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All electric booms

We are already seeing the repercussions of tighter emission regulations in Europe - particularly in Scandinavia, Switzerland, the UK and Netherlands - regarding trucks and cars in cities, but also in the use of construction equipment. Although constraints differ between individual countries they have given rise to a massive interest and growth in cleaner, quieter machines including full electric, lithium and hybrid platforms. This month we feature a new start-up rental company in the Netherlands - Hoogwerkt - and its totally different business model. However we start with big all-electric booms from Dutch rental company Riwal and fellow rental company Collé Rental & Sales which recently introduced an 86ft all electric boom.

Riwal began converting JLG diesel telescopic booms to all-electric more than four years ago starting with the 80ft 800AJ, adding the 86ft 860SJ the following year, the 120ft 1200SJP in 2017 and a few months ago the 135ft 1350SJP - the first of which has been sold to Steiness Liftcenter in Denmark.

"We like to be an innovation leader in the industry," says Riwal chief executive Norty Turner. "However innovation needs to be customer driven and the development of the

all electric boom came from our customer - Dutch airline KLM which required emission free booms for aircraft maintenance. At the time an all electric boom with a 26 metre working height was not available from any manufacturer, but we made it happen."

Riwal has now built many large all-electric booms, some of which have been sold, while others have been added to its rental fleet.

"We are fortunate to have the in-house capability to convert



these machines. Demand is growing because more and more environmental machine regulations are coming forward. Companies are now incorporating environmental sustainability as part of their strategy with values and mission statements reflecting eco-friendly intentions."

How it started

"Converting any big boom has its complications," said Nico den Ouden, Riwal's Technical Specialist. "Following discussions with component manufacturers we first had to establish the power of the electric motor and the capacity of the battery pack. About 80 percent of these questions can be calculated before assembly, however many can only be answered by building and testing the machine. Fortunately, for the first 800AJ we started with about the right power - about 24kW nominal 28kW peak - using an 80 volt system. We wanted to use standard batteries but had we placed the batteries in the chassis the 800AJ's 360 degree continuous slew would have required a complicated rotary coupling, so we decided to mount them in

the superstructure, together with the electric motor, charger and hydraulics which are retained for the drive and boom functions. Removing the diesel engine saved some weight but the additional bulk of the electric motor and battery pack meant the counterweight needed to be redesigned to accommodate them or the total machine would have been too heavy. The end result was a machine that weighed just 200-300kg more than the standard diesel boom."

"If we had placed the batteries in the chassis the overall weight would have increased by about 2,500kg. This wouldn't affect the structure or performance of the boom but would affect transportation and ground pressures etc when working on site."

Riwal opted for an integrated high quality Fronius charger available as one 400 volt or two 230 volt options. "These are expensive but worth it as it first diagnoses the state of the battery pack and then creates a battery charging programme which remains under the voltage at which the battery water evaporates. This means we



Riwal built its first all-electric boom for Dutch airline KLM



The JLG 860SJ installation including the Fronius charger

only have to top up the battery water level every two months or so via the automatic refill system. If a high quality charger and batteries are used then we have found they have a life of at least 10 years if correctly maintained."

Battery life?

"From tests carried out we found that the machines can run for five hours continuously on one full battery charge," he says. "Our telematics data on diesel 800/860 booms suggests that during an eight hour shift, the diesel engine

is running up to four hours but the time operating the machine - driving/boom operation etc - is typically only two and a half hours. So, the ability of the all electric boom to run five hours before needing a charge is effectively the equivalent of two full day shifts."

"When the battery has discharged 70 percent a warning light alerts the operator that he has 10 percent usable charge remaining and has to find a recharging point. If the battery is fully empty, recharging the 80 volt system takes between seven and nine hours, the larger booms use a 96 volt battery pack which takes eight to 10 hours to fully charge, so overnight is more than enough time. The 96 volt machines use two 48 volt chargers because a single 96 volt charger is very expensive."

The telematics data also revealed some other interesting information.

