System for e-scooters is in the pipeline

Bosch Starts E-Bike Drive System Production

MONDEVILLE, France – This year German automotive supplier Robert Bosch GmbH has a lot to celebrate. The latest good news is the record result of approximately € 47.3 billion in fiscal year 2010. With an eye on the previous year's result – in the year of the worldwide crisis – this was a most impressive comeback. For 2011 the German giant is aiming to surpass the € 50 billion benchmark. Moreover, Bosch Group is celebrating its 125th anniversary, as well as the 150th birthday of company founder Robert Bosch.

By Jo Beckendorff

That's not all. The French Bosch plant alias Bosch-France is celebrating its 50th year in business. Since last week of 2010 mass production of the first Bosch e-bike kit began here. Delivery to the market started in February. Bike Europe was happy to get a look at the mass production debut of the



Bosch offers two different battery pack designs: One – new – for the carrier (left hand) and a standard one for the frame (right hand). Photo Bosch Bosch e-bike drive system at Bosch-France, located in Monde-

ville in the Normandy region.

Partners

At Eurobike 2010, the Bosch Group was celebrating its entry into the e-bike market. Together with its bicycle partner Cannondale, they celebrated their e-bike kit world premiere. But in 2011, Cannondale won't be the only bike supplier using the new kit, which includes a drive-unit, battery pack, charger, and HMI (human-machine interface). According to Rainer Jeske - Senior Vice President, Automotive Electronics Powertrain Systems - Ebike, in 'Year One' there are 13 bicycle suppliers with 16 bicycle brands using the new system.

Asked about the largest challenges Jeske and his team had when building up the new company's e-bike division based in Reutlingen/Germany and the production at Bosch-France in Mondeville, he says: "First of all we had to convince our top management. That was not easy. Then we had to talk to all parties within Bosch Group that are able to help us out to bring it all together. Moreover we as a complete newcomer into the bicycle industry had to find a good partner. Luckily we found Cannondale. Last but not least, before the production start, we had to achieve some improvements after our official world premiere on Eurobike. The products we had at Eurobike have been prototypes." All in all Bosch spent two years in R&D before showing the first e-bike kit on Eurobike 2010.

Additional improvements

What exactly changed between September and December – the time between Eurobike and the beginning of the Mondeville-based mass production? Automotive Electronics and E-Bike Systems Sales and Marketing Director Claudia Wasko points to some expert critics popping up after checking the new product in Friedrichshafen. "We took the criticisms on noise and vibration most seriously. Our French production team was very successful solving these problems."

Rainer Jeske also notes that a set of problems that arose with transmission components was actively addressed. This means that the use of internal gear hubs in combination with the Bosch e-bike kit is now without any problem. Jeske as well as Christophe Barret, Vice President and Commercial Plant Manager Automotive Electronics at Bosch-France, point to growing relationships and synergies between the German e-bike division and the French production team when working on this group project. Although there have been many challenges to start this project from scratch to the final mass production, looking back, Barett says, "It required from all of us a lot of flexibility. We in France for example had to search for new suppliers and the foundation of a continuous system. For us this was new because the bicycle industry - different from our customers out of the automotive industry - relies on a seasonal business."

Circuit boards production When it comes to the new e-bike

drive system, what exactly is ma-



The complete Bosch e-bike system (from left to right): battery pack, HMI-display and drive unit. What's missing on this picture is the charger. Photo Bosch

nufactured and assembled at Bosch-France with its more than 1,000 employees and yearly sales of € 210 million? The company's Director of the Preparation & Realization Department for Electronics Fabrication Philippe Baloche shows the electronic devices being produced at his factory hall. "Most of the fully automated printed circuit board production with brazing is already done for automotive products," said Baloche. "This is a field with which we at Bosch-France have long experience. Producing printed circuit boards for an e-bike kit or something different isn't such a big

change." Totally different to the printed circuit board production is the production of battery packs and drive-units. It is housed in the company's second production hall and is taking place at two assembling lines each. Here Gilbert Labourot is the master of the company's new production lines. "All assembling processes - from pressing bevel and free wheels, mounting smaller printed circuit boards, fixing torque sensors and laying cables, mounting the upper shell with the Bosch print on top of the drive unit to scanning the

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Safety Light Water Spider

SL-10W/SL-10R

The outer case is made of special eco-friendly elastomeric material. It can be fixed on a circular or non-circular tube of the bicycle, or on the bicycle helmet. With unique structure design, it can also be tied on the arm or ankle, with a velcro band, strap, or belt ...etc, passing through its outer case. It can be tied on the strap of a knapsack as well.

