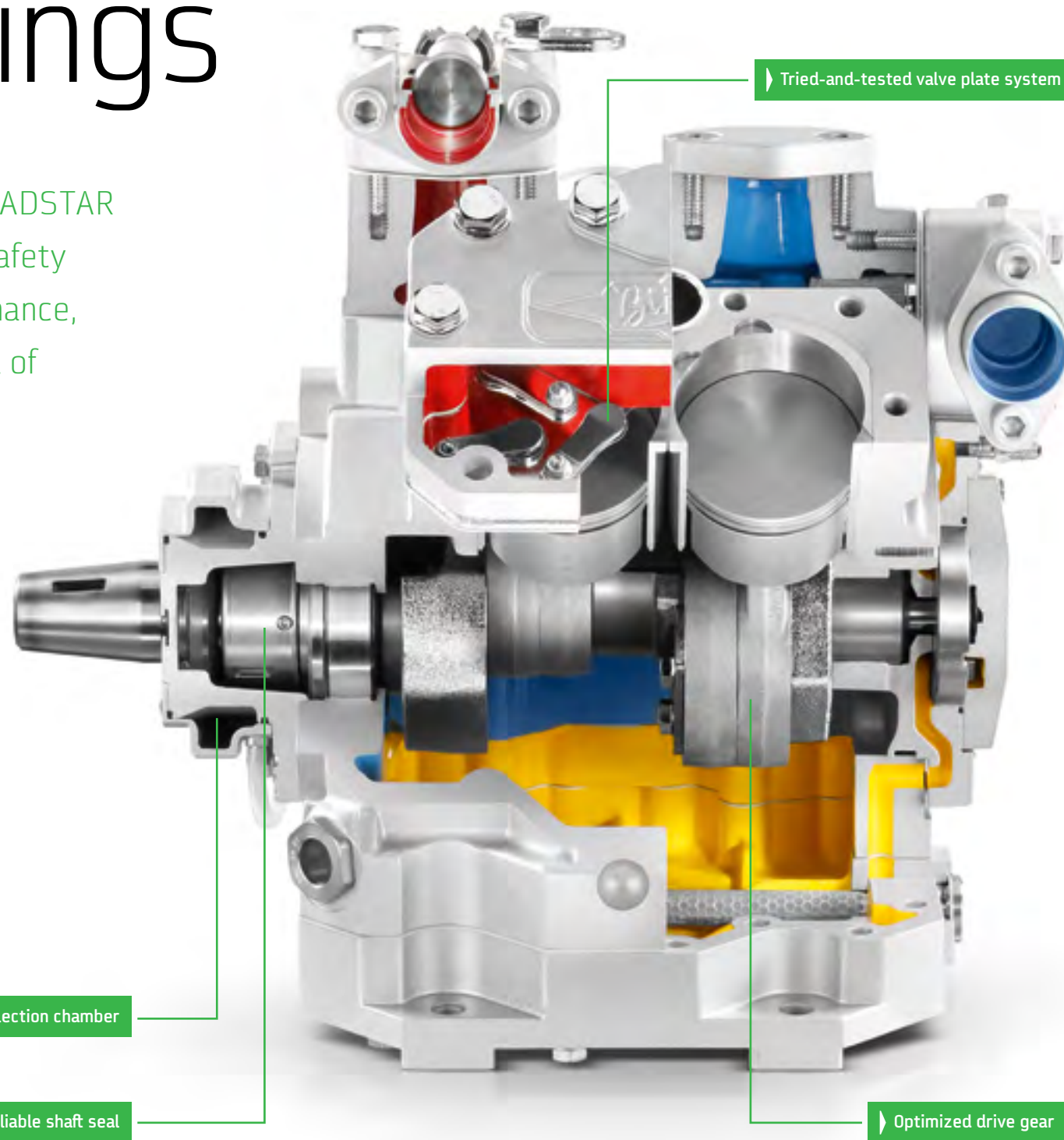
### Stress Test on the Test Bed

The new compressors must first show what they are capable of in the laboratory. The test candidates survived 1,000 operating hours under emergency running conditions as well as numerous critical conditions. The engineers thus simulated use following a long period of downtime and operation in conjunction with high thermal loads and maximum speeds. The ROADSTAR also passed the 100-hour stress test from our partner Spheros with flying colors.