"We were surprised that customers left the engines on the booms idling every day



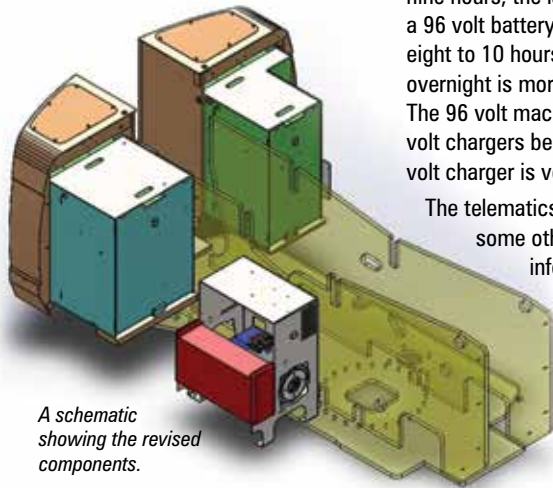
for up to two hours and longer on larger machines. Travelling is also a big consumer of battery power, however this is not necessarily the case on level ground, but quickly changes as the gradient increases. The power of the electric motor has to be limited when driving up inclines to protect it from overheating. This also helps to extend battery life."

"It is almost impossible to notice the difference between the performance of the diesel and electric booms during operations. On level ground we have reduced the all electric travel speeds slightly however this also helps to extend the battery pack life. We have looked into electric drive but I don't think it

is worthwhile at the moment. The hydraulic system is reliable and much cheaper and the only advantage would be a greater drive speed and longer battery life but it is more than adequate at the moment."

Future models

"We have just launched the 1350 model with its 43 metres of working height, so we will see how that fits in the market," says Turner. "As the need arises we will develop new models if they are not available from the major manufacturers. However I think we will get a good idea of the rate of development of electric and hybrid platforms at upcoming trade shows such as Bauma."



A schematic showing the revised components.

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Collé launches all-electric boom

Fellow Dutch company Collé Rental & Sales recently launched its 86ft fully electric SPS E-280TJ straight boom lift - developed and built jointly with Smart Platform Solutions. The Manitou based boom with articulating jib has a working height of 27.75 metres, four wheel steer and 350kg platform capacity. It is also available with four and five metre wide baskets.

Collé says that cutting CO2 emissions, fuel consumption and

noise were the driving issues and it is "investing strongly in the electrification of its range of machines for rental to meet this 'green' market demand."

"As a partner for innovation, we are constantly working on ways to make working at height smarter, more efficient and more sustainable," says Collé sales director Michiel Kokkermans. "Our innovation team works closely with specialists such as SPS. The new boom is powered by an electric

motor with a battery capacity for one to three days depending on the work. The machine performs better than the diesel version and its 400 volt/16 amp charger connection is enough to recharge a fully discharged battery pack within 10 hours. Another advantage is that the

noise level is well below 80 dBA. It also contributes to the structural reduction of our CO2 emissions."

There has also been several hybrid boom developments and new models from Genie, Niftylift and JLG and these will be featured in a future issue of C&A.



The SPS E-280TJ was developed and built jointly by Smart Platform Solutions and Collé Rental & Sales.



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A totally different rental model

Earlier this year Netherlands start-up rental company Hoogwerkt raised a few eyebrows in the industry when it purchased 800 lithium powered booms and scissor lifts and outlined a totally different rental model involving high specification equipment, on-line booking, customer collection and full telematics. Mark Darwin visited the company to find out more.

Hoogwerkt is the brainchild of its two partners - Arnold Grootveld and Jan Vriesinga - who have been friends for more than 20 years. Vriesinga's background was in shipbuilding and shipping as well as in investor relations, gaining finance to fund and manage projects for clients.

Grootveld has 17 years equipment rental and sales experience working for several companies in the Netherlands. His first job was fleet manager with Reisiger Verhuur an eight branch company in the north of the country. The business was merged into 2Rent in 2005 and he became involved in purchasing, service and maintenance. He then became managing director of the Bobcat/Ingersoll Rand distributor. When the company was sold in 2009 he moved to the Komatsu distributor Bia as managing director. The financial crisis had hit the business hard, so he switched strategy towards a focus on large service contracts with rental companies such as Boels which helped the company return to profitability in 16 months.

"Other companies were not



Jan Vriesinga (L) and Arnold Grootveld

interested in looking after fleets with multiple brands such as Caterpillar, Komatsu and Hitachi etc... however my thinking was to be a partner with my customers for all their equipment marques. That company still looks after that part of the Boels fleet."

