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DE NOTÍCIAS



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Efficient compaction

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Accelerated investments in road infrastructure

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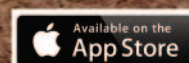
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ROAD AND MINERAL TECHNOLOGIES

October / 2013
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Luiz Marcelo Tegen, President of Ciber >>>



COMPACTION EFFICIENCY

T

he special report in this edition of *Usina de Notícias* is dedicated to earth compaction. The stages of this process are fundamental to making sure the other stages of the work are not damaged by sinking, cracking, crevices or other types of deformation. It is always important to study the earth before starting a project, paying close attention to the fact that each type of soil requires a different compacter and that characteristics such as climate also have an influence on quality compaction. In this report, we also include technical information, such as recommendations on which types of compaction roller are best for each situation, so as to ensure greater productivity and fuel savings.

Many of our clients in Brazil and around the world are aware of the incomparable quality of Hamm compactors. There is constantly gro-

wing demand for new technology and equipment that serves different solutions innovatively. Hamm offers all the knowledge of its more than hundred years in the compaction business and its lineup includes over 90 models of compaction rollers, combining performance efficiency and savings, in this way always ensuring superior results.

We have dealers spread out all across Brazil, with delivery agility and the availability of a large parts inventory. Our technicians are also fully prepared to supply the best product support to you and your company. You can rely on Hamm for all your compaction demands, be they for earth or asphalt. We hope you enjoy this edition of *Usina de Notícias*.

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RECYCLED ASPHALT IN RIO GRANDE DO SUL



CASTELLAR ENGENHARIA WORKS ON PROJECT TO RENEW HIGHWAY
IN CORONEL BARROS, IN RURAL AREA

The main shipping method in Brazil is via highway. With a road network of approximately 1,6 million km, some of them paved and others not, it is extremely important for the national roads to be in good condition for this process to take place quickly and without losses.

At the end of 2012, the Federal Government launched a program to invest in logistics that will direct BRL 133 billion to modernizing and expanding highways and railways, further proving the importance of applying funds to infrastructure.

Castellar Engenharia, headquartered in the city of Curitiba, is one of the companies that contributes to keeping highways in good conditions for traffic. The company operates all across Brazil, with special attention to the Southern and Southeastern regions. In addition to paving work, it also pro-

vides site leveling, signage, drainage, and maintenance and repair services, to name just a few.

Among its current jobs, the firm is repairing pavement on highway BR-285 in Coronel Barros, Rio Grande do Sul. The work is already in its final stage and is scheduled for completion in December of 2013. According to Ivaldo Deoud, equipment director at Castellar Engenharia, the progress of the work has been entirely satisfactory and is on track to meet their deadline. He also pointed out the work they are doing is fundamentally important to the highway's users.

Among the equipment they use, one standout is the Vögele Super 700 paver, which assists in the process of applying pavement to small repairs (potholes). The Super 700 is a paver that moves on crawler tracks. It's perfect for filling trenches with asphalt, covering paths or paved areas or highway with traffic. For Castellar, its performance has been extremely important. "It surpassed our initial expectations, so much so that we purchased another and now have two," stated Deoud.

Other work in the Southern Brazilian city should end in December 2013



« EFFICIENCY: THE WORLD'S LARGEST MOBILE CRUSHING PROJECT IS IN RJ, USING KLEEMANN MACHINERY

EIGHT PIECES OF KLEEMANN EQUIPMENT TAKE PART IN THE WORLD'S LARGEST MOBILE CRUSHING PROJECT IN RIO DE JANEIRO, PRODUCING 900 TONS/HOUR

The worldwide trend to replace fixed plants with mobile ones for crushing projects is here to stay in Brazil. This initiative in particular has brought together no fewer than eight pieces of mobile crushing and screening equipment. The machines work for Tamoio Mineração S.A., in Jacarepaguá, in the city of Rio de Janeiro. The company is the city's only gravel supplier, which gives it extremely important competitive advantages to stand out in supplying large local urbanization and infrastructure works.

In order to meet such high demand, Tamoio Mineração S.A. chose equipment by Kleemann, which belongs to the Wirtgen Group, alongside the Wirtgen, Vögele, Hamm and Ciber brands. "With our need to evolve, to innovate, we invested in Kleemann products," said Orlando Ribeiro, vice-president of Tamoio Mineração S.A.

Currently, their two new crushing lines produce 900 tons of product per hour, and they can even reach 1,000 tons/hour.

Their fleet of mobile machinery consists of the following models: MCO 13 (cone crusher), MCO 13S (cone crusher with triple-decker screen unit) and the MS 23D (mobile triple-deck screening unit on crawler tracks). For the first step of crushing, the plant relies on the following models: MC 140 Z (jaw crusher on crawler tracks with integrated pre-screening system and hydraulic crusher coupled to the feeding inlet) and the MC 120 Z (jaw crusher on crawler tracks with integrated pre-screening system).

One of the main advantages in replacing stationary plants with mobile ones is that they reduce operating costs. The high cost of transporting rocks to the crushing



plant becomes a thing of the past with mobile crushing.

“Our production speed is exceptional, in addition to their added mobility, meaning we can make any changes that become necessary,” emphasized Orlando Ribeiro. In the opinion of Jorge Sales, regional sales consultant for Wirtgen Brasil, another highlight is the added value of the equipment: “With these mobile machines, at the end of a job you can use them on other projects, which gives them a higher added value.”

Tamoio Mineração S.A.’s choice of Kleemann machinery arose from its visits to other large miners around the world in North America, Asia and Europe and learning about their procedures. Orlando Ribeiro emphasized that the company’s strong partnership with Kleemann further increases the efficiency the machines have shown on location. “We have a very close relationship, with daily meetings to talk about the project. There’s also 24-hour assistance from technicians, and they have a mobile repair shop to fix any problems, as well as an enormous parts inventory,” stated Ribeiro.



^ Orlando Ribeiro, vice-president of
^ Tamoio Mineração S/A
^

Jorge Salles pointed out this aspect as being one of Kleemann’s strong points. “The way Kleemann develops projects, they aim to adapt the machine to the client, not the other way around. So much so that their slogan is ‘Close to our customers’ due to this concern of theirs with meeting needs,” he said.



SAVINGS

Another advantage lies in lowering operating costs. Their Dual-Power system makes it possible to operate Kleemann machinery on either diesel fuel or electricity, external sources of energy that make them more versatile.