# Cool Runnings

“With the BITZER ROADSTAR series, apart from safety and ease of maintenance, we offer a high level of awareness of our environmental responsibility.”

Helmut Meyer,  
BITZER Director Sales  
Transport Division and  
Managing Director  
of Lumikko Technologies Oy



### Ninety-Six Million Fault-Free Test Kilometers

Experts at the BITZER competence center for reciprocating compressors in Schkeuditz sent more than 700 ROADSTAR compressors out onto the roads of Brazil, Europe, India, Iran, Mexico and the USA for field tests. They had a lot of support from our partners for the field tests, EvoBus, Spheros and Eberspächer Sutrak, who use compressor types 4PFC(Y), 4NFC(Y), 6TFC(Y) and 6NFC(Y). In the various climate zones the ROADSTAR covered a total of over 96 million kilometers during the field test period. Thanks to the improvements, there wasn't even a single breakdown. The reliability and performance also impressed the customers: "We were using more than 160 compressors and able to rely on all of them at all times, even in the extreme conditions of the Middle East," emphasized Paul-Rainer Hoffman, general manager of Spheros Middle East, an established manufacturer of bus air conditioning systems.

### This Is How BITZER ROADSTAR Compressors Make an Impression

- Compact design and low weight
- Proven valve plate system with flapper valves made of impact-resistant spring steel
- Patented shaft seal for minimal leakage
- Very smooth running due to dynamic mass compensation
- Low frictional losses due to surface hardened drive shaft, optimized pistons and hard chrome-plated piston rings
- Strengthened connecting rod geometry with generously dimensioned bearing surfaces
- Wear-resistant cylinder liners
- Combined roller and slide bearing with minimal axial clearance
- Internal oil collection chamber for easy maintenance
- Tapered shaft end for reliable and low-vibration transmission of force

# Great Climate in the Bus

It was 18 years ago that engineers from Konvekta discovered the potential offered by CO<sub>2</sub> air conditioning. The first bus with a CO<sub>2</sub> air conditioning system went into a practical, functional test in 1996. **Dr. Michael Sonnekalb**, Head of Research and Development at Konvekta, on the prospects for R 744 in bus air conditioning

*Dr. Sonnekalb, what role does Konvekta play in the market for bus air conditioning?*

**Dr. Michael Sonnekalb:** I think that we can not only call ourselves pioneers but also technological leaders for CO<sub>2</sub> air conditioning systems. There is scarcely anyone else with more practical experience of R 744 as a refrigerant in mobile bus applications. Seven buses have been regularly operating since July 2010 using the natural refrigerant CO<sub>2</sub> in Berlin alone. The Berlin public transport company BVG has thus taken up a pioneering role internationally.

*Are other bus operators still hesitating?*

Well at the least they are reserved. Still, there are currently 45 buses operating faultlessly with our components in the field. And, following the discussion about R1234yf, I am

convinced that dynamics are now coming into the market. For example, Mercedes-Benz has declared, at least for cars, that they would like to use CO<sub>2</sub> air conditioning systems. We see a lot of promise in the current developments.

*Is the trend towards fully electric or hybrid buses playing into your hands?*

The path to electromobility is really a driving force for R 744 systems. After all, we can use fully hermetically sealed systems, the control system of which has been especially designed for efficiency when partially loaded. A CO<sub>2</sub> air conditioning system can also be used as a heat pump for the bus heating.

*What are the challenges which have to be addressed when using a CO<sub>2</sub> air conditioning system in a bus?*

You cannot use the standard components as the levels of process pressure are very much higher. This means that many new components have to be validated before they can be used in a bus. Some of these have been developed by Konvekta or arose by working closely together with suppliers. The higher pressures do represent a larger challenge in preventing leaks.

*Are the requirements on the pressure load still a critical subject today?*

No, our long-term tests have shown that. The air conditioning system in our premier bus has already covered more than 400,000 kilometers without a fault. Very strong components designed for refrigerant pressures of up to 150 bar offer the same safety as a conventional system. ❖



Dr. Michael Sonnekalb, Head of Research and Development at Konvekta AG

**To the Point: BITZER on the Subject of Refrigerants** BITZER has comprehensively tested compressors with the available "low-GWP" refrigerants. There was a clear result from this: that so far there is no clear favorite. Of the natural refrigerants, only CO<sub>2</sub> is an option. The BITZER application engineering group has thus decided that in the medium term, R134a remains the refrigerant of choice for compressors in transport applications.