When the company was sold at the end of 2010, Grootveld left and Boels approached him to manage a small company it had just purchased and was running separately to the main business. Over the next two years Grootveld focussed completely on customers, renewed the fleet and upgraded the marketing. Boels then decided



C&A

Hoogwerkt



One of the Sorage Hybrid truck mounted platforms.

to integrate the business into the main Boels operation. Grootveld had a different approach to customer service so it was time for another move.

Over the next two years he took consulting jobs and studied for an MBA, writing his thesis on 'The sustainability process within construction sector'.

"All the major contractors say they are into sustainability but there is very little from the supplier's side," he says. "If contractors source 90 percent of their revenues from suppliers/sub contractors I would say they are not sustainable. This mismatch between demand and supply made me realise that there will be a point when the Government steps in and forces

contractors to make purchasing sustainable. This was the starting point of the new rental company."

At that time Vriesinga was renting out electric Sloops (small recreational boats) with on-line booking purchasing, sustainable high specification boats with full telematics.

"This model of sustainable high specification equipment with telematics connection, on-line booking and picking up the equipment appealed to me and I was also interested in how he financed the €4.5 million project," says Grootveld.

The partners began working together in May 2016 and in September pitched the Hoogwerkt business plan to a small group of investors - some already involved in the electric Sloop business. In December the equity was in place and by May 2017 they agreed the leasing deal with ABN Amro Lease and the company was formed.

A total of €20 million enabled them to purchase 800 lithium powered machines eventually choosing equipment from JCB, Niftylift and Hinowa. The order included 420 JCB scissors ranging from 6.6 to 10



Part of the 420 lithium scissor order placed with JCB

metres, 150 Hinowa spider lifts and 230 Niftylifts including 150 trailer mounts and 80 articulated booms.

"We both saw the enormous sustainability benefits of lithium power, but the machines also had to be light enough to be trailered so that the customers could collect them."

Hoogwerkt also purchased 650 two axle trailers - each platform having its own trailer - from Dutch manufacturer Henra which worked with them on a compact trailer specifically engineered for each of the machines to reduce the risk of roading and loading incidents.

High spec machines

"When we spoke with manufacturers about starting a new rental company they all pointed us in the direction of the low cost, basic rental spec machines," says Grootveld. "We wanted high spec machines that the end customer would want if they were buying them - machines that would give high productivity, ease of use and increased safety etc with options such as auto levelling stabilisers, traction drive on the trailer mounts, power and air to the platform and multiple drive speeds where possible. All our machines have all the options included helping customers do their job."

"Rental is not just about pricing, the trends we see include greater specialisation, because you need to add value for the customer which is very difficult if you have a very broad machine portfolio. Other trends include local availability and reducing transport costs. Rental is about machine specifications that



A Hinowa lightlift 17.75 on its two axle trailer



One of 150 Hinowa lithium spiders

the customers want. It is crazy why we still have low spec machines. While extra options may increase the cost by 30 percent we believe we can increase productivity with more."

Why JCB scissors?

"We talked to around 14 different manufacturers and only two did not quote us for the lithium machines," said Grootveld. "Most wanted to make that next step in machine development. We did not want to be involved in the design or the manufacturing of the equipment, we just want to buy the fully sorted end product."

"Everyone knows JCB sources its scissors from China - as do other manufacturers - however they control the quality, take responsibility for the product design and for solving problems in the field or at the factory. They were keen for the order but also had the team onboard which understood what we wanted to do. Our relationship with JCB is brilliant - we see them as a very loyal partner."

"We also wanted a self-propelled articulated boom and asked if it was possible to produce a lithium powered machine below 2,500kg. Niftylift said they already had ideas about such a machine and came back to us within a few months with the design for the new lightweight HR12 essentially

increasing the existing 1.5 metre width to 1.8 metres to offset the weight reduction."

"If you talk to engineers they all love lithium. Firstly, the performance is far superior to lead acid batteries which start to drain as soon as the machine is turned on. Lithium keeps performing until about 90 percent of capacity has been used. The other advantage of lithium is zero maintenance - we don't need to change battery packs if damaged during a charging cycle. And customers can run the machine until the low battery warning light and if not charged at that point it cuts off without damaging the battery."