Also regarding costs, one common worry among companies purchasing crushers is premature wear to parts. Answering this concern perfectly, Kleemann’s mobile units are designed to avoid such deterioration. This starts with the choice of type and volumes of steel used to build the machinery. That makes the equipment far more robust, which leads to increased stability and reduced impact to internal components, as well as reducing the risk of damaging the chassis.

Another outstanding feature is their scalp pre-screening, which reduces the need for replacement parts and thereby lowers operating costs, not to mention the optimization of the machinery’s continuous flow of materials and ability to produce extremely high quality material. Add to these advantages the presence of a vibrating discharge chute after the crusher, which reduces operating costs and wear on the discharge conveyor, further improving the continuous flow of material.

Another item on the already long list of innovative features for the mobile crushing system is how fast it can be set up. Once acquired, the machinery can begin operating immediately upon assembly, unlike stationary plants, which take around 90 days to get up and running. This fact further reinforces its advantages, since in the case of Tamoio Mineração S.A., time is gravel, or in other words, money.



CIBER PLANTS INCREASE MARKET SHARE ON AFRICAN CONTINENT AND NOW WORK ON SITES IN TUNISIA



PLANT PLEASES HIRING CONTRACTOR WITH ITS PERFORMANCE AS WELL AS ASSISTANCE PROVIDED BY CIBER

After a period of revolution, Tunisia has been working to resume progress in the country. One of the most important sectors for this “new democracy” is infrastructure. It is helping to rebuild the country through highway and road improvements, vital to the development of an economy that has grown 3.6%, according to the World Bank.

In this situation, which presents a market and population with a new and high level of demand, Ciber has been increasing its market share in Tunisia with equipment in-

already bought a Vögele Super 1300 paver and Hamm compactors from us. Societè El Amen was very satisfied with the Wirtgen Group machines. When they visited another facility that had a Ciber plant in operation, they were convinced it was the better deal,” he revealed.

According to Charni, a variety of attributes of the UACF 15P-1 have been praised by the client: “A few of the points that attracted Societè El Amen’s attention were its ease of use, the high quality of material it produces and the machinery’s strength. They’re very satisfied, above



involved in jobs of great importance to the country, such as work on downtown Gabès, one of the African continent’s largest industrial hubs. Since the end of 2012, the UACF 15P-1 plant has been in operation, supplying asphalt to many roads in the region.

The equipment was purchased by Societè El Amen contractor in a deal intermediated by Sotradies, which also represents other Wirtgen Group brands. Maher Charni, a salesperson for Sotradies, explained why they decided to work with the UACF 15P-1 instead of other options on the market. “When we started the negotiation, we considered a series of competitors, but the client had

all, with the good service and fast assistance supplied by Sotradies, with support from Ciber Equipamentos Rodoviários,” he commented.

About the Ciber UACF 15P-1

The UACF 15P-1 belongs to Ciber’s line of UACF Advanced Counterflow plants, which combine continuous production technology with a mixture quality comparable to that produced by gravimetric plants. The AC (Asphalt Cement) is not exposed to high temperatures, in that way ensuring a longer life expectancy for the asphalt mix and subsequently higher quality, important for high temperature locations like Tunisia.



CIBER AT BAUMA AFRICA



CIBER PRESENT AT THE FIRST EDITION OF BAUMA AFRICA AIMING TO FURTHER EXPAND ITS INCREASING PRESENCE ON THE CONTINENT



The first edition of Bauma Africa, in South Africa, was a very positive experience for Ciber Equipamentos Rodoviários. The company was the only asphalt plant manufacturer in attendance that presented a piece of equipment, which attracted people interested in doing business.

The company’s idea is to expand its presence across the African continent, where Ciber already has dozens of machines in operation.

Displayed at the Wirtgen Group stand, the Ciber UACF 17P2 plant, with its 120 ton/h production capacity, features WMA technology (Warm Mix Asphalt), which

is becoming more and more popular in South Africa, a country that is a reference point in road building, and it ensures longer lasting pavement. In addition, the company will also be increasing its range of optional features, such as 50% RAP and 100-ton asphalt storage bins.

According to Anderson Bastos, responsible for Ciber sales in Africa and in other new markets, the event is encouraging new business with the African market. “Potential clients got a look at our Ciber plant on display and were impressed and interested. We are expecting to see good sales results in the market.”





AIRPORTS UNDER CONSTRUCTION ACROSS BRAZIL

IMMINENCE OF WORLD EVENTS LEADS TO RENOVATION

INVESTMENTS FOR BRAZIL'S AIRPORT NETWORK



With the date for the large sporting events Brazil is set to host closing in fast, the country is investing in infrastructure and is preparing to meet the expectations of fans. The Confederations Cup was a first test and now everybody's looking forward to the 2014 World Cup and the 2016 Olympic Games. Many tourists are sure to be touching down on Brazilian soil in the coming year, boosting commerce and tourism.

For this reason, one fundamental point is the renovation of airports to increase their passenger terminal capacity, as well as improve runway conditions. One company specialized in this field is EPC Construções, headquarter-

ed in Brasília-DF. On its own or in collaboration with other groups, EPC is heading up jobs on many commercial airports across the nation.

ACROSS BRAZIL

Recently, the company finished laying the asphalt at Santa Genoveva Airport in the city of Goiânia, Goiás. This project, which was initially expected to take six months, was finished in just four. Alexandre Costa, director of EPC, chalks up this success to the staff's know-how and

equipment performance, including their Vögele S1800 paver. "The paver, working in conjunction with a Wirtgen W200 milling machine, was able to provide us with extremely high productivity. All that efficiency was the deciding factor in allowing us to step up work at the airport and reduce the time we needed to complete the job." In addition to these machines, four Hamm compactors, including GRW-18, HD-75 and HD-90 models worked in Goiânia.

Other jobs Costa pointed out are the enlargement of the plane yard at Luis Eduardo Magalhães Airport in the city of Salvador, Bahia, and the renovation of Juscelino Kubitschek Airport in Brasília, in a consortium with AMC. "We bought Hamm compactors because of their



Enlargement of runways at



Guarulhos (SP) and Galeão (RJ)

mean the airports will now be able to handle Airbus A380s.

performance and the good service we get from Ciber's technical staff, which is a great help," commented the director.

Another project he mentioned is Tom Jobim Airport (Galeão) in the city of Rio de Janeiro (RJ), which included yard repair and runway widening. With these new measures, the airport will now be prepared to handle large aircraft like the Airbus A380. They are expecting to conclude the work by the end of 2013. The adaptation for A380 aircraft was also carried out at Guarulhos Airport in São Paulo.