## Transport Cooling Alliance

BITZER took over all the shares of Lumikko's transport cooling division at the end of 2012. With this alliance, BITZER is positioning itself as a system supplier in the transport cooling market. BITZER provides the open, semi-hermetic transport compressors, BITZER's Danish subsidiary LODAM provides the control unit and Lumikko provides the refrigeration units, service and maintenance. Located in Seinäjoki, the Finnish company was established in 1970 and now produces innovative and reliable cooling systems for transport via trucks and trailers.

# Fresh on Arrival

The new Lumikko L7 Temperature Control Unit is economical, reliable and efficient, providing the Finnish pilot customer Ilpo Salomaa Oy with a key competitive advantage

Higher energy efficiency and even better reliability — these were the primary goals Lumikko pursued with the development of its new L7 Temperature Control Unit. In just ten months, the engineers of the BITZER subsidiary developed the new product, focusing primarily on optimized redundancy and improved capacity control. Thanks to the new BITZER 4NFT compressor specially developed for Lumikko, the L7 unit offers a higher cooling capacity and thus shorter cooling times. Kari Saikkonen, Head of Development, Purchasing and Production at Lumikko: "With the optimization of condenser airflow and the extensive range of capacity control possibilities, we can achieve higher efficiency for the entire system." Lumikko has already been using start/stop technology since 2000. The diesel motor stops once the desired temperature has been achieved in the freight compartment, decreasing frequency of maintenance and additionally reducing fuel consumption.

Following extensive tests in its laboratories, Lumikko launched a pilot phase, installing the first two L7 temperature-controlled cooling systems in the trucks of its customer Ilpo Salomaa Oy. The Finnish company transports vegetables, meat and sausages for its

customers. The transportation company has been using Lumikko's cooling solutions since 1973 to keep food fresh in truck freight compartments. "Because we'd already been working with Lumikko for so long, I was happy to have two of my 11 trucks equipped with the new L7 temperature-controlled cooling systems. Even with the extremely low winter temperatures here, the Lumikko systems are always reliable," explains Ilpo Salomaa, who's the second generation to manage the family company.

During the pilot project, Lumikko monitored the L7 cooling systems in use by Ilpo Salomaa Oy round the clock with a remote monitoring system, which constantly transmitted the ambient conditions, information from the freight compartment, the location and the status. "The system immediately raises alarm if any irregularities occur," explains Saikkonen. "Our technicians then immediately see to the problem and solve it as quickly as possible. This helps us to keep the customer on the road."

A successful partnership: Kari Saikkonen from Lumikko and Ilpo Salomaa from Ilpo Salomaa Oy



Ilpo Salomaa is delighted with the results of the partnership: "Thanks to its low energy consumption and high cooling capacity, the Lumikko technology provides me with a key advantage in a highly competitive industry. Even the feedback from my drivers has been extremely positive." ❖

# Global Presence

Whether container, bus, train, truck or trailer – all around the world, BITZER compressors are used in mobile refrigeration and air conditioning applications. Robust, reliable and energy efficient. Tailor-made applications result from working together with integrators such as Eberspächer Süttrak, Faiveley, Konvekta, Liebherr or Spheros. BITZER developers are also working with customers such as Maersk Container Industry on energy efficient solutions for transport refrigeration



Buses for the US market, made by the Belgian producer Van Hool, are equipped with BITZER compressors, which is a joint project with Eberspächer Süttrak.



In their successful Citaro model, the Daimler subsidiary EvoBus is using compressors from BITZER around the world.



More than 1,000 BITZER OCTAGON and ECOLINE compressors have been installed in the innovative biodiesel LRV train. The system partner here is EUROAR Automotive Systems.



With the Star Cool compressor, BITZER reacted to requirements produced by Maersk Container Industry. Around the world, there are about 150,000 Star Cool reefer containers on the move.



The BITZER subsidiary Lumikko is extremely well positioned as a system provider for refrigeration systems in trucks and trailers in the Scandinavian market.