Size: 98 x 45 x 15 mm Weight: 23 g (batteries included)





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Taiwan Invests Millions in Development of new Battery Technology & Hub Motor

Taiwan Invests Millions in Development of new Battery Technology & Hub Motor HSINCHU, Taiwan – Taiwan's environmental problem is clear to everyone who has visited the island. Too many polluting scooters. More than 12 million for a total population of 23 million! That's going to change. Not only by urging its citizen's to turn to (electric) bicycles, the Taiwan government is also investing millions into turning the 2 and 4 stroke scooter engines into electric ones. To that end, the country's research institute ITRI is developing new electric motors and new battery technologies.

By Jack Oortwijn

This year's Taipei International Cycle Show will undoubtedly feature the results of the multi-million dollar investment the Taiwan government has made in its 'Green Vehicle Development Program'. As Taiwan aims at becoming a global industrial partner for green vehicles, it is focusing on getting the right products in place. All of this is to establish the country as the world's leading high-tech products supplier. Bike Europe visited



ITRI's R&D manager Yu-Pin Peng: 'The ITRI hub motor has Axial Variable flux technology which is being used for the first time in an ebike motor. Photos Bike Europe

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bar code and the final improvement of all functions - is done here step by step," explains Labourot. Samsung delivers the lithium battery cells used for the Bosch battery packs. The assembling of the battery packs starts within the two U-shaped assembly lines with the correct positioning of the battery cells and the connection between battery pack and printed circuit board (brazing the negative terminal before the positive). Bosch offers two battery pack designs - a standard one mounted at the frame and - a new one mounted on the carrier. Both of them are assembled at Bosch-France.

the country's Industrial Technology Research Institute and was introduced to a super slim hub motor for electric bicycles, as well as to the STOBA technology for lithium batteries.

New polymer

At ITRI some 60 engineers are devoted to the development of new battery technologies. Their first major accomplishment is STOBA. This stands for Self-Terminated Oligomer with Branded Architecture. Simply put, it is a new polymer developed by ITRI that effectively prevents lithium batteries from exploding when damaged, as has occurred in several highprofile cases in recent years. Those incidents took place with laptop computers, where lithium batteries are commonly used. Nowadays, they're also found in higher priced and better quality e-bikes. And with iPhones, iPads, and tablet computer sales soaring; all of which are all fitted with lithium batteries, it's clear that the STOBA technology is very valuable.



ner and produces two to three times the torque generated by traditional units of the same weight, with comparable production costs. Photo Gazelle

bilize the thermal runaway process that occurs when a Li-lon battery is punctured. To be more precise, the technical explanation by ITRI says, "STOBA is a nano-sized polymer material which is added in the battery to form a protective membrane on the surface of the electrode electric material. A second stage polymerization process will be triggered while an internal short happened in the battery that blocked the lithium ion transportation and prevents further heat accumulation. The burning catastrophe is consequently inhibited, and the battery becomes safe." Since the development of this new technology the 'High Safety Lithium Battery SOBA Consortium'

a press statement, "This Consortium is to build a strong position for Taiwan's battery industry in the emerging electric vehicle market, in the hope that Taiwan will become one of the top three lithium battery producers in the world. Mass production of high safety lithium STOBA batteries started end of 2010."

Super slim hub motor

Another major accomplishment by ITRI is the development of a super-slim hub motor. According to the research institute it is 50% lighter and 70% thinner. As well, the new motor produces two to three times the torque generated by traditional units of the same weight, with comparable production costs. ITRI's R&D manager Yu-Pin Peng explains that what's new with the ITRI hub motor is the Axial Variable flux technology, which is being used for the first time in an e-bike motor.

