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CONATEC® news

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18 electric AGVs from Kalmar to Singapore s. 6 Industrial and production plants all around the world are automated at a fast pace s. 8 Khimaira from Kalanti knows how to manufacture a bus bench s. 10













2 ComatecNews

COMATEC Table of Contents

Editorial		
Comatec news	·····	4
18 electric AGVs	from Kalmar to Singapore	e
Industrial and production plants all around the world are automated at a fast pace		8
Seats matter in a	a bus	1(

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Editorial Looking at the development of Comatec from the perspective of the Board

In this editorial, Raimo Ylivakeri, who will leave the Board of Comatec after eight years, reminisces on the past and looks towards the future.

The 2010s have been a fairly difficult and eventful time for Comatec and all Finnish business, not to mention globally. Finnish GDP instantaneously collapsed by more than eight per cent. The volume of industrial production decreased by some twenty per cent in a short period of time. The recession hit Comatec as hard as the rest of the Finnish business community. The volume of orders dropped, the turnover decreased and the financial status deteriorated. Even during these difficult times, the owners and management firmly believed in Comatec's future.

Basic growth was sought through old customer relationships, but a significant amount of additional growth was obtained through several corporate transactions and acquisitions. Approximately a dozen acquisitions were realised. Expansion to new geographic locations took place at the same time – even to Estonia and Poland.

A very important change during the first half of the decade was the transfer to a customer-centred expertise-based organisation and growth in the fields of projects and solution business. At present, we still have four business segments, but a new segment, Automation Solutions, was established at the beginning of the year to find new expertise, customers and growth for the Group.

Unlike many other entrepreneur-owned companies, Comatec emphasises the significance of the work done by the Board, and has done so ever since it was an SME. The open cooperation between the Board and the management has influenced the development of the company, in particular. There has been continuous improvement in the preparation of business plans and the discussion of alternative strategies, as well as in related decision-making.

The acquisitions, as well as the integration of the acquired companies and the upheavals in the Group organisation would not have been so successful if the management, our expertise and all the operating systems had not been simultaneously developed. More investments in the development of these issues are needed, however, so that the operating systems of the current and future Comatec, an international company with several hundred employees, can be raised to a whole new level.

Continuous recruitment and the acquisitions have increased the number of employees in the Group to clearly more than 500. The turnover in 2018 will probably be twice that of the record high turnover in 2008, before the recession. Profitability has also returned to normal.

The development of the Finnish economy as a whole has not reached this level yet: the GDP in 2017 was a couple of per cent lower than in 2008. The GDP in the other euro area countries is already some seven per cent higher. Finland is seriously lagging behind the competition. The situation of the Finnish technology industry is similar. Therefore, when comparing the development of Comatec and the development of Finland as a whole, we can somewhat proudly say that we have done fairly well.

Recent trust indices by the Confederation of Finnish Industries (EK) indicate that Finnish businesses have a high level of trust. In all sectors – industry, services, construction and retail – trust is clearly higher than the long-term average. You should keep an ear out for talk about trade war and other global threats, but you should not allow them to influence you too much; instead, the organisation must assertively focus on reaching its goals.

I feel that I have received more than I have given. I would like to thank all of the people I have met for the pleasant cooperation!

Raimo Ylivakeri Member of the Board Comatec Group

Comatec news

Vantaa office to move



Comatec's Vantaa office will move a couple of kilometres to the north in late April.

Starting from 26 April, the new address will be Jaakonkatu 3, FI-01620 Vantaa, Finland.

There are parking spaces for guests right in front of the main entrance.



Comatec Group will continue its growth with acquisitions

Comatec's subsidiary Rantotek has purchased KPA Unicon's project business in Pirkkala

Rantotek Oy, a member of Comatec Group, has bought KPA Unicon Oy transfers Pirkkala's project design business unit of KPA Unicon Pirkkala. As the result of the business deal, six employees were transfered to Rantotek on January 1, 2018 as current employees. The transaction strengthens Rantotek's competence especially in boiler plant engineering. It is a natural follow-up for long-time cooperation between KPA Unicon and Rantotek.

"We have been cooperating with Rantotek for a long time and with our experience we believe that this business arrangement will serve all parties," says **Teemu Koskela**, Managing Director of KPA Unicon.