850 GOLAZ and MAZ buses using BITZER compressors were used for the Olympic Games in Sochi. The system provider there was Spheros.



Just in Beijing, in 2013 almost 3,000 new buses equipped with BITZER compressors were put on the road.



The first big order: Spheros Turkey ordered 200 units of the brand new BITZER ROADSTAR 4GFC(Y) – for use in articulated buses with 45 kW cooling capacity.



Zhongtong and Changan, two Chinese bus manufacturers, are exporting their very successful bus to the Middle East with about 2,000 BITZER ROADSTAR compressors.



BITZER compressors are used in more than 1,000 buses in India, operated by the joint venture company Tata Marcopolo Motors.



The driverless public transport systems made by the Dutch company 2gether in Masdar City, an "eco-city", are cooled by air conditioning systems made by Hevac using BITZER compressors.



Horizontal scroll compressors from BITZER's ELH7 series are used in air conditioning units made by Faiveley in trams from Bombardier's FLEXITY series.

Eberspächer Süttrak, Daimler AG, Eurocar Automotive Systems, iphemant/shutterstock.com, Maersk Container Industry, Spheros GmbH, www.2gether.eu, Bombardier Transportation, Golaz, Beijing Public Transportation Group, Zhongton

## 36

BITZER has 36 Green Point branches around the world

## Green Point India Delivers Fast Help

In addition to high-quality products, ever more customers around the world also expect prompt, uncomplicated service — particularly for transport applications. BITZER meets this requirement with its global Green Point network even in heavy conditions, as demonstrated in India. "Here, high ambient temperatures, difficult street conditions and a lack of know-how among some drivers lead to more compressor malfunctions than in other countries," explains Harvinder Bhatia, BITZER Country General Manager India. That's why the local Green Point offices are all the more important. Close proximity to customers means compressors are up and running again in no time, minimizing downtime. In northern India, Green Point repairs high numbers of compressors for tourist coaches, ensuring that people both within India and those coming from abroad can explore this fascinating country in the comfort of air-conditioned buses. ■



Lumikko is keen to add the Israelis to those who are convinced of the quality of their systems

## Lumikko Exports to Israel for the First Time

At the start of the year, Lumikko signed a distribution agreement for the Israeli market with Klimatech Ltd. The company installed a type L7 truck system and a type L400 trailer system for the introduction to the Israeli market. Klimatech Ltd is now going on a promotional tour, to persuade even more customers of the benefits of Lumikko systems. Both the truck system as well as the trailer solution are characterized by their ergonomic design, their ease of servicing and their high cooling capacity. ■

## One Stop for Everything

Especially when used in buses, containers and trucks, compressors and their components have to withstand heavy shocks and high variations in temperature. To ensure the enduring quality of their refrigeration units, last year BITZER acquired the Armaturenwerk Altenburg GmbH (AWA) in the German state of Thuringia so that it can offer its customers a complete range of products as a single source for everything. For example, AWA supplies the spacing flanges and shut-off valves used in the ROADSTAR compressors. ■



AWA shut-off valves

## Fighting Product Piracy

Experienced counterfeiters copy compressors, spare parts and pressure vessels with a superficial perfection that makes it difficult to tell them apart from originals. However, the performance data and the efficiency of pirated products are a long way away from the high standards of original BITZER products. Owing to the low quality of the components used, both the service life and operative reliability of the compressors are significantly reduced. BITZER must warn about installing imitation spare parts or using fake refrigerants. In transport cooling systems, there have already been instances of personal injury with fatal consequences. There is also a risk of engine damage, liquid slugging, thermal damage or short circuits, which are often irreparable. This is why BITZER is increasingly taking legal action against product piracy — and we are currently introducing various measures so that original parts can be clearly distinguished from fakes. ■

German machinery manufacturers suffer damages of 7.9 billion euros annually through product piracy

7.9

## "Mobile Refrigeration Guarantees Quality and Comfort."

In an interview, Helmut Meyer talks about the BITZER strategy for mobile applications



What strategy is BITZER pursuing to achieve its goals in the market for mobile applications?