The list of the company's jobs also includes runway enlargement at Salgado Filho Airport in Porto Alegre, Rio Grande do Sul, in a collaboration with Paulo Octávio. Costa explained why EPC Construções chose the Vögele S1800 paver for its jobs: "At airports, you need to ensure asphalt grading with much greater strictness than on regular road work. We chose the Vögele for its ability to do paving work transversally and longitudinally." The equipment reduces runway irregularities and contributes to increasing the asphalt's life expectancy. "Wirtgen Group machinery has always given us good results," Costa concluded.

IN THE AIR AND ON THE GROUND

The renovation of the Brazilian airport network is just one part of the work being done there. Investments are also being made to improve highways and urban roads in the four corners of the country. Wirtgen Group equipment is providing assistance on many projects, with its customary technology and high performance.

In Porto Alegre, Wirtgen W100F milling machines worked on the BRT (Bus Rapid Transit) corridors, a system that should improve public transportation user mobility. In Rio de Janeiro, the "Smooth Asphalt" project conducted a task force to repair 800 km of roads. Among the equipment used were model HD10CVV, GRW18 and HD14VT Hamm compaction compactors, in addition to a Wirtgen W100F milling machine and a Vögele S1100-2 paver.

APPLICATION OF GRANULAR BASE LAYERS



THE CIBER AF 5000 PLUS PAVER, WHICH APPLIES NOT ONLY THE ASPHALT LAYER, BUT THE BASE LAYER TOO, IS WORKING ON A LARGE JOB ON BR-277, IN PARANÁ



Unlike the conventional method of applying base layers by motor grader spreading, the Ciber AF 5000 Plus paver allows for greater precision during application, as well as making it possible to exactly specify the desired thickness of a base's granular layers.

Another benefit lies in the application and leveling of this layer, since when applied by the AF 5000 Plus, there is no need to correct the transversal slope of the pavement during execution of the final asphalt layer. In addition to the exactness in application, it presents the advantage of material homogeneity, fulfilling its structural purpose and

preventing leaks or grain discontinuities that might end up compromising the layers above.

According to Ciber Equipamentos Rodoviários product specialist Juliano Gewehr, this method has yet to become widely adopted in Brazil. "Usually, simpler, not at all precise spreading methods are used. The AF 5000 Plus provides the benefit of applying the asphalt as well as the granular base layer. Its productivity is also superior to other base layer application methods, which ensures the excellence of its work," he explained.

This application method is increasing the flow and safety of highway and urban traffic during widening of highway BR-277, in Campo Largo, in the Curitiba Metropolitan Region. The work, headed up by the CCR Rodonorte concessionaire, is using graduated gravel treated with cement as a base material, employed between the earth and the asphalt to absorb forces and hold up the pavement.

Ciber's paver, in addition to being versatile, is on crawler tracks, which gives it better traction with a wide area

of contact with the soil. It has a compacting screed with vibrating and tamping plates and variable rotation adjustment, which ensures several levels of pre-compaction, finishing and homogeneity for the asphalt surface, in addition to preventing wasted material and reducing job time. "When pre-compacted, a base needs fewer compactor passes and that reduces cost and time," emphasized Juliano.

Its paving capacity can reach 450 tons per hour and it combines high technology and operating practicality, in addition to the ability to operate with different kinds of medium and large-sized trucks.

EASY TRAFFIC

This work will give the highway, which has already been widened northbound, two-lanes southbound as well, in this way reducing interference to in-city traffic. The project will also eliminate the need to install other forms of intervention like radar, speed bumps and traffic lights, in this way reducing traffic at intersections and the number of accidents.

But in addition to improving mobility and safety, widening the highway is expected to work in favor of the environment. By renovating the region's highway network, carbon monoxide emissions by vehicles are expected to drop 657 tons a year.

With what is being called the "Campo Largo Contour," the goal is to eliminate these problems. There will be 11 kilometers of four-lane asphalt covered highway, a completely new highway that will modify BR-277's route. After finishing the project, all of the long distance traffic between the rural area of Paraná and its capital will be directed away from the city, separating its traffic from highway traffic. At that point, the old highway will only serve for uneven transfers, making passages through Campo Largo faster and safer. For its part, the current southbound lane will be transformed into an avenue to integrate the highway with the city.

The project began in April of 2012 and should be completed by the end of the year. The work is being done between kilometer markers 114 and 123 of highway BR-277. The budget for the project is estimated at BRL 70 million and included construction of a highway overpass, a bridge, two ditches and new on-ramps for two other overpasses, including two roundabouts. Nearly 1,600 workers are involved, both directly and indirectly employed, according to data from the concessionaire.



KNOWING THE DIFFERENT SOIL TYPES WELL AND THE RIGHT EQUIPMENT ENSURES RESULTS

Both inadequate or excessive numbers of passes - a phenomenon known as super-compaction or over-compaction - will cause problems. Cracks, splits and fissures are the most common of these.

Since there are so many technical details, one should not belittle the technology employed by compaction rollers. Hamm line equipment is designed precisely to optimize compaction work. The machines have a vibration frequency and amplitude system that can be adjusted to the type of soil. They also have traction control for work on steep grades and devices that orient operators regarding the compaction parameters. The speedometer helps maintain an ideal speed of 4 km/h. The sensor for smooth compactors, for its part, detects and informs the operator about gaps in the soil.

Market response is the best proof of their quality, as contractors all over Brazil choose Hamm compaction rollers. The machinery's advanced technology and high performance have been proven on construction sites nationwide.

In the state of Rio Grande do Norte, the Caicó consortium is working on the BR-427 ring road that also crosses highways 288 and 118. The stretch is 18 kilometers long. "Since Ciber began operating in Brazil and especially since they began to introduce Wirtgen Group technology here, we've chosen to work with their machinery. Our partnership has grown and grown. We used to have two compactors and just bought two more. We'll probably buy more," stated Luiz Carlos, the consortium's buying manager.

Also in the Northeast, the city of Caucaia in the Fortaleza Metropolitan Region (CE), is improving state highway CE-422. Vinicius Ruiz, buying manager for JBM Construções, guarantees they are satisfied with their return on investment. "The Hamm compactors provide excellent performance on site leveling and earth compaction processes. Their price is another advantage, and that's exactly what we're looking for in the buying sector: pleasing in terms of price and quality," he commented.

FOR ALL KINDS OF JOBS

RC Damedá, a Manaus-based company, is using Hamm compactors for site leveling work at the Villa Suíça apartment complex. The project for the residential complex, scheduled for completion in December of 2013, is "fundamental to the region's real estate development, as it is large and high standard," ensured business owner Roberto Damedá. He pointed out his satisfaction with the machinery and good service the dealers have received.