The transaction is an important part of Comatec Group's future stra-

tegy and development of project business. Since 2014, the Comatec Group has grown steadily organically and by acquiring expert firms supporting the company's strategy.

Rantotek Oy, a member of Comatec Group, is

an expert in energy sector. Rantotek's core competences are boiler plants technology, high pressure pipelines and vessels. Rantotek's services consist of sub-assemblies such as process engineering, thermal design, strength calculation, equipment and plant design, and conformity assessment documentation. These areas form an integral part for investing in boiler plants starting from the decision to commissioning.

www.comatec.fi/en/rantotek

KPA Unicon provides life cycle services for responsible district heat, steam and power generation. The company was found in 1990 and the Group employs over 250 energy industry professional. Its turnover in 2017 was approx. 80 MEUR with strongly positive result. The Group comprises of the parent company KPA Unicon Group Oy and its subsidiary KPA Unicon Oy in Finland and its international subsidiaries in France, Russia, Ukraine, Croatia and Chile. The company's headquarter is located in Pieksämäki, Finland and energy-producing factories at Kiuruvesi and Lapua, Finland. www.kpaunicon.fi

Comatec news

Meet us at the trade fair!



Yet again this year, we will attend trade fairs and other events to present our expertise and meet our customers and partners.

17-18 May 2018, NaviGate 2018 in Turku. You will find us at stand C 24.

29-30 May 2018, Advanced Engineering in *Helsinki.* Our stand is 3b28.

4-7 September 2018, SMM 2018 in Hamburg, Germany. You will find us at the Finnish Maritime Pavilion in Hall B1.

25-27 September 2018, Subcontracting Fair in Tampere. You will find us at stand E 120.

20-22 November 2018 Smart Factory in Jyväskylä.

Appointments – New talent in Comatec Group

Mobile Machinery and Commercial Vehicles

In the Mechanical Engineering Unit Mikael Tynkky has started as a Senior Design Engineer and Markus Munukka as a Design Engineer. Ville Järvensivu and Matti Keituri have started as Junior Design Engineers and Mikko Möykky as Trainee. In the Electricity and Automation Unit Ville-Pekka Tila has started as a Senior Design Engineer and Pauli Ylänen as a Junior Design Engineer. In the Expert Services Unit Mikko Erkkilä and Veikko Puumala have started as Specialists and Jarmo Rapatti Test Engineer. In the Rolling Stock Unit Jan Lindberg has started as a Project Engineer, Pekka Lehto as Specialist and Markus Bruun as Design Engineer.

Power Plants and Conveyors Jarmo Kivimäki and **Prabin Sharma** have started as Design Engineers in

the Conveyors Unit in Oucons Oy's Kankaanpää office. In the Power Plants Unit in Rantotek **Anja Saarinen** has started as a Chief Project Engineer, EIC. Antti Martikkala, Pasi Mäenpää and Jari Saarelainen have started as Design Engineers. Riina Rajala and Hannu Piirainen have started as Project Engineers ja Nina Liimatainen has started as a Documentation Engineer. In the Engineering Office Metso Oy Kari Nevalainen has started as a Senior Design Engineer in the Processing Machinery and Plant Engineering Unit. Esa Puhakka has started as a Project Manager in the Local Services Unit, Aki Tahvanainen has started as a Junior Design Engineer and Tiia Mirzayeva as a trainee.

Industrial Production Systems

In the Electromechanical Systems and Components Unit **Jyri Viitala** has started as a Senior Design Engineer, **Juha-Pekka Lehtilä** started as a Design Engineer, **Jarkko Brunou** and **Petri Immonen** have started as Junior Design Engineers. **Jari Kekki, Ossi Rahkonen, Mika Ruokonen** and **Lasse Wintter** have started as Junior Test Engineers. **Dmitri Romanenko** has started as a Design Engineer in Comatec Estonia OÜ. In the Processing Machinery and Plant Engineering Unit **Petri Kuusisto** has started as a Senior Design Engineer. **Taneli Laakso, Esko Syvälahti, Tom Sourander** and **Tarmo Wahlström** have started as Junior Design Engineers. **Jenni Rautio** and **Anne Luukkanen** have started as Senior Design Engineers In the Engineering Office Metso Oy. **Edvard Mononen** has started as Junior Design Engineer.