"A lithium battery last three times longer than lead acid - i.e. about 15 years - so resale values of machines after five years will still be good because their value is based on the quality and replacement cost of the battery pack. We don't mind spending more on lithium machines because they have higher residual values. We take the Total Cost of Ownership approach and this is the investment to make. On the sustainability side no new batteries are needed during the life of the machine and when charging a lead acid battery 30 percent of the charge is lost with heat, while virtually all the charge goes into a lithium battery and charging time is

only two hours compared to up to 12 hours for lead acid. We choose lithium because it is the best power source not just because of the 'green' advantages. Sustainability for customers includes no fuelling costs or time etc, reduced charging times, lower transport costs, higher performance and productivity. We don't expect customers to pay more for our machines, but in the future we can see customers will want to rent clean and quiet machines that offer higher productivity and ease of use."

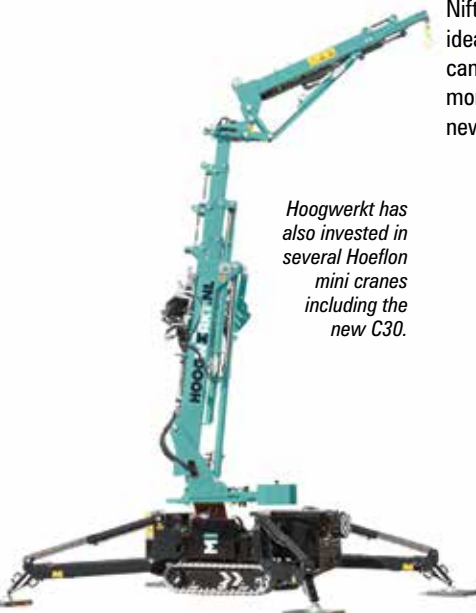
Essential telematics

Another important element of the Hoogwerkt rental model is the inclusion of telematics on every platform so that they can be tracked and monitor to save costs.

"Once the new system is fully up and running we will be happy to share this information with customers," says Grootveld. "The data allows us improve our customer care and work more efficiently and safer. Currently we have several telematics systems - JCB Livelink, Track Unit etc - but they do not give us all the information we need. We therefore decided to develop our own system in cooperation with specialist company AMS - Advanced Mobility Services - which is compatible with all types of equipment. We need to be able to see and control the machine to integrate it into the on-line booking process which gives customers instant availability. We are a very small team - today just five people - and believe it is beneficial for us to work with partners and specialists, especially because these partners add value and increase quality within their specialism."

Will self collection work?

Because we wanted to design a rental booking platform - which was only finalised in April - before we started marketing, we do not yet



Hoogwerkt has also invested in several Hoeflon mini cranes including the new C30.



The fleet includes 150 Niftylift trailer mounted platforms.

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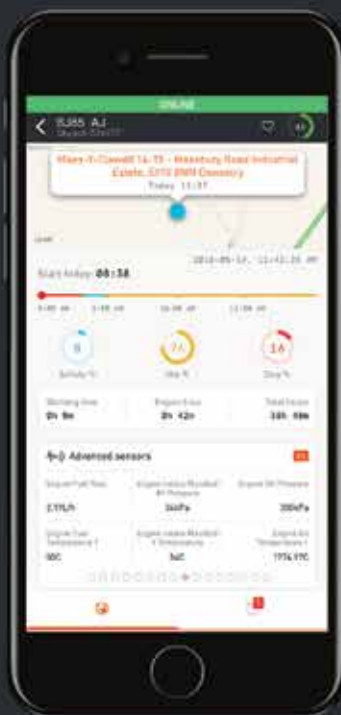
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More than Telematics.





Hoogwerkt has purchased 80 Nifty HR12 lithium booms

have many machines out on hire. However, every day customers are applying for an account, so the model is beginning to prove itself. We have a special 50 percent introductory price discount for new customers for the first three months with us," says Grootveld. "Why? Because we think we have the best product in the market and want them to experience it. We are not competing on price but on productivity."

Hoogwerkt currently is currently operating from six locations each with around 10 machines and has in the region of 80 platforms out on rent. A look at the Hoogwerkt website and online booking pages indicates that the company also supplies other equipment, but this is re-rented from other rental companies.