In Paraíba, Hamm compactors are a strong presence in work being done on the Cariri Ring Road, which consists of 72 kilometers of highway interconnecting the cities of São Sebastião do Umbuzeiro, São João do Tigre, Camalaú, Congo, Caraúbas, São Domingos do Cariri and Cabaceiras. Seven compactors are doing site leveling, sub-surfaces and sub-bases. "The latter two stages are fundamental, since they ensure effective paving of the soil.

This is why having efficient equipment is so important," explained Daniel Andrade, buying manager for PSO Engenharia. Andrade added that the cost-benefit ratio for the machinery is one of its main advantages, so much so that the group is using Ciber equipment on work in several states across Brazil, such as Minas Gerais, Goiás and Santa Catarina.

Heleno Woloszyn, from Coesul's commercial department, is another person who expressed satisfaction with Hamm machinery. "The equipment has met our performance expectations. The reasons we chose it are the excellent technology and the fact they're assembled right here in Brazil," he listed. The company is using four 3411 Hamm compactors on their project to enlarge the Celulose Riograndense factory. For infrastructure work, their daily production is 4,900 m³. No matter the soil type or weather conditions: Hamm compaction rollers are the best solution for any project.

The earth compaction stage is just as important as the other stages of building a new highway, but it does not often get the attention it deserves, and that's a problem. Flaws in the sub-surface of a highway can endanger the layers above, leading to damage. To avoid this, you need to use the right equipment.

Compaction consists of filling in the open spaces in a layer by compacting the earth. If that is not done, everything built above may end up sinking and becoming deformed. This also means compactor operators must have the right training. They are not there to just drive the machine back and forth. More than that, proper planning needs to be done.



CARRYING OUT IDEAL COMPACTION



EARTH COMPACTION IS MUCH MORE THAN JUST RUNNING A COMPACTOR INNUMEROUS TIMES OVER THE SAME PLACE. YOU NEED TO STUDY THE TERRAIN AND KNOW EXACTLY WHAT EQUIPMENT IS MOST APPROPRIATE

Anyone who works on road building and earth compaction will tell you: a poorly compacted road or terrain will result in damage on the medium-term. The only way to prevent this kind of damage is to correctly prepare the underlying layers, which is only possible when you use the right equipment for each specific service.

Among the currently available compaction roller models, you will find smooth vibrating, padfoot, combination and tire rollers, which when chosen correctly can ensure success during these stages, so fundamental to the work.

In addition to efficient machinery that ensures compaction perfection, identifying different kinds of soil is also fundamental. There is a specific drum right for each composition that will ensure execution perfection. It is through observing the characteristics of each type of soil that you can decide which equipment is right for the job. This is a subject Ciber Equipamentos Rodoviários product specialist Juliano Gewehr knows well. According to him, soil is separated in two main groups: cohesive, such

as clay and silty clay; and granular (non-adherent), such as sand, gravel and grit. "This is checked by taking a sample. If over 35% of the material passes through a 200 screen (0.074 mm openings) the soil is considered to be predominantly cohesive. If it's less than 35%, it's considered granular," Juliano explained.

However, guaranteeing excellence doesn't end with just studying the region's soil. Location climate characteristics should also be considered, since excess moisture or a lack thereof directly interfere in soil compaction, meaning there is a minimum amount of water necessary to achieve ideal compaction moisture level. The method and speed of compaction applied are also extremely important.

SOIL TYPES

Cohesive - With this type of soil, composed of extremely fine particles with strong cohesive power, you

need to use a padfoot drum, since the studs penetrate the surface layer, airing and drying clay and silt, in addition to breaking up the cohesion of the particles.

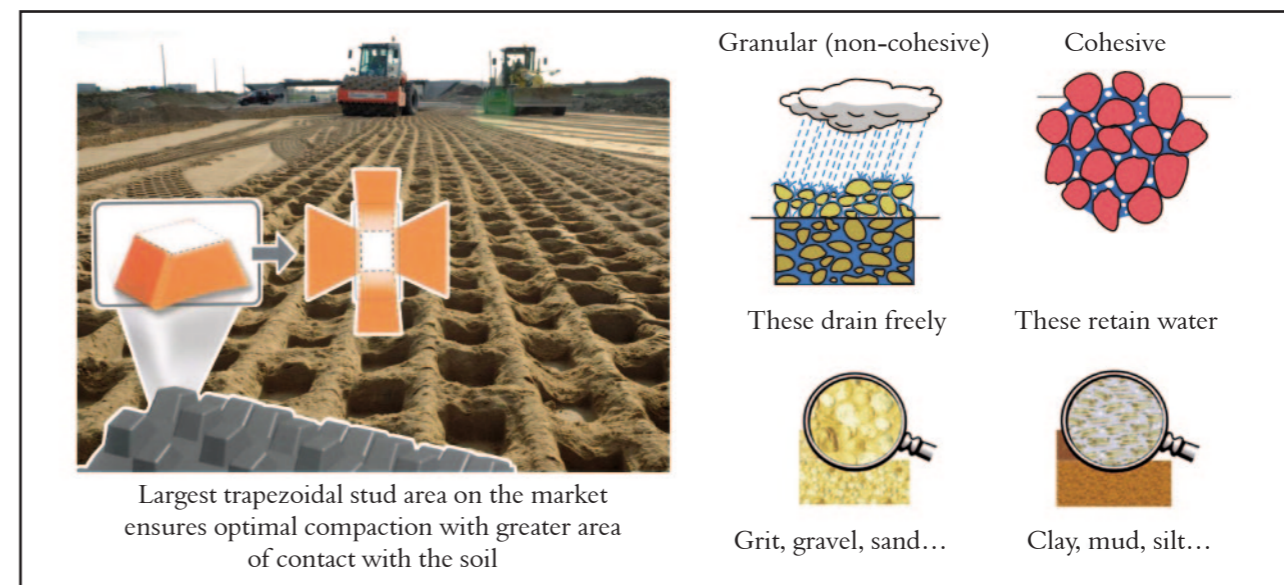
Among the Hamm compactor models featuring padfoot are the 3000 series. "The advantage of using Hamm compactors is that they have the largest stud area on the market, which increases potential contact area with the soil, in this way making compaction more agile," he added.

Granular - For their part, terrain consisting of large particles like rocks, gravel, grit and sand are known as granular soils. They are made up of loose particles, with relatively large spaces between them that don't adhere to each other when dry and are highly permeable. For these sites, the best choices are Hamm smooth cylinder 3411 Series compactors weighing eleven tons.

building and bridge proximity.

According to Juliano, for general compaction of asphalt, it is recommended to first use a double vibrating compactor and then a tire compactor. Several types of special asphalt mixtures, such as discontinuous ones, need to be compacted differently, without using a conventional vibrating system. In short, compaction can be applied in three ways: static, dynamic by vibration and dynamic by oscillation.

Static - Here compaction is achieved by the sheer weight of the compactor moving over the asphalt layer, leading the particles to rub against each other and regroup more densely. "This type of compaction is less effective than the others, although the use of a tire compactor aims to give a good finish to the asphalt layer," explained the



CHOICE OF MODEL FOR THE APPLICATION

In addition to all these specific types of soils and drums, there is also an infinite number of equipment types that can be used for asphalt compaction. One example are the combination compactors, which include a set of smooth tires on the rear and a cylinder on the front. These are recommended for small jobs or street repairs instead of tandem compactors, which have two cylinders and are used on large construction just getting underway.

For their part, tire compactors are often used for surface finishing of asphalt layers and in areas where the terrain cannot receive shock waves from vibrating systems due to

product specialist.

Dynamic by vibration - In this mode, there is more effective compaction of the layer, since there are two eccentric weights that spin at high speed along an axis at the center of the cylinder, which generates repeated charges against the layer, with the particles receiving the impact and moving and regrouping in a denser form. The most commonly used are tandem and double metal cylinder compactors, like the ones in Hamm's HD and HD+ line.

The compactors are also vibrating and can also come in a combination version, where instead of two cylinders, tires are used instead of the rear cylinder, providing excellent performance by more effectively compacting with the front vibrating cylinder and excellent surface finish by passing over the compacted layer with rear rubber tires. These are recommended for repair work over layers that are not as thick.

MORE EFFICIENCY AND SAVINGS WITH A 20-TON COMPACTOR

TEST CARRIED OUT WITH THREE MACHINES BY TWO DIFFERENT BRANDS
PROVED THE HAMM ADVANTAGE IN TERMS OF QUALITY AND COST-BENEFIT

Compaction drum of the Hamm 3520 P
compactor, in Cajamar (SP) >>>

All professionals who work on soil compaction know the steps taken during the process are essential to avoid putting the rest of the stages of a job at risk. Problems like cracking, sinking, chinks and fissures, among other types of deformation, may arise if the site has not been prepared well. In order to prevent this from happening, it is essential to start off by analyzing the soil well to check which group it belongs to (cohesive or granular).

With the purpose of studying the excellence of equipment available on the market for this type of work, Teram, Engenharia e Infraestrutura, Grupo Pillar and Consórcio Encalso - S.A. Paulista - with support from Ciber Equipamentos Rodoviários - tested four different brands of compactor available on the market for this purpose, three different models from two brands and a fourth, the Hamm 3520 P.

This comparative study was carried out on two jobs, one being Dr. Antônio João Abdalla Avenue in the city of Cajamar, and another on Tamoios Highway in Paraibuna, both in the state of São Paulo, in July.

According to Juliano Gewehr, a product specialist for Wirtgen Group, the idea to carry out the test was to show just how much 20-ton compactors increase productivity for the compaction stage. "When dealing with a recycling project, we really need this heavy piece of equipment, since the recycler has such high productivity that an 11-ton compactor won't be able to keep up. Not only that, but using one 20-ton compactor saves approximately 40% on fuel in comparison with two 11-ton compactors," Juliano explained.



CAJAMAR

In the test carried out in the city, the objective was to compare the vibrating compaction rollers of a Hamm

3520 P cylinder with two other models from other brands (highlighted below as "A" and "B"). To this end, the equipment was placed side by side on a test stretch 80 meters long by 12 meters wide, composed of cohesive soil (39% silt, 26% sand and 35% clay) 30 to 40 cm thick and containing 13.2% moisture.

Details on the compactors tested (*see table 1, page 23*).

Equipment performance was judged by criteria involving compaction, fuel consumption and surface closure in the compaction process. Compaction control was conducted by the Hilf method and the tests were done by

RESULTS I

- 30 cm thick: this study demonstrates that under normal working conditions the Hamm compaction roller achieved greater compaction than its competitors. On the 30 cm thick stretch, the Hamm compactor performed better than the other models in fewer passes (*see table 2, page 23*).

- 40 cm thick: on this stretch, models A and B were not tested, since they do not work in these conditions, not

laboratory technicians from Alpha Eng. Consultoria Ltda. The results were photographed, checking the appearance of the pass and surface finish from the studs on the road base for each piece of equipment.

The compaction tests provided interesting data:

meeting the demand. Compaction tests were conducted to check the number of passes by the 3520 P compactor (*see table 3, page 23*).

- Consumption (data obtained during operation): o Model A consumed 11.8%, and Model B 9.1% more than

the Hamm 3520 P (see table 4 on the page to the right).

Closure: It can be seen that in comparison with Model A and B, the Hamm 3520 P has 15% and 7% more studs, respectively. This gives it greater contact with the soil, potentializing compaction.

PARAIBUNA

On Tamoios Highway (which connects São José dos Campos to Caraguatatuba, on São Paulo state’s coastline), two machines were tested: the Hamm 3520 P compactor and another model (below shown as “C”) (see table 5 on the right). With the same objective - to compare vibrating compaction rollers - the equipment were run parallel to each other on the outer right edge and axis of the lane.

The evaluation criteria used were compaction performance and fuel consumption.

The stretch, 180 meters long by 12 wide, with 16.1% moisture, was composed of a gravel sub-surface with the addition of water to 30 cm deep and the addition of binding agents (cement).

For this study, two samples were removed from the stretch where the equipment was being analyzed. The Hamm compactor executed 10 laps (20 passes) and the Model A, 12 laps (24 passes). The field tests were done by checking the density of the samples collected using the flask in sand method. The compaction essays were done by lab technicians from Consórcio Encaso - S.A. Paulista.

At the end of the work, photographs were taken of the appearance of the passes and surface finish from the studs on the road base for each piece of equipment.

RESULTS II

Compaction: the study demonstrates that the Hamm 3520 P compactor performed better than the competing model, achieving 20% better compaction performance, in addition to needing to take 4 fewer passes in comparison with Model C on the same stretch (see table 6 on the right).

Consumption (data obtained during operation): model A consumed 21% more diesel in comparison with the Hamm 3520 P (see table 7 on the right).

Table 01

	Hamm 3520 P	Model A	Model B
Maximum weight:	21,730 kg	11,600 kg	10,120 kg
Hobbs Meter:	40.1 h	2147 h	1237 h
Engine:	Deutz 207.7 hp	Cummins 110 hp	Cummins 116 hp
Frequency:	27 Hz / 30 Hz	33 Hz	32 Hz / 35 Hz
Amplitude:	1.93 mm / 1.15 mm	1.6 mm / 0.8 mm	1.8 mm / 1.15 mm
Centrifugal force:	331 kN / 243 kN	300 kN / 146 kN	277 kN / 206 kN
Number of studs:	150	130	140
Stude area:	152 cm²	146 cm²	120 cm²

Table 02

	Hamm 3520 P	Model A	Model B
Laps:	3	4	4
Number of passes:	6	8	8
Degree of compaction:	99.4%	96.2%	95.5%

Table 03

	Hamm 3520 P	Hamm 3520 P	Hamm 3520 P
Laps:	2	3	3
Number of passes:	4	6	6
Degree of compaction:	92.1%	97.1%	97.3%

Table 04

Equipment	HobbsMeter (start)	Hobbs Meter (start)	Hours worked	Fuel supply (liters)	Average Consumption (l/h)
Hamm	47	50	3	50	16.66
Model A	2147	2155	8	149	18.62
Model B	1237	1248	11	200	18.18

Table 05

	Hamm 3520 P	Model C
Maximum weight:	21,730 kg	18,500 kg
Hobbs meter:	40.1 h	126.3 h
Engine:	Deutz 207.7 hp	Cummins 175 hp
Frequency:	27 Hz / 30 Hz	29 Hz / 33 Hz
Amplitude:	1.93 mm / 1.15 mm	1.7 mm / 1.0 mm
Centrifugal force:	331 kN / 243 kN	300 kN / 238 kN
Number of studs:	150	130
Stud area:	152 cm²	146 cm²

Table 06

	Hamm 3520 P	Model C
Number of passes:	20	24
Moisture (%):	15.5%	15.6%
Degree of compaction (%):	100.6%	100.2%%

Table 07

Equipment	Hobbs Meter (start)	Hobbs Meter (start)	Hours worked	Fuel supply (liters)	Average Consumption (l/h)
Hamm	40.1	46.3	6.2	110	17.74
Model C	126.3	130.6	4.3	92	21.39

<<< Machines on site at Tamoios Highway, in Paraibuna (SP)



CIBER RENEWS QUALITY CERTIFICATION



Ciber renewed its ISO 9001 certification last June. The audit took place on the 13th and 14th of that month. First achieved in 2011, ISO 9001 certifies the company rigorously follows established quality criteria,

meeting international standards. "It's formal recognition that our organization is set up to capture client requirements, design and validate products, plan and execute, assemble, deliver and provide after-sales support, all in

a standardized way," stated Rafael Sobral Vieira, quality management system analyst at Ciber. ISO 9001 certification maintenance occurs annually.



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CIBER PLANTS PREFERRED BY URUGUAYANS



LATIN AMERICAN COUNTRY STANDS OUT AS A BIG BUYER OF THE COMPANY'S ASPHALT PLANTS: OVER A DOZEN HAVE BEEN ACQUIRED IN RECENT YEARS

In recent years, Uruguay has been an attractive place to do business: its GDP grew 3.9% last year, making it a veritable hub for external investments. In addition, inflation has fallen there and is now under control (0.84% in July, according to Uruguay Central Bank), and the country's employment of capital towards building infrastructure demonstrate the government's recent efforts to further expand, thereby awakening the interest of companies and new commercial relations. According to official data published by Uruguayan authorities, the country has 50,000 kilometers of highways and has been investing roughly USD 200 million a year to improve its highway network.

Aware that a market this close to Brazil should not be wasted, Ciber Equipamentos Rodoviários has strengthened its relationship with the country. Over the last three years, over a dozen asphalt plants have been sold to Uruguayans, which has definitively placed them on the list of the company's strongest commercial partners.

Among the machines working with Uruguayan clients, we should mention: UACF 1200 INOVA P-1, UACF 17 P-1 and UACF 15 P-1. These asphalt plants have been used on a variety of jobs across the country, such as the Province of Maldonado and the cities of Montes Del Plata and Canelones, located 134, 190 and 45 kilometers from Montevideo, respectively. "We're respected by the Uruguayan market. The country's largest contractors have expressed full satisfaction with the quality and productivity of our plants," said Cristiano Lameira, responsible for Ciber sales in Uruguay.

In order to form an opinion and clearly understand the importance of the cities where these Ciber plants are

operating, for example, it is enough to learn that the Maldonado region includes the cities of San Carlos and Punta del Este, which have the country's highest rates of economic and tourism growth. Another hub is Canelones,

considered an extension of the Capital city of Montevideo and located on the banks of Rio de la Plata, Uruguay's most important waterway and one of Latin America's most important as well.

In order for their works to achieve the desired levels of quality, acquiring machines that are able to operate with quality and efficiency is crucial. Installed in the department (word used by Uruguay and other countries with Spanish heritage for "state") of Flores, one Ciber plant has been used to maintain "Route 3," one of the country's widest and most important highways, responsible for much tourist traffic and connecting the populations of San José de Mayo, Trinidad, Young, Paysandú, Salto and Bella Unión.

The Ciber equipment there is ideal for works of this size, since it is able to adapt to the different climate conditions in each department. Another characteristic of this plant that is important to point out is its ability to increase the life expectancy of the asphalt mixture and as a result improve the quality of asphalt being used. A third quality

that attracted the attention of Uruguayan business owners regarding this machinery is its production capacity: 40-80 tons per hour.

Serviam is one of the end customers of the asphalt plants sold by Ciber in the country. The equipment is working on maintenance for an important Uruguayan road: Ruta Interbalnearia, a highway that connects Montevideo and Punta del Este. "It's a splendid machine, very useful. It's also easy to operate and quick to set up. We've been impressed with the number of functions it's able to carry out," said Luis Pedro Mackinnon, general director for Serviam.

In the director's opinion, the past 24 months using the machine have been more than enough to do away with any doubts they might have had about its capacity. For him, the Ciber equipment has attributes they could not do without to carry out their processes fully, which made it an excellent choice. "You're constantly being guided as the machine is operating. If you make a mistake, the machine corrects it quickly, showing what's wrong."



ENVIRONMENT

With a particularly wide variety of fauna and flora that attract travelers of all kinds, coming from the four corners of the planet, Uruguay boasts over 2,000 unique plant species, in addition to broad plains, sierra vegetation, mountains and countless other types of landscape.

Such a variety of nature in Uruguay has led to good returns for the country in tourism, making this another factor to add to Uruguay's positive economic balance.

Whether for reasons of the country's financial administration or an innate desire to keep their beautiful landscapes intact, it is a fact that Uruguay has shown concern for its environment since the turn of this century. This is no accident, since in February of 2001, the country signed the Kyoto Protocol, and since then has taken increasing care to follow environmental norms. From the time they signed, the country began to avoid harming nature as much as possible during construction work and infrastructure building.

But as you can imagine, reconciling fast economic growth and a commitment to not harm the environment is no easy task. However, even in this matter the Uruguayan government has demonstrated competence: one of the requirements made by Uruguayan business owners to buy the more than ten asphalt plants was specifically that the machines do as little harm to nature as possible.

Ciber fully met client expectations on this point as well. The company's asphalt plants are known worldwide for their use of technology concerned with taking measures to avoid harming nature during the asphalt production process. To this end, the plants use a special filtering method called "bag filters," and these parts are able to increase the filtering area using the same number of filtration elements, which considerably reduces pollution released into the atmosphere.

Ciber asphalt plants have
been used on many jobs in
Uruguay



GROWING RELATIONS

Since both countries belong to Mercosul (Southern Common Market, a free trade zone including five South American countries) and are experiencing a period of prosperity, the trend is for the relationship between Brazil and Uruguay to become stronger and grow.

Ciber's expectation is for the prestige it has earned among clients in Uruguay in recent years to grow and make the future even more promising. That is because the country wants to take advantage of the economic upturn and invest heavily in improving highway and road infrastructure.

"We have seen growth in the relationship between Ciber and Uruguayan entrepreneurs, which will tend to become stronger in the coming years. These relationships will certainly stay strong and will likely get stronger," Cristiano Lameira reiterated.

For Cristiano, responsible for Ciber sales in Uruguay, all signs point to the company's continuing to work to strengthen its commercial ties with clients, authorities and engineers there. According to him, the country is an excellent market and recent years have proven that both sides can benefit from the relationship: Ciber is studying Uruguay's needs and is seeking to design machinery that meets those requirements. For its part, the Latin American country has sought out Ciber when it needs machines to meet specific demands.

By bringing innovative features like more agile external mixers or increased asphalt mix production to the Uruguayan market, Ciber Equipamentos Rodoviários has succeeded in finding its way into important areas of the country. The elements responsible for strengthening this commercial union are many, but the fact is that since 2010, the company has managed to demonstrate the characteristics that set its asphalt plants apart: versatile when necessary and what's more, easy to move, all attributes the Uruguayan economy is asking for in every contract it signs with a foreign country - and Ciber has successfully responded to these expectations with precision.



EXCELLENCE IN REPLACEMENT PARTS

GOOD ASSISTENCE PROVIDED BY CIBER PRAISED BY CLIENTS
AND SETTING THE COMPANY APART



Logistics at large companies involves three segments. The first is responsible for receiving feedstock, raw materials, equipment, parts etc. For its part, the second segment takes care of production, in which the feedstock is transformed into finished products or services. Finally, the third part takes care of physically transferring or distributing end products or services to customers. Each segment is fundamental and they all complement each other.

A specialist in technology, innovation, development and manufacturing of equipment for road and mining construction, maintenance and repair, Ciber Equipamentos Rodoviários knows how important product distribution is to the success of its business, and for this reason works hard to ensure perfect operation of its machinery. That means a sure supply of replacement parts, by moni-

toring client demand, in its own space for planning and managing processes.

The company's distribution center is located at its factory complex in Porto Alegre, in a 2,400 m² area. The warehouse contains a total 615,000 units of nearly 11,500 different replacement parts. They are manufactured separately from the machinery. Inventory is planned by analyzing the movement of high, medium and low turnover items through monitoring delivery. Every day the parts department meets 80% of the urgent orders and is responsible for keeping an eye on machinery sales and proposing replacement inventory.

Their excellent service is also associated with their logistics, which keeps up constant, effective routines. Support teams all assist in purchasing processes, improving the speed of replacing items sold.



In the services of site leveling, paving and recycling by Wirtgen Group machinery carried out on Ayrton Senna (SP-070) and Dom Pedro I (SP-065) state highways, the company's fast parts replacement and quality assistance have been fundamental to the work being done by the Anne Group, responsible for these projects. "The reliability, high technology and good assistance for the Ciber machines have been extremely important to this job and meeting our deadline. By replacing parts in due time they have helped us keep up the necessary rhythm, without having machinery down," stated commercial director Elio Cepollina Jr.

The preparation of the distributor's service network also relies on the training center at the factory complex in Porto Alegre. Its courses include modules involving operation and application, maintenance and diagnostics, with additional certification events. These activities seek to prove what the participants have learned about diagnosing and solving technical problems with each of the different products sold.

Expansion of service: Committed to serving clients better, Ciber is expanding our distribution network. Two new branches will expand the company's service capacity: one in Jaboatão dos Guararapes, Pernambuco, and another in Rio de Janeiro, both to serve clients of Wirtgen Brasil in the Northeast and Southeast, the exclusive dealer of Ciber Equipamentos Rodoviários in those regions.

The Northeast operation, which opened on August 29, will deal in the group's entire line (Wirtgen, Vögele, Hamm, Kleemann e Ciber) and is going to serve, besides clients in Pernambuco, those in the states of Ceará, Paraíba, Piauí and Rio Grande do Norte.

The new branch will be providing sales service for

machinery and parts, in addition to complete product support for all the brands. Regarding its infrastructure, it will have 2,200 m², with 1,000 m² of developed area, including workshops, storage and inventory spaces, in addition to training and meeting rooms.

For its part, Wirtgen Brasil's Southeastern operation is already up and running with commercial and technical teams in Rio de Janeiro and Espírito Santo, and will have a new branch by the first quarter of 2014. They will have a total area of 5,000 m², with a parts inventory area and a shop for machinery repair.



New Ciber Web Portal

Ciber is also in the testing stage for a new web portal. By way of this online channel, dealers will have direct access to all the information necessary to ask for price quotes and place orders. With this resource, dealers will be able to independently and directly answer client needs, reducing the number of cases that require factory participation in the response and in this way the company expects to reduce response time for demands.

HAMM SHOW TOURS BRAZIL, SHOWING OFF INNOVATIVE FEATURES TO THE COMPACTION MARKET



TRAVELING DEMONSTRATION ATTRACTS OVER 500 CLIENTS
ON BRAND NEW TOUR OF BRAZIL'S MAIN CITIES

From April to August of this year, 22 Brazilian cities saw the Hamm Show, an event organized and put on by Ciber, a brand belonging to the Wirtgen Group, along with Wirtgen, Hamm, Vögele and Kleemann. In all there were over 110 hours of programs and over 500 clients from many companies attended. And all this on a tour that demonstrated the most innovative features in the field of earth and asphalt compaction to audiences all across the nation.

The event travelled no fewer than 20,000 kilometers, passing through Brazilian cities like Porto Alegre, Chapecó, Itajaí, Campo Largo, Cuiabá, Goiânia, Maringá, Campinas, Brasília, Salvador, São Paulo, Recife, Campina Grande, Mossoró, Belo Horizonte, Uberlândia, Fortale-

za, Bauru, São Luis, Ribeirão Preto, São José do Rio Preto, Pouso Alegre and Rio de Janeiro.

Hamm Show was a live demonstration for owners, engineers and representatives from the construction sector, who were able to witness demonstrations of Hamm 3000 series compaction rollers during events that lasted around five hours. In the opinion of Roberto Ferreira, owner of TAC Transportes, the event was a success that should be repeated next year. "It gave us a broad comparative overview, and was an excellent opportunity to learn even more about the brand and its equipment."

In addition to the presentations, the Hamm Show also offered speeches to guests so they could learn more about the compaction world, discussing subjects like degrees of

soil and asphalt compaction, and compaction roller operation, among other information about new technology and resource optimization.

For those who have already chosen Hamm equipment, like the director of PG Mineração e Engenharia, Jorge Prado, the Hamm Show was an extremely important method for checking on and deepening knowledge of how the compactors operate. "It's rare in the heavy machinery sector to get an opportunity to see live demonstrations of the machinery in action. I could see how robust and strong the equipment really is."

For their part, more long-term clients of the company did not spare praise on the presentation. That's the case of Tobias Cardoso, machinery and equipment manager at Esse Engenharia, which has been using Ciber equipment for over 15 years now. "It's a cutting edge company that keeps up with the international market." Cardoso believes



that Wirtgen Group machines are the trend for the future, citing their recyclers as an example. "Government projects are beginning to focus more and more on recyclers. They're faster and can replace up to three conventional machines".

The event travelled
20,000 kilometers

> > >



NORTHEASTERN BRAZILIAN CLIENTS NOW HAVE NEW BRANCH OF WIRTGEN BRASIL

WIRTGEN BRASIL INAUGURATES NEW BRANCH IN JABOATÃO DOS GUARARAPES (PERNAMBUCO) AND BRINGS SERVICE EVEN CLOSER

According to data published by the Central Bank in June of this year, Northeastern Brazil was the country's fastest growing region: 2.1% during the four month period from December 2012 to February 2013.

The positive economic period experienced by the region has also reflected on Ciber Equipamentos Rodoviários' sales to the Northeastern market. The company doubled sales in the state of Bahia during the first months of 2013. For example, paver sales in that state increased more than five times in comparison with the first half of 2012.

Aware of the scenario of opportunities in the entire region, the company has just inaugurated the newest de-

aler branch - Wirtgen Brasil Nordeste. Attended by Wirtgen Group and Ciber presidents Jürgen Wirtgen and Luiz Marcelo Tegen, respectively, as well as representatives from the group's other brands like Vögele, Hamm and Kleemann, the new branch was inaugurated in the city of Jaboatão dos Guararapes, in Pernambuco, in August and aims to meet growing demand from the region's clients, in this way improving product support and service proximity and agility.

"With the new branch, we are aiming to further intensify our service coverage to the region and offer superior service to our clients. The Northeast is one of Brazil's fastest growing regions. This is why we believe we chose a



great location, since it offers excellent logistics conditions, such as highways, airports and ports," explained the president of Ciber Equipamentos Rodoviários, Luiz Marcelo Tegen.

Another important point to highlight regarding the inauguration is the expanded range the dealer will be serving: it will not be limited to Pernambuco, extending to four other Northeastern states, also reaching Ceará, Paraíba, Piauí and Rio Grande do Norte. The new branch has the Wirtgen Group's full line:

Wirtgen, Vögele, Hamm, Kleemann and Ciber equipment, and in addition to availability of the machinery, a full inventory of parts and specialized technicians ready to provide support for products by all the brands.

JABOATÃO DOS GUARARAPES

Over the last ten years, the city has shown increasing economic development, in addition to having all the infrastructure a big city needs. According to data published during the last census conducted by the Brazilian Institute of Geography and Statistics (IBGE), in 2012, Jaboatão has the third largest GDP among cities in the state of Pernambuco, at 8.79%, just behind Recife and Ipojuca.

<<< Wirtgen Brasil Nordeste:
Rodovia BR 101 Sul, km 85 - Bairro Prazeres -
Jaboatão dos Guararapes / PE

"The city is home to an important industrial and commercial sector and is strategically located between Suape Port, the state's main development hub, and Recife. It is also served by important highways like BR-101, BR-232 and PE-007, as well as having transportation infrastructure and excellent airports nearby," said Ciber president, Luiz Marcelo Tegen.

EXPECTATIONS FOR THE FUTURE

Wirtgen Brasil's new branch has an area of 2,220 m², with 1,000 m² of developed area, with training and meeting rooms, as well as workshops, storage and inventory. The high investment in the unit - to the order of BRL 6 million -, in addition to making it possible to provide closer service to Northeastern Brazilian clients, should also stimulate the local economy, especially regarding job creation.

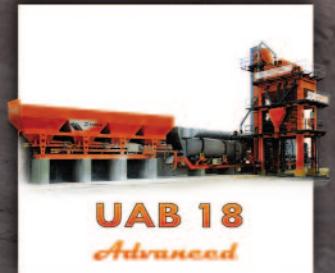
In the opinion of president Luiz Marcelo Tegen, this growth presented in the region and across Brazil befits their expectations to maintain its position in the domestic market, even as they expand to foreign markets, for example. "We hope that after finishing 2012 with 54% domestic growth (Brazil), we can keep up such a good rhythm. For 2013, we intend to increase our machinery sales in Brazil by 20%, as well as expand business throughout Latin America, Australia, Africa and Southeast Asia," Tegen finished.

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