Automation Solutions

In the A & D Automation Oy **Petri Tuhkanen** has started as Design Engineer and **Jesse Lankinen** as a Trainee. In the Microteam Oy **Pia Lampinen** and **Markku Puro** have started as Design Engineers.

Group Administration

Maria Uurto has started as a Communications Manager and Nina Laine as an Invoicing Specialist.

18 electric AGVs from Kalmar to Singapore

In the summer of 2017, Kalmar delivered 18 fully electric Automated Guided Vehicles (AGV) to the Singapore port. The project, consisting of new technology, partners and design, was completed on schedule. The AGV was completely customised based on the customer's needs. The implemented AGV design expands Kalmar's range of fully electric products. Comatec was involved in the project from the concept design stage.

TEXT: TAINA SYRJÄNEN

Kalmar is a pioneer in the automation of terminals and energy-efficient handling of containers. One in every four containers in the world is transferred using a solution by Kalmar.

Singapore is one the world's busiest shipping hubs: one in every seven containers in the world goes through Singapore. The AGVs are in preparation for an increase in trade. Furthermore, a completely new mega terminal will be opened in Singapore in a couple of years, and automatic container transfer equipment will play a key role there.

AGVs operate at the port without operators

"An AGV is an automatic vehicle, i.e. there is no driver. Automation has become more and more common at ports, and there is huge growth potential. An AGV can transfer containers between a ship's crane and a pile of containers. The piece of equipment is able to transfer two 20foot containers or one 40- or 45-foot container at a time," explains Product Manager **Jukka Ristimäki**. "The positioning of the AGVs at the port is based on the RFID technology. Large RFID antennas on the AGV can read the exact location from transponders installed in the ground. This allows for automatic control of the AGV at the port. As the port is full of large metallic elements, airborne signals cannot be relied on.

"Kalmar's delivery included only the AGVs and their automation. The top level automation systems were supplied by another company this time, even though Kalmar has its own Terminal Logistic System (TLS). The TLS is delivered in connection with straddle carriers, and it has been proven functional in many places," Jukka says.

"The AGV market is project-based. Last summer, we delivered the 18 AGVs on schedule. We hope that the AGVs will perform well so that we could get more orders in the future. New terminals or new automation systems are not built very often. A project is in the planning stage for several years, and when the planning is finished, several pieces of equipment are ordered at once."

Kalmar aims for green business

"The delivered AGVs were fully electric. This was what the customer wanted, and it fits very well into our strategy, too. Kalmar's vision is having all ports operate with renewable energy and without any CO2 emissions by 2060. The customer also shares this vision," Jukka says.

"In addition to emissions from the motors, noise and light are issues that must be taken into account, because ports are often located very close to the downtown areas of cities. The lights of a fully automated port can be switched off at night. This not only reduces the disturbance caused by the lights, but also saves energy. Furthermore, electrically powered vehicles are very silent.

"Building a fully electric port is easy, because the power grid of a port is already very effective. Working at a port is clear: the routes do not change much, which means that the loading of electric vehicles is easy to arrange. This was our first fully electric delivery. We believe that their share will clearly increase in

the future.

"The AGV complements our range of fully electric equipment. We can also deliver our Kalmar Fast Charge™. In this case, the fast charging device and batteries were provided by another supplier, however. We integrated the batteries into our AGV."

Challenges included battery charging concept and schedule

"The customer wanted to try out two different charging concepts, fast charging and charging the batteries offsite. The customer had a special request: the battery pack would have to be easy to detach, so that it could be replaced with a fully charged battery while the empty battery was removed to be charged elsewhere. Designing automatic replacing of batteries was a complex process. The most major risks involved the batteries and their cooling. We were able to resolve these issues, however. Realising the fast charging was much easier, and it is also the solution that Kalmar favours," Jukka explains.

"Optimising the weight of the AGV was a challenge from the get-go. The maximum weight-carrying capacity of the piece of equipment is 65 metric tonnes. One container can weigh up to 32.5 tonnes, and the batteries weigh some five to six tonnes. As the AGV has four wheels, the vehicle itself can weigh 24 tonnes. This meant that we had to optimise weight at every turn.