"For the larger access rental companies, the customer pickup model is now rare however for other items - such as building materials



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and tool hire - it is quite common for the smaller builders and sub-contractors. We think our model of easy ordering and pickup, combined with being charged by the hour, will appeal to these companies. In the Netherlands seven million houses need to be made sustainable over the next 20 years so there will be huge demand from smaller companies carrying out the work."

"We are in this venture for the long haul, but we expect to be cash positive in the next nine to 12 months - partly because we have a very cost effective structure and partly because there is no pressure to achieve a quick payback to the bank or investors."

Future expansion

Hoogwerkt believes that its model could work in other countries, however that possibility is not even being discussed. The company is however planning to expand its fleet and move into larger equipment of its own and is talking to its current suppliers to source larger platforms having secured an additional €32 million, taking the total investment to €52 million.

"The second round of investment was finalised in July and we will be looking to add a further 600 machines making a total of 1,400 in the fleet. We have gone back JCB, Niftylift and Hinowa but the struggle was to find an all electric telescopic boom lift. There are a few around such as the JLG based machine from Riwal or the 28 metre Manitou based unit from Collé/ Smart Platform Solutions. However, we want the volume market for these machines so are looking

up to 33 metres for the spiders, articulated booms up to 28 metres and 28 to 38 metre telescopics - all of them lithium or hybrid powered. Obviously the customer pickup model no longer applies, and machines would have to be delivered to site with outsourced transport."

It has also been looking at industrial forklifts/telehandlers and has purchased several Hoeflon mini cranes, including a C6 and a C10 as well as one of the first new eight tonne capacity C30. It is also purchasing 3.5 tonne Socage hybrid truck mounts - 21 metre articulated and 23 metre telescopic units. From the sustainability angle, the hybrid lifts will use a CO2 neutral special diesel that is available in the Netherlands.

More locations

Hoogwerkt is hoping to expand to 80 locations by the end of 2019. This will be done by working with outlets such as builders' merchants which are present in most towns and already work with the type of customers that Hoogwerkt is looking for.

"Last year we became an IPAF member and everyone involved in the supply of access equipment at each of our six locations - between two and five people - are IPAF trained. These partners are paid part of the rental revenue and also benefit by offering a new service and being introduced to new customers."

How it works?

Marketing is carried out by a specialist company experienced in online and website work - Google for example is currently the biggest source of customers. Creating an account can be done at a location or easier still - online. The process is said to take about a minute with financial checks carried out automatically. Working with existing business databases, customer input is minimal to trigger the registration process which automatically checks financial details and takes a small payment to establish the identity of the person renting the machine. Machine availability is visible online so the whole rental process is quick and efficient.

"The staff at the locations spend minimal time on our equipment, just booking the machines out and in and checking for damage. If you look at the model the only

cost if we don't have machines on rent is depreciation and interest. Machine servicing is outsourced to our service to specialist company Mastwin - run by the ex-technical manager of Loxam, Netherlands who set up the service and maintenance company two years ago. He also helps us set up the locations. We don't expect to have a lot of costs on the maintenance side, but machines still need to be checked and certified etc."

On location

This rental model is ideal for large construction projects, factories or airports where there is a lot of demand for certain machines. Hoogwerkt is in the process of setting up its first multi machine onsite compound so that the customer can take and use machines at any time of day or night - paying for the platforms only when needed and with no transport cost.

"Machines can be activated by the operator once the appropriate procedure has been carried out using his smartphone," says Grootveld. "This is already the process in the Sloop rental business. There needs to be a process of reporting and checking for damage etc and checks such as if the operator is fully trained can easily be added into the process."

Summary

"In the future we may expand internationally, but for now we know and like the market and customers in the Netherlands, which with 22,000 access platforms is big enough to grow. My belief is that if you build a company around smaller customers then the quality will be better and more appreciated. If you supply a good service then they will be loyal and build a long term relationship. It is still early days and the company is still just a business model - we feel modest and haven't proven ourselves yet. We currently have a low utilisation, so we are still learning from our customers and still need to prove our ideas every day."



The new lithium powered Nifty HR12 weighs just 2,500kg.