"Variable Flux technology is based on the principles of electromagnetism and permanent magnetism, which not only contributes to the motor's power but also to the motor speed control. Currently available super slim hub motors use rare earth magnets which are primarily produced in China and are subject to export controls. Thus the use of variable flux has obvious advantages reducing the use of rare earth magnets," said Peng.

The Intelligent Vehicle Technology Division of ITRI hopes that the new motor will spark a major change in the current market and will diversify the use and characteristics of the traditional e-bike motor. R&D manager Yu-Pin Peng explains that the fundamental change to the motor's function was reached by increasing the power density at each unit, i.e. horse power, while also increasing torque density, yet keeping the torque. This opinion is reinforced

(and not only e-bikes) Jeske is positive about the potential of a complete e-scooter drive system. "This product group is not only being sold on the Chinese market but rolls more into the high-end direction and into the international market". Somehow it's funny. While the high-end and Made in Europe e-bike products are concentrating first on Europe and the United States (and perhaps later into Asia) Bosch is approaching things the other way round when it comes to its e-scooter ambitions. The reason is easy to explain. Currently China is - thanks to governmental subsidies – the most attractive market for environmental-friendly e-scooters where, no-

BIKE europe



development of new battery technologies. Their first major accomplishment is STOBA Simply put, it is a new polymer that effectively prevents lithium batteries from exploding when damaged. Photo Gazelle

Netherlands, bike manufacturers and other suppliers of electric bikes are turning to new target groups. In particular, commuters that use e-bikes for longer distances are believed to be the next generation of e-bikes buyers. In Germany, Europe's second biggest e-bike market, more and more speed-pedelecs are being offered. ITRI's first super-slim hub motor weighing 2100 grams and 1 inch thick, was shown at the 2010 Taipei Cycle Show. ITRI's research team and Taiwan parts maker Joy-Tech cooperated to install the motor on a Pacific Birdy folding bike. In addition, the research team and Joy-Tech worked together to create a powered wheel, also displayed at the 2010 Taipei Cycle Show. Response was positive from firms such as Merida, Giant, Sanyo, and other domestic and foreign companies. At the 2011 Taipei International Cycle Show ITRI's super-slim hub motor is expected to be the star at numerous booths!

wadays, there are some 30 million produced per year.



Rainer Jeske (left), responsible for the Bosch e-bike systems and Christophe Barret, plant manager Bosch-France, proudly present one of the first mass-produced Bosch e-bike driveunits. Photo Bosch

According to Rainer Jeske, there are, "some parts of our new e-bike drive system previously partiallyproduced in Germany". An external supplier for example makes

Made in Europe

the HMI display. "But it all comes together here in Mondeville at Bosch-France, and is completely mounted and assembled over here."

Even with an eye on those Bosch units and external suppliers doing some preliminary work for the entire e-bike system, it's all 'Made in Europe'. Jeske emphasizes, "Customers are looking for European-made high-end products." And Bosch takes that demand seriously as it's the compa-

ny's goal to get to a 20% market share in the international e-bike market. The course for fast market penetration is set. To reach the 20% market share as quickly as possible, Bosch and its e-bike system service partner Magura are working hard.

"Since Eurobike we had a total of 60 training courses being attended by approximately 2,200 specialty dealers," explains Jeske.

"This year we and Magura want to offer a total of 100 training courses. The current Magura lecture team of five people will very soon receive some more manpower. And beginning of March we will have our multi-lingual hotline for specialty dealers ready to go."

Also e-scooters

Talking to Rainer Jeske – the top man behind the introduction of the Bosch e-bike drive system - it turns out that he is also responsible for e-scooters. "This is also a topic we are seriously working on," he says. Different from the ebike drive system, Bosch's e-scooter business is being handled by Bosch-China in Shanghai. Here Bosch is working together with a major Chinese scooter producer "delivering several parts for the e-drivetrain".

A complete e-scooter-kit isn't ready yet but it is in the pipeline. In his role as Senior Vice President Automotive Electronics Powertrain Systems e-two-wheelers

whole unit as light as possible. Given the current trends in electric bikes, Yu-Pin Peng believes that e-bike users are looking for higher speeds as well as higher by current trends in e-bike sales in Europe. In the leading e-bike market – the

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