"We did not have a product line for the piece of equipment, so we knew that we would have to use several third party suppliers. The frame and assembly were completed in Estonia and testing took place in Tampere in our own testing area. In addition to our design engineers, people from Comatec and other engineering companies participated in the project. The customer was also closely involved in the design process. A good supply chain is one of Kalmar's strengths. It means that we can find good suppliers," Jukka says.

"The 14-month lead time added its own challenges to the project, because the piece of equipment was designed and manufactured almost from scratch. Due to the tight schedule, production occurred simultaneously with design. This was a fairly difficult and stressful situation for the design engineer. The design engineer had to get everything right the first time round. Otherwise, we could have had 18 faulty AGVs in our hands. We were able to deliver the AGVs on schedule, and they have been functioning well without problems. One of our key competitive advantages is the fact that we are able to operate on schedule and deliver the equipment when agreed," Jukka says.

Comatec ensured the project's design expertise

"Comatec's design engineers participated in the project from the concept design stage all the way to testing. Four to five Comatec design engineers participated in the project, performing hydraulic, mechanical and electrical design. Comatec's expertise in commercial vehicles and previous shared projects supported this project well," Jukka says.

"Comatec's design engineers designed the hydraulic hoses and shaft accessories, and fitted service hatches to the mechanics of the AGV. Mechanical design had a major role already at the concept design stage.

"At Comatec, we have extensive experience in various sectors. In this project, we utilised our expertise from several sectors in a whole new application. One of Comatec's strengths is the fact that it is likely that we can find the expertise needed for each project in the house. We can apply our expertise so that it benefits our customers. Customers will see this as flexible service and cost savings. The project was well managed by the customer, and we felt that we were part of the team", says Business Unit Manager Mikko Helminen from Comatec.

"The project was a good example of functional teamwork. The cooperation between all the parties involved was very fluent. The project involved major challenges, which motivated the engineers. The team's motivation was at a high level in this project," Jukka says.





Industrial and production plants all around the world are automated at a fast pace

Comatec assists in catching the top countries

Industrial automation – robotics, in particular – is used by more and more companies around the world. When people expect more products to reach the market faster and in a more profitable manner, industrial robots are no longer just for the dullest, dirtiest and most dangerous jobs: instead, they are a key competitive edge in several industries. Meanwhile, the developing technology and increased intelligence of robots in terms of mobility and sight promote the expansion of automation into new fields in industry and the handling of goods, for example.

Up until 2016, the turnover from industrial robotics represented 75 % of the entire turnover from robotics, and its share is expected to increase two digits every year, first and foremost thanks to the automobile industry (Robotics Trends, Frank Tobe, 2016). Robotics plays a major role in the development of industrial automation as well. Globally, China is the trendsetter. Another important development trend is replacing old robots with collaborative robots, which are safe, quick to commission and can be trained. TEXT: MARIA UURTO

Robotics is entering Finland with a slight delay, but the investment volume will grow in future

Despite the opportunities offered by the continuous development, Europe is lagging slightly behind in investments to automation that uses robotics, with the exception of Germany. Finland is no exception from this rule. According to a robotics study by Deloitte, robotics investments in Finland do not even reach the European level, despite the general technological expertise (Deloitte RPA survey, 2017). In Finland, robotics has mainly been tested in pilot projects. Successful pilot projects motivate companies to continue their tests. According to the survey, 78 % of all companies that utilise robotics believe that they will clearly increase the related investments in the next three years.

Robotics has a short repayment period, sometimes even less than a year. Taking into account this and the fact that robots improve job satisfaction because there are less routine tasks to be taken care

KUKA iiwa robot is an example of a sentient collaboration robot. Microteam is KUKA's System Partner in Finland.

8 ComatecNews

of, there is a clear need to step up the game. There is a threat that if cost-efficient and quick to commission automation is not utilised more effectively, Finland will lag behind the rest of the world in terms of performance.

Comatec responds to this challenge by investing in automation, robotics and modernisation

Comatec has identified the global trends and edited its service portfolio to cater for the increased need for automation. The common denominator for Comatec's expertise and services is the Automation Solutions business segment. We combine vehicle technology by Microteam Oy, our expertise in embedded systems, robotics and production line automation, industrial automation by A & D Automation Oy and the supporting expertise in the Comatec design teams into an entity that enables us to respond to the increased demands of our customers in comprehensive automation deliveries.

"Several megatrends and technological breakthroughs support the development and create pressure within our clientele to more effectively utilise automation and robotics. The development of hybrid technology, battery technology and related vehicle technology is a good example of this. The need to increase the degree of automation in the industries of several of our customers should not be overlooked either," says **Miikka Riittinen**, Vice President, Automation Solutions.

"The special expertise of our subsidiaries and the multidisciplinary experience of the parent company ensure that we can offer our customers solutions that will allow them to catch up with the rest of the world in terms of the degree of automation," Riittinen promises.



We can offer our customers comprehensive expertise that will allow them to catch up with the rest of the world in terms of the degree of automation, Miikka Riittinen promises.

Kemppi X8 MIG Welder is a new generation welding system that meets the strictest user needs Microteam is involved in the design of the control device

X8 MIG Welder is Kemppi's flagship product for demanding industrial welding. It is also a combination of top-notch performance, usability and a whole new type of welding control, which also utilises the opportunities of the Internet of Things. In addition to new properties related to welding, there is a new kind of wireless control device, Control Pad. Microteam, a Comatec Group company, was involved in its design for the entire product development stage.

Aiming for a cost-efficient X8 Control Pad suited for production

A challenging operating environment demands a lot from a control device: it must withstand dirt, impact, electric interference and humidity. In addition to

Kemppi is a pioneer in the welding industry. Kemppi develops smart devices, welding production control software and supporting expert services for demanding industrial solutions and consumers. Kemppi offers solutions for customers to significantly improve the value of their welding production. Headquartered in Lahti, Finland, Kemppi's turnover is more than EUR 110 million, and it employs these demands, the product structure, the optimisation of component costs and costefficient manufacturing were key factors that guided the electronics design.

"Professional competence, project management and drive were excellent in the Kemppi product development unit. Integration of the many aspects of the demanding product went excellently well. It was a joy to work in a project where each and every sector was completed thoroughly," say the Microteam employees who participated in the project.

"The goal in the design was combining cost-efficiency and the demands imposed by the challenging operating environment – two issues which do not always go hand in hand. A host of issues in the operating environment, many of them mutually



X8 MIG Welder is a high-performance, digitally updated welding device for demanding industrial welding that utilises a variety of application software and has



exclusive, had to be taken into account in the electronics design of the X8 Control Pad. The design involved technical challenges, such as making sure that the Control Pad works over a 10–12 kV separation when it is attached with a cable to a welding device.

"We believe that this was a demonstration of our varied technical expertise, which also impressed the customer," says Senior Design Engineer **Heikki Pietiläinen,** who participated in all stages of the project from specifications to electronic design, prototype testing and production.

excellent usability. The fact that it can be connected to the welding production control software enables the integration of digital welding instructions into the system. Meant for synergic and pulse MIG/ MAG welding, manual metal arc welding, MIG arc soldering, carbon arc gouging and surfacing, its maximum output is 600 A.

Seats matter in a bus

Comatec involved in the design of a new seat for Khimaira

The leading manufacturer of bus seats in the Nordic countries, Khimaira Oy has extensive experience in the requirements of the industry and the changing needs of customers. Comatec is proficient in the mechanical design of commercial vehicles, which means that cooperation in designing seats with Khimaira is natural. The ongoing seat design project is also a good example of how Comatec can benefit from cooperation between its own offices.

TEXT: TAINA SYRJÄNEN

Headquartered in Kalanti, Finland, Khimaira manufactures seats and upholstery for vehicles, trains, military vehicles and boats. Khimaira delivers seats in Finland and the rest of Europe. More than half of the company's production is exported.

As the leading manufacturer of bus seats in the Nordic countries, Khimaira has extensive experience in the requirements of the industry and the changing needs of customers. Khimaira has built its business so that it can quickly and flexibly respond to its customers' needs. This creates the basis for the entire business model. The customers' strict quality requirements and criteria are followed in the case of small and large orders alike.

Special attention to user experience, travel comfort and safety

Passenger seats, interior upholstery, curtains and special seats for buses are part of Khimaira's own bus industry product lines. Furthermore, many customers design their own seats but outsource their manufacture to Khimaira.

In its own seats, Khimaira focuses on light weight, dimensions, ergonomics and durability. Particular attention is paid to the passengers' user experience and travel comfort.

"Comatec cooperates with Khimaira in the design of a new seat model, for example. The seat will be a finished product that suits large-scale production, which means that it will also be optimally priced. Did you know that the seats are the second most expensive part of a bus right after the chassis?" asks Engineering Manager **Andrei Kotliar** from Comatec.

"The seats are a key part of a bus, because the passengers will actually be touching the seat for the entire duration of their trip. In addition, seats are what they see in front of them. That is why you should invest in seat design.

"A prototype of the seat we designed for Khimaira was recently introduced at the Bus World trade fair, where it received praise on its ergonomics, in particular. The passenger experience is important for us and for Khimaira as well," Andrei says.

"Safety should not be overlooked

Members of the project design team (from the left): Engineering Manager Andrei Kotliar, Mechanical Design Engineer Minja Pönni, Structural Analyst Niko Finska and Mechanical Design Engineer Jarno Suurjärvi. The test bench that can be used for statutory testing is behind the team.





either. Safety requirements on seats are specified in the e-regulations published by the United Nations Economic Commission for Europe. The regulations list exact safety criteria and testing methods to verify compliance. A particularly challenging issue in the design of seats is the fact that the regulations include some mutually excluding properties: the seat must be sturdy but flexible too, for example."

Testing is an important part of seat design

"An important part of seat design is the simulation and testing of the seats to verify compliance with the e-regulations. The tests are performed at our own location with equipment we have designed. Everything has been done in strict compliance with the requirements. We can also perform the statutory approval tests here, as long as we invite a representative of an accredited laboratory to supervise the test," Andrei explains.

"A special characteristic of bus seats is the fact that unlike in a passenger vehicle, the seatbelt must be fully attached to the seat. The frame of the seat must be strong enough to withstand the high forces the seatbelts will experience in case of an accident. On the other hand, the seat must absorb the impact of the passenger behind the seat being thrown against the seat. This is to prevent passenger injuries. Reconciliation of these requirements is challenging and requires plenty of testing. Typically, several prototypes have to be made when developing a passenger seat.

"Simulation can reduce the need for testing. Creating a simulation model that is close enough to the actual conditions is extremely difficult due to the significant deformation of the seat. Comatec has focused on this problem with the help of a strain gauge analysis. The tested seat prototypes are equipped with strain gauges to obtain a clearer view of how the prototypes behave in the tests. The simulation model is fine-tuned based on the results to ensure that the results better correspond to reality. This way, each test serves the development of the seat frame and the simulation model. The simulation expertise obtained from the project can surely be utilised in future projects."

Cooperation between offices to benefit customers

"The bench project has been a good indication of how easily Comatec can combine the special expertise of its different offices. Cooperation between offices is easy, because Comatec's design process is the same at each office and for each design engineer," Andrei explains.

"In this project, we utilised the strong expertise in commercial vehicle mechanics design at the Turku office and the strength calculation and simulation expertise of the Kuopio office. The best experts in strain gauge measuring were found at the Tampere office. "Mechanical Design Engineers **Minja Pönni** and **Jarno Suurjärvi** from the Turku office participate in this project. Furthermore, Structural Analyst **Niko Finska** from the Kuopio office is involved in the strength design and simulation model development. Engineering Manager **Suvi Petäjäjärvi** and Testing Specialist **Marko Ylinen** from the Tampere office assist in the strain gauge measuring.

"We performed a strain gauge test on the frame of a seat at the Turku office, and Niko came to Turku in person for the test. We tested whether the prototype's frame is strong enough and whether the back of the seat is flexible enough when subjected to a specific force. We also verified the actual stresses at specific points with strain gauges. We will use the test results to adjust the simulation model. We will also fine-tune the structure of the seat based on the test results."

Cooperation with suppliers as well

"We like to cooperate with future suppliers as well, to introduce them to the project at an early stage so that we can take into account the requirements based on the manufacture of the different components, such as plastic components, in the design. This way, we can better optimise the manufacture, detect problems at an early stage and create the optimal final result for our customer," Andrei explains.

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