**Helmut Meyer:** In the medium term, we would like to become one of the most important suppliers in all four segments of the worldwide market — following air conditioning for trains and buses and container refrigeration, we are now addressing the truck and trailer market. The keys to our success are our technological skills and our close relationships with customers. This is how the Star Cool was created, working together with Maersk Container Industry, Danfoss and Lodam. The energy-efficient container refrigeration concept covers a good third of the worldwide market for reefer containers. We lead the world market for bus air conditioning — with a significant gap between us and the next competitor. Each year, we produce about 90,000 open aluminum compressors for air conditioning in buses.

Where do you put the emphasis here?

Energy efficiency, sustainability and low total cost of ownership are the central criteria when making decisions. As recognized experts on everything to do with refrigerants, for our customers, we are just the right partner when low-GWP alternatives have to be tested for their practicality.

What is BITZER's position on air conditioning on the railways?

In the past we have set worldwide standards for air conditioning on the railways with our technically unique screw compressors from the VSK series. At the IAA, we presented to our customers an efficient counterpart using scroll technology — which we believe to be the technology with the most potential for development at BITZER.

There is still the market for trucks and trailers ...

We are energetically addressing the growth market for truck and trailer solutions. Our subsidiary Lumikko is the nucleus of our work in this field. Numerous customers have told us that they are very interested in another strong alternative on the supplier side. The combination of BITZER and

Lumikko offers everything that is needed to conquer the market in the medium term.

Many see mobile applications as the most demanding for refrigeration and air conditioning. Do you share this view? The compressor is the heart of a mobile system. In contrast to stationary solutions, the demands are incomparably higher — due to widely varying climatic conditions, due to high mechanical loads and due to a harsh everyday operating environment. Despite all adversities however, our compressors work reliably. We have demonstrated this in many field tests which have impressed our customers around the world. In July, for example, Chinese air conditioning specialists such as Songhzi and others ordered 4,000 ROADSTAR compressors, which will be delivered to various bus manufacturers in the Middle East.

Does air conditioning mean more than just comfort?

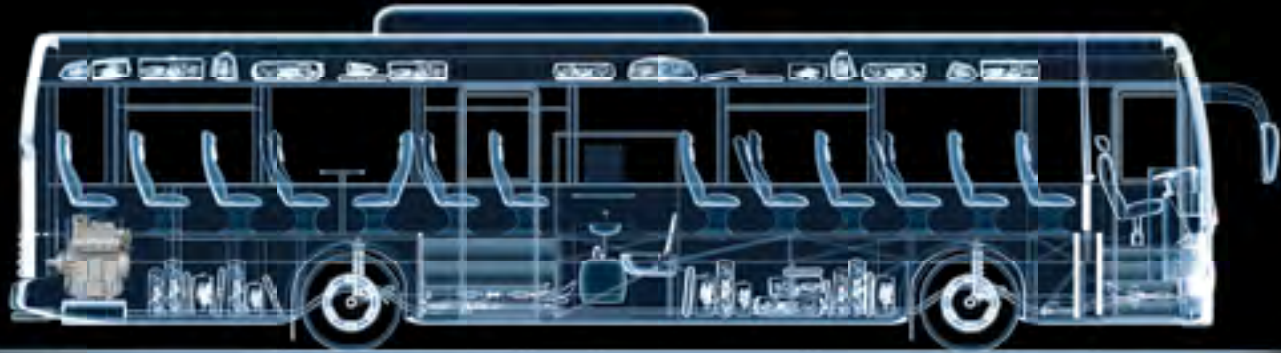
For bus or train travelers to get to their destination without any exertion, a means of transport with properly conditioned air is a fundamental requirement. The drivers of the vehicles also benefit from an air-conditioned driver's cab. Pleasant temperatures increase their awareness and concentration — which is an obvious safety bonus in buses, trains, trucks and construction machinery.

What does refrigeration contribute during transport from the producer to the consumer?

Mobile refrigeration ensures the quality of goods which have to be transported. If easily perishable goods such as vegetables, fish or meat arrive undamaged when they reach the consumer, then the cooling in the container or truck has played a large part. When you consider that in developing countries 40 percent of food suffers during transport, it becomes clear how significant reliable cooling is. ■

Helmut Meyer, BITZER Director Sales Transport Division and Managing Director of Lumikko Technologies Oy





BUSES CARRY PEOPLE FROM A TO B.  
ON THE ROAD WE TAKE CARE OF °